



## **Floodplains by Design:**

A New Approach to Managing River Corridors in Puget Sound

August 2014



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## EXECUTIVE SUMMARY

### **Floodplains by Design: A New Approach to Managing River Corridors**

Floodplains by Design (FbD) is an ambitious public-private partnership focused on integrating and accelerating efforts to reduce flood risks and restore habitat across Puget Sound's major river corridors. By working together, we can coordinate state and federal investments with locally-driven solutions that solve multiple floodplain management problems and serve a broad range of affected interests. The partnership's goal is to improve the resiliency of these floodplains for the protection of human communities and the health of the ecosystem, while supporting values important in the region such as agriculture, clean water, a vibrant economy and recreation.

The last year has been a tremendous success for those working towards the FbD vision. Thanks to the leadership of legislators and a diverse coalition of supporters, the Washington State Legislature appropriated \$44 million to advance this multiple benefit approach – allowing the Department of Ecology to create a new, innovative grant program to fund integrated floodplain projects across the state. These projects will reduce flood risks to farms and communities through the restoration of natural floodplain functions and the upgrading of critical infrastructure.

A growing number of communities are engaged in collaborative processes to define the future of their river corridors and achieve benefits for all interests. Momentum is building across the region and a new paradigm for managing our critical river corridors is emerging.

The Nature Conservancy, Puget Sound Partnership, and Department of Ecology lead the FbD partnership with active support from the Environmental Protection Agency, National Oceanographic & Atmospheric Administration, US Army Corps of Engineers, Federal Emergency Management Agency, the US Geological Survey and many local partners.

Puget Sound's lowland river valleys are among the region's most valuable assets, delivering a wealth of economic, natural and social benefits. These floodplain areas contain the region's richest farmland, and host the Sound's signature salmon runs. They feature commercial, residential, and industrial development valued at over \$18 billion. They support wetlands and forests that filter pollutants out of our water sources. They recharge aquifers and provide recreational opportunities for the 4 million people who live in the Puget Sound region.

## **People, Farms and Fish at Risk**

Despite the many values they contain, Puget Sound floodplains are also home to the most damaging natural disasters in the state: floods. Over 1000 critical public facilities, including hospitals, schools, and fire stations are located within Puget Sound's floodplain areas.

Population growth and development continues to change the landscape, increasing the number of people in harm's way and compromising river functions. The agricultural industry is trying to maintain its viability in the face of increasing development, habitat restoration and regulatory pressure.

Meanwhile, salmon runs continue to decline, despite the recognition that the protection and restoration of floodplain ecosystems is a critical component of salmon recovery in Puget Sound. With the region's population growing rapidly and climate change forecasts calling for more frequent and severe winter flooding, the problems continue to grow.

The problem: floodplain management programs tend to be narrowly focused, some on reducing flood hazards to property and people and others on restoring salmon habitat or enhancing water quality. Planning for these multiple uses of the floodplains is critical, yet the systems for managing them remain disjointed, uncoordinated and inadequately resourced. Meanwhile, flood response and repair costs are increasing while federal funds for flood control facilities are decreasing, and investments in habitat or water quality improvements are overwhelmed by investments in activities that degrade river functions.

## **The Solution: Innovation through Collaboration**

To confront these challenges, floodplain managers and stakeholders are increasingly gravitating toward an integrated approach to floodplain management. FbD embraces a holistic and collaborative approach to decision-making that accounts for the full reach of the river – from headwaters to Puget Sound – as well as the full range of affected interests. By working together we can better confront shared challenges and reconcile competing priorities. By integrating flood risk, salmon recovery and other floodplain management goals we can make greater strides—more efficiently.

Integrated floodplain management requires a tailored approach in each river corridor to effectively address current conditions and interests. Integrating efforts across entire river corridors improves overall effectiveness and has the potential to attract more financial resources. A comprehensive framework is being developed for the highly developed Green River; the Skagit River Fish Farm and Flood Initiative is identifying ways to reduce flood risk while planning for salmon recovery and preserving farmland. Similar efforts are underway on the Cedar, Dungeness, Pysht, Skokomish, Snohomish, Snoqualmie, Stillaguamish and Tolt rivers.

What we do over the next 10 years will define the quality of life for Puget Sound's communities. It will influence the health of the region's agricultural industry, the cleanliness of its waters, and the vitality of its salmon runs. Smart floodplain management is the key to safeguarding commercial areas like the Kent Valley and Port of Tacoma, and population centers such as Stanwood, Orting, Snoqualmie, Auburn and Burlington.

## **Accelerating the Pace of Action**

The FbD partnership has worked with diverse stakeholders to identify barriers to success, practical solutions to those barriers, and an initial suite of projects. The initial phase of work has been marked by rapid progress and growing momentum.

Yet the combined estimated cost for reducing flood risk and restoring salmon habitat over the next 10 to 20 years is approximately \$3 billion -- far in excess of currently available funding. Our challenge now is to build on the groundbreaking examples of integrated floodplain management taking shape across Puget Sound to increase the pace and scale of our efforts.

If these examples are taken to scale, we can attract additional resources and break the trend of decreasing natural benefits and increasing flood damages associated with our floodplains. Through a collaborative regional effort, programs and projects can be created that respect local community goals, achieve local results and meet regional priorities for habitat restoration and floodplain management.

### **The Puyallup River Watershed: An Example of Integrated Floodplain Planning**

Pierce County estimates that a short-term investment of \$48 million in the Puyallup River would:

- Reconnect over 1100 acres of floodplain, including 500 acres of tidally influenced estuary habitat
- Represent a significant step in Puyallup basin recovery of listed species (Chinook salmon, steelhead, and Orca whales – through both estuary and floodplain efforts)
- Protect over 600 acres of prime farmland through the placement of conservation easements
- Provide estuarine and side channel habitat critical to improve populations of wild spring and fall Chinook salmon, and

Significantly reduce flood risk along the White, Carbon and Puyallup rivers.

This summer, as an initial investment in comprehensively addressing the floodplain needs of the Puyallup River, work crews began setting back and strengthening the levee alongside the City of Orting, protecting Orting from future flooding while reconnecting 42 acres of floodplain. Just downstream, Pierce County is restoring 100 acres of floodplain forest habitat and reconnecting side channel habitat. Carefully designed logjams will create habitat for Chinook salmon, bull trout and steelhead throughout the project area. These combined actions will provide future generations with less flooding, more fish, cleaner water and approximately 2 miles of riverfront open space.

## **Moving Forward: 4 Key Actions**

### ***1. Implement Integrated Floodplain Projects along the 17 Largest Rivers in Puget Sound***

The 17 largest rivers in Puget Sound and their associated floodplains have been adopted by FbD as priority areas for floodplain project work. These are also the places with the greatest risk for flood damages to critical facilities, commerce, residences and farmlands. The FbD partnership will assist current and new local efforts to develop integrated visions, goals and actions in each river corridor by:

- Convening local leaders to address common challenges and share effective tools;
- Effectively integrating state and federal agencies into locally led efforts and the overall effort across Puget Sound;
- Encouraging funders to support pre-construction activities that are required to create integrated visions, strategies and actions.

### ***2. Craft a Locally Based Regional Vision and Work Plan***

The FbD partnership will develop a 10-year regional vision and work plan based on the visions and strategies developed for each of the 17 major river floodplains. The work plan will include elements of geographic specificity, adaptive management and an assessment of relevant on-going programs. This regional vision will help inform the priorities and focus of state and federal agencies involved in floodplain management and recovery in Puget Sound.

### ***3. Match the Funding to the Need***

#### ***i. Sustain existing funds***

It is critical to sustain current funding levels for Federal, state and local funding programs that support integrated floodplain management<sup>1</sup>. It is especially important to make the Department of Ecology's FbD grant program permanent. Demand is far outstripping available funding: Ecology received \$38 million in requests for the available \$11 million available in 2014 and \$180 million in requests were received for the next biennium. *The FbD partnership recommends that this program be funded with at least \$50 million in the 2015-2017 biennial budget.*

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<sup>1</sup> Key state programs include the Puget Sound Acquisition and Restoration Program, Salmon Recovery Funding, the Estuary and Salmon Restoration Program, the Aquatic Lands Enhancement grants, and the Washington Wildlife and Recreation Program. Key federal programs include EPA's National Estuary Program funding for Puget Sound, Pacific Coast Salmon Recovery Fund, and the NOAA Community – based Restoration grant program.

## ***ii. Secure new funding***

The FbD partnership will pursue new financing, either through growing or repurposing existing funds or creating new revenue streams. One option that is gaining momentum is to address the state's broader water infrastructure project backlog (stormwater, water supply and floodplain restoration) through a multi-billion dollar bond measure. The FbD partnership also encourages local governments to expand dedicated local revenue sources to implement integrated floodplain management projects.

## ***iii. Align state and federal funding programs with regional vision***

The FbD partnership seeks to advance a coordinated investment strategy for Puget Sound which will better allocate funding for ecosystem restoration and flood risk reduction. Aligning state and federal funding behind shared priority projects will increase efficiency and accelerate implementation. Agencies are already implementing measures to better coordinate funding programs and ease administrative burdens on project sponsors. Building on these efforts, the FbD partnership has identified specific opportunities to expand coordination, streamline grant processes, and incorporate flexibility in funding program requirements.

## ***4. Build technical and permitting capacity***

The FbD partnership recommends the creation of a dedicated permit/technical assistance team for integrated floodplain projects. The permit team should involve staff at five agencies that permit or consult on floodplain projects (the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Washington Department of Ecology, and Washington Department of Fish and Wildlife). This team would improve coordination between and among permitting agencies, build a body of knowledge on permitting technically complex floodplain projects, act as a resource for local jurisdictions working on floodplain projects, and improve the speed and consistency of permitting decisions.

## **A vision for the future**

Thanks and appreciation goes to everyone working at the local and regional level to improve the resiliency of Puget Sound's floodplains for the safety and well-being of our communities and the health of the environment. Our shared success over the past year would not have been possible without the contributions of many. Building on our success will be critical to ramping up the efforts to reduce the risk of catastrophic flood damage to residences, farms and other businesses, to restore the ecological health of the major river floodplains in Puget Sound and to maintain the rich quality of life that we enjoy in this region.

FbD envisions a future 10 years from now where:

- People and businesses are better protected from catastrophic floods;
- Salmon are on the path towards sustainable runs;
- Farms, the infrastructure that supports them and the food they produce are less vulnerable to the losses incurred by flooding;
- Restored floodplain forests and wetlands improve the regional quality of life by producing cleaner and more reliable water, enhanced recreational opportunities, abundant fish and wildlife, and more resilient ecosystems;
- Floodplain stakeholders have strong working relationships and ongoing political support;
- Federal, state and local policies, programs, regulations and funding function more in concert towards common goals.

Achieving our future policy, funding and on-the-ground management goals will require continued engagement and leadership spanning local, state, federal, tribal and private sector interests. Success will mean a major step taken in securing our region's unique quality of life. It will make our families safer, protect public and private property, and allow Puget Sound communities to continue to enjoy and build their cultures and livelihoods around fishing, farming and outdoor recreation for generations to come.

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# 1 INTRODUCTION

This report reflects the first two years of work of the Floodplains by Design Partnership, a partnership of agencies and communities coordinating investment in the management of the land along Puget Sound's major rivers. The Floodplains by Design Partnership (FbD) goal is to improve the resiliency of Puget Sound major river floodplains for the protection of farms and human communities and the health of the ecosystem and salmon runs while supporting other values important to the region such as agriculture, a vibrant economy and recreation. Over the next ten years, FbD will nurture and expand on the great work already being done by many across Puget Sound, seek to address some of the common barriers to success and secure additional funding and technical assistance to advance a suite of major, transformational projects that deliver multiple benefits for people and nature.

The Nature Conservancy, Puget Sound Partnership, and Department of Ecology lead the Floodplains by Design Partnership with active support from the National Oceanographic & Atmospheric Administration, U.S. Army Corps of Engineers (USACE), Federal Emergency Management Agency (FEMA), U.S. Environmental Protection Agency, the U.S. Geological Survey (USGS) and many local public, private and tribal partners. Funding for the effort has been provided by the Washington State Department of Ecology, U.S. Environmental Protection Agency, Puget Sound Partnership, National Oceanic and Atmospheric Administration, Boeing Company, National Fish and Wildlife Foundation and The Russell Family Foundation. Over the past year, the Floodplains by Design team has worked with practitioners involved in ecosystem restoration and flood risk reduction as well as other interested parties to identify barriers to success, practical solutions to those barriers, and a suite of projects needed to protect our communities and recover salmon ecosystems while supporting other floodplain community values and economies.

The purpose of this document is to summarize our findings about the status of floodplain management in the major rivers of Puget Sound, describe the programmatic obstacles to integrated management, and lay out a series of recommended actions to guide a more effective and sustainable approach to floodplain management and ecosystem recovery across the Puget Sound region.

This report includes some preliminary data from a concurrent effort being undertaken by USGS, a geospatial assessment of ecological functions and flood-related risks on floodplains along major rivers in the Puget Sound Basin. The report, with full methodology and geospatial data files, will be available in September 2014. Preliminary data from the assessment is used in Section 4 (Puget Sound Floodplains).

The **Executive Summary** summarizes the key themes of the report, focusing on the Floodplains by Design visions, potential solutions, and next steps.

**Section 1 – Introduction** describes the Floodplains by Design Partnership, the purpose of this document, and the contents of the report.

**Section 2 – The Need for Integrated Floodplain Management and the Floodplains by Design Vision** describes the value of Puget Sound’s floodplains and the current state of floodplain management. The section discusses challenges currently facing floodplain managers and those involved in salmon recovery and lays out an integrated – or multiple-benefit – approach for floodplain management. The ten-year vision of the Floodplains by Design Partnership is described in this section.

**Section 3 – Floodplain Recovery: Needs, Costs, and Priority Areas for Action in the Short-Term** includes information on salmon recovery and flood risk reduction goals, estimated costs for each, and priority areas for action.

**Section 4 – Puget Sound Floodplains** defines the floodplain area and places Puget Sound’s floodplains in a statewide and Soundwide perspective. This section discusses current issues in flooding and flood risk reduction, salmon recovery, agriculture, and water quality. Local descriptions are provided for the major Puget Sound floodplains.

**Section 5 – Challenges to Address to Advance Integrated Floodplain Management** addresses the eight major challenges identified by project proponents working at the local and regional level.

**Section 6 – Accelerating Integrated Floodplain Management** describes the immediate next steps identified by the Floodplains by Design Partnership, including support of local integration at the river corridor scale, the creation of a dedicated permitting team for floodplain projects, and strategies for policy improvements for the PL 84-99 program, collaboration with WSDOT relating to their infrastructure in the floodplain, and use of Hazard Mitigation Grants from FEMA and the Emergency Management Division (EMD). Section 6.5 describes the Coordinated Investment Strategy, the Floodplains by Design Partnership’s proposed plan to increase the investment in integrated floodplain management. The section inventories current funding sources and describes the funding gap. The Coordinated Investment Strategy for Puget Sound floodplains is described, including plans to sustain existing funds, secure additional funds, and better coordinate funding programs.

**Section 7 – Floodplains by Design: Moving Forward** describes the key next steps for the Floodplains by Design Partnership.

**Appendices** include notes and source for local floodplain information, including cost estimates (Appendix A) and descriptions for current best practices for coordinating grants and facilitating major capital projects (Appendix B).

## 2 THE NEED FOR INTEGRATED FLOODPLAIN MANAGEMENT AND THE FLOODPLAINS BY DESIGN VISION

Puget Sound's lowland river valleys are among the region's most valuable assets. These floodplain areas<sup>2</sup> host the Sound's signature salmon runs; contain commercial, residential, and industrial development worth billions of dollars; absorb flood waters; filter nutrients and contaminants from our waterways; contain the region's richest farmlands; recharge aquifers; and provide recreational opportunities for the 4 million people who live in the Puget Sound region. They are also home to the most damaging natural disaster in the state – flooding. Changes in land use and weather patterns are putting additional pressures on all of these floodplain uses and values. The future of Puget Sound's salmon runs, key commercial areas like the Kent Valley and Port of Tacoma, the agricultural industry, and river valley cities like Stanwood, Orting, Snoqualmie, Auburn, and Burlington depend on the success of actions taken over the next ten years.

Floodplain management is changing rapidly in an attempt to balance various interests in the context of dynamic circumstances.

- Population growth and development are still changing the landscape, affecting the number of people in harm's way and the functioning of the hydrologic system.
- The safety and economic vitality of floodplain communities (people, homes, businesses and public infrastructure) is threatened by the predicted increase in flood frequency and magnitude, increased costs and diminishing Federal funds to support maintenance and repair of flood control facilities, and conflicting mandates at all levels of government.
- Salmon runs continue to teeter on the brink of extinction - threatened by continued degradation of habitat, lack of recovery funding, and potential conflict between agriculture, flood control, and other community values.
- The agricultural industry is trying to maintain its land base and adapt to changing globalization of food markets and changing land use regulations.
- Federal agencies and programs are responding to lessons learned from the Katrina and Sandy super storms, the increasingly overwhelming costs of natural disasters, and the lack of political support for government programs.

These are significant challenges for the people involved in salmon recovery and managing flood risks as well as people and businesses that reside in floodplains. The question on the table is how the region's decision makers and managers will respond.

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<sup>2</sup> Floodplains are defined in Section 4 (Puget Sound Floodplains).

Local floodplain managers and salmon recovery advocates, grappling with decreased funding and divergent community values and government mandates, are increasingly gravitating toward an integrated approach to floodplain management.

The Floodplains by Design Partnership supports this integrated approach and is working to improve the resiliency of Puget Sound floodplains for the protection of human communities and the health of the ecosystem. The Nature Conservancy, Puget Sound Partnership and Department of Ecology lead FbD with active and growing support from tribal, local, state, and Federal partners.

The region's floodplains can be better managed to reduce risk to people, farms, and communities, restore ecosystem functions, and support other values important to the region such as clean water, agriculture, a vibrant economy, and recreation. Local flood risk management and ecosystem restoration programs are beginning to provide examples for how the region can, through integrated management, better protect the public, support economic development and protect and restore the ecosystem on which our salmon runs and quality of life depends. There are trade-offs to be made and this integrated approach isn't the answer to every floodplain issue or challenge. However, many managers and stakeholders see significant opportunity to improve and maximize results delivered for a variety of interests by working collaboratively to achieve mutual goals at a larger, more effective and more efficient river-corridor scale than by working in isolation at a parcel- or project-scale.

Now is the time to build on the groundbreaking examples of integrated floodplain management taking shape across Puget Sound and scale them up to become the norm. Now is the time to bring additional resources to bear and address the barriers to achieving multiple community goals. Through a collaborative regional effort, strategies, programs, and projects that respect local community values, achieve on-the-ground results and meet regional priorities for restoration of the ecosystem can be created.

Over the next ten years, Floodplains by Design will nurture and expand the great work already being done to manage and restore Puget Sound's river corridors, seek to address some of the common barriers to success, and secure additional funding and technical assistance to advance integrated floodplain management. These actions will result in the implementation of a growing pipeline of transformational, multiple-benefit projects across the Puget Sound basin that dramatically accelerate the region's ecosystem restoration and flood risk reduction goals.

FbD envisions a future 10 years from now where:

- People and businesses will be better protected from the increasing incidence of catastrophic floods and the local economy will flourish.
- Salmon will be solidly on the path towards sustainable runs.

- Agricultural viability has been enhanced through the reduction of flood hazards and improvements to critical infrastructure.
- Restored floodplain forests and wetlands improve the regional quality of life by producing scenic amenities, cleaner and more reliable water, enhanced recreational opportunities, important fish and wildlife habitat, and more resilient ecosystems.
- New and improved working relationships will make efforts to solve tomorrow's problems more effective and efficient.
- Federal, state, and local policies, regulations, enforcement, and funding will be working in concert towards common goals.

Integrated floodplain management requires a tailored approach in each floodplain corridor to effectively address the current conditions and interests for future prosperity. By delivering multiple community benefits, integrated management can have the potential to garner more political support, attract more financial resources for project implementation, and lead to a better return on public investments. The FbD Partnership believes that jurisdictions and areas that are successful in implementing this work will be better positioned to manage their floodplains more effectively and achieve long-standing floodplain management goals.

This integrated approach at the local level means finding solutions that can be supported by multiple stakeholders and funded through multiple programs. By integrating flood hazard reduction with habitat protection and restoration, it is possible to address diverse mandates and help local, state, and Federal agencies achieve their floodplain management and ecosystem recovery goals. From an engineering perspective, multiple-benefit actions can be designed so that individual actions can complement each other. Socially and politically, having multiple benefits integrated into a set of actions builds greater support and reduces the risk of an affected group blocking success. Economically, it is often a more cost-effective approach to achieving the desired results because multiple goals can be achieved through single actions and mitigation costs can be reduced or avoided through greener approaches to flood risk management (e.g. increasing natural flood storage and conveyance).

For years, integrated floodplain management has been described as the floodplain management paradigm of the future. In Puget Sound, it is time to make it the reality of today.

## 3 FLOODPLAIN RECOVERY: NEEDS, COSTS, AND PRIORITY AREAS FOR ACTION IN THE SHORT-TERM

Across Puget Sound, people are working at the local and regional levels to reduce flood risk, recover salmon, protect working lands, revitalize and sustain cities, improve water quality, and increase recreational opportunities and access.

By 2020, the Puget Sound Partnership Action Agenda and Vital Signs efforts call for no additional loss of floodplain function in any Puget Sound watershed relative to a 2011 baseline. The Action Agenda also calls for 15 percent of degraded floodplain areas to be restored or projects underway to achieve that outcome. The Partnership also calls for a stop to the decline of Chinook salmon and improvements in abundance. The Partnership does not have a target for flood risk reduction but does have goals related to the quality of life and health of communities in Puget Sound.

Even though there are a number of efforts to integrate floodplain management at the local level, institutional structures and programs have been established separately for salmon recovery and flood risk management. In order to understand the capital funds needed for integrated floodplain management it is important to understand the goals and costs that have been developed separately for these two categories of action.

### 3.1 Salmon Recovery Goals

The Puget Sound Partnership, through its salmon recovery efforts and partners, has been working with salmon recovery stakeholders across Puget Sound to identify measurable goals and strategies within floodplain areas as well as a means of tracking and measuring success over time. Salmon recovery plans seek to achieve sustainable and harvestable runs of Chinook salmon across Puget Sound and must achieve explicit abundance, productivity, diversity and spatial structure for delisting under the Endangered Species Act. Governments also have a responsibility to meet Federal treaty and trust obligations to the tribes for salmon recovery. Local recovery plans are designed to address key factors limiting salmon recovery in each watershed. Not surprisingly, degradation of floodplain habitat is a major significant limiting factor in every Puget Sound watershed.

What follows are some examples of goals and strategies in floodplain areas that salmon recovery proponents are undertaking:

- Protect floodplain corridors from further loss of connectivity with active channels,
- Restore floodplain function and connectivity along mainstem rivers and their tributaries,

- Restore shoreline conditions,
- Restore hydrologic and sediment processes for peak and base flows,
- Address water quality impacts,
- Enhance habitats, and
- Replace culverts blocking or limiting fish passage.

The Governor’s Salmon Recovery Office (GSRO) oversees a comprehensive monitoring and adaptive management program which tracks progress in achieving salmon recovery goals. The GSRO issues a State of the Salmon Report every four years. Examples of measures of success are:

- Miles of riparian habitat with percent cover and species distribution,
- Area of connected floodplain,
- Number of fish passage barriers corrected, and
- Number of stream miles opened.

Within the next several years, the Puget Sound Partnership staff hopes to have compiled all salmon recovery activities into a shared database that can readily report on salmon recovery strategies and the progress that is being made in achieving locally identified goals.

### **3.2 Flood Risk Reduction Goals**

Across Puget Sound, flood managers are seeking to protect life, property, and infrastructure; protect the environment; and reduce flood risk. Flood managers have a fairly consistent means of evaluating risk and prioritizing projects, which includes risk of loss of life, frequency and severity of flooding, extent, and type of impact incurred (i.e., hospital or I-5 flooded compared to a single house or rural road). Hazard management planning across Puget Sound appears to be creating a more standardized approach to evaluating hazards and instituting and funding mitigation planning and action. One clear measure of success over time for flood risk reduction would be the amount of flood damage sustained during varying levels of flooding. A reduction of damages over time, in the midst of continued population growth pressures, would signal a significant success in flood risk reduction.

### **3.3 Limitations of the Current Structure and the Need to Accelerate the Pace**

Even though a significant number of projects have been implemented over the last decade for salmon recovery and ecosystem restoration, it is only a small percentage of the actions identified in the Puget Sound Chinook Recovery Plan and the Puget Sound Action Agenda. The same is true for reducing flood risks to farms, other businesses, public facilities, and homes. The *Treaty Rights at Risk* paper produced by the Western Washington Treaty Tribes points out that habitat is still being

degraded faster than it is being restored. The maintenance and capital funding needs of local flood hazard management agencies far exceed their budgets and their capacity to raise revenue. If effectiveness and rate of actions are not increased, salmon populations and other ecosystem values will continue to decrease and the level of damage from major floods will increase. Both of these results could have a chilling effect on the region's economy.

Floodplains by Design seeks to increase the pace at which salmon recovery and local flood risk reduction goals are met while also supporting the achievement of other key needs such as improving water quality, supporting the prosperity of business and working lands, and providing more recreational and open space opportunities.

### **3.4 Estimated Costs for Floodplain Restoration and Reducing Flood Risk**

The following long-term cost estimates are provided for each major Puget Sound floodplain. These costs are largely based upon flood and salmon recovery planning efforts and largely represent capital needs including feasibility studies, land acquisition, and project design and construction.

Salmon and flood project needs are called out separately because there is still limited integration across these two areas of effort. Greater integration is possible and is the goal of the Floodplains by Design Partnership.

The estimated costs come from hazard management plans, Comprehensive Flood Hazard Management Plans, Capital Investment Programs, 3-Year Salmon Recovery Work plans, USACE General Investigations, and other planning efforts as deemed appropriate by the local sources of information. It is not yet clear how much overlap exists between the salmon recovery and flood risk reduction cost estimates, but duplication has been removed where possible. Many of the areas have not done the analysis or work to create an integrated vision and set of actions for their area, so the numbers may look much different once further analysis and integration occurs. Many flood and salmon managers felt that the ultimate costs as well as the benefits would be higher as integration moved forward. Thus further refinement to cost estimates will proceed over the coming months and years as additional work is done to further combine flood and salmon planning into a single floodplain vision and set of actions.

Flood managers provided the estimated costs for flood risk reduction in Table 1 in May 2014 based on a variety of local planning efforts. All flood managers stated that these estimates represent a likely suite of work that could be completed in a 6- to 20-year timeframe, but local governments would need time to increase staffing if a significant and regular increase in available funding were likely. A King County flood manager stated that \$1 million in capital funding requires one staff person. Upon mentioning this to other flood managers across the region, most noted that this ratio is a reasonable estimate of staff needs relative to capital funding. Several

jurisdictions noted that they are engaged in processes now to develop more robust cost estimates that will be available in six months to one year.

Estimated costs for salmon recovery actions are derived from the May 2014 3-Year Work Plan submissions. Puget Sound Partnership staff took submissions for each watershed area and isolated floodplain-related projects. Costs were then made available for review by Lead Entity staff or other key watershed leaders. The 3-Year Work Plans vary across Puget Sound but generally describe work to be implemented over a two- to five-year period depending on funding and other implementation issues. Many projects have outdated cost-estimates or no cost estimates. Integration with flood risk reduction projects is limited. Staff felt costs were likely underestimated. Despite these limitations, the cost estimates still provide an “order of magnitude” estimate of the funding need.

Table 1 lists the estimated long-term costs for both flood risk reduction capital projects and salmon recovery activities in the major Puget Sound river basin floodplain complexes. Sources, notes and caveats for the costs are provided in Appendix A.

**Table 1. Estimated Long-Term Capital Floodplain Project Costs for Large Puget Sound Rivers (Dollars in 000s)**

Major Puget Sound River Floodplain Systems	Flood Risk Reduction	Salmon Recovery
Nooksack	\$115,000	\$48,000
Skagit/Samish	<i>to be determined</i>	\$43,600
Stillaguamish	\$23,000-100,000	\$42,200
Snohomish	\$42,000	\$83,600
<ul style="list-style-type: none"> <li>• Snoqualmie</li> <li>• Skykomish</li> </ul>	\$170,000 \$30,000	<i>included above</i> <i>included above</i>
Cedar/Sammamish	\$100,000	\$55,100
Green/Duwamish	\$1,400,000	\$89,700
Puyallup/White	\$240,000	\$241,800 <sup>3</sup>
Nisqually	\$20,000	\$27,900
Deschutes	<i>no capital projects</i>	\$67,700-87,700
Skokomish	<i>unknown</i>	\$23,600 <sup>4</sup>
Hood Canal	<i>no estimates available</i>	\$12,600
Elwha	<i>no flood projects identified</i>	\$2,700
Dungeness	\$45,900	\$29,500
Rounded Total <sup>5</sup> :	\$2,262,900	\$788,000

<sup>3</sup> There is potentially a 30 to 50 percent overlap in the salmon recovery costs with the flood costs.

<sup>4</sup> There is a longer-term cost estimate of \$41 million currently in review as part of a US Army Corps of Engineer General Investigation. The \$23.6 million need stated here is two- to five-year cost estimate of the likely longer-term need.

<sup>5</sup> Totals include the higher cost estimate for those basins where a range is provided.

There are several related reasons why some of the less developed jurisdictions do not have cost estimates for flood projects. These jurisdictions typically have less infrastructure in the floodplain, so there is less flood risk that needs to be dealt with. Rural jurisdictions typically do not have dedicated funding streams (such as Flood Control Zone Districts) for flood hazard management. At the same time, general funds are smaller, so less funding is available for flood projects and planning. These jurisdictions also have less staff than larger jurisdictions, so there are fewer resources available to develop cost estimates. Though cost estimates are not available, the majority of these jurisdictions do manage flood hazards through regulatory enforcement, Comprehensive Flood Hazard Management Plans including programmatic recommendations, and/or acquiring, relocating, removing, or flood-proofing structures in the floodplain as grant funding and local resources become available.

There is no capital project cost estimate for the Deschutes watershed because Thurston County focuses flood management activities on programmatic actions, such as floodplain regulations, and does not plan capital projects for flood risk reduction.

Stakeholders in the Skagit watershed are beginning the process of selecting their preferred approach to flooding based on a U.S. Army Corps of Engineers General Investigation (GI) to address flood concerns. County staff did not wish to provide an estimate for flood costs until that work is completed in 2015 because the overall approach has not yet been selected nor approved. The completion of the Skagit GI will likely have a large impact on the overall cost estimates.

The combined estimated cost for reducing flood risk and restoring salmon habitat over the next 10 to 20 years is approximately \$3 billion<sup>6</sup>. Over the next several

#### **Results in the Puyallup Watershed**

As an example, planners in the Puyallup River watershed estimate that a short-term investment of \$48 million would:

- remove 36,000 feet of flood control structures,
- construct 76,000 feet of new setback flood constructs,
- reconnect over 1,100 acres of floodplain, including 500 acres of tidally influenced estuary floodplain,
- reconnect 300 acres of side channel habitat,
- represent a significant step in the recovery of listed species (Chinook salmon, steelhead trout, and Orca whales) through efforts in both the estuary and floodplain,
- place conservation easements on over 400 acres of prime farmland, and
- significantly reduce flood risk for high-risk areas along the White and Puyallup rivers.

<sup>6</sup> Currently available funding relative to this overall cost is described in more detail in Section 6.5 (Coordinated Investment Strategy).

months, the Floodplains by Design will work with local groups to identify the results that would be achieved by these actions as well as the relationship to the Puget Sound Partnership goals of restoring 15 percent of the degraded floodplain habitats in Puget Sound.

### 3.5 Priority Areas for Action in the Short-Term

Reconnecting floodplains in the major rivers provides the best opportunities for restoring multiple functions. Floodplains by Design has identified the largest river systems in Puget Sound as a priority because they contribute the most freshwater, salmon, wood, nutrients and sediment to Puget Sound and because they have the largest flows and floodplains. The major river basins are also the areas with the greatest risk for flood damage to critical facilities, commerce, residences, and farmlands. The priority areas for FbD in the short-term are areas in those basins where a project or planning process is aimed at achieving ecosystem restoration *and* flood risk reduction, and there is coalition of the interested parties supporting the effort.

Figure 1 shows the major Puget Sound floodplains defined as priority areas for the Floodplains by Design initiative.

**Figure 1. Puget Sound Major River Floodplains**



Priority projects in the major river floodplains should strive to restore the natural and beneficial functions of the floodplain while reducing flood risks. A primary emphasis should be placed on protecting or reconnecting floodplains where feasible as a means to maintain or increase flood storage and conveyance, improve salmon production, and provide other benefits associated with functioning floodplains. In many places, reconnection is a cost-effective and sustainable pathway to delivering multiple benefits to local communities. In addition to the multiple benefits gained from making room for rivers, effective floodplain management should also take into account other uses within or beyond the footprint of capital projects. Efforts to protect natural areas or working lands from being developed (e.g. through zoning or acquisition of easements), improve water quality or quantity (e.g. through adopting best practices for agriculture or through the planting of riparian buffers), and maintain or enhance open space are sensible components of corridor-scale floodplain management. Floodplain projects and programs should significantly further local flood risk reduction and salmon recovery plan goals and desired outcomes<sup>7</sup>.

It is recognized that in some places there is a limited ability to rely on green infrastructure (making room for rivers) due to high levels of development or other community values. In these places, integrated floodplain management goals are likely to be attained only through corridor-scale management<sup>8</sup> that includes upgrading flood infrastructure as well as improved natural flood storage or restoration actions upstream or downstream.

The core intent of Floodplains by Design is to reduce the risk of flood damages and improve salmon habitat in Puget Sound's major rivers. The following are examples of functions, risks, and values that should be prioritized in funding actions as well as programmatic improvements in the short-term.

Flood reduction functions:

- Flood conveyance: Floodplains that are capable of receiving floodwaters prior to and during flood stage, are connected to the river, and are relatively free of structures that impede flowing water provide the best opportunity to improve conveyance. In some cases the floodplain will require actions to realize these functions. In other cases the preservation of already existing functions will be the preferred alternative.

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<sup>7</sup> While this report is focused on floodplain-specific problems and solutions given the higher levels of degradation and risk that generally exists there in this region, it is important to note that flood risks and river/estuary health is also a function of upland land uses and management actions. Efforts to manage upland areas in order to minimize downstream flood risks and improve ecological functions are an important part of comprehensive river/risk management.

<sup>8</sup> See section 6.1.2 for a definition of corridor-scale management.

- Flood storage: The volume of flood storage provided by floodplains varies depending on the elevation of the floodplain relative to flood elevation.

#### Habitat functions:

- Habitat for salmon: Mainstem rivers provide habitats for salmon to migrate, spawn, and rear. The loss of edge and off-channel habitat that salmon require for rearing is considered one of the biggest factors limiting salmon recovery.
- Supply of sediment and wood: The movement of sediment and wood through river systems is essential to maintaining productive habitat. Floodplains that are composed of erodible material and have forest cover provide some of the best habitats. Hardened channel banks and areas covered with impervious surfaces generally do not supply sediment or wood to the river system.
- Retention and transformation of contaminants: Connected valley bottom areas, particularly floodplain forests and wetlands, can cool water temperatures and filter nutrients and contaminants from the water column.

#### Risk assessment:

- Inundation hazard: Areas within the Special Flood Hazard Area (SFHA) provide the best opportunity to reduce flood risks.
- Channel occupation: Channel avulsion, erosion, and aggradation alter the processes that affect how river channels move over time.
- Exposure: The value of properties, critical facilities, or services exposed within hazard zones.
- Agricultural viability: Drainage or other valuable infrastructure improvements are an important value for agricultural areas.

#### Other Community Benefits

- Recreation opportunities or open space.
- Groundwater recharge.

Focusing on actions in the major river basins of Puget Sound and designing projects to achieve the objectives listed above will ensure the most effective use of limited funds and staff resources in the short-term. Over the next several months, Floodplains by Design will work with local groups to identify the best opportunities for achieving these multiple but related benefits over the longer-term.

## 4 PUGET SOUND FLOODPLAINS

To achieve the Floodplain by Design vision and chart a path forward, it is critical to understand the current situation for Puget Sound's floodplain areas. This section describes Puget Sound floodplains from a statewide and local perspective. Puget Sound has long had management institutions in place focused on flood risk reduction, salmon recovery, water quality, working lands protection and enhancement, open space protection, recreation, and other key floodplain interests. For the scope of this report, effort focused on flood risk reduction and salmon recovery as two critical components of floodplain management for early integrative work. These two were selected as the starting place for regional integration based on early examples where integration has already begun, the importance to both urban and rural areas, the system-wide need for planning and action, and the readiness of these two efforts to further collaborate. The FbD Partnership recognizes the importance of further coordination aimed at other key floodplain uses and values and future work will focus on furthering the regional understanding of these other important interest areas.

### 4.1 Defining the Floodplain

The topographic floodplain definition used in this report is a geographic definition – based on elevation and river flow data. The preliminary data for the topographic floodplain is taken from an upcoming report: *Konrad, C.P. In review. Geospatial assessment of ecological functions and flood-related risks on floodplains along major rivers in the Puget Sound Basin*. The USGS assessment used here defines a broader extent of Puget Sound's floodplain areas based on height above water surface analyses. Based on this analysis, there are nearly 400,000 acres of floodplain. To calculate the height above water surface, the land elevation was derived from the National Elevation Dataset (NED) and the river elevation was derived from streamflow data at USGS gages. The full technical report full methodology and geospatial data files will be available September 2014.

The topographic floodplain is large enough to capture:

- the historic floodplain areas that have been disconnected by levees or flood control dams from the river and are not included in maps showing the regulatory floodplain,
- historic and current channel migration zone areas, and
- other important areas that provide opportunities for multiple-benefit floodplain projects.

Figure 2 below shows an example of the topographic floodplain area at the mouth of the Duckabush River.

**Figure 2. Topographic Floodplain Example**



In a few places this report also refers to the “regulatory floodplain” as defined by the Federal Emergency Management Agency (FEMA) for the purposes of implementing the National Flood Insurance Program. The regulatory floodplain is used by flood managers at the local level as well as Federal agencies like the U.S. Army Corps of Engineers (USACE) and FEMA to manage flood risk. The regulated floodplains, or FEMA’s Special Flood Hazard Areas (SFHA), are areas subject to inundation during a “100-year flood” or “1 percent annual chance flood.” These floodplain areas are defined by FEMA’s hydrologic and hydraulic modeling, and they do not include portions of the historic floodplain that are protected by certified levees, embankments, or flood control dams that provide a level of protection against the 1 percent annual chance flood. The FEMA maps for Puget Sound floodplains are often out of date, and in some jurisdictions the maps are 30 years old. Therefore, the regulatory floodplain often doesn’t take into account the effects of increased runoff from development, the potential effects of climate change, or current mapping and hydrologic modeling capabilities. They assume that flood control facilities built to 1 percent chance standards will not breach or fail and they do not

**Topographic Floodplain:** Low-lying areas adjacent to the river where the land elevation is less than 10 meters (33 feet) above the river elevation at a 10-year flood stage.

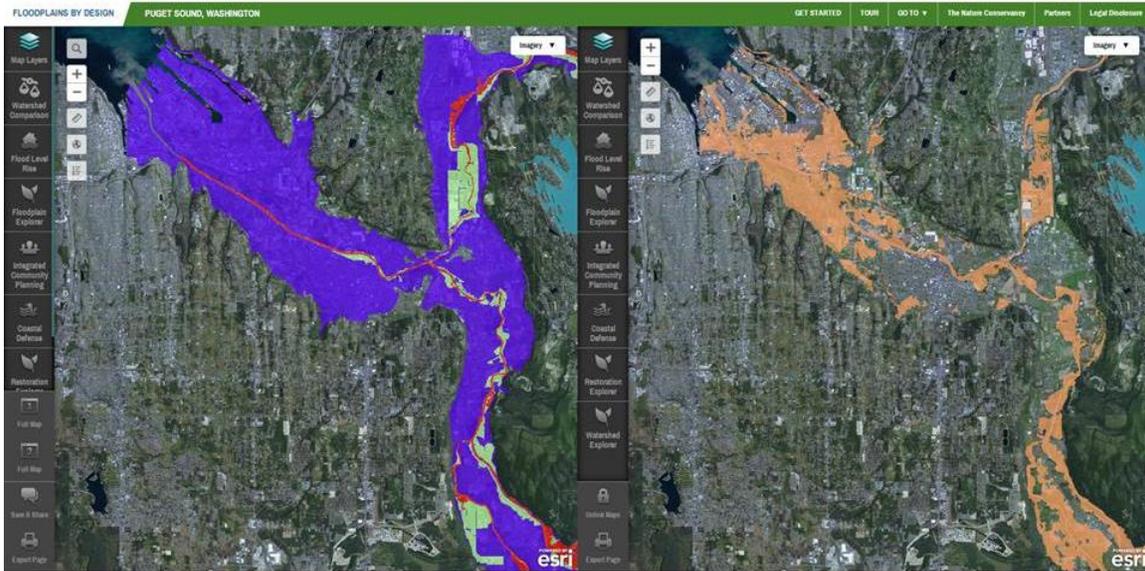
**Regulatory Floodplain (or FEMA Special Flood Hazard Areas):** Low lying areas that would be covered by a base flood, or 100-year flood, excluding areas behind certified levees. Base flood elevation is determined by FEMA for the purpose of implementing the National Flood Insurance Program.

account for channel migration (erosion) or larger than 1 percent chance floods.

Though the regulatory floodplain is an important tool for managing many flood risks and for implementing the National Flood Insurance Program, it is insufficient for understanding the full extent of the landforms that provide floodplain functions and are at risk of periodic flooding. Moreover, many communities around the nation are designing flood facilities or writing flood management plans to address larger flood events and future hydraulic conditions that would impact the larger floodplain area.

Figure 3 shows a comparison of the topographic floodplain (on the left shown in purple and green adjacent to the river, shown in red) and the regulatory floodplain (on the right) for the Puyallup River.

**Figure 3. Comparison of the Topographic and Regulatory Floodplains**



This report uses the topographic floodplain (left) as the basis for determining information provided in tables (unless otherwise noted) but also provides regulatory floodplain (right) acreage by floodplain for comparison. Table 2 below shows preliminary data on floodplain acreage for both the topographic floodplain and the regulatory flood as defined above for the floodplains in each of Puget Sound’s major watersheds. The topographic floodplain acreage for the Dungeness River watershed is not available at this time due to an issue with existing elevation data.

**Table 2. Floodplain Acreage for Major Puget Sound Watershed Floodplains**

Major Puget Sound Watersheds	Topographic Floodplain (acres)	FEMA Special Flood Hazard mapping (acres)
Nooksack	49,429	37,394
Samish	21,429	16,342
Skagit	111,195	99,733
Stillaguamish	20,162	23,059
Snohomish Snoqualmie	66,188	68,063
Cedar-Lake WA	8,627	5,579
Green - Duwamish	17,935	9,942
Puyallup/White	36,825	24,901
Nisqually	31,369	18,793
Deschutes	5,146	4,705
Skokomish	5,785	6,827
Hamma Hamma	735	441
Duckabush	606	227
Dosewallips	992	687
Quilcene	711	492
Dungeness	not available	1,157
Elwha	3,115	2,357
	380,249	320,699

## 4.2 Puget Sound Floodplains: A Statewide and Puget Sound Perspective

### 4.2.1 Statewide Perspective on Floodplains

Puget Sound floodplains are some of the highest risk areas in the state for flooding, are key to overall Puget Sound health and salmon productivity, are vital for western Washington agriculture production, and are home to two major ports and the state’s largest warehousing district. The sections that follow describe salmon recovery and flood risk reduction in Puget Sound from a statewide perspective.

#### 4.2.1.1 Salmon Recovery

The Puget Sound region has been designated as one of eight regions in the State of Washington working to recover salmon. These salmon recovery regions have long-established funding allocation agreements and institutions and structures for setting goals, accomplishing work, and tracking progress. In Puget Sound, the salmon recovery effort is part of a larger ecosystem recovery effort described in the Puget Sound Action Agenda.

The Puget Sound Partnership is the state agency established to lead efforts to protect and restore the Puget Sound ecosystem. Puget Sound salmon recovery advocates are faced with several Federal listings under the Endangered Species Act

including Puget Sound Chinook, Hood Canal Summer Chum, Bull Trout, and Puget Sound Steelhead. Many other populations teeter towards future listing. The Endangered Species Act requires specific goals be met for de-listing of species and removal from ESA protections.

#### **4.2.1.2 Flooding and Flood Risk**

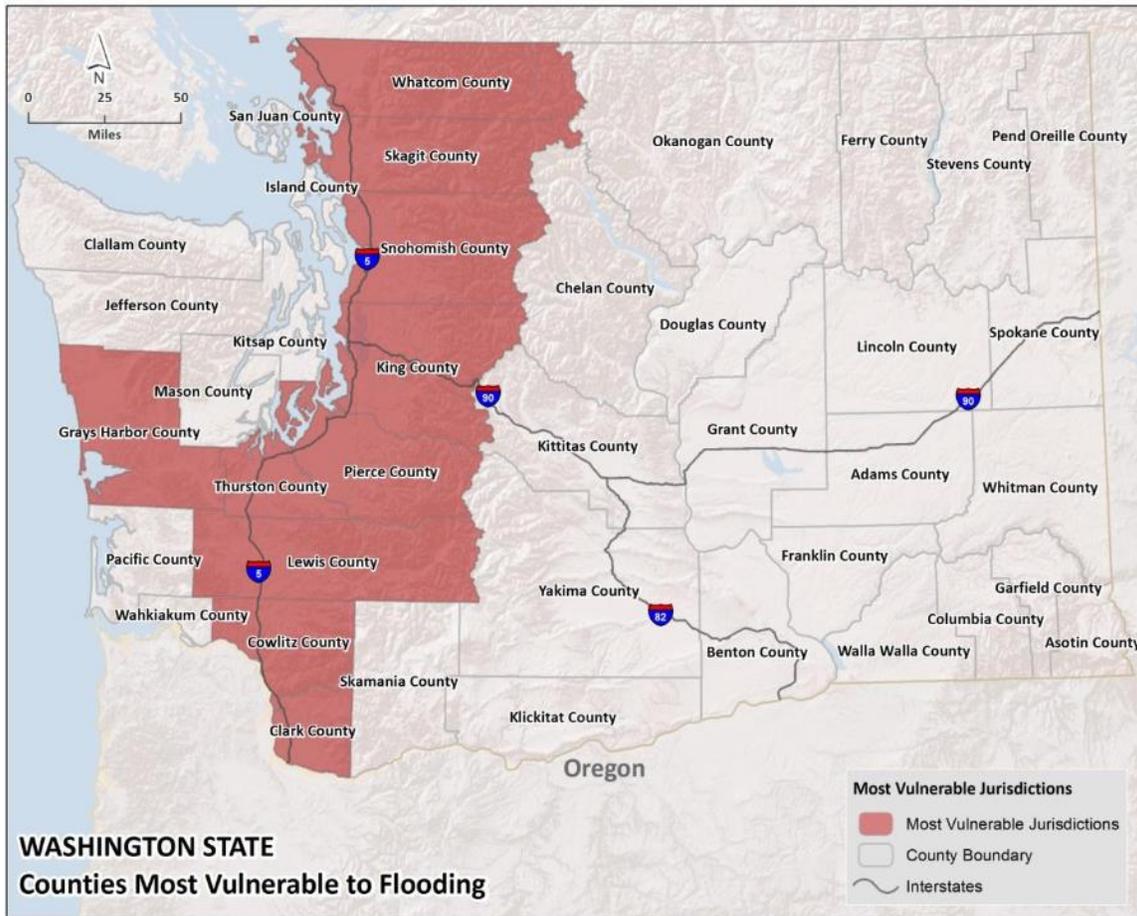
The Puget Sound region has a higher risk for flood events causing significant economic loss than many other parts of Washington State. Some of the areas that are at risk of flooding include areas that have statewide implications, including major transportation corridors (like I-5) or areas such as the Kent Valley and the Green River where warehouse and industrial daily activities generate 12 percent of Washington's Gross State Product.<sup>9</sup>

Figure 4, from the Washington State Enhanced Hazard Mitigation Plan, shows the counties in the state most vulnerable to flooding. It is clear from this image that the majority of counties vulnerable to flooding are located in the Puget Sound region.

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<sup>9</sup> April 2, 2010 King County and Department of Commerce presentation, citing sources: WA State Input-Output Model, Puget Sound Research Council, WA Employment Security Dept, US Bureau of Economic Analysis

**Figure 4. Washington State Counties Most Vulnerable to Flooding**



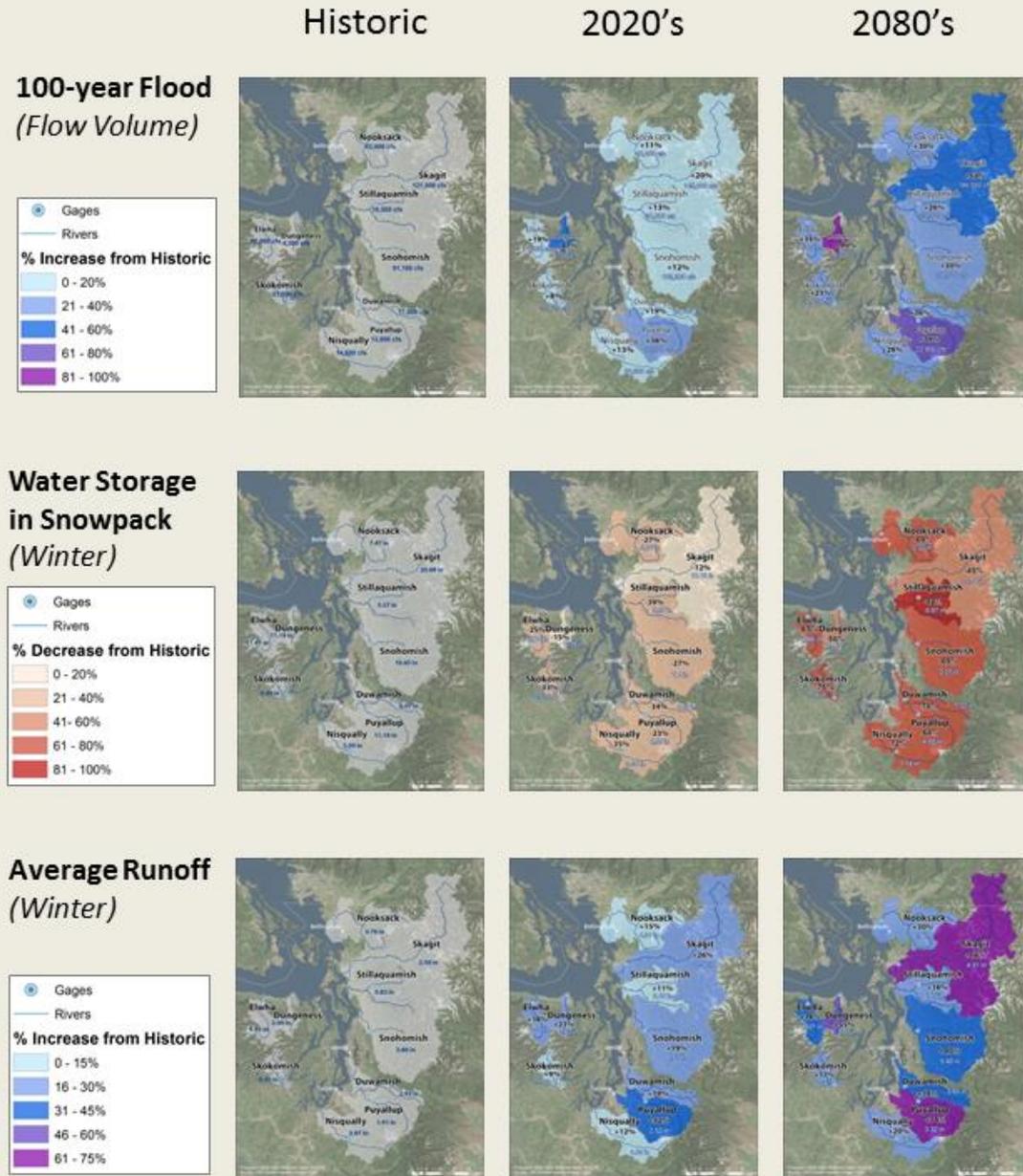
#### 4.2.1.3 Climate Change

The impact of climate change on Puget Sound flood risk and salmon recovery is a growing concern. Changes in air temperature and sea levels increase flood risk, shift the hydrologic cycle by producing more rain than snow, increase storm intensity, increase the amount of sediment moving through rivers, and result in higher sea levels which can back up floodwaters. Recent reports (synthesized in Snover et al. 2013) indicate that 100-year flood events could increase by 10 percent to 250 percent. Summer flows are projected to be lower. Water temperatures are projected to increase. These impacts will fundamentally change how our floodplains function for people and for salmon.

Figure 5 illustrates the relative hydrologic changes predicted in a few of the basins based on downscaled climate data. The most recent and comprehensive review of climate change impacts in Puget Sound is available in the *State of the Knowledge Report: Climate Change Impacts and Adaptation in Washington State* (Snover et al. 2013; <http://ces.washington.edu/db/pdf/snoveretalsok816.pdf>)

Figure 5. Projected Climate Change Impacts in Puget Sound Watersheds

## Projected climate change impacts in Puget Sound watersheds



All data represent model outputs that were generated for sub-basins upstream of major stream gages. For these maps, the data for the gage farthest downstream in each river basin was used to represent the entire watershed. Global climate model projections for the moderate A1B climate scenario (IPCC Fourth Assessment, 2007) were downscaled and used as inputs to drive local models.

Maps created by The Spatial Institute, Western Washington University (<https://huxley.wvu.edu/spatial-institute/>)  
 Data from the University of Washington Climate Impacts Group (<http://ces.washington.edu/cig/>)

## **4.2.2 Soundwide Floodplain Perspective**

There is a large diversity of biological, physical and socioeconomic conditions across Puget Sound floodplains. Floodplains are managed differently, they have developed differently, and their actual floodplains vary greatly in size. Floodplain management is at varying levels of integration in Puget Sound. As a result, each floodplain has multiple management structures in place. This section provides more detailed information on the varying management structures associated with flood risk reduction and salmon recovery across Puget Sound.

### **4.2.2.1 Flooding and Flood Risk Reduction**

Flood risk across Puget Sound is largely assessed through two main flood risk reduction planning efforts and managed at the county or city scale<sup>10</sup>.

One of the main flood risk reduction planning tools is the adoption of a Comprehensive Flood Hazard Management Plan (CFHMP). CFHMPs have been developed for many Puget Sound floodplains. CFHMPs typically include information on flood history, flood problems, and potential actions (programmatic actions, capital projects, or both). CFHMPs are typically county-wide, but some focus on a specific watershed if the watershed is entirely within one county's jurisdiction. CFHMPs do not extend across county boundaries. For example, there is a Pierce County CFHMP as well as a King County CFHMP for each county's respective portion of the Puyallup/White watershed. There is no combined flood hazard assessment or mitigation plan for the Puyallup/White watershed.

Flood risk is also evaluated at the state, county and city scales through hazard mitigation plans. Hazard mitigation plans are developed "pursuant to the federal Disaster Mitigation Act of 2000 (Public Law 106-390), where state and local governments must develop all hazard mitigation plans as a condition of federal grant assistance."<sup>11</sup>

These plans are created by counties and cities to:

"to protect the health, safety and economic interests of residents by reducing the impacts of natural hazards through mitigation planning, awareness and implementation of mitigation alternatives. Hazard mitigation is any action taken to permanently eliminate or reduce the long-term risk to human life and property from natural hazards. It is an essential element of emergency management along with preparedness, response and recovery."<sup>12</sup>

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<sup>10</sup> Local diking and irrigation districts also conduct very localized assessments at an even smaller scale.

<sup>11</sup> Information taken from the MRSC, Municipal Research and Service Center website, <http://www.mrsc.org/subjects/pubsafe/emergency/ps-hazard.aspx>, May 2014.

<sup>12</sup> Municipal Research and Service Center website, <http://www.mrsc.org/subjects/pubsafe/emergency/ps-hazard.aspx>, May 2014.

Flood risk reduction cost estimates described in the latter part of this report come, in part from these two planning exercises.

With Puget Sound there are several ways in which flood infrastructure is owned, maintained, and improved based on local assessments or the planning efforts described above. These vary by area and may include a mix of management structures as shown in Table 3. Areas with private levees were not noted in the table as they don't represent the majority of flood infrastructure within Puget Sound floodplains. Flood infrastructure management institutions include:

- Counties and cities,
- Flood Control Zone Districts,
- Diking and drainage districts,
- Private levees, and
- U.S. Army Corps of Engineers flood control dams.

The institutions noted above raise funds to address flood issues through Federal and state grant and loan programs, general funds of local governments, stormwater fees, flood control assessments, or other means. Flood Control Zone Districts, diking districts, counties, and cities have taxing authority. The King County Flood Control District has the most significant flood-related annual revenue of any area in Puget Sound with an operating budget of approximately \$40 million annually (Table 26 shows annual revenue streams provided by active Flood Control Zone Districts for potential flood risk reduction work). Flood Control Zone Districts and county governments often implement programs at a larger geographic scale while dike districts, private landowners, or city-owned levees usually have jurisdictions that cover more discreet areas.

**Table 3. Floodplain Management**

<b>Watershed</b>	<b>County Flood Planning<sup>13</sup></b>	<b>Flood Control Zone District</b>	<b>Diking Districts</b>	<b>Drainage Districts<sup>14</sup></b>	<b>Major Flood Control Dams</b>
Nooksack	Whatcom	Whatcom County Flood Control Zone District	X	X	
Skagit/Samish	Skagit and Snohomish	Partial - Skagit County Flood Control Zone District??	X	X	
Stillaguamish	Snohomish		X		
Snohomish, Snoqualmie, and Skykomish	Snohomish and King	Partial – King County Flood Control District	X	X	
Cedar/Sammamish	King	King County Flood Control District		X	
Green/Duwamish	King	King County Flood Control District		X	X
Snoqualmie	King	King County Flood Control District		X	
Puyallup/White	King and Pierce	King County Flood Control District and Pierce County Flood Control Zone District		X	X
Nisqually	Lewis, Thurston and Pierce	Partial – Pierce County Flood Control Zone District			
Deschutes	Thurston			X	
Skokomish	Mason	Skokomish Flood Control Zone District		X	X
Elwha	Clallam				
Dungeness	Clallam			irrigation districts	
Hood Canal	Jefferson and Mason	Inactive Flood Control Zone Districts in Jefferson County			

<sup>13</sup> Depending on the county this could be Public Works, Surface Water, River and Flood or other department.

<sup>14</sup> Information from the Municipal Research and Service Center website, <http://www.mrsc.org/subjects/governance/spd/spdmain.aspx>

### 4.2.2.2 Puget Sound Management: Salmon Recovery

This section focuses on salmon recovery management and planning and how funds are raised to address identified issues.

Each major watershed in Puget Sound has one organization, called a Lead Entity, assigned to coordinate salmon recovery efforts for the watershed and thus its floodplain areas. Lead Entities are local, watershed-based organizations, established by law, that develop local salmon habitat recovery strategies and then recruit organizations to do habitat protection and restoration projects that will implement the strategies. These organizations bring together multiple jurisdictions and stakeholders to set priorities, allocate State and Federal funds and track progress. In most cases Lead Entities are managed by county governments but partner with other governments, including tribes. Cost estimates for salmon recovery are derived from 3-Year Work Plans developed by each of the Lead Entity organizations.

While some individual State and Federal grants can be pursued outside of the Lead Entity structures on behalf of salmon recovery efforts, anecdotal information suggests most funding secured on behalf of salmon specific recovery efforts is consistent with salmon recovery plans and Lead Entity efforts. For the most significant salmon recovery funding programs, the Puget Sound Acquisition and Restoration Fund and the Salmon Recovery Funding Board, applicants must be promoting projects as part of the Lead Entity process.

### 4.2.2.3 Puget Sound Floodplains: A Human, Biologic and Geologic Footprint

Floodplains in Puget Sound vary widely in how they have been developed, the degree of hydrologic connectivity between the river and the floodplain, and their basic geologic structure. Puget Sound floodplains have many similarities. Most feature small cities, agriculture, areas with urbanized or industrial development, and forested uplands. The floodplains in all major watersheds support a variety of salmon and aquatic species, many of which are at levels of abundance and productivity far below historic levels. The historic ecologic functioning of rivers and floodplains has been impacted by dams, levees and sea dikes, which have altered flows and in some cases shaped development patterns.

Table 4 shows similarities and differences across Puget Sound's floodplain areas. The topographic floodplain acreage described in Section 4.1 was used as the basis to calculate the percentages of developed lands, connected floodplains, key facilities at risk, and area in agricultural production. Medium to high development is defined as areas where impervious surfaces account for at least 50 percent of the total area. This classification includes suburban residential areas and more urbanized and industrial areas. The source is NOAA's C-CAP data. Connectivity is defined as connection to the river or other floodplain areas without roads, levees, or railroads. Agricultural lands are based on aggregated parcel data from the Washington

Department of Revenue. Facilities at risk include municipal water systems, wastewater treatment plants, large septic systems, hospitals, fire stations, and emergency medical facilities in the floodplain. Many of these critical facilities are outside of the regulatory floodplain or otherwise protected from inundation from the 100-year flood. In many jurisdictions in Puget Sound, critical facilities are required to be located outside the 500-year floodplain or be otherwise protected from a 500-year flood. Information for the Dungeness River watershed is not available at this time due to issues with existing elevation data. Source data and notes on assessed values are included in Appendix A. Assessed values are taken from Flood Hazard or Hazard Mitigation plans and are a combination of the values of improvements and land. Some of the assessed values are as old as 1999 while others are as recent as 2013. Since many of these assessed values are out of date and some floodplains are not included, the total assessed value in Puget Sound's floodplain areas is likely much higher.

#### **4.2.2.3.1 Agriculture**

As seen in Table 4 below, agriculture is a major land use in many floodplains of Puget Sound. In one major Puget Sound watershed, the Samish for example, agriculture accounts for 78 percent of land use in the topographic floodplain. Agricultural sectors and individual farms play a key role in integrated flood management. Due to the absence of high density development and the fact the many farmlands are located in former wetland areas, flood risk reduction and salmon habitat plans often identify agricultural lands as potential project sites. Agriculture is dependent upon effective floodplain management to minimize damage from flood events, address drainage issues, and restrict urban encroachment. Agriculture is also affected by land use regulations that significantly alter property values and dictate what can and can't be done on agricultural properties.

#### **4.2.2.3.2 Water quantity and quality**

Table 4 below clearly shows the prevalence of water quality degradation in Puget Sound. According to the State's current assessment, 35 percent of major rivers in Puget Sound are failing to meet state water quality standards (<http://www.ecy.wa.gov/programs/wq/303d/currentassessmt.html>). Surface water runoff poses the main threat to water quality and is the primary source of nutrient, toxins, bacteria, and sediment pollution. Runoff loading can be attributed to river flow volume and land use patterns. Nutrient yields are largest from watersheds with the highest percentage of urban and agricultural land uses. Ecology has extensive studies available on the pathways and loading of pollutants in Puget Sound Waterways, is required by the Federal Clean Water Act to assess the state's water quality every two years and produce the 303(d) list, and is the leading agency addressing water quality threats in Puget Sound.

## Floodplains by Design

**Table 4. Characteristics of Major Puget Sound Floodplain Systems<sup>15</sup>**

Floodplain System	Connectivity	Condition		Habitat		Infrastructure	Value <sup>16</sup>
	% FP Connected to the River	% of Floodplain in med-high development	% of Floodplain in Agriculture	Length of Chinook Salmon streams (miles)	% of stream segments tested with Category 5 (303d list) water quality impairments	Key facilities in the topographic floodplain	Assessed Value
Nooksack	54%	1%	56%	894	65%	32	\$270 million
Samish	25%	1%	78%	128	32%	24	\$3.3 billion
Skagit	47%	3%	49%	1,148	32%	93	
Stillaguamish	55%	1%	47%	400	11%	37	\$317 million
Snohomish/ Snoqualmie/ Skykomish <sup>17</sup>	58%	3%	32%	1046	19%	173	Snohomish: \$663 million Snoqualmie: \$1.2 billion
Cedar/Sammamish	66%	21%	6%	513	44%	122	\$2.2 billion
Green /Duwamish	44%	38%	7%	508	48%	105	\$7.3+ billion
Puyallup	52%	20%	8%	765	26%	176	\$2.7 billion
Nisqually	73%	2%	9%	278	67%	151	~\$90 million
Deschutes	99%	1%	24%	178	85%	33	\$148 million
Skokomish	72%	0%	17%	190	7%	13	\$406 million
Hamma Hamma	98%	0%	2%	12	0%	1	<i>Not available</i>
Duckabush	94%	0%	0%	27	15%	7	<i>Not available</i>
Dosewallips	91%	1%	3%	45	20%	15	<i>Not available</i>
Quilcene	85%	0%	22%	38	60%	14	<i>Not available</i>
Dungeness	-	-	-	-	-	-	<i>Not available</i>
Elwha	94%	0%	1%	155	87%	13	<i>Not available</i>

<sup>15</sup> Preliminary data taken from upcoming report: *Konrad, C.P. In review. Geospatial assessment of ecological functions and flood-related risks on floodplains along major rivers in the Puget Sound Basin.* Report with full methodology and geospatial data files will be available September 2014.

<sup>16</sup> Sources for assessed value are provided in Appendix A, they are not a product of the geospatial assessment.

<sup>17</sup> Separated data for each of the main floodplain areas (Snohomish, Skykomish and Snoqualmie) will be available fall 2014, per local request.

The comparison of Puget Sound floodplains in Table 4 above shows several key findings about floodplains:

- The value of infrastructure in floodplain areas is very high. For five floodplains, the assessed value is in the billions of dollars. However, in some of the smaller floodplains (such as those draining into Hood Canal), assessed values for floodplain areas are not available. These floodplains undoubtedly have lower assessed values, but also lack information about flood hazards.
- Significant areas of medium to high levels of development only exist in a few watersheds, the Cedar/Sammamish, Green/Duwamish, and Puyallup/White.
- The percent of agriculture in the different floodplain systems varies greatly, from 0 percent to 78 percent. Even though there is a big range in the percentage of agriculture by floodplain, the farm community is a key stakeholder in almost all of the floodplains as they own lands adjacent to the rivers where flood risk reduction and salmon recovery projects are frequently sited.
- Over 1,000 key facilities are located within Puget Sound's topographic floodplains. Many of these facilities are outside of the regulatory floodplain or otherwise protected from inundation from the 100-year flood. In many jurisdictions in Puget Sound, critical facilities are required to be located outside the 500-year floodplain or be otherwise protected from a 500-year flood.

### 4.3 Major Puget Sound Floodplains: A Local Description

Puget Sound's floodplains are diverse representing a range of conditions. In urban floodplains, such as those that border the Green and Duwamish Rivers, planning needs may focus on water quality, inclusion of public access and recreation, and protection of major infrastructure from flooding. In some rural floodplains, such as those that border the Hamma Hamma River in Hood Canal, there is little infrastructure to protect from flooding so flood planning may be based on landowner needs and interest. This section provides a brief overview of the flood and salmon/ecosystem related issues in each of the major Puget Sound floodplains.

The information in these sections is derived from local jurisdiction flood plans, salmon recovery plans, and other planning documents as well as conversations with local jurisdiction staff. Because jurisdictions use different methods to calculate statistics (such as assessed value), care should be taken when attempting to roll up numbers from the floodplain level to the regional scale. This information is presented to provide a broad understanding of the different issues and different management structures in the floodplains of Puget Sound.

Data in the local floodplain tables on land use, topographic floodplain area, connectivity, length of Chinook streams, streams with water quality impairments, and key facilities in the floodplain is preliminary data from the upcoming report: Konrad, C.P. *In review. Geospatial assessment of ecological functions and flood-*

*related risks on floodplains along major rivers in the Puget Sound Basin.* The report, with full methodology and geospatial data files, will be available September 2014. Information on mainstem salmon species is from WDFW's Priority Habitat and Species database and is based on species presence on the mainstem near the mouth of the river.

### **4.3.1 Nooksack Watershed Floodplains**

The North and Middle Forks of the Nooksack River flow from Mount Baker and Mount Shuksan while the South Fork flows from snowfields on Forest Service lands. The Nooksack River enters Puget Sound north of Bellingham on a river delta that is aggrading (i.e. expanding seaward). Agriculture in the Nooksack watershed floodplains had the highest market value of any county in Puget Sound and seventh in Washington State for crops and agricultural products in 2008, producing \$326 million worth of goods<sup>18</sup>. Increased demand for agricultural property, largely coming from Canada, has made it harder and more expensive to implement both flood and salmon recovery projects. Addressing the protection and restoration of key salmon habitats essential to restore the ecosystem and treaty reserved fishing rights is a key priority. Additional understanding of how to maximize floodplain restoration for salmon capacity and productivity is still necessary. Other significant concerns in the watershed's floodplains include water quality and the agricultural industry's need for drainage and flood protection. The Nooksack River Chinook are known for their diversity, and the spring run is one of the few remaining in Puget Sound. There is limited infrastructure in the Nooksack watershed floodplains, but flooding of the Trans-Canada Highway in B.C. is a significant concern. Whatcom County is currently pursuing a System-Wide Improvement Framework (SWIF) project with the U.S. Army Corps of Engineers for the Nooksack River. The SWIF planning process is integrating goals for flood risk reduction, salmon recovery, and agriculture.

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<sup>18</sup> Data from Washington Department of Agriculture based on U.S. Dept. of Agriculture 2007 Census of Agriculture. <http://agr.wa.gov/AgInWa/docs/126-127-CropProduction-FoodProcessingMap12-13.pdf>

**Table 5. Nooksack Watershed Floodplains Summary and Highlights**

Cities and Towns	Everson, Sumas, Deming and Acme
Assessed Value	\$270 million (as of 1999)
Land Use	1% in medium to high development 56% in agriculture
Topographic Floodplain Acreage	49,429 acres
Regulatory Floodplain Acreage	37,394 acres
Percent of the Floodplain Connected to the River	54%
Mainstem Salmonid Species	Bull trout, cutthroat, steelhead trout, Chinook salmon, coho salmon, coast resident cutthroat, chum, pink salmon
Length of Chinook salmon streams (miles)	894
% of stream segments tested with Category 5 (303d list) water quality impairments	65%
Key Facilities in the Topographic Floodplain	32
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• 4 diking districts</li> <li>• Whatcom County Flood Control Zone District</li> <li>• 3 Sub-Flood Control Zones</li> <li>• WRIA 1 Watershed Joint Policy Boards (Local Integrating Organization) comprised of: WRIA 1 Salmon Recovery Program (Lead Entity) and the WRIA 1 Watershed Management Joint Board</li> <li>• Whatcom County SWIF</li> <li>• Lummi Nation and Nooksack Indian Tribe</li> </ul>

**4.3.2 Skagit Watershed Floodplains**

For the purposes of this report, the Skagit watershed floodplains include lands adjacent to the Sauk, Cascade, Suiattle, Baker and Skagit rivers as well as the Samish River and its floodplain. The Skagit and Samish floodplains are linked because large flood events in the Skagit inundate a large percentage of the Samish floodplain. The Skagit is the largest watershed and floodplain in Puget Sound. The Skagit watershed floodplains are more than one and a half times as large as the watershed with the next largest floodplain area, the Snohomish. Approximately 30,000 people, or about 28 percent of Skagit County’s population, live in the Skagit River floodway or floodplain. The Skagit River supports the largest run of wild Chinook salmon in the Puget Sound, as well as the largest spawning runs of pink and chum salmon in the coterminous United States.<sup>19</sup>

**Table 6. Skagit Watershed Floodplains Summary and Highlights**

Cities and Towns	Sedro-Woolley, Mt. Vernon, Hamilton, La Conner, Burlington, Lyman, Rockport, and Darrington
Assessed Value	\$3.3 billion
Land Use	3% in medium to high development 49% in agriculture
Topographic Floodplain Acreage	132,624 acres
Regulatory Floodplain Acreage	116,075 acres
Percent of the Floodplain Connected to the River	25% (Samish) and 47% (Skagit)
Mainstem Salmonid Species	Steelhead, coho, Chinook salmon, bull trout, pink, coast resident cutthroat, chum, sockeye
Length of Chinook salmon streams (miles)	128 (Samish) and 1,148 (Skagit)
% of stream segments tested with Category 5 (303d list) water quality impairments	32% each
Key Facilities in the Topographic Floodplain	117
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Skagit County Flood Control Zone District</li> <li>• 12 Dike districts</li> <li>• Sedro-Woolley, Dunbar Road and South Mt. Vernon sub-flood control zones</li> <li>• Skagit Watershed Council (Lead Entity)</li> <li>• Farms, Flood &amp; Fish initiative</li> </ul>

<sup>19</sup> Salmonid Stock Inventory 2000: Washington State, Washington Department of Fish and Wildlife, Olympia, WA,2002.

### 4.3.3 Stillaguamish Watershed Floodplains

The Stillaguamish River drains a 684-square mile basin and empties into Puget Sound at Port Susan and Camano Island. The largely rural floodplain area includes agriculture and numerous salmonid species. It is not yet clear how the Stillaguamish River and its salmon will respond to increased sediment and changes to the river caused by the Oso landslide on the North Fork. It is also unclear if the landslide, with its impact on the community and subsequent litigation, will result in shifts in development or floodplain planning and management. Snohomish County staff and other stakeholders expect to have a better understanding of the situation, changes to cost estimates, and next steps over the coming years.

**Table 7. Stillaguamish Watershed Floodplains Summary and Highlights**

Cities and Towns	Granite Falls, Darrington, Arlington, Stanwood, and Silvana
Assessed Value	\$317 million
Land Use	1% in medium to high development 47% in agriculture
Topographic Floodplain Acreage	20,162 acres
Regulatory Floodplain Acreage	23,059 acres
Percent of the Floodplain Connected to the River	55%
Mainstem Salmonid Species	Pink, cutthroat, chum, steelhead, sockeye, coho, bull trout, Chinook, cum, rainbow trout
Length of Chinook salmon streams (miles)	400
% of stream segments tested with Category 5 (303d list) water quality impairments	11%
Key Facilities in the Topographic Floodplain	37
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Snohomish/Stillaguamish Local Integrating Organization</li> <li>• Sustainable Lands Strategy</li> <li>• Stillaguamish Flood Control District</li> <li>• Stillaguamish Watershed Council (Lead Entity)</li> </ul>

### 4.3.4 Snohomish Watershed Floodplains

The Snohomish River is formed by the confluence of its two major river tributaries, the Skykomish and the Snoqualmie. Together, the floodplains adjacent to these three major systems form the second largest floodplain complex in Puget Sound. The Snohomish watershed’s floodplains extend through both Snohomish and King Counties and flood planning happens within each county and by affected cities. Snohomish County’s Comprehensive Flood Hazard Management Plan is over 20 years old and outdated, though the Sustainable Lands Strategy initiative is currently conducting integrated planning for the Snohomish River, attempting to balance flood, fish recovery, and agricultural interests. King County’s Flood Control

## Floodplains by Design

District, Water and Land Resources Division, and Farm-Fish-Flood Advisory Committee are similarly involved in planning and implementation efforts to integrate flood risk reduction, salmon recovery, water quality and agricultural interests in their floodplain areas. King County has a recently updated Comprehensive Flood Hazard Management Plan (2013) including capital and programmatic efforts to reduce flood hazard. Salmon recovery planning and implementation happens at a watershed-wide scale. Given the unique nature of each of these systems, they will be described in more detail separately below.

**Table 8. Snohomish Watershed Floodplains (Snohomish, Skykomish, Snoqualmie) Summary and Highlights<sup>20</sup>**

Cities and Towns	Gold Bar, Startup, Monroe, Sultan, Index, Town of Skykomish, Snoqualmie, Fall City, Duvall, and Marysville
Assessed Value	\$663 million
Land Use	3% in medium to high development 32% in agriculture
Topographic Floodplain Acreage	66,188 acres
Regulatory Floodplain Acreage	68,063 acres
Percent of the Floodplain Connected to the River	58%
Mainstem Salmonid Species	Steelhead trout, coho, Chinook, bull trout, chum, pink, sockeye, cutthroat,
Length of Chinook salmon streams (miles)	1,046 (Snohomish, Snoqualmie, and Skykomish combined)
% of stream segments tested with Category 5 (303d list) water quality impairments	19%
Key Facilities in the Topographic Floodplain	173
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Snohomish/Stillaguamish Local Integrating Organization</li> <li>• 7 different dike districts</li> <li>• Snohomish County manages levees</li> <li>• King County Flood Control District</li> <li>• Sustainable Lands Strategy</li> <li>• Snohomish Basin Recovery Forum (Lead Entity)</li> <li>• Snoqualmie Watershed Forum</li> </ul>

<sup>20</sup> Input from various staff at the local level expressed concern about “rolling up” information from the Snohomish, Snoqualmie and Skykomish river floodplains into an overall table, given the analysis was not able to be broken down into the subbasins with which they are familiar. Thus, they were unable to verify if the information in this table is generally accurate or not.

#### **4.3.5 Snoqualmie Watershed Floodplains<sup>21</sup>**

The Snohomish River Salmon Conservation Plan states,

The Snoqualmie River drains the southern 703 square miles of the Snohomish River basin. The Snoqualmie River begins high in the Cascade Mountains near Snoqualmie Pass and flows over a relatively confined, alluvial floodplain that is divided into two distinct segments by Snoqualmie Falls. While the Falls is a barrier to anadromous salmon, the North, Middle and South Forks of the Snoqualmie River above the falls are valued for resident trout populations. The lower Snoqualmie River has two major tributary rivers, the Tolt and the Raging, both with their own unique floodplains. The Tolt and the Raging Rivers and the Snoqualmie River reaches immediately downstream of their confluences, provide the best mainstem Chinook salmon spawning habitat. The Lower Snoqualmie River Floodplain, nearly 2 miles wide below the Falls, inundates frequently and includes significant agriculture lands, recreation activities and small city development. The lower 6 miles of the Snoqualmie River resides in Snohomish County.

Planning efforts in the Snoqualmie basin include Middle Fork Snoqualmie River Corridor Management Planning and the Tolt River Corridor Action Plan, both of which integrate flood and habitat planning. The City of Snoqualmie, with a population of just 10,670 in 2010, has the largest FEMA payout of any city in Puget Sound with almost 18 million dollars in total payments between 1978 and 2012.

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<sup>21</sup> Local reviewers felt it was critical to be able to describe the Snoqualmie River floodplains specifically. As noted in the table, additional analysis will be completed in 2014 to address this need.

## Floodplains by Design

**Table 9. Snoqualmie Watershed Floodplains Summary and Highlights**

Cities and Towns	Snoqualmie, Carnation, North Bend, Duvall, and Fall City
Assessed Value	\$1.2 billion assessed value, \$172 million potential damage from a 1% annual chance flood
Land Use	These numbers are included in Snohomish above, Snoqualmie specific numbers expected Fall of 2014.
Topographic Floodplain Acreage	These numbers are included in Snohomish above, Snoqualmie specific numbers expected Fall of 2014.
Regulatory Floodplain Acreage	These numbers are included in Snohomish above, Snoqualmie specific numbers expected Fall of 2014.
Percent of the Floodplain Connected to the River	These numbers are included in Snohomish above, Snoqualmie specific numbers expected Fall of 2014.
Mainstem Salmonid Species	Steelhead, pink, Chinook, bull trout, cutthroat, coho, chum
Length of Chinook salmon streams (km)	These numbers are included in Snohomish above, Snoqualmie specific numbers expected Fall of 2014.
% of stream segments tested with Category 5 (303d list) water quality impairments	These numbers are included in Snohomish above, Snoqualmie specific numbers expected Fall of 2014.
Key Facilities in the Topographic Floodplain	These numbers are included in Snohomish above, Snoqualmie specific numbers expected Fall of 2014.
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• King County Flood Control District</li> <li>• Snoqualmie Watershed Forum</li> <li>• Various corridor-scale planning efforts</li> <li>• Snohomish Basin Recovery Forum (Lead Entity)</li> </ul>

### **4.3.6 Skykomish Watershed Floodplains<sup>22</sup>**

The Snohomish River Salmon Conservation Plan states,

The Skykomish River drains over 800 square miles of the northern Snohomish River basin. Streams originate in Federal wilderness areas from glaciers on Mount Daniel, Mount Hinman, and other Cascade peaks. The north and south forks of the Skykomish converge in Index. The mainstem Skykomish River is much steeper than either the mainstem Snoqualmie or the mainstem Snohomish Rivers. The upper reach, from the forks to the City of Gold Bar, transports sediment quickly through its steep, confined channel. As gradient decreases downstream between the cities of Gold Bar and Sultan, gravel and cobble settle out, forming multiple channels. This dynamic area shifts rapidly during floods, eroding banks and cutting new channels through the floodplain. From Sultan to Monroe the channel becomes naturally more stable. The cities of Monroe, Sultan, and Gold Bar are

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<sup>22</sup> At the request of local reviewers, a separate section for the Skykomish River floodplains has been added. Additional research and follow-up will be completed in 2014.

located along the Skykomish River and have seen rapid population growth over the past decade. The majority of the floodplain is in private ownership and used for agriculture, a dominant floodplain land use from Sultan to the confluence with the Snoqualmie River.

**Table 10. Skykomish Watershed Floodplains Summary and Highlights**

Cities and Towns	Research to be completed in 2014.
Assessed Value	Research to be completed in 2014.
Land Use	Research to be completed in 2014.
Topographic Floodplain Acreage	These numbers are included in Snohomish above, Skykomish specific numbers expected Fall of 2014.
Regulatory Floodplain Acreage	These numbers are included in Snohomish above, Skykomish specific numbers expected Fall of 2014.
Percent of the Floodplain Connected to the River	These numbers are included in Snohomish above, Skykomish specific numbers expected Fall of 2014.
Mainstem Salmonid Species	Research to be completed in 2014.
Length of Chinook salmon streams (km)	These numbers are included in Snohomish above, Skykomish specific numbers expected Fall of 2014.
% of stream segments tested with Category 5 (303d list) water quality impairments	These numbers are included in Snohomish above, Skykomish specific numbers expected Fall of 2014.
Key Facilities in the Topographic Floodplain	These numbers are included in Snohomish above, Skykomish specific numbers expected Fall of 2014.

#### **4.3.7 Cedar/Sammamish Watershed Floodplains**

The Sammamish and Cedar Rivers watershed also includes Issaquah Creek and Lake Washington. The Corps of Engineers modified the entire Sammamish River, which drains from Lake Sammamish to Lake Washington as part of a flood control project in the late 1960s. As result, the most significant flooding currently occurs in Issaquah Creek, where flooding is recurrent and widespread in the lower basin, and in the Cedar River, where \$3.1 million in damages to levees and revetments alone was caused during the 2009 flood event<sup>23</sup>. Continued restoration and flood risk reduction occurs along the Sammamish. Despite being significantly altered and re-engineered from its historic hydrologic functioning, the greater Lake Washington system is home to a number of salmon runs, including populations of threatened Sammamish and Cedar River fall Chinook and Chester Morse bull trout.

<sup>23</sup> King County Flood Hazard Management Plan, 2013.

## Floodplains by Design

**Table 11. Cedar/Sammamish Watershed Floodplains Summary and Highlights**

Cities and Towns	Sammamish, Issaquah, and Renton
Assessed Value	<p>City of Issaquah: \$67.3 million assessed value, \$17 million in estimated losses, \$3-4 million in damages from a 25-year flood</p> <p>Sammamish River: \$1.5 billion assessed value exposed, \$179 million potential damage from a 1% annual chance flood</p> <p>Cedar River: \$331 million assessed value exposed, \$8.1 million potential damage from a 1% annual chance flood</p>
Land Use	<p>21% in medium to high development</p> <p>6% in agriculture</p>
Topographic Floodplain Acreage	8,627 acres
Regulatory Floodplain Acreage	5,579 acres
Percent of the Floodplain Connected to the River	66%
Mainstem Salmonid Species	Sockeye, cutthroat, Chinook, steelhead, bull trout, coho
Length of Chinook salmon streams (miles)	513
% of stream segments tested with Category 5 (303d list) water quality impairments	48%
Key Facilities in the Topographic Floodplain	122
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• King County Flood Control District</li> <li>• Lake Washington/Cedar/Sammamish Salmon Recovery – WRIA 8 (Lead Entity)</li> <li>• South Central Action Area Caucus Group (Local Integrating Organization)</li> </ul>

### 4.3.8 Green/Duwamish Watershed Floodplains

The Green River begins at the crest of the Cascade Mountains and drains into Elliott Bay by the Port of Seattle as the Duwamish. Howard Hanson Dam, the levee system, and other factors combine to reduce flooding in the lower river to a fraction of its historical magnitudes. As a result, commercial and industrial land use in the largely flat and generally accessible lower Green and Duwamish River valleys has proliferated in what were formerly rural and agricultural communities. The ongoing System-Wide Improvement Framework (SWIF) project for the Green River is a partnership among many interests to implement system-wide improvements to the Lower Green River levee system to address system-wide issues and facilitate development of solutions to issues that cannot be accomplished through routine corrective actions (while allowing levee sponsors to remain eligible for PL84-99 funding). Key issues for the SWIF process to address include flood risk reduction, salmon recovery and habitat restoration, water quality (specifically temperature and riparian shade), integration of recreation (parks and trails), and tribal treaty rights relating to fishing access. The Green River features 36 miles of levees, most of which were built in the 1960s to protect agricultural lands, not urban areas. The levees are aging, and many have been damaged by scour caused by channel incision, largely a result of the Howard Hanson dam limiting sediment from being transported downriver. Twelve levees along the Green River are in the PL 84-99 program.

**Table 12. Green/Duwamish Watershed Floodplains Summary and Highlights**

Cities and Towns	Renton, Kent, Auburn, Tukwila, and Seattle
Assessed Value	\$7.3 billion assessed value exposed, \$1.6 billion potential damage from a 1% annual chance flood
Land Use	38% in medium to high development 7% in agriculture
Topographic Floodplain Acreage	17,935 acres
Regulatory Floodplain Acreage	9,942 acres
Percent of the Floodplain Connected to the River	44%
Mainstem Salmonid Species	Chum, sockeye, bull trout, steelhead, cutthroat, pink, chinook, coho
Length of Chinook salmon streams (miles)	508
% of stream segments tested with Category 5 (303d list) water quality impairments	26%
Key Facilities in the Topographic Floodplain	105
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• King County Flood Control District</li> <li>• Green/Duwamish Salmon Recovery – WRIA 9 (Lead Entity)</li> <li>• South Central Area Caucus Action Group (Local Integrating Organization)</li> </ul>

**4.3.9 Puyallup/White Watershed Floodplains**

Dropping steeply from Mount Rainier to Puget Sound, the Puyallup watershed includes the Carbon, White and Puyallup river valleys and spans both Pierce and King Counties. Approximately 21,000 people live and 12,000 people work in the floodplain. Some of the small cities, like Orting, are at high risk to flooding. Some years, more than 1 million pink salmon return to the Puyallup. Salmon return home by swimming through the Port of Tacoma, passing under I-5, and then continuing past small cities, rural homes and farms. The Salmon Habitat Protection and Restoration Strategy for WRIA 10 lists floodplain reconnection and the protection and restoration of presently functioning salmon streams as two of the highest priority actions for salmon recovery in the watershed. The Pierce County Rivers Flood Hazard Management Plan, adopted in 2012, included a significant shift from seeking to provide 100-year protections everywhere to providing differing levels of flood protection across the floodplain.

**Table 13. Puyallup/White Watershed Floodplains Summary and Highlights**

Cities and Towns	17 cities and towns including Sumner, Puyallup, Orting, and the Port of Tacoma
Assessed Value	\$2.7 billion assessed value Personal property losses could range from \$199 million to \$520 million King County portion of White \$55 million in exposed value (structure and content) and \$5.6 million in total 100-year damage (structure, content, damages)
Land Use	20% in medium to high development 8% in agriculture
Topographic Floodplain Acreage	36,825 acres
Regulatory Floodplain Acreage	24,901 acres
Percent of the Floodplain Connected to the River	52%
Mainstem Salmonid Species	Chinook, pink, coho, steelhead, chum, bull trout, cutthroat, sockeye
Length of Chinook salmon streams (miles)	765
% of stream segments tested with Category 5 (303d list) water quality impairments	67%
Key Facilities in the Topographic Floodplain	176
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Pierce County Flood Control Zone District</li> <li>• King County Flood Control District</li> <li>• Puyallup Watershed – WRIA 10 (Lead Entity)</li> <li>• South Central Area Caucus Action Group (Local Integrating Organization)</li> </ul>

### 4.3.10 Nisqually Watershed Floodplains

The Nisqually River passes through Lewis (26 percent of the total floodplain area), Thurston (16 percent), and Pierce (58 percent) counties as it makes its way from Mt. Rainier past two dams and then under I-5 before reaching the Puget Sound north of Olympia. The upper floodplain areas are above natural barriers and the dams and are thus limited to cutthroat trout, while the lower floodplain areas are home to many different fish species, including fall Chinook, coho, chum, pink and winter steelhead. The watershed’s floodplain areas are predominately rural residential with significant forestry in the upper portion.

**Table 14. Nisqually Watershed Floodplains Summary and Highlights**

Cities and Towns	McKenna
Assessed Value	\$73 million in Thurston County, \$17.1 million in Pierce County (Lewis County assessed value unavailable)
Land Use	2% in medium to high development 9% in agriculture
Topographic Floodplain Acreage	31,369 acres
Regulatory Floodplain Acreage	18,793 acres
Percent of the Floodplain Connected to the River	73%
Mainstem Salmonid Species	Chinook, steelhead, chum, pink, coho, sockeye, cutthroat
Length of Chinook salmon streams (miles)	278
% of stream segments tested with Category 5 (303d list) water quality impairments	85%
Key Facilities in the Topographic Floodplain	151
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Pierce County Flood Control Zone District</li> <li>• Thurston County</li> <li>• Pierce County</li> <li>• Nisqually River Council (Lead Entity)</li> <li>• Alliance for a Healthy South Sound (Local Integrating Organization)</li> </ul>

**4.3.11 Deschutes Watershed Floodplains**

The Deschutes River is located south of the Nisqually River and drains into Budd Inlet in Olympia, Washington. Though a relatively small river at 57 miles, the Deschutes traverses a large breadth of land uses from forestry, farm, and rural residential to urban. Thurston County calls the Deschutes the “fastest rising and falling river in Thurston County” as it responds quickly to rainfall and run-off.

**Table 15. Deschutes Watershed Floodplains Summary and Highlights**

Cities and Towns	Tumwater, Olympia, and Lacey
Assessed Value	\$148 million assessed value, \$17 million in potential flood losses
Land Use	1% in medium to high development 24% in agriculture
Topographic Floodplain Acreage	5,146 acres
Regulatory Floodplain Acreage	4,705 acres
Percent of the Floodplain Connected to the River	99%
Mainstem Salmonid Species	Coho, steelhead, cutthroat, coho, Chinook
Length of Chinook salmon streams (miles)	178
% of stream segments tested with Category 5 (303d list) water quality impairments	7%
Key Facilities in the Topographic Floodplain	33
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Thurston County</li> <li>• Lewis County</li> <li>• Stormwater and Surface Water Advisory Board</li> <li>• Alliance for a Healthy South Sound (Local Integrating Organization)</li> <li>• WRIA 13 Salmon Habitat Recovery Committee (Lead Entity)</li> </ul>

### 4.3.12 Skokomish Watershed Floodplains

The Skokomish River is the longest and most powerful river draining into Hood Canal. It is also the primary flood concern in Mason County. Formed high in the Olympic Mountains, the Skokomish has two forks, which combine to form the mainstem. The mainstem flows 9 miles before emptying into the southernmost end of Hood Canal. The North Fork Skokomish feeds Lake Cushman and the hydroelectric power plant at Potlatch (built by the City of Tacoma). The Skokomish River has been referred to by the National Weather Service as the “flashiest river in Washington, where a teaspoon of rain can result in flooding.” The Skokomish Reservation can become isolated and flood within a very short period of time. The US Army Corps of Engineers recently completed a draft report as part of a General Investigation seeking to restore the Skokomish ecosystem. Ecosystem projects in the General Investigation may also provide flood reduction as a secondary goal. Salmon recovery stakeholders have worked to ensure actions will address salmon recovery needs. The draft report is available for review during the spring of 2014.

**Table 16. Skokomish Watershed Floodplains Summary and Highlights**

Cities and Towns	Skokomish Tribal Reservation
Assessed Value	\$406 million across Mason County, \$1.2 million from repetitive loss properties
Land Use	0% in medium to high development 17% in agriculture
Topographic Floodplain Acreage	5,785 acres
Regulatory Floodplain Acreage	6,827 acres
Percent of the Floodplain Connected to the River	73%
Mainstem Salmonid Species	Steelhead, sockeye, chum, cutthroat, coho, pink, bull trout, Chinook
Length of Chinook salmon streams (miles)	190
% of stream segments tested with Category 5 (303d list) water quality impairments	0%
Key Facilities in the Topographic Floodplain	13
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Skokomish Flood Control Zone District</li> <li>• Hood Canal Coordinating Council (Lead Entity and Local Integrating Organization)</li> <li>• USACE General Investigation</li> </ul>

**4.3.13 Hamma Hamma Watershed Floodplains**

The Hamma Hamma River originates in the Olympic National Forest and flows into Hood Canal. The Hamma Hamma floodplains are relatively undeveloped compared to other Puget Sound floodplains and is primarily in forestry. Limited farming occurs in the lower river floodplain, and aquaculture is a key business at the mouth of the river. There are two U.S. Forest Service campgrounds and several hiking trails along the river. The channel migration zone is relatively large. The river is not considered to have significant flood risks, in large part due to the lack of significant development in the floodplain. Salmon recovery planning documents suggest that the restoration in the Hamma Hamma watershed is not designated as an immediate priority because of stable ownership in the watershed by one family dedicated to farming and aquaculture.

**Table 17. Hamma Hamma Watershed Floodplains Summary and Highlights**

Cities and Towns	None
Assessed Value	Not available
Land Use	0% in medium to high development 2% in agriculture
Topographic Floodplain Acreage	735 acres
Regulatory Floodplain Acreage	441 acres
Percent of the Floodplain Connected to the River	98%
Mainstem Salmonid Species	Steelhead, pink, coho, chum, Chinook, cutthroat
Length of Chinook salmon streams (miles)	12
% of stream segments tested with Category 5 (303d list) water quality impairments	15%
Key Facilities in the Topographic Floodplain	1
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Mason County</li> <li>• Hood Canal Coordinating Council (Lead Entity and Local Integrating Organization)</li> </ul>

#### ***4.3.14 Dosewallips and Duckabush Watershed Floodplains***

The Duckabush and Dosewallips Rivers originate in the Olympic Mountains, and most of their watersheds are located within the National Park and Forest boundaries (89 percent and 93 percent respectively). Even those portions of the floodplain outside of Federal ownership are largely forested. The two rivers flow into Hood Canal, and both are less developed than other Puget Sound watersheds. The Dosewallips River is listed as impaired due to temperature levels that exceed state standards. Dosewallips State Park hosts one of the largest public clam and oyster beaches in Puget Sound. The town of Brinnon and Dosewallips State Park occupy each side of the lower Dosewallips River floodplain and have experienced flooding, as have other rural residential properties and small platted communities present in the floodplain. Aging on-site septic systems are at risk of failure during flood events and have caused shellfish closures and threatened public health. The upper estuary of the Duckabush floodplain also floods periodically at times, impacting a local fire station. For these reasons, the rivers are considered to have a higher flood risk than the Hamma Hamma River. There is relatively little agriculture in either river's floodplain. The rivers support listed Chinook and summer chum salmon as well as coho, pink, and fall chum salmon and steelhead.

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**Table 18. Dosewallips and Duckabush Watershed Floodplains Summary and Highlights**

Cities and Towns	Brinnon
Assessed Value	Not available <sup>24</sup>
Land Use	Duckabush: 0% in medium to high development <sup>25</sup> 0% in agriculture Dosewallips: 1% in medium to high development 3% in agriculture
Topographic Floodplain Acreage	Duckabush: 606 acres Dosewallips: 992 acres
Regulatory Floodplain Acreage	Duckabush: 227 acres Dosewallips: 687 acres
Percent of the Floodplain Connected to the River	Duckabush: 94% Dosewallips: 91%
Mainstem Salmonid Species	Duckabush: Steelhead, chum, cutthroat, pink, coho, Chinook Dosewallips: Cutthroat, pink, chum, coho, steelhead, Chinook
Length of Chinook salmon streams (miles)	Duckabush: 27 Dosewallips: 45
% of stream segments tested with Category 5 (303d list) water quality impairments	Duckabush: 20% Dosewallips: 60%
Key Facilities in the Topographic Floodplain	Duckabush: 7 Dosewallips: 15
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Jefferson County</li> <li>• Flood Control Zone No. 1 (Dosewallips) – inactive</li> <li>• Brinnon Flood Control Subzone – inactive</li> <li>• Hood Canal Coordinating Council (Lead Entity and Local Integrating Organization)</li> </ul>

<sup>24</sup> Assessed values for all the listed Hood Canal floodplains could be calculated based on local review input. Additional analysis will be completed in 2014.

<sup>25</sup> Local reviewers questioned why this is 0% when the floodplain is “largely constrained by development on both sides.” Additional review will be completed in 2014.

### 4.3.15 Quilcene Watershed Floodplains

The Big Quilcene River, which drains into Hood Canal at Quilcene Bay, has seen flooding and flood damage since the 1980s. Rural residential and agricultural properties are at risk from flooding, as is public infrastructure, including county roads, a bridge, and culverts. Flooding on the Big Quilcene also has a water quality and public health impact as septic systems flood. This has damaged salmon habitat and threatened the multi-million dollar shellfish industry and public shellfish resources in Quilcene Bay. Hood Canal summer chum and Puget Sound steelhead are important listed species of focus for this area’s recovery efforts.

**Table 19. Quilcene Watershed Floodplains Summary and Highlights**

Cities and Towns	Quilcene
Assessed Value	Not available
Land Use	0% in medium to high development 22% in agriculture
Topographic Floodplain Acreage	711 acres
Regulatory Floodplain Acreage	492 acres
Percent of the Floodplain Connected to the River	85%
Mainstem Salmonid Species	Steelhead, chum, coho, pink, cutthroat, Chinook
Length of Chinook salmon streams (miles)	38
% of stream segments tested with Category 5 (303d list) water quality impairments	0%
Key Facilities in the Topographic Floodplain	14
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Jefferson County</li> <li>• Inactive Flood Control Zone Districts for the Big Quilcene and Little Quilcene</li> <li>• Hood Canal Coordinating Council (Lead Entity and Local Integrating Organization)</li> </ul>

**4.3.16 Dungeness Watershed Floodplains**

The Dungeness River originates in the Olympic National Forest and flows for 32 miles before emptying into the Strait of Juan de Fuca. The lower river flows through a floodplain with a mix of forested areas, agriculture, and rural residential development associated with the City of Sequim. Flooding in the Dungeness frequently causes deposition of sediment, scouring and erosion, and channel avulsion. River channels have been known to move by hundreds of feet in a single flood. Three residential areas on the Dungeness are considered to be at high risk from flooding, even from a small flood. There are levees and other forms of bank protection at various points along the lower 10 miles of the river. Agriculture is a major land use in the Dungeness, which is unique among Puget Sound floodplains for its largely irrigated farmlands. Channel migration often leaves irrigation outtakes “high and dry.” Salmon recovery has been a focus of effort for many years and many people working on the flood risk reduction side are also active salmon recovery proponents.

**Table 20. Dungeness Watershed Floodplains Summary and Highlights**

Cities and Towns	Residential development in proximity to Sequim
Assessed Value	Not available
Land Use	Information not available at this time.
Topographic Floodplain Acreage	Information not available at this time.
Regulatory Floodplain Acreage	1,157 acres
Percent of the Floodplain Connected to the River	Information not available at this time.
Mainstem Salmonid Species	Sockeye, pink, cutthroat, chum, bull trout, steelhead, Chinook, coho
Length of Chinook salmon streams (miles)	Information not available at this time.
% of stream segments tested with Category 5 (303d list) water quality impairments	Information not available at this time.
Key Facilities in the Topographic Floodplain	Information not available at this time.
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Clallam County</li> <li>• North Olympic Lead Entity for Salmon</li> <li>• Dungeness River Management Team</li> <li>• Dungeness Irrigation District</li> <li>• Strait Ecosystem Recovery Network (Local Integrating Organization)</li> </ul>

### 4.3.17 Elwha Watershed Floodplains

The recent removal of Elwha Dam and the ongoing removal of Glines Canyon Dam have made the Elwha River floodplain very dynamic. Dam removal is expected to increase channel migration and erosion. However, existing development is largely located outside the floodplain and channel migration areas. There are levees along the lower three miles of the river, and levees adjacent to the Lower Elwha Klallam Tribal Reservation. The tribal levees were recently expanded in expectation of increased flood levels after dam removal. Salmon recovery stakeholders are excited to see how salmon respond to the removal of the dams and new access to high quality habitats upstream.

**Table 21. Elwha Watershed Floodplains Summary and Highlights**

Cities and Towns	Lower Elwha Klallam Tribal Reservation
Assessed Value	Not available
Land Use	0% in medium to high development 1% in agriculture
Topographic Floodplain Acreage	3,115 acres
Regulatory Floodplain Acreage	2,357 acres
Percent of the Floodplain Connected to the River	94%
Mainstem Salmonid Species	Coho, bull trout, steelhead, pink, cutthroat, chinook, chum, sockeye
Length of Chinook salmon streams (miles)	155
% of stream segments tested with Category 5 (303d list) water quality impairments	65%
Key Facilities in the Topographic Floodplain	13
Flood and Salmon Management Groups	<ul style="list-style-type: none"> <li>• Clallam County</li> <li>• North Olympic Lead Entity for Salmon</li> <li>• Strait Ecosystem Recovery Network (Local Integrating Organization)</li> </ul>

## 5 CHALLENGES TO INTEGRATED FLOODPLAIN MANAGEMENT

Although achieving the state and region's salmon recovery and flood risk reduction goals is possible through adoption of an integrated approach, there are several significant challenges inhibiting success. To identify and understand these barriers, the FbD team pulled information from past reports, conducted an online survey, convened a workshop of over 150 floodplain stakeholders, and hosted multiple smaller workshops and discussions with local project proponents and floodplain managers. A draft white paper titled "Puget Sound Floodplains: Next Steps for Integrated Management" was developed in September 2013 based on these discussions, and updated information from that paper is included in this section. The local and regional participants in our online survey and workshops most commonly identified the following list of challenges as critical to address if we are to successfully achieve the Floodplains by Design vision.

1. Lack of locally integrated floodplain management visions, strategies, and sets of actions.
2. Conflicts between Federal, state, and local policies, programs, regulations, and funding.
3. Uncertainty in the future of Federal programs that are part of the foundation for how floodplains are managed.
4. Inadequate protection of naturally functioning floodplain areas.
5. Insufficient funding and lack of funding alignment with an integrated vision, strategy, and suite of actions for floodplain management.
6. Unpredictable and inefficient process for permitting projects and ensuring ecological outcomes are met.
7. Lack of effective partnerships with landowners to develop a realistic and implementable suite of actions that achieves floodplain goals.
8. Lack of capacity and governance structures at the local and regional levels needed to implement a much larger set of actions on the ground in a shorter period of time.

Each of these challenges is addressed in more detail below.

### 5.1 Need for locally integrated floodplain management visions, strategies, and sets of actions

Many local plans, regulations, programs, and funding sources are aimed at the continued growth and prosperity of floodplain communities, agriculture, recreation and open space, or the protection and restoration of species or ecosystem functions.

However, while there are innovative examples<sup>26</sup> across Puget Sound of integrated programs and projects that successfully address multiple values, efforts are frequently directed at supporting only one of the values. This results in conflicts or programs ultimately working at cross-purposes<sup>27</sup>. It is timely and critical to foster an integrated vision, strategy, and set of actions for each major Puget Sound floodplain that shows the pathway and trade-offs necessary to consider if we are to more effectively advance the various values sought in each of these local communities.

However, developing an integrated program at the local floodplain level is inherently challenging because of the time, money, and resources necessary to successfully engage the affected parties in a complex technical, policy, and political process. Achieving an integrated floodplain management program inherently requires better alignment of Federal, state, and local policies; funding programs; technical resources; and regulations. There is a timely need and growing capability for a unified vision and set of actions across flood control plans and salmon recovery plans, nearshore restoration plans, agricultural needs, and city and county comprehensive plans.

## 5.2 Conflicts and uncertainty of Federal, State, and local policies, programs, regulations, and funding

It is not just local managers and planners that have an opportunity to better integrate their efforts. Federal and state planning processes, regulations, and policies have institutionalized conflict between various floodplain values, significantly hindering the ability to develop or implement integrated floodplain programs. The following list captures issues that inhibit an integrated vision, strategy, and suite of floodplain actions. These issues are important to either address directly or through alternative pathways that allow local efforts to move forward.

- Key Federal programs that have been the backbone of flood risk reduction and flood response inhibit integrated management.
  - a. USACE PL 84-99: The levee management requirements to qualify for Federal flood disaster assistance conflict with state and Federal requirements for water quality and species protection by encouraging the removal of trees that provide shade and other habitat functions.

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<sup>26</sup> For example, the Calistoga Setback Levee Project on the Puyallup River is designed to reduce flood risks, restore salmon habitat, improve water quality and create a public trail. The Fisher Slough project on the Skagit River was designed to restore fish and wildlife habitat, increase flood storage, improve agricultural drainage infrastructure and improve water quality.

<sup>27</sup> For example, millions of dollars are spent annually through a variety of flood mitigation or infrastructure management programs to constrain rivers through the building, maintenance and repair of levees and revetment to protect people and infrastructure while millions are spent annually through separate habitat oriented programs to remove river constrictions to restore floodplain habitats and processes. Both types of programs are important, but pursuing them independent of one another can result in conflicting outcomes or sociopolitical conflict.

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- b. USACE and FEMA programs encourage new development or rebuilding in flood risk areas by reducing flood risks or paying for reconstruction, which at times can be in conflict with maintaining natural flood storage capacity and the protection or restoration of ecosystem functions.
  - c. FEMA and USACE benefit-cost analyses typically do not value the environmental costs or benefits of projects such as improved water quality, supporting salmon recovery under the Endangered Species Act, increased resilience to climate change, or other ecosystem service impacts.
  - d. FEMA flood insurance mapping and rates are changing due to recent policy changes and it is unclear what effect these changes will have relative to GMA requirements for directing growth into existing incorporated areas in floodplains.
  - e. USACE and FEMA funding for flood risk management are diminishing and policies frequently don't support approaches to floodplain management that address multiple local interests. For example, local governments that prevented urbanization of their floodplain may no longer meet benefit-cost criteria, thus failing to qualify for Federal flood support.
- State and local programs further complicate integration of floodplain management.
    - a. Local jurisdictions are required to meet a variety of separate mandates: e.g. state environmental standards call for no net loss of ecosystem functions; locally adopted salmon recovery and nearshore restoration plans call for significant improvement to ecosystem functions; county policies and programs seek no net loss of farmlands; counties and cities seek reduced flood risk for economic development; and the Growth Management Act promotes growth in designated urban growth areas even if they are at risk of flooding.
    - b. Local governments may avoid acquiring frequently flooded and contaminated sites since state assistance has been terminated. Thus, known contaminated sites continue to degrade water quality.
    - c. There is insufficient coordination of local land use decisions related to flood risk reduction. For example, a regional medical facility was recently built behind a levee system only designed to contain the 25-year flood. There is no funding readily available to increase the levee's level of protection.
    - d. Agriculture is frequently the preferred floodplain use in local comprehensive plans based on the assumption that it requires less flood control investment. However, many agricultural activities may

not be economically sustainable when subjected to potential future increases in flood frequency or magnitude, changing seasonality of flooding, decreased drainage capabilities, or migrating river channels.

- e. Local, state and federal programs seeking to protect farmlands in perpetuity have placed easements on parcels that preclude using the property for restoration or flood risk reduction projects.
- Federal programs are sometimes implemented in manners which contribute to local frustration, ill will, and confusion about flood risk and consequence.
  - a. FEMA and USACE floodplain mapping does not always utilize the best available local data or include climate change information. At times, mapping exercises result in conflicting findings across Federal and state agencies.
  - b. Rules and guidelines sometimes inhibit reasonable options. For instance, railroad grades cannot be considered as levees for liability purposes even though they function as such. This can result in significant local consequences for insurance rates and development standards due to factors other than actual flood risk.
  - c. Federal levee accreditation and certification processes and results allow people to perceive they are “no longer in the floodplain.” This impacts local development and regulations, public support for risk management efforts, and public willingness to acquire and maintain flood insurance. Already, less than half of landowners within the FEMA 100-year floodplain carry flood insurance.
  - d. Several USACE programs (in addition to mapping) do not include or account for climate change, which creates uncertainty as to whether infrastructure being built is sufficient for future needs.

### **5.3 Changing Federal programs causes uncertainty about the future**

The Federal landscape, a major underpinning for current floodplain management, is undergoing rapid changes. This includes examples such as the FEMA Biological Opinion; the 2012 Biggert-Waters legislation and recent revisions by Congress affecting FEMA flooding insurance rates, mapping, and post-disaster financing; the USACE changes to levee certification; the PL 84-99 program benefit-cost analysis; institution of the USACE System-Wide Improvement Framework program; and other shifts. Tribes, diking districts, cities, counties and other stakeholders may or may not hear of changes, be able to plan strategically, or benefit from a broader discourse about what is happening. As fundamental programs and assumptions that have underlain floodplain management for decades continue to change, the future will likely be very different from the past. Some of these changes are consistent with the goals of FbD as national policy-makers strive to address the inter-relationships between federal flood risk goals and clean water and endangered species goals.

### 5.4 Protection of naturally functioning floodplain areas

The Puget Sound Chinook Salmon Recovery Plan, developed by the state and tribal salmon co-managers and adopted by the National Marine Fisheries Service (NMFS), identified protection of existing habitat as the most important action needed in the short term. Despite this commitment, a 2010 assessment by NMFS of the Puget Sound Chinook Salmon Recovery Plan declared that habitat is still declining and protection efforts need improvement. Salmon recovery targets are based on the crucial premise that existing habitat will be protected while degraded habitat is restored. A report by the Treaty Tribes of Western Washington, *Treaty Rights at Risk*, states that significant investments in recovery may not be realized because the rate of habitat loss continues to outpace restoration. The report points out that Federal, state and local governments have existing tools that they could employ to better protect habitat and support salmon recovery, but in many cases those tools are either misapplied or not being implemented adequately<sup>28</sup>.

Efforts to protect existing ecological functions are addressed by Federal, state, and local governments through land use policies and through the permit process on a site-by-site, project-by-project basis.

A number of factors contribute to the limited effectiveness of programs aimed at protecting existing ecological functions:

- Land use policies and programs at each level of government are often trying to balance multiple interests and values which often don't result in the optimum solutions for fish.
- With individual project-by-project permitting occurring absent a larger context, it is difficult to deliver the ecological results necessary for salmon recovery and ecosystem improvements. For example, some project proponents have described requirements to mitigate for impacts to human-made wetlands that are disconnected from river ecosystems even as they are setting levees back to restore ecosystem processes that will create and maintain more ecologically functional wetland habitats.
- Voluntary landowner incentives provided through a variety of state and federal programs have not resulted in the scale of ecosystem protection or improvements necessary to achieve ecological goals.
- Enforcement of existing local, state, and Federal rules and regulations is not protecting existing ecological functions from continued degradation.
- There is not a clear strategy to address the past approval of land subdivisions, which has created hundreds of lots in floodplains that local governments must either allow to be developed or purchase outright.

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<sup>28</sup> NWIFC. 2011. Treaty Rights At Risk: Ongoing Habitat Loss, the Decline of the Salmon Resource, and Recommendations for Change. More information can also be found at: <http://treatyrightsatrisk.org/>.

- Channel migration studies show the potential changes to come for many of the major rivers. Most systems have no strategy to address the coming conflict between existing uses and ecological functions as river channels migrate.

## **5.5 Insufficient funding and lack of alignment with an integrated vision, strategy and suite of actions for floodplain management**

Ecosystem restoration projects as well as flood facility maintenance and improvement projects are becoming increasingly complex and expensive to undertake. Funding is not sufficient to support the progress that is needed. This issue is discussed more in Section 6.5 (Coordinated Investment Strategy).

This deficit is compounded by the fact that funding sources are frequently focused on one key value making it difficult to implement innovative projects that address multiple values. The institutional structure and funding at the local level is often siloed by individual issue.

There are several ways current funding levels and sources are inhibiting progress:

- There is a lack of ongoing, dedicated funding necessary to ensure that multiple floodplain interests and needs can be pursued in a timely fashion.
- Existing sources of funding fail to fund multiple-benefit projects, which can't compete against projects and funding sources focused solely on one aspect of floodplain management. For instance, a multiple-benefit project that addresses stormwater, open space for urban vitality, salmon recovery, and flood risk reduction may not compete well for salmon funding against a project focused solely on salmon recovery even though the overall return on public investment may be greater.
- There is a lack of capacity funding to foster an integrated vision, strategy, and suite of actions at the floodplain and Puget Sound scales.
- There is a lack of capacity funding to address issues such as conflicting policies and regulations or to track changes in Federal programs.

## **5.6 Unpredictable and inefficient permitting process**

Project proponents have indicated that securing permits for floodplain projects can take years and be very costly. They believe the process is uncertain in regard to the time it will take, the number and type of studies that will be necessary, the cost and staff time required, and the environmental results. This jeopardizes grant funding when projects can't be completed within certain windows and consumes already limited staff time and funds. It also generates ill will amongst those trying to do the right thing because they feel penalized rather than supported and guided.

The following significant challenges have been identified:

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- State and Federal permit processes focus almost solely on achieving or protecting ecological benefits at the project site without a connection to other actions occurring in the floodplain. Given the scale at which hydrogeomorphic and ecological processes occur, long-term habitat and flood management goals are unlikely to be met without a larger-scale strategy and plan that involves a series of actions. The site-scale nature of permitting is not conducive to evaluating these large scale management needs.
- Lack of clear guidance and requirements in the permit process means getting a permit can become highly dependent on the interests and skills of the specific permit review staff.
- Often regulators have no internal time requirements, so the permit review process proceeds with no clear end point.
- Regulators can ask for studies and information without having to consider cost or timing implications, explain why information is needed, or disclose how the information will be used.
- Permit review staff can be unauthorized or reluctant to support non-traditional or unorthodox project approaches focused on achieving multiple benefits.
- Staff expertise is not always perceived to be sufficient. Especially with large-scale projects, biologists are forced to weigh in on engineering issues. In other instances, the regulatory feedback is focused on what can't be done rather than offering alternative ways to be successful<sup>29</sup>.

### 5.7 Need for partnerships with landowners to develop a realistic and implementable suite of actions that can achieve floodplain goals

Much of the land adjacent to Puget Sound rivers is privately owned and of high economic and personal value. The fact that many of the lands sought by flood managers and those focused on ecosystem restoration are privately held has made setting and achieving floodplain management goals difficult, and at times has strained relationships with private landowners. It is imperative that a realistic and implementable suite of strategies and actions be developed for long-term success. Additionally, landowners need to be more involved in shaping the vision for the future of floodplains for any plan to be successful over time. Incentives that more directly address landowner needs or interests may be necessary. Also, as the nation and the state are less willing and able to subsidize high risk and high cost development, landowners adjacent to rivers may face different choices and risks if they continue to reside next to Puget Sound rivers. Some issues include:

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<sup>29</sup> It is important to note there may be legal reasons why regulators do not offer alternative solutions.

- There is a need to foster partnerships with landowners to create a vision for river valleys that inspires their support and participation.
- Many current incentive packages and programs to acquire parcels or portions of parcels are frequently insufficient and don't address the landowners' interests for use of their property.
- It is unclear what is feasible in the short-term given current land ownership and how close the current set of proposed floodplain projects move the region towards achieving its flood risk reduction and ecosystem recovery goals.
- Moving people out of harm's way is complicated by several factors:
  - a. People don't want to leave because of the natural amenities or the low cost of housing in high flood risk areas.
  - b. Federal flood insurance and disaster relief programs incentivize staying by subsidizing insurance costs or transferring the costs of living in floodplains to other taxpayers.
  - c. Current flood infrastructure promised protection, and businesses and private property owners have made significant financial and personal investments based on that promise.
  - d. Using condemnation for flood risk reduction measures has been a tool of last resort, as government seeks to value individual property rights. Condemnation is simply not a politically viable option for restoration projects.

## **5.8 Lack of local and regional capacity and governmental structures sufficient to implement the floodplain management vision and strategy**

Many different governments and organizations play a role in floodplain management. As projects become increasingly complex in an ever shifting regulatory and funding landscape and as many government agencies have reduced overall staff sizes, having the expertise and staffing levels necessary to achieve stated floodplain goals are increasingly difficult to attain. Salmon recovery and other ecosystem restoration efforts are only provided support to work on their issues of focus. Diking districts and other single purpose governments are not designed to operate at the system-wide scale and need additional time and support to be part of an integrated floodplain management approach. If we are to continue to transform floodplain management, then current structures, staffing levels, and partnerships are likely insufficient.

Some issues include:

## Floodplains by Design

- There needs to be capacity at the local and regional levels to coordinate all the various interests to develop and achieve an integrated floodplain vision and strategy.
- Certifying, accrediting, designing, and building a range of floodplain projects is increasingly challenging. Success will require additional staffing (likely at all levels of government) if more projects are to be built quicker while maintaining certainty that desired results for the variety of interests will be delivered.
- Management and governance structures may need to be assessed and modified to be more efficient and effective as the barriers in and between flood risk reduction, ecosystem protection, ecosystem restoration, and economic development continue to be removed.

## 6 ACCELERATING INTEGRATED FLOODPLAIN MANAGEMENT

All of the issues noted in Section 5 (Challenges to Integrated Floodplain Management) are critical to achieve better management of floodplains in Puget Sound and to accelerate actions that achieve multiple benefits. However, the Floodplains by Design Partnership needed to set priorities for its focus over the last year due to limited resources and a goal to produce results of significance. With input from an advisory committee and project partners, the following actions were identified as priorities:

- Developing tools, improving processes and creating funding to support local integration at the river corridor scale;
- Providing enhancements to the permit process;
- Improving alignment of key infrastructure programs with integrated goals;
- Creating a regional vision and documenting the need for funding and other actions to achieve the vision;
- Increasing the amount of funding; and
- Improving coordination across fund sources to increase effectiveness and reduce administrative burdens.

The following section describes progress made on the immediate actions and recommended next steps.

### 6.1 Supporting Integrated Floodplain Management at the River Corridor Scale

#### *6.1.1 Why Integrated Floodplain Management at the Local Level is Needed*

Local Jurisdictions are required to meet a variety of regulatory obligations related to floodplain management, including flood hazard mitigation, salmon recovery, shoreline access, agricultural preservation, economic development and open space/recreation. Each of these issues has a number of parties that have a stake in how floodplains should be used. Without an integrated approach, different interests can see others as threats to their own viability and prosperity. For example, work to restore floodplains for salmon habitat has at times been opposed by agricultural and other business interests because it takes land out of economically productive uses. Likewise efforts to maintain or improve flood control facilities have been opposed by environmental interests because they impact salmon habitat or water quality.

Changing climate conditions and watershed development are making floodplains more dangerous for residents. The increased frequency and duration and altered timing of flooding, as well as more pronounced droughts, is having a significant

impact on agriculture and residential areas in major river floodplains. The increasing complexity of the regulatory environment is making it harder to build and maintain projects in the floodplain, whether it is a project to improve flood control infrastructure, restore salmon habitat, or maintain agricultural drainage.

Projects that involve building or improving flood control or other water infrastructure are costly and the need for capital project funding is well short of need on both the flood risk and ecosystem recovery fronts. Project cost-effectiveness, and the number of funding sources available, can be increased if projects can be designed to achieve multiple objectives. It can be difficult to permit and build public support for projects that have a narrow geographic or technical scope because of uncertainty about how the project will function in the larger system and how it will impact neighbors. Projects that do not include a wide range of stakeholders from the start may find it difficult to garner landowner support or are subject to appeals and oppositional pressure. Overall, the narrow approach we've taken to developing floodplain projects is not providing effective flood risk reduction, salmon recovery, or agricultural viability.

### ***6.1.2 What is Corridor-Scale Integrated Management?***

Integrated management is a way to look at the river corridor and identify a suite of projects and actions that addresses multiple benefits and advance the interests of multiple stakeholders. The geographic scale varies depending on the issues and characteristics of the floodplain and communities, but the scale is larger than an individual project site and can be miles in length (see Table 22). Integrated planning brings diverse interests together to have constructive conversations upfront and then move forward together to identify the best use of the river's floodplain areas. Integrated management involves technical analyses and engaging the public and affected parties to find the right solution to the many challenges and opportunities facing floodplain areas. As shown in the following section, many jurisdictions across Puget Sound have started corridor-scale integrated management efforts for their floodplain areas.

### ***6.1.3 Current River Corridor Integrated Management Processes***

Table 22 lists current corridor-scale planning processes throughout Puget Sound.

**Table 22. Current Local Integrated River Corridor Processes**

Planning Effort	Length of River	Unique Conditions
Cedar River	21.5 Miles	Channel migration risks in residential areas; dredging in Renton to protect Boeing plant.
Dungeness	31.9 Miles	Diked floodplains & continued land conversion are problematic for water quality, quantity and habitat. Working to integrate flood risk, habitat and agricultural interests.
Pysht	16.3 Miles	Integrating flood hazard reduction to highway and residences with instream and floodplain restoration to create salmon habitat and improve water quality.
Green River SWIF	57.3 Miles	Highly developed floodplain.
Skagit Delta Farm Fish and Flood Initiative	10 Miles	Integrating flood risk, salmon, and agricultural interests.
Snohomish Sustainable Lands Strategy – Snohomish River		Integrating flood risk, habitat, and agricultural interests.
Snohomish Sustainable Lands Strategy – Stillaguamish River		Integrating flood risk, habitat, and agricultural interests.
Snoqualmie – Fall City Reach	3 Miles	Integrating flood risk, habitat, and agricultural productivity.
Snoqualmie – Middle Fork	5 Miles	Channel migration risks to residential areas in North Bend.
Snoqualmie – South Fork	3.5 Miles	Flood inundation risks to commercial areas in North Bend and I-90.
Tolt River	6 miles	Channel migration risks to homes and roads; priority habitat area for salmon.
Whatcom County SWIF	36 miles	Levees that may be removed from the PL 84-99 program, agricultural interests.
Skokomish River		General Investigation for ecosystem restoration that takes flood risk reduction into account as a secondary benefit

#### ***6.1.4 Incentives and Barriers to Participate in Corridor Integration***

There are many incentives to participate in corridor-scale integrated planning efforts. Such efforts can help local governments, tribes and other project proponents build broad support for projects, solve multiple problems with one set of projects, avoid building multiple projects, access multiple funding streams, and meet a variety of regulatory obligations. Said simply, integrated floodplain management can bring more political support, more funding, and greater efficiency.

Proponents of salmon recovery often choose to participate in integrated planning processes in order to pursue net environmental gain, build support for restoration projects with agricultural communities and other stakeholders, access additional

funding streams, and provide input on plans and locations of flood risk management activities. Incentives for agricultural interests include the opportunity to secure support for upgrading drainage and flood control infrastructure, pursue funding to support the economic viability of agriculture, provide input on plans and locations for restoration projects, leverage technical information to identify needs and weaknesses in infrastructure, and pursue permitting certainty for maintenance of infrastructure. Flood managers participate in integrated planning because it: 1) provides opportunities to determine the best solutions for adjacent landowners, 2) addresses complex issues regarding water quality and aquatic species, and 3) builds consensus amongst stakeholders that facilitates approval of their projects. For all participants, integrated planning efforts provide a pathway to a positive outcome.

Current barriers to participation in corridor integration are largely related to a lack of resources. Many jurisdictions do not have the funding, time, or skill to do this type of collaborative planning. Another major barrier is the lack of certainty that regulatory agencies will support the results of the collaborative process. It is often difficult to determine how to cost-share multiple-benefit project implementation, or the longer-term monitoring and adaptive management that needs to occur to ensure project goals are met. In many cases, it can be difficult for stakeholders to quantify their needs. And it can also be difficult to maintain a coalition of support over time due to participants not getting reelected, retiring, or being too busy. Many of these barriers can be overcome with greater resources and with greater understanding across elected officials, agencies, and stakeholders of what integrated corridor-scale planning is and what it can achieve. As integrated floodplain management becomes the norm, it will become easier.

### ***6.1.5 Components of Corridor Integration Work***

There are many components to successful corridor-scale integration planning. The key elements of work are project startup, technical work, stakeholder engagement, funding coordination, developing an action plan, project design and permitting, and implementation. These elements are described in more depth below. They are not intended to be done consecutively – outreach and technical work should be pursued concurrently and should inform each other, and both elements will continue throughout the development of an action plan and implementation. See the flowchart below for an example of how these tasks should be coordinated.

**Project startup.** At the beginning of the integrated planning process, it is necessary to identify a project lead with the expertise to deliver the technical work and the credibility to bring the stakeholders together. It is also necessary to define the problems and objectives that are of most interest to the key stakeholders.

**Technical work.** Technical work includes studies to determine how the systems functioned in its natural condition, how it functions under existing conditions, and how it will function in the future after projects have been implemented. This element also includes communication of the technical information to stakeholders and the public. The work should help participants understand the floodplain system

for flooding, ecosystems, agriculture, and other critical goals. Essential to this effort is the integration of technical information related to the diverse interests and goals of river corridor partners. It is challenging to develop comprehensive benefit-cost assessments that address all of the potential stakeholder interests equally because the issues are so diverse and because of differences in data quality and availability. However, it is essential to integrate technical information to the greatest extent possible to enable effective comparison of the relative benefits likely to result from implementation of alternative potential projects.

**Engaging Stakeholders and Public Outreach.** Outreach and engagement, which should be conducted alongside the technical work, includes the identification of key stakeholders, forming committees or other engagement mechanisms, setting goals, and developing a public outreach plan.

**Funding coordination.** Corridor-scale planning groups should convene relevant funding agencies to discuss opportunities to align resources to achieve multiple benefits.

**Develop an action plan.** The outreach and technical work should lead into the development of an action plan, which should include the development of criteria for evaluating projects, identification and screening of projects, and the selection of a package of projects.

**Implementation.** Implementation can include early action projects, detailed engineering, permitting, construction, and monitoring of projects, and sharing of the results with stakeholders and the interested public.



### ***6.1.6 Resources Needed for Corridor-Scale Integrated Management***

Corridor-scale integrated management is a time-intensive process that requires significant funding not only for technical studies, permitting, project construction, and monitoring, but also for outreach to stakeholders and an effective public involvement process. Costs of technical studies and engagement processes can range from several hundred thousand dollars to several million. It often takes multiple years to produce an integrated action plan and set of projects. These planning processes require a host entity, such as a county government, with the capacity and expertise to effectively coordinate both the technical and stakeholder engagement work. Integrated planning requires state and Federal agency support and efficient and consistent permitting, along with understanding from permitting agencies of the project objectives and how packages of projects work together across the river corridor to address multiple interests. Integrated planning also requires local and region-wide support to provide consistent funding to carry out the planning process and implement the projects.

### ***6.1.7 Tools for Improving/Facilitating Integrated Planning***

River corridor integration enables diverse stakeholders to collaborate for the design and implementation of multiple-benefit projects. Essential to this effort is the integration of technical information related to the diverse interests and goals of river corridor partners. For example, analysis of flood risk and hazards needs to be integrated with information about salmon habitat, water quality, agriculture, and recreational, cultural and other relevant issues. It is challenging to develop comprehensive benefit-cost assessments that address all of the potential stakeholder interests equally because the issues are so diverse and because of differences in data quality and availability. However, it is essential to integrate technical information to the greatest extent possible to enable effective comparison of the relative benefits likely to result from implementation of alternative projects or different suites of projects.

One example of an approach to integrate technical information is a complex and robust decision support tool under development by Floodplains by Design in coordination with Snohomish County's Sustainable Lands Strategy. This decision support tool (DST) will consist of an online data and map visualization platform that will enable users to seamlessly view technical outputs related to multiple issues in interactive and dynamic ways. For example, this tool will allow users to simultaneously view priority areas for salmon habitat, priority areas for agricultural production, and areas most vulnerable to flooding. Although development, design, and programming of such an application can be costly and time-consuming, this type of tool provides a powerful platform for integration of technical information and communication to a broad array of audiences. The DST is designed to serve as a transferable mapping platform that can be used more cost-effectively than developing a new mapping tool from scratch.

### **6.1.8 Next Steps**

The FbD Partnership is committed to assist current and new local efforts to develop integrated visions, goals and actions. The team will convene the leaders of these local integration efforts from across Puget Sound to facilitate learning from each other about how to address common issues such as effectively engaging the agricultural community and to discuss how tools such as the DST can facilitate the development of projects and other actions to achieve the multiple-benefits desired in each local community. Floodplains by Design will continue to advocate for the effective involvement of state and Federal agencies in the local processes and for their overall support of the combined effort across Puget Sound. Floodplains by Design will also advocate for funding to be made available to cover pre-construction as well as construction costs. There will be a joint effort with the leaders of the local processes and the FbD Partnership to define the measurable results that can be achieved over the near- and long-term.

## **6.2 Enhancements to the Permit Process**

### **6.2.1 Dedicated Technical and Permit Assistance Team**

In October 2013, the Floodplains by Design Partnership held a workshop for local jurisdictions and agency staff to discuss barriers to multiple-benefit floodplain projects. Participants in the workshop identified the permitting process as one of the main barriers to constructing floodplain projects in a timely and cost-effective manner. A follow-up meeting to discuss permitting was held with a group of multiple-benefit floodplain project sponsors in December 2013.

In the permitting meeting, the project sponsors agreed that the permitting process is often unpredictable and dependent upon specific agency personnel assigned to the project. In some cases the Federal permits are most challenging and in other cases the local and state permits are most difficult. Some of the challenges with the permitting process include:

- Requirements can vary from project to project given that the application of permit policies to highly variable projects is somewhat subjective in nature;
- Regulators do not have clear timelines for permit review or are not always able to meet the statutory review timelines;
- There is significant turnover in the regulatory staff and it is common to have a change in the permit staff during the course of the regulatory review process for a project;
- Regulatory staff often don't have expertise in all technical aspects of the project and often appear not to have technical experts to consult with;
- Guidelines can be interpreted so narrowly as to undermine the intent of the regulations (for example, requiring wetland mitigation for specific site-scale

- impacts of a project that is designed to restore larger-scale ecological processes that create and sustain functioning wetlands);
- Opportunities to combine mitigation requirements with actions related to stormwater flow or water quality treatments are limited by agency regulations or policies;
  - The process for project sponsors and permit staff to come to agreement on project impacts and mitigation requirements and receive needed permits takes significant time; and
  - The applicant bears the responsibility to integrate and reconcile conflicting or overlapping permitting conditions/requirements.

The list of challenges above is from the perspective of project sponsors. Permitting agencies have also identified challenges that make it difficult to issue permits in a timely and cost-effective manner. Permit applications can be incomplete or poorly developed. Applicants can be unaware of the numerous permits and statutes that govern their projects and engineering designs can be completed before understanding all the potential requirements.

In discussions with project sponsors and regulatory agency staff, creation of a floodplain permitting team was identified as one of the most effective ways to overcome the challenges listed above. The Puget Sound Partnership has also identified the need to improve permitting for salmon recovery projects. This section outlines the proposed solution, including the following elements:

- A list of the types of projects that may need to be permitted to pursue multiple-benefit solutions;
- An outline of the permits typically needed for floodplain projects;
- A description of a permitting team as a way to improve the efficiency of project permitting;
- Descriptions of two example programs (the WSDOT Liaison Program and the Shellfish Interagency Permitting Team);
- Potential objectives for a permitting team;
- A description of how a permitting team could be structured;
- Other tools for permitting multiple-benefit projects; and
- Next steps estimate the workloads, expertise, and cost for a dedicated team.

### **6.2.2 Projects to Permit**

Multiple-benefit floodplain projects are defined as including flood risk reduction and ecosystem restoration benefits, such as setback levees. They often include other benefits for agriculture, open space, recreation, and water quality improvements. They can be single site projects or a suite of interconnected projects

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along a major river corridor. They can include a mix of green and gray infrastructure, such as the combination of an urban levee with an upstream floodplain reconnection to increase in natural flood storage (and habitat) or a setback levee that partially restores natural flood storage while ultimately relying on an engineered structure. These projects often need to address a complex array of economic, social, and ecological objectives that are designed to move forward together.

Based on conversations with planners and project sponsors involved in major river corridor-scale efforts, the following types of projects may need to be permitted:

- Removal of rip-rap,
- Construction of in-water flood fences,
- Construction of logjams,
- In-stream habitat enhancement projects,
- Channel splits,
- Island splits,
- Maintenance of existing diking and drainage infrastructure,
- Improvements to existing diking and drainage infrastructure,
- Installation of methane digesters (in agricultural settings),
- Levee setbacks,
- Creation and/or restoration of estuary habitat,
- Levee or revetment removal,
- Levee breaches,
- Drain tile replacement/removal,
- New drain tile placement,
- Flood gate and pump installation, maintenance, or replacement,
- Dredging of waterways (ditches, straightened streams, or natural streams),
- Channel creation/maintenance (e.g., tidal channels, distributary channels, side channels),
- Culvert replacement/removal, especially for fish barrier culverts,
- Road realignment/reconstruction,
- Farm pads/critter pads (fill in the floodplain for purposes of keeping farm animals or equipment safe during floods),
- Elevation of existing homes in the floodway or floodplain,
- Elevation of barns in the floodway or floodplain,

- Replacement of road berms/causeways with bridges,
- Filling of wetlands (for example, if a manmade wetland is within the footprint of a setback levee),
- Property acquisition,
- New flood infrastructure,
- New levees,
- Lowering of levees,
- Realignment of berms, and
- Septic system repair.

### **6.2.3 Permits for Floodplain Projects**

This section lists the permits required for a typical single-site multiple-benefit floodplain project, such as a setback levee. This list is not intended to include every permit required for every project that might be pursued, but is instead intended to identify the major permits most likely to be needed.

#### **Federal permits and approvals**

- **Clean Water Act Section 404 (USACE)** – required for fill in waters of the US, including wetlands; requires a Joint Aquatic Resources Permit Application (JARPA); can be an individual permit or a Nationwide Permit.
  - **Nationwide Permit #27 (USACE)** - often applicable for restoration projects; certain limits and criteria apply.
- **Section 10 of Rivers and Harbors Act (USACE)** – required for work in navigable waters; requires a Joint Aquatic Resource Permit Application (JARPA); can be an individual permit or a Nationwide Permit.
- **408 Permit (USACE)** – Necessary if a USACE certified levee will be modified; process is currently ill-defined.
- **Conditional Letter of Map Revision (FEMA)** – required if restoration project results in change to base flood elevation and/or floodplain extent.
- **Endangered Species Act (ESA) Section 7 Review (USFWS and NMFS)** – required if there is any Federal nexus (permit approval such as USACE Section 404 or Section 10 permitting, funding).
- **NEPA** – Required for projects with Federal funding, done by a Federal agency, or located on Federal land; Categorical Exclusion, Environmental Assessment, or Environmental Impact Statement required.

#### **State permits and approvals**

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- **Water Quality Certification Section 401 of the Clean Water Act (Ecology)** – triggered by Federal permit; review generally concurrent with Section 404 review; requires a JARPA.
- **Coastal Zone Management Act Consistency Determination (Ecology)** – triggered by Federal permit; review generally concurrent with Section 404 review; requires a JARPA.
- **Federal Water Pollution Control National Pollutant Discharge Elimination System (Ecology)** – required for construction activities.
- **Section 106 of the National Historic Preservation Act (Washington Department of Archeology and Historic Preservation)** – required if there is any Federal nexus (permit approval [including USACE Section 404 or Section 10 permit], funding).
- **Hydraulic Project Approval (Washington Department of Fish and Wildlife)** – triggered if there are any impacts to waters of the state (in-water work); requires a JARPA.
- **Aquatic Use Authorization (Washington Department of Natural Resources)** – required for activities taking place on state-owned aquatic lands.

### Local permits and approvals

- **SEPA** –SEPA Checklist required to assess environmental impacts; threshold determination made by lead agency; EIS may be required.
- **Critical Areas Reporting and Review** – assessment of critical areas (including wetlands, streams, floodplains, and geologic hazards); reporting and review generally includes development of critical areas report(s) and mitigation plan to avoid, minimize, and also compensate for unavoidable project impacts.
- **Shoreline Substantial Development Permit** – requires JARPA submittal; other information required by jurisdiction (often consistent with critical areas reporting); can trigger requirement for public access; some projects are exempt from this permit.
- **Floodplain Development Permit** – floodplain permit application; Biological Opinion requirements for habitat assessment and mitigation likely met by Endangered Species Act Section 7 review.
- **Grading Permit** – grading permit application; grading plans; other information required.
- **Agricultural Land Protection Ordinances** – Requirements may need to be met in some jurisdictions.

#### ***6.2.4 Floodplain Permitting/Technical Assistance Team***

The Floodplains by Design partnership recommends the creation of a dedicated permit/technical assistance team for multiple-benefit floodplain projects, as well as a dedicated team for large-scale salmon restoration projects. This team would be funded by the Department of Ecology, which manages the FbD grant program, and made available to support FbD project implementation. The permitting team should involve staff at five agencies that permit or consult on floodplain projects (the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Washington Department of Ecology, and Washington Department of Fish and Wildlife). A floodplain permitting team could improve coordination between and among permitting agencies, build a body of knowledge on permitting technically complex floodplain projects, act as a resource for local jurisdictions working on floodplain projects, and improve the speed and consistency of permitting decisions.

One question that needs to be addressed is which projects would be reviewed by the permit team. Initially, the recommendation is for the team to support projects that are proposed by integrated river corridor processes, those that are funded by the Department of Ecology's Floodplain by Design program, and the regional salmon restoration projects identified through the Ecosystem Restoration Program and the Salmon Recovery Funding Board. Another recommendation is that the permit team could provide technical assistance to jurisdictions and agencies pursuing multiple-benefit floodplain projects or planning processes. The team can provide jurisdictions with advance understanding of the requirements they will need to meet. The team can gain an understanding of the overall goals and challenges that the local jurisdiction is trying to address and help them develop projects that meet the local needs as well as the regulatory requirements. The following sections discuss example programs, possible objectives and goals, and information about team structure.

#### ***6.2.5 Draft Goals and Objectives for a Floodplain Technical/Permit Team***

The floodplain technical/permit team goal could be to support project development and provide efficient and predictable permitting for multiple-benefit floodplain projects.

The objectives could be to:

- Develop, maintain, and strengthen the working relationships between resource agencies and applicants.
- Provide efficient and consistent delivery of permits.
- Work with a broad range of applicants pursuing multiple-benefit floodplain work.
- Provide applicants effective regulatory guidance and feedback.

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- Provide technical assistance to jurisdictions and agencies pursuing multiple-benefit floodplain projects.
- Participate in river corridor feasibility processes, early project review, pre-application meetings, or other similar interagency review and coordination.
- Consistently resolve technical issues related to the impacts of multiple-benefit floodplain projects.
- Ensure projects improve the resiliency of Puget Sound floodplains for the protection of human communities and the health of the ecosystem.

### **6.2.6 Technical/Permit Team: Next Steps**

It is recommended that a technical/permit team be funded in the capital budget in the next state biennium budget as part of the FbD capital budget allocation. It is believed the team would have the capacity to support all relevant FbD-funded projects. During the biennium, a study could be conducted to determine what savings the permit team provided for floodplain capital projects and whether in future biennia the team could be funded partially or solely by permit fees. Other options for funding the dedicated permit team could include the U.S. EPA's National Estuary Program (for short-term funding) or the state's operating budget.

### **6.2.7 Other Actions to Improve the Permit Process for Multiple-Benefit Projects**

A potential tool for permitting floodplain projects that could be used by the technical/permit team or by the individual agencies would be Memorandums of Understanding (MOUs) with diking or drainage districts. WDFW has signed MOUs with diking and drainage districts in the Skagit River basin to help permit their maintenance activities. In the MOUs, the drainage and diking districts agree to follow certain best management practices and resource protection measures which are specified in the document. WDFW agrees to issue a Five-Year General HPA for maintenance activities. WDFW also agrees to expedite renewal of the HPA. These agreements ensure that maintenance activities will be undertaken in ecologically sound ways and also give diking and drainage districts certainty that they will be able to permit maintenance of their infrastructure.

WDFW has also issued project-specific agreements alongside permits for single-site projects. In the Effendahl Pass Road Bridge Settlement Agreement, WDFW agreed to issue an HPA and Mason County agreed to a monitoring and contingency plan. The two parties also agreed to review monitoring results together.

The technical/permit team or the individual agencies could pursue the development of MOUs to address routine activities like drainage ditch maintenance in areas where there is an integrated river corridor plan. These MOU's help provide a level of regulatory certainty that is of real benefit to some stakeholders and therefore can be an important incentive mechanism.

## **6.3 Aligning of Key Infrastructure Programs with Integrated Goals**

There two key infrastructure programs (the Army Corps of Engineers PL 84-99 program and the Washington Department of Transportation capital program) that provide significant opportunities to advance integrated floodplain management.

### **6.3.1 PL 84-99 Strategy**

#### **6.3.1.1 Supporting Integrated Flood Risk and Habitat Management**

The Puget Sound Partnership is supporting the implementation of two pilot projects focused on the development of capital plans that address high priority flood risks while meeting habitat restoration needs and Treaty obligations. These projects are being led, respectively, by Whatcom County (for a project area that encompasses a portion of the Nooksack River floodplain), and King County (for a project area that encompasses a portion of the Green/Duwamish River floodplain).

These projects are being conducted within the System-Wide Improvement Framework (SWIF) approach developed by the US Army Corps of Engineers (USACE). The SWIF approach is being employed in these pilot projects in part to help resolve long-standing challenges faced by local levee sponsors to maintain eligibility for Federal funding provided through the PL 84-99 program. Management of vegetation on levees has been a prominent source of these challenges, with levee sponsors facing the prospect of losing funding eligibility for allowing vegetation to grow while also facing consequences for removing riparian vegetation that supports the recovery of ESA-listed salmonids.

As part of the SWIF process, local levees sponsors guide and participate in a community-based process that informs or addresses the flood risk and related habitat goals for the project area; assesses and prioritizes flood risks; develops a capital project list that addresses the prioritized risks and incorporates measures to help meet habitat goals and Treaty obligations; and describes the implementation and funding plan for the project list. This process addresses the vegetation management driver in the context of other management issues and encourages a broader, more integrated management approach that aligns well with the integrated approach being advanced by the Floodplains by Design Partnership. The respective SWIF pilot processes have two year timeframes that will end in mid-2015.

#### **6.3.1.2 Integrating PL 84-99 Funds into Multiple-Benefit Projects**

USACE has authority under PL 84-99 for the rehabilitation of flood control works threatened or destroyed by floods. This section identifies opportunities to integrate multiple-benefit actions into the USACE levee rehabilitation and inspection program (RIP) under PL 84-99.

The current approach under PL 84-99 reinforces the status quo of single-purpose projects. The RIP is easiest to apply when used to repair an existing levee in place that was damaged during a flood event. With the significant cost share of 80 percent

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Federal funds, levee owner/operators are cautious to pursue alternatives that are seen as more costly, less certain, and less timely, such as levee realignment or setbacks.

However, there are opportunities to use the program to make improvements over the status quo. The authority exists. The primary purpose of the RIP is flood risk reduction, and the statute limits the ability of the emergency funds to be used for other purposes. There are elements within PL 84-99 that present opportunities for use of USACE emergency funds for projects other than “fix in place.” A 2003 revision to the Federal regulations added language for non-structural alternative projects, with specific rules regarding application of RIP funds to such projects.

There are two primary approaches within PL 84-99 for multiple-benefit projects, structural and non-structural, each requiring a significantly different method:

- Structural projects can use the USACE authority and appropriation to repair levees in a manner that preserves the structural flood risk reduction capability of the levee while adding other features, such as increased conveyance from a setback and habitat restoration features. These other features are considered “betterments” and in some cases may be funded by the USACE. In others, the local sponsor may have to fund these features.
- Non-Structural Alternative Projects (NSAP) can use the USACE authority and appropriation to reduce the flood risk by restoration of floodplains and provision or restoration of floodways. NSAP have broader rules for the use of Federal funds, including the acquisition of land and removal of levees, and can achieve a 100 percent Federal cost share. However, once completed, USACE will no longer support the repair or rehabilitation of flood control works (FCW) anywhere within the originally protected area. Since a non-structural alternative must be requested by the FCW owner, this deters use of this authority.

For either of these approaches, the levee must be eligible under PL 84-99. Any Federal levee constructed by USACE is automatically eligible when completed. Other levees must pass an Initial Eligibility Inspection (IEI) prior to enrollment.<sup>30</sup> After enrollment, all levees must periodically pass continuing eligibility inspections to remain eligible for repair.<sup>31</sup> With the latest guidance from USACE, excessive vegetation may cause a levee to be rated unacceptable, but will not cause the levee to lose its eligibility.<sup>32</sup> Initial analysis indicates that vegetation would likely prevent enrollment into the RIP, but this requires verification.

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<sup>30</sup> 33CFR §203.42

<sup>31</sup> 33CFR §203.46(c)

<sup>32</sup> Interim Policy for Determining Eligibility Status of Flood Risk Management Projects for the Rehabilitation Program Pursuant to Public Law (P.L.) 84-99

In order to shape the direction of the rehabilitation towards something other than the status quo, considerable thought and effort must be done prior to any flood event. A potential approach could include the following steps:

- a. Identify PL 84-99-eligible levees.
- b. Screen potential PL 84-99 levees for suitability. Screening criteria should include at a minimum:
  - Likelihood of damage,
  - Potential for setback,
  - Potential for enhanced environmental features,
  - Existing habitat,
  - Endangered Species,
  - Habitat improvement plans, and
  - Water quality listings.
- c. Screen potential levees for feasibility. Gather information about the physical, natural and political environment around the system. Potential sources of information:
  - The eligible levee owner/operator. Although not all levee owners are interested in multiple-benefit projects, they are an invaluable source of information as to the damage frequency, flooding patterns, environmental concerns, and condition of their levee system. They also will have local knowledge on land use, ownership, and political will with respect to levee setbacks.
  - Water Resource Inventory Area;
  - County; and
  - Federal agencies including NRCS, NOAA, USFW, and EPA.
- d. Develop schematic of levee modification in coordination with levee owner and other funding sources.
- e. Develop checklist of necessary actions and timing to execute the project in the event the levee is damaged by a flood event.
- f. Identify sources of funding for “betterments” and incremental cost increases over rehabilitation in place.
- g. Acquire real estate or perpetual easements.
- h. Wait for flood damage.
- i. Coordinate for other sources of funding to proceed if levee remains undamaged.

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Recommendation: The Floodplains by Design team recommends local jurisdictions identify levees certified under the PL 84-99 program where there is local interest to either set back or remove the levee. The local jurisdiction should propose a project for funding under Ecology's Floodplains by Design program to develop the design and acquire the right-of-way for the project. By implementing these actions, the local jurisdiction would be prepared to pursue the possibility of USACE funding of a levee removal or setback in the event that the levee is damaged in a flood event.

### **6.3.2 Washington State Department of Transportation (WSDOT)**

The state highway system is a major infrastructure component in Puget Sound floodplains with:

1. Approximately 500 bridges, and
2. Approximately 185 miles of roadway.

Flooding adversely impacts transportation facilities, causing disruption of services and interrupting the movement of people and goods. The construction and maintenance of WSDOT facilities can also affect flood storage and conveyance and may have a negative impact on floodplain functions and natural resources. The impacts of climate change on state transportation infrastructure are not well understood in the Puget Sound region. In addition, the impacts of the transportation system on floodplain functions have not been quantified. As WSDOT replaces and repairs its infrastructure, there are opportunities to work with local jurisdictions to coordinate improvements to floodplain functions.

The Puget Sound Action Agenda includes the following near-term actions for WSDOT:

- a) Develop methodology to prioritize bridges, and vet this methodology with Puget Sound floodplain stakeholders. (This has been completed.)
- b) Obtain funding for the analysis.
- c) Complete the analysis and, in conjunction with the Floodplains by Design Partnership, share the results with local governments to identify complementary locations for multiple-benefit floodplain projects and adjust the prioritization as appropriate. Present the results to the Ecosystem Coordination Board and Leadership Council.
- d) Identify future actions and performance measures in consideration of integrating the prioritization work into the WSDOT decision-making process for bridge replacement projects.

Target dates for steps (c) and (d) are dependent on obtaining grant funding.

#### **Next Steps:**

The Floodplains by Design Partnership supports the actions in the Action Agenda and advocates for funding for WSDOT to complete the work. The FbD Partnership

will also work with WSDOT to identify areas where river corridor integration processes include WSDOT infrastructure and facilitate the agency's interaction with the local processes.

#### **6.4 Creating a Regional Vision, Goals, and Work Plan and Documenting the Need for Funding and Other Actions to Achieve the Vision**

This report is the start of creating a regional vision and documenting the need for funding and other actions to achieve the vision. The next steps include working with local organizations in the major river floodplains to firm up their short- and long-term strategies. This work will include developing metrics for the results that can be achieved. It will also involve working at the regional scale with tribes and state and Federal agencies to implement the recommendations in this section and the funding recommendations as well as encouraging the agencies to continue to explore how their practices and policies could be more aligned with the vision for integrated floodplain management.

##### **Next Steps:**

Over the near term the FbD Partnership recommends the development of a regional floodplain vision and implementation plan that includes: a 10-year work plan that clearly articulates goals and milestones to accelerate integrated floodplain management across the region; the identification of the necessary partners, capacities, and resources needed to implement the 10-year plan; and a description of strategies for integrating local flood risk and ecosystem recovery priorities into a regional capital work program.

#### **6.5 Coordinated Investment Strategy: Sustaining, Increasing, and Aligning Funding Programs to Advance Major Capital Projects**

The long-term success of the Floodplains by Design effort depends on linking available funds with current needs and spending those funds both effectively and efficiently to deliver the necessary results for salmon recovery and flood risk reduction, among other interests.

The Floodplains by Design Coordinated Investment Strategy estimates the long-term costs of achieving local floodplain goals and describes the Federal, State, and local funding that is currently available for these projects. Based on this information, the funding strategy focuses on sustaining existing funding sources, dramatically increasing investments in floodplains, and better coordinating existing funding programs.

The overall goals of the Coordinated Investment Strategy are to:

- Accelerate the implementation of salmon recovery and flood risk reduction efforts by sustaining and increasing available funding sources;
- Coordinate and focus investment by funders; and

- Reduce administrative burden for project proponents.

### **6.5.1 Estimated Costs for Floodplain Improvements**

The following long-term cost estimates are provided for each major Puget Sound floodplain. These costs are largely based upon flood and salmon recovery planning efforts and largely represent capital needs including feasibility studies, land acquisition, and project design and construction.

Salmon and flood project needs are called out separately because there is still limited integration across these two areas of effort. Greater integration is possible and is the goal of the Floodplains by Design Partnership.

The estimated costs come from hazard management plans, Comprehensive Flood Hazard Management Plans, Capital Investment Programs, 3-Year Salmon Recovery Work plans, USACE General Investigations, and other planning efforts as deemed appropriate by the local sources of information. It is not yet clear how much overlap exists between the salmon recovery and flood risk reduction cost estimates, but duplication has been removed where possible and otherwise noted. Many of the areas have not done the analysis or work to create an integrated vision and set of actions for their area, so the numbers may look much different once further analysis and integration occurs. Many flood and salmon managers felt that the ultimate costs as well as the benefits would be higher as integration moved forward. Thus further refinement to cost estimates will proceed over the coming months and years as additional work is done to further combine flood and salmon planning into a single floodplain vision and set of actions.

Flood managers provided the estimated costs for flood risk reduction in Table 23 in May 2014 based on a variety of local planning efforts. All flood managers stated that these estimates represent a likely suite of work that could be completed in a 6- to 20-year timeframe, but local governments would need time to increase staffing if a significant and regular increase in available funding were likely. A King County flood manager stated that \$1 million in capital funding requires one staff person. Upon mentioning this to other flood managers across the region, most noted that this ratio is a reasonable estimate of staff needs relative to capital funding. Several jurisdictions noted that they are engaged in processes now to develop more robust cost estimates that will be available in six months to one year.

Estimated costs for salmon recovery actions are derived from the May 2014 3-Year Work Plan submissions. Puget Sound Partnership staff took submissions for each watershed area and isolated floodplain-related projects. Costs were then made available for review by Lead Entity staff or other key watershed leaders. The 3-Year Work Plans vary across Puget Sound but generally describe work to be implemented over a two- to five-year period depending on funding and other implementation issues. Many projects have outdated cost-estimates or no cost estimates. Integration with flood risk reduction projects is limited. Staff felt costs

were likely underestimated. Despite these limitations, the cost estimates still provide an “order of magnitude” estimate of the funding need. It is also assumed that integration of salmon and flood actions, while more effective in achieving multiple benefits, will have a higher cost than separate actions for flood risk reduction and salmon recovery.

Table 23 lists the estimated long-term costs for both flood risk reduction capital projects and salmon recovery activities in the major Puget Sound river basin floodplain complexes. Sources, notes and caveats for the costs are provided in Appendix A.

**Table 23. Estimated Long-Term Capital Floodplain Project Costs for Large Puget Sound Rivers (Dollars in 000s)**

Major Puget Sound River Floodplain Systems	Flood Risk Reduction	Salmon Recovery
Nooksack	\$115,000	\$48,000
Skagit/Samish	<i>to be determined</i>	\$43,600
Stillaguamish	\$23,000-100,000	\$42,200
Snohomish	\$42,000	\$83,600
<ul style="list-style-type: none"> <li>• Snoqualmie</li> <li>• Skykomish</li> </ul>	\$170,000 \$30,000	<i>included above</i> <i>included above</i>
Cedar/Sammamish	\$100,000	\$55,100
Green/Duwamish	\$1,400,000	\$89,700
Puyallup	\$240,000	\$241,800 <sup>33</sup>
Nisqually	\$20,000	\$27,900
Deschutes	<i>no capital projects</i>	\$67,700-87,700
Skokomish	<i>unknown</i>	\$23,600 <sup>34</sup>
Hood Canal	<i>no estimates available</i>	\$12,600
Elwha	<i>no flood projects identified</i>	\$2,700
Dungeness	\$45,900	\$29,500
Rounded Total <sup>35</sup> :	\$2,262,900	\$788,000

There are several related reasons why some of the less developed jurisdictions do not have cost estimates for flood projects. These jurisdictions typically have less

<sup>33</sup> There is potentially a 30 to 50 percent overlap in the salmon recovery costs with the flood costs.

<sup>34</sup> There is a longer-term cost estimate of \$41 million currently in review as part of a US Army Corps of Engineer General Investigation. The \$23.6 million need stated here is two- to five-year cost estimate of the likely longer-term need.

<sup>35</sup> Totals include the higher cost estimate for those basins where a range is provided.

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infrastructure in the floodplain, so there is less flood risk that needs to be dealt with. Rural jurisdictions typically do not have dedicated funding streams (such as Flood Control Zone Districts) for flood hazard management. At the same time, general funds are smaller, so less funding is available for flood projects and planning. These jurisdictions also have less staff than larger jurisdictions, so there are fewer resources available to develop cost estimates. Though cost estimates are not available, the majority of these jurisdictions do manage flood hazards through regulatory enforcement, Comprehensive Flood Hazard Management Plans including programmatic recommendations, and/or acquiring, relocating, removing, or flood-proofing structures in the floodplain as grant funding and local resources become available.

Stakeholders in the Skagit watershed are beginning the process of selecting their preferred approach to flooding based on a U.S. Army Corps of Engineers General Investigation (GI) to address flood concerns. County staff did not wish to provide an estimate for flood costs until that work is completed in 2015 because the overall approach has not yet been selected nor approved. The completion of the Skagit GI will likely have a large impact on the overall cost estimates.

The combined estimated cost for reducing flood risk and restoring salmon habitat over the next 10 to 20 years is approximately \$3 billion. Over the next several months, the Floodplains by Design will work with local groups to identify the results that would be achieved by these actions as well as the relationship to the Puget Sound Partnership goal of restoring 15 percent of the degraded floodplain habitats in Puget Sound.

### **6.5.2 Current Funding Sources**

A variety of Federal, State, and local funding programs currently fund floodplain projects. Figure 7 shows the funding sources for the Calistoga Levee Setback project, which is in the Puyallup/White floodplain, while Figure 8 summarizes funding sources for the project by whether they are Federal, state, or local. This provides one example of how Federal, State, and local funds are combined to implement a project.

Figure 7. Funding Sources for the Calistoga Levee Setback Project by Individual Source

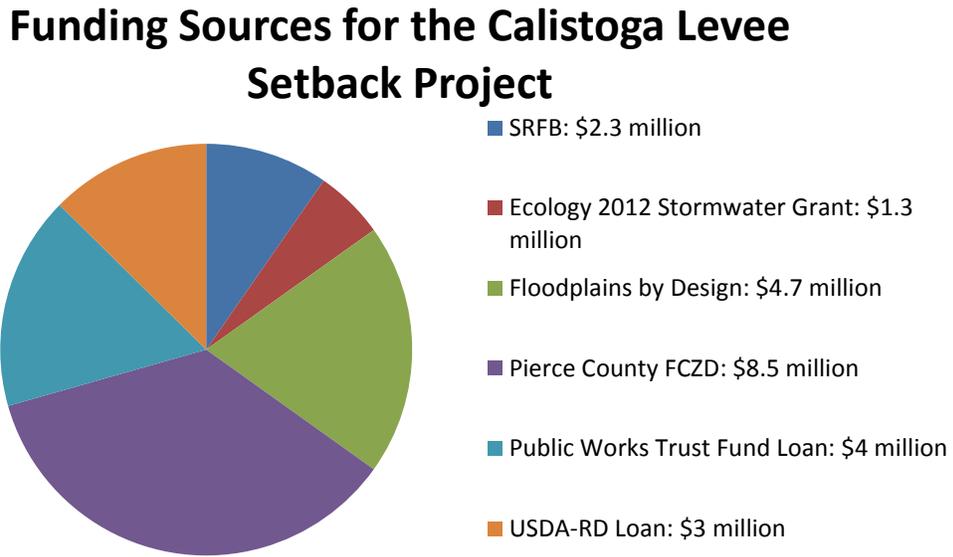
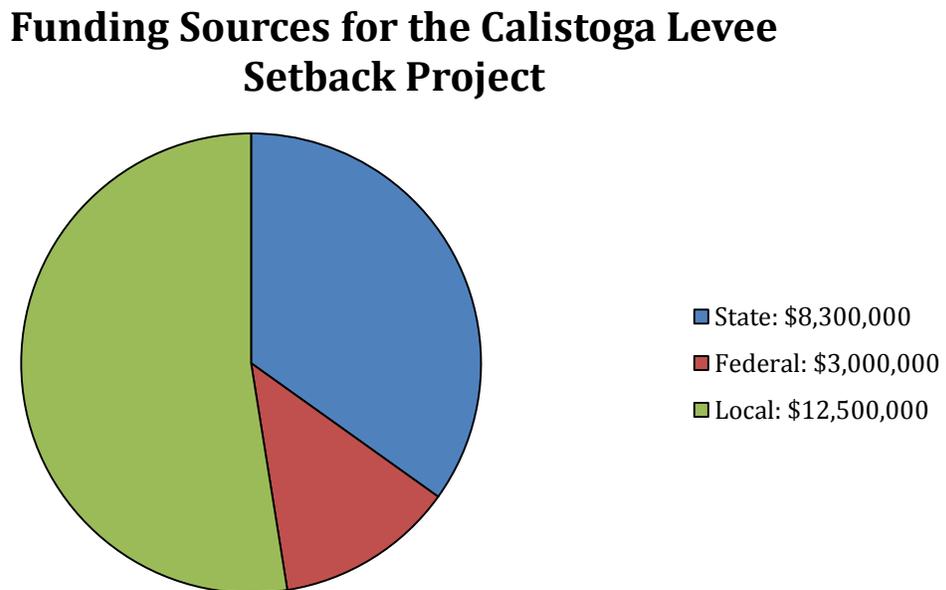


Figure 8. Funding Sources for the Calistoga Levee Setback Project



#### 6.5.2.1 State and Federal Funds for Floodplain Projects

State and Federal funds are mostly delivered through grant or loan programs for projects that restore salmon habitat and ecosystem function and/or reduce flood risk, though sometimes agriculture or water quality funds are utilized. State and

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Federal appropriations vary from year to year, so it is difficult to characterize the “base funding level” for these grant programs. Tables 24 and 25 below provide a snapshot of recent appropriations (2013-2015 biennium and Federal fiscal year 2013) for the most significant programs that support floodplain projects. *During the 2013 legislative session, the state legislature made a significant investment in habitat restoration and floodplain projects beyond historic funding levels, including a significant increase in funding for the Puget Sound Acquisition and Restoration Program and a new appropriation, called Coordinated Investment for Floodplains, for Floodplains by Design projects.*

**Table 24. State Funding Programs that can Support Floodplain Projects (Dollars in 000s)**

Agency	Program	2013-2015 Biennial Appropriation	Estimated Biennial Amount Allocated to Puget Sound <sup>36</sup>
Ecology	Floodplains by Design Program	\$50,000	\$45,000
RCO	Puget Sound Acquisition and Restoration	\$70,000	\$70,000
RCO	Salmon Recovery Funding Board grants - state portion	\$15,000	\$6,659
RCO/DNR	Aquatic Lands Enhancement Grants	\$6,000	\$5,500
RCO/WDFW	Estuary and Salmon Restoration Program	\$10,000	\$10,000
RCO	Washington Wildlife and Recreation Program	\$65,000	\$11,706 <sup>37</sup>
<b>TOTAL</b>		<b>\$216,000</b>	<b>\$148,865</b>

**Table 25. Federal Funding Programs that can Support Floodplain Projects (Dollars in 000s)**

Agency	Program	FFY13 National Appropriation	Estimated Annual Amount Allocated to Puget Sound <sup>38</sup>
EPA	Puget Sound National Estuary Program	\$29,900	\$29,900
NOAA	Pacific Coast Salmon Recovery Fund - Federal portion	\$65,000	\$8,878
NOAA	NOAA Community-based Restoration Program	\$19,200	\$2,500
Corps	PSNERP General Investigation	\$850	\$850
Corps	Puget Sound & Adjacent Waters (PSAW) Restoration	\$2,000	\$2,000
Corps	Duwamish/Green Ecosystem Restoration Program	\$1,800	\$1,800
Corps	Skokomish GI	\$300	\$300
Corps	Continuing Authorities Program	\$25,000	\$245
USFWS	Coastal Wetlands Grants	\$20,040	\$6,746
FEMA/EMD	Flood Mitigation Assistance Program	\$120,000	\$2,092
FEMA/EMD	Pre-Disaster Mitigation Program	\$23,000	\$0
<b>TOTAL</b>		<b>\$307,090</b>	<b>\$55,311</b>

<sup>36</sup> Amount allocated for salmon recovery and ecosystem restoration projects in Puget Sound are based on estimates received from the agencies that manage each program.

<sup>37</sup> Amount allocated to projects in Puget Sound from the Habitat Conservation Account and Riparian Account of WWRP (Critical Habitat, Urban Wildlife, Natural Areas, State Lands Restoration, Water Access, and Riparian categories) during the 2013-2015 biennium.

<sup>38</sup> Amount allocated for salmon recovery and ecosystem restoration projects in Puget Sound are based on estimates received from the agencies that manage each program.

Much of the focus of this report is on the state and Federal competitive *grant programs* that support floodplain projects. However, as shown in the table above, the U.S. Army Corps of Engineers is invested in restoration projects in several geographies through *partnering with local entities*, and there are additional opportunities to partner with the Corps through its PL 84-99 and Continuing Authorities Programs. There are also significant FEMA funds that are spent in floodplains through the Hazard Mitigation Grant Program (HMGP). The HMGP provides assistance to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Funding for the HMGP is not shown above because it is only available after a Presidential disaster declaration.

### **6.5.2.2 Local Funds for Flood Risk Reduction**

Local funding mechanisms for flood risk reduction vary by county, by city, and by project. Collecting local funding information is beyond the scope of this report, so this section provides general information and several examples. As noted in Section 4.2.2.1 describing flood risk reduction management, several Puget Sound jurisdictions have formed Flood Control Zone Districts (RCW 86.15), which have authorized property tax collections to support planning, capital projects, and operation and maintenance of flood control infrastructure within their designated areas. Flood Control Zone District funds are used to support both the programmatic costs of floodplain management as well as capital improvements. In some areas, funds are also used for other county priorities such as water quality or habitat improvements. Table 26 shows Flood Control Zone District revenue for the major Puget Sound floodplain systems. The table does not include information on revenue from other sources, such as diking districts, general funds, cities and towns, surface water management assessments, or grant funding.

**Table 26. Flood Risk Reduction Annual Revenue: Flood Control Zone Districts**

<b>Puget Sound Major Floodplain Systems</b>	<b>Flood Control Zone District Annual Revenue</b>
Nooksack	\$3 million annually – Whatcom County Flood Control Zone District <sup>39</sup>
Skagit/Samish	
Stillaguamish	
Snohomish	
Snoqualmie/Skykomish	\$40 million annually (King County Flood Control District)
Cedar/Sammamish	
Green/Duwamish	
Puyallup/White	\$6 million annually (Pierce County Flood Control Zone District) <sup>40</sup>
Nisqually	
Deschutes	
Skokomish	
Hood Canal	No revenue – Flood Control Zone Districts are in place for some rivers, but they are currently inactive
Elwha	
Dungeness	

Other areas generate funding through diking and drainage assessments or through general operating funds. Snohomish County collects a Watershed Management Fee which funds flood control and a wide variety of other watershed programs and activities. Some jurisdictions utilize the Public Works Trust Fund, stormwater fees, general funds, or other funding sources to address flood infrastructure maintenance or improvements or other flood risk reduction activities.

### **6.5.3 Potential Funding Gaps**

This section reviews the current available sources of funding compared with the total cost estimates for floodplain capital projects identified by local jurisdictions and salmon recovery organizations.

As noted above, the most recent revised 3-Year Salmon Recovery Work Plans include an estimated \$788 million *in floodplain-related capital costs alone* (over the next three to five years). Some of this need is covered by the existing state and Federal funds described above, but it is clear that there is a significant funding gap between the full range of salmon recovery needs and the available funding. It is

<sup>39</sup> Nooksack Numbers: These funds come from the Whatcom County Flood Control Zone District. Revenue largely covers existing staffing and overhead with limited available for capital investment. Revenue is spent on natural resources, stormwater, WRIA planning, and flood risk reduction.

<sup>40</sup> This figure covers the portion of Flood Control Zone District revenue dedicated to capital projects

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difficult to quantify the amount of the funding gap because: 1) the \$788 million estimate is *only* for the floodplain-related costs in the 3-Year Work Plans (the total cost of the 3-Year Work Plans is considerably higher); and 2) not all the state and Federal funding described above is dedicated exclusively to salmon recovery and, therefore, it is not possible to estimate how much will actually be available for these projects.

Similarly, existing data suggests that the funding gap for flood risk reduction efforts in Puget Sound is also significant. The total estimated capital costs included in the flood risk reduction plans total \$2.2 billion over the next 6 to 20 years. As described above, the dedicated annual revenue from Flood Control Zone Districts is approximately \$49 million per year (Table 26). Even if local revenues were dedicated solely to capital needs (which they are not), there would still be a substantial gap between the flood risk reduction funding need and the available local revenue.

These estimates are clearly approximations, but they are grounded in the best information available today regarding planned floodplain project costs and likely revenue streams. However, it is important to keep in mind that: 1) floodplain project funding needs will increase significantly as plans are completed or updated; 2) the estimates do not include related water quality, agricultural, and recreation needs associated with Puget Sound floodplains; and 3) the funding availability figures are based on a year in which significant new state funding became available. With these caveats in mind, *a rough “order of magnitude” estimate is that the current overall floodplain funding gap is in excess of \$1 billion over the next 10 years.*

### **6.5.4 Coordinated Investment Strategy for Puget Sound Floodplains**

While significant habitat and flood risk reduction projects are being accomplished with existing funding sources, it is clear that: 1) current funding amounts are not adequate to address the scale of the problem; and 2) state and Federal funding programs are often “siloes” into single purpose grant programs, which creates barriers to the development of multiple-benefit floodplain projects.

This section lays out a three-pronged strategy to address these challenges and facilitate implementation of multiple-benefit floodplain projects. The strategy includes the following actions:

- 1) Sustain existing funds,
- 2) Secure significant new funding, and
- 3) Better coordinate existing funding programs.

#### **6.5.4.1 Sustain Existing Funds**

Given the magnitude of the need described above, it is critical to sustain existing Federal, state, and local funding programs that support integrated floodplain management.

Existing state programs which are critical to sustain include the Floodplains by Design grant program, the Puget Sound Acquisition and Restoration Program, Salmon Recovery Funding, the Estuary and Salmon Restoration Program, the Aquatic Lands Enhancement grants, and the Washington Wildlife and Recreation Program. These programs should be continued at the 2013-2015 biennial funding levels if not more (see Table 24 above).

***It is especially important to continue the Floodplains by Design grant program as an ongoing program in the state Capital Budget.*** Stakeholders and project managers across Puget Sound emphasize that a predictable, reliable, and flexible state funding program will help communities tackle their floodplain management challenges. Sustaining this program will help spur corridor-scale planning and development of multiple-benefit projects, by increasing the predictability of future funding to support implementation. A stable, steady state funding source will also incentivize local governments to create or increase dedicated revenues which would provide critical matching funds for these projects. Demand for this funding source is high: In response to a recent Request for Proposals, local governments around Puget Sound submitted \$150 million in funding requests. *The Floodplains by Design Partnership recommends that this program be funded with at least \$50 million in the 2015-2017 biennial budget.*

Existing Federal funding programs which are critical to sustain include EPA National Estuary Program funding for Puget Sound, the Pacific Coast Salmon Recovery Fund, and the Community-based Restoration grant program. At a minimum, these Federal funding programs should be continued at FY13 funding levels (see Table 25 above).

#### **6.5.4.2 Secure Additional Funds**

Given the need described above, it is clear that current funding sources can support only a fraction of the identified need. In order to address the true scope and scale of our region's floodplain management need, it will be necessary to dramatically increase available funding. The following two recommendations are offered as the most promising opportunities to increase funding for floodplains:

- 1) ***Create a stable, dedicated, long term funding source for multiple-benefit floodplain projects through a potential water infrastructure bond measure.*** Recognizing that the near- and long-term project funding needs likely exceed available capital budget capacity, new ways to finance this work must be obtained, either through repurposing existing funds or creating new revenue streams. There is growing momentum to address the state's broader water infrastructure project backlog (stormwater, water supply, and floodplain management) through a multi-billion dollar bond measure, possibly with a dedicated fee or tax to support the bond. Floodplains by Design partners should continue to stay engaged in legislative and stakeholder discussions about new state-level funding mechanisms.

- 2) ***Secure state funding for a dedicated floodplains permit team.*** During the 2015 legislative session, Floodplains by Design partners should support an appropriation for the dedicated permit team described in Section 6.2 above.
- 3) ***Support local governments in expanding dedicated local revenue sources*** to implement integrated floodplain management projects. Increasing local revenue sources will provide critical matching funds for both existing grant programs and for the new state funding options described above.

### 6.5.4.3 Better Coordinate Funding Programs

A key thrust of the Floodplains by Design Partnership is to advance a Coordinated Investment Strategy for Puget Sound to better align habitat-oriented funding with flood or infrastructure-related funding.

Project sponsors talk about the challenges of funding big floodplain projects “one grant at a time.” Because so many different funding sources are often required, it can be a challenge to line up all the necessary grants at the right time. Some projects literally take years to plan and assemble the necessary funding – sometimes from dozens of separate grant programs. The Qwuloolt restoration project in the Snohomish Estuary, for example, had to secure twenty-one separate grants. Procuring and administering all of these grants adds additional challenges to project implementation.

The Floodplains by Design Partnership is seeking innovative solutions to make it easier for projects such as Qwuloolt to be implemented. The recommendations below describe opportunities to align Federal/state funding and authorities behind shared priority projects to maximize leverage, incentivize larger scale projects, and ensure investments are generating the broadest set of benefits to the ecosystem and to communities. It is hoped that these recommendations will help shorten project implementation timelines and incentivize increasingly impactful projects. The recommendations are informed by input from project proponents and from discussions with state and Federal funding agencies.

To be clear, agencies are already implementing innovative measures to better coordinate funding programs and ease administrative burdens on project sponsors. For example, the Recreation and Conservation Office (RCO) routinely bundles multiple funding sources into a single grant award, which dramatically simplifies grant administration for project sponsors. Another example comes from the Washington Department of Fish and Wildlife, which pooled EPA, NOAA, and state capital funding into a single Request for Proposals under the Estuary and Salmon Restoration Program (ESRP), again simplifying the granting process for applicants. Finally, the Puget Sound Partnership created the PSAR Large Capital Project Program in an effort to give a boost to projects that would otherwise have difficulty raising necessary funding through existing programs with small grant maximums. See Appendix B for other examples of current coordination and streamlining efforts.

Building on the good efforts that are already underway, the following recommendations are intended to increase coordination and make it easier for project sponsors to fund and implement projects:

**1) Promote collaboration and coordination among state and Federal funders:**

Continuous collaboration among agencies and other entities is critical to achieve the Floodplains by Design vision. Collaboration is needed in various forms, in various places, and at different levels of government so that multiple programs can be leveraged to provide integrated solutions to our floodplain challenges. Below are some recommendations to further collaboration in the floodplains realm:

- **Convene a regular Floodplains Funding Coordination Group:** The Floodplains by Design Partnership should convene lead staff from the core state and Federal funding agencies *at least 3 times per year* to increase inter-agency communication around floodplain funding efforts and pursue opportunities to improve coordination *at the program level*.
- **Encourage funding agencies to participate in corridor-scale planning groups:** The Floodplains by Design Partnership should encourage state and Federal funding agencies to participate in corridor-scale planning groups (see Section 6.1 above) to identify opportunities to align resources to achieve multiple-benefit project outcomes. The structure could be flexible depending on the needs of the local community, but the objective would be to coordinate and leverage additional funding for projects and help local project proponents and agencies get the “biggest bang for the buck.” These efforts could focus on corridor-scale funding strategies or they could help resolve project-level funding issues.
- **Foster more integration between the Department of Ecology Floodplains Program, Washington Emergency Management Division (EMD) Hazard Mitigation Grant Programs, and the Puget Sound Partnership:** Ecology, EMD, and the Partnership should explore ways to strengthen the connection between their respective programs. Specific suggestions include:
  - The Department of Ecology should work with EMD to determine how to incorporate environmental benefits as a factor in hazard mitigation grants per new FEMA guidance. This is particularly important early in the application process (when RFPs are released and/or during the letter of intent stage).
  - The FbD Partnership should continue conversations with FEMA, EMD, and local governments to explore how Floodplains by Design values could be better incorporated into both state and local hazard mitigation plans. If environmental benefits are incorporated into hazard mitigation plans, it may help direct FEMA funding toward more integrated, ecosystem-based projects.

2) **Streamline grant administration and incorporate flexibility into program requirements**

- **Allow more flexibility in match requirements:**

Project proponents consistently say that it would be helpful to have more flexibility on grant program matching requirements. There are a wide variety of options to allow more flexibility on matching. These include:

- Waive or reduce match for feasibility, project planning, and design phases of the project,
  - Allow match to be calculated across all phases of the project, so that the project proponent is allowed to count contributions that occurred during earlier phases of the project,
  - Allow staff time and prior acquisitions to be counted as match, and
  - Consider opportunities for Federal agencies to contribute match at the program level, which would reduce the need for individual project level match.
- **Consolidate multiple grants into a single contract:** All funding agencies should build on RCO's model and pursue opportunities to bundle multiple grant awards into a single contract.
  - **Consolidate grant reporting requirements:** State and Federal agencies should strive to implement consistent reporting requirements across different grant programs, with consistent reporting periods and consistent reporting metrics.
  - **Coordinate application forms and grant cycles:** Ecology and RCO should consider developing a common core application and coordinating timing of application cycles. Consider the Joint Aquatic Resource Permit Application (JARPA) as a potential model.
  - **Develop a "User Guide" to Floodplain Grants:** Surprisingly, there is no single easily accessible and up-to-date reference guide to grants that support floodplain projects. Funding agencies could collaborate on a brochure or online user guide to help applicants navigate the complex world of habitat restoration and flood risk reduction grant programs. The guide would map out the domains for each program and identify their unique roles, what they fund, how they work together, and their timelines.
  - **Pursue flexibility in habitat restoration program guidelines** to support more multiple-benefit projects. Allow grantees to fund other project elements (flood risk reduction, water quality, etc.) if those components are needed to accomplish the habitat objectives of the project.

## 7 FLOODPLAINS BY DESIGN: MOVING FORWARD

Building on the success of the past year, the Floodplains by Design Partnership can begin to address the challenges and move forward towards integrated floodplain management. There are three key actions for the next year.

### 7.1 Refine the Integrated Strategies and Implement Floodplain Projects Across the Largest Rivers in Puget Sound

The largest rivers in Puget Sound and their associated floodplains were prioritized through the Puget Sound Nearshore and Estuary Restoration Project process and have been adopted by the Puget Sound Partnership and by Floodplains by Design as priority areas for floodplain and delta restoration projects. Reconnecting floodplains in the major rivers provides the best opportunity for restoring multiple functions. The major rivers and their associated floodplains are also the places with the greatest risk for flood damage to critical facilities, commerce, residences, and farmlands. The priority areas for FbD in the short-term are areas within the major river basins where a project or process is aimed at achieving the dual benefits of ecosystem restoration and flood risk reduction and where there is coalition of the affected parties supporting the project or process.

The FbD Partnership will work to assist current and new local efforts to develop integrated visions, goals, and actions, including a joint effort with the leaders of the local processes and the FbD Partnership to define the measurable results that can be achieved over the near- and long-term. It will convene local leaders of integrated efforts to learn from each other about how to address common issues like engaging the agricultural community and tools that can facilitate the development of projects and other actions to achieve the multi-benefits desired in each local community. The FbD Partnership will continue to advocate for the effective involvement of state and Federal agencies in the local processes and for their overall support of the combined effort across Puget Sound.

### 7.2 Match the Funding to the Need

Accelerating the level of effort in Puget Sound to address the estimated \$3 billion dollar implementation need for flood risk reduction and floodplain-related salmon recovery actions will require sustaining and expanding existing levels of funding from local, state, and Federal sources.

*State programs* including the Department of Ecology's Floodplains by Design grant program, Puget Sound Acquisition and Restoration Program, Salmon Recovery Funding, Estuary and Salmon Restoration Program, the Aquatic Lands Enhancement grants, and the Washington Wildlife and Recreation Program. At a minimum, these programs should be continued with the 2013-2015 biennial funding levels, if not more. This will continue a \$149 million investment from these sources.

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*Federal programs* including EPA National Estuary Program funding for Puget Sound, Pacific Coast Salmon Recovery Fund, and the NOAA Community-based Restoration grant program. At a minimum, these Federal funding programs should be continued at FY13 funding levels. This will continue a \$55 million investment from these sources.

*Create a new stable funding source* for integrated multiple-benefit floodplain projects. Recognizing that the near- and long-term project funding needs exceed available capital budget capacity, new ways to finance this work must be obtained, either through repurposing existing funds or creating new revenue streams. There is growing momentum to address the state's broader water infrastructure project backlog (stormwater, water supply, and floodplain restoration) through a multi-billion dollar bond measure. The Floodplains by Design Partnership will continue to stay engaged in legislative and stakeholder discussions about new state-level funding mechanisms to support floodplain management needs.

*Support local governments* in expanding dedicated local revenue sources to implement multiple-benefit floodplain management projects. Increasing local revenue sources will provide critical matching funds for both existing grant programs and for the new state funding options described above.

*Better coordinate across existing funding programs:* A key goal of the Floodplains by Design Partnership is to advance a coordinated investment strategy for Puget Sound which will better coordinate funding for habitat and flood risk reduction activities in order to reduce administrative burdens and produce better results. The Floodplains by Design Partnership is seeking innovative solutions to make it easier for projects to be implemented. Agencies are already implementing innovative measures to better coordinate funding programs and ease administrative burdens on project sponsors. Building on the good efforts that are already underway will increase coordination and make it easier for project sponsors to fund and implement projects.

### **7.3 Facilitate A More Efficient and Effective Permit Process**

The Floodplains by Design partnership recommends the creation of a dedicated permit/technical assistance team funded by the Department of Ecology for multiple-benefit floodplain projects and a dedicated team for large-scale salmon restoration projects. The permit team should involve staff at five agencies that permit or consult on floodplain projects (the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Washington Department of Ecology, and Washington Department of Fish and Wildlife). This team could improve coordination between and among permitting agencies, build a body of knowledge on permitting technically complex floodplain projects, act as a resource for local jurisdictions working on floodplain projects, and improve the speed and consistency of permitting decisions. Team technical knowledge should bring expertise on flood risk reduction, salmon recovery, agriculture, and water quality.

## 7.4 Final Conclusion

Thanks and appreciation goes to those across Puget Sound working at the local and regional level to integrate floodplain management. The last year was very successful for advancing an integrated approach to floodplain management. Building on our success will be critical to ramping up the efforts to restore the ecological health of the major river floodplains in Puget Sound and reduce the risk of catastrophic flood damage to residences, farms, and other businesses. The three steps recommended above are just of the beginning of the aggressive effort needed over the next ten years and beyond.

## APPENDIX A: LOCAL INFORMATION SOURCES, CAVEATS, AND NOTES

Table 27 includes source information and notes for the data on assessed values, long-term flood risk reduction and salmon cost estimates and revenue sources presented throughout the report.

**Table 27. Local Information Sources, Caveats, and Notes**

Watershed	Sources
Nooksack	<p>Assessed Value: Data from the Lower Nooksack River Comprehensive Flood Hazard Management Plan, November 1999. This is the oldest assessed valuation in Puget Sound. The assessment includes both property and improvements.</p> <p>Cost of Flood Risk Reduction: The Nooksack flood risk reduction costs include acquisition, design, and construction. The cost estimate does not include the additional staffing necessary to increase the rate of implementation or the current staffing costs. This estimated cost is for a 15 to 20 year timeframe. It was noted, “additional salmon recovery, water quality, agricultural or other floodplain needs will be necessary on top of this estimated number. These additional costs are not yet known/integrated into a total floodplain cost.” A more detailed and integrated cost estimate will be available when the USACE led SWIF process is completed. Estimate provided per personal communication by Paula Cooper, Whatcom County Flood Manager, May 2014.</p> <p>Cost of Salmon Recovery in Floodplains: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the Nooksack 3-Year Work Plan, submitted May 2014. The Plan includes several projects with no cost estimate and a more robust project list will be developed through the USACE SWIF and flood-fish integration efforts. Projects included those tagged as part of Floodplain Reconnection Strategy, Floodplain-Salmon Recovery Integration, Large Wood Restoration (when side channel or floodplain connection were also described), and Estuary projects with the habitat type of estuary (located in the Nooksack estuary), tidally-influenced areas (in the Nooksack), and floodplain connection.</p> <p>Flood Risk Reduction Annual Revenue: These funds come from the Whatcom County Flood Control Zone District. Revenue largely covers existing staffing and overhead with limited funds available for capital investment. Revenue is spent on natural resources, stormwater, WRIA planning, and flood risk reduction. Personal communication with Paula Cooper, Whatcom County Flood Manager, May 2014.</p>
Skagit/Samish	<p>Assessed value: USACE Skagit River Flood Damage Reduction Feasibility Study and Skagit County Hazard Mitigation Plan, 2008 cites \$2.8 billion; Snohomish Flood Hazard Management Plan, 2010 cites \$521 million.</p> <p>Cost of Flood Risk Reduction: The Skagit is currently involved in a USACE General Investigation. A draft Feasibility Report and Environmental Impact Statement was released June 6, 2014 for public review and comment. This includes a cost estimate of \$218 to \$244 million. A 2007 presentation to the Skagit River Flood Control Committee put forward a set of conceptual projects and costs for a sense of magnitude to discuss funding options. They cited \$262 million in flood risk reduction project costs just for the portion of the river around Sedro-Woolley,</p>

	<p>Burlington, and Mount Vernon.</p> <p>Cost of Salmon Recovery in Floodplains: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff and staff from the Skagit Watershed Council from the Skagit 3-Year Work Plan, submitted May 2014. Costs are potentially underestimated by as much as 50 percent, with the highest percentage of underestimation occurring in the third year as several projects are identified but have no cost estimates yet.</p>
Stillaguamish	<p>Assessed value: Snohomish Hazard Management Plan, 2010 cites \$44 million for unincorporated areas and \$273 million for incorporated area. All of Darrington’s assessed value is included in the Skagit system though some may be flood damage from the Stillaguamish.</p> <p>Cost of Flood Risk Reduction: Depending on how North Fork Stillaguamish options proceed after the Oso landslide, the total Snohomish County need could be \$80 to \$100 million. \$20 million is the pre-Oso landslide estimated cost. The Snohomish County estimate also includes \$3 million for additional assessments such as LiDAR, climate and flood modeling, and forecasting. The estimate is for approximately ten years. Personal communication Debbie Terwiliger, May 2014.</p> <p>Flood Risk Reduction Annual Revenue: Snohomish County annually collects fees through a Watershed Management Area (RCW 36.89). Fees cover the drainage, the capital program, operations, habitat, flood control (within the service area), National Pollution Discharge Elimination System compliance, and education obligations. Personal communication Debbie Terwiliger, May 2014.</p> <p>Cost of Salmon Recovery in the Floodplains: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the Stillaguamish 3-Year Work Plan, submitted May 2014. The Stillaguamish 3-Year Work Plan also provides a 2055 cost estimate of \$324.6 million dollars. This estimate includes some nearshore and forest road treatment cost estimates. 3-year costs also include some nearshore and forest road treatments and includes \$6.587 million in non-capital costs considered related to key floodplain concerns.</p>
Snohomish	<p>Assessed value: Snohomish Hazard Management Plan, 2010 cites \$309 million for unincorporated areas and \$354.3 million for incorporated areas. \$173 million of this total is for Sultan.</p> <p>Cost of Flood Risk Reduction – Snohomish River Floodplain: Cost estimate is for 10 years and does not include Smith Island costs. Estimate includes \$2 million for additional assessments such as LiDAR, climate and flood modeling, and forecasting. Personal communication with Debbie Terwiliger, May 2014</p> <p>Cost of Flood Risk Reduction – Skykomish River Floodplain: King County estimate for South Fork Skykomish, personal communication with Brian Murray, May 2014.</p> <p>Cost of Salmon Recovery in the Floodplains: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the Snohomish 3-Year Work Plan submitted May 2014. Estimate is based on capital costs only.</p>
Snoqualmie	<p>Assessed value: King County Flood Hazard Management Plan Update and Progress Report, November 2013.</p> <p>Cost of Flood Risk Reduction: King County staff estimate for Upper and Lower Snoqualmie including the Tolt. Estimate is actually a range of \$140 million to \$170 million. Personal communication with Brian Murray, May 2014.</p>

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Cedar/Sammamish	<p>Assessed value: King County Flood Hazard Management Plan Update and Progress Report, November 2013 cites \$1.9 billion; Snohomish Flood Hazard Management Plan, 2010 cites \$257 million. The assessed value discusses potential damages, not actual damages. There are many repetitive flood losses on the Cedar. There were \$3.1 million in damages to levees and revetments alone from the 2009 flood event per the 2013 King County Flood Hazard Management Plan.</p> <p>Cost of Flood Risk Reduction: King County estimate for Cedar/Sammamish. Personal communication with Brian Murray, May 2014.</p> <p>Cost of Salmon Recovery in the Floodplains: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the Lake Washington/Cedar/Sammamish 3-Year Work Plan, submitted May 2014. Cost estimates reflect planning level estimates, dated cost information, and missing cost information and the estimate doesn't encompass all floodplains in WRIA 8 (only Cedar, Sammamish, Issaquah Creek). The cost estimate is likely significantly underestimated.</p>
Green/Duwamish	<p>Assessed Value: King County Flood Hazard Management Plan Update and Progress Report, November 2013; April 2, 2010 King County and Department of Commerce presentation states \$12 billion of assessed value citing a Department of Revenue source.</p> <p>Cost of Flood Risk Reduction: King County estimate of \$800 million to \$1.4 billion but doesn't include corridor-scale integration work for the lower Snoqualmie, White, Raging, North Fork Snoqualmie, and Upper South Fork Snoqualmie. Personal communication with Brian Murray, May 2014.</p> <p>Cost of Salmon Recovery in Floodplains: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the Green/Duwamish 3-Year Work Plan, submitted May 2014. Estimate is based on capital costs only. Cost estimates reflect planning estimates, dated cost information, and missing cost information and are thus likely underestimated. Breakdown of estimated costs by area: Duwamish: \$9.683 million; Lower Green: \$40.101 million; Middle and Upper Green: \$39.924 million.</p>
Puyallup/White	<p>Assessed Value: Pierce County Flood Hazard Management Plan, February 2013.</p> <p>Cost of Flood Risk Reduction: \$80 million King County estimate, personal communication with Brian Murray, May 2014. \$160 million Pierce County. This cost includes some of the highest priority flood risk reduction, some high priority salmon recovery projects, and work to better integrate agricultural needs and address farmland loss necessitated by levee setback projects. This is estimated as a ten-year cost. There is significant overlap with the salmon recovery estimate for a few expensive levee setback projects.</p> <p>Flood Risk Reduction Annual Revenue: Pierce County Flood Control Zone District portion of revenue dedicated to capital projects.</p> <p>Estimated Cost of Salmon Recovery: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the Puyallup-White 3-Year Work Plan, submitted May 2014. Note that approximately \$80 million of the unfunded need addresses the Buckley dam. There is significant (potentially 30 to 50 percent) overlap with the flood estimate for a few expensive levee setback projects. More detailed project level analysis would be necessary to quantify the overlap.</p>

Nisqually	<p>Assessed value: Thurston County Hazard Mitigation Plan, 2013 cites an assessed value of \$73 million for the Thurston County portion of the floodplain; Pierce County cites an estimated value of \$17.1 million for its portion; a cost estimate for the Lewis County portion of the floodplain could not be found.</p> <p>Cost of Flood Risk Reduction: The Pierce County Flood Hazard Management Plan, February 2013 states an estimate of \$17 to \$20 million for the Pierce County portion of the Nisqually only. Thurston County does not have an estimate for the Nisqually is because the County focuses flood management activities on programmatic actions, such as floodplain regulations, and does not plan capital projects.</p> <p>Flood Risk Reduction Annual Revenue: Pierce County Flood Control Zone District portion of revenue dedicated to capital projects.</p> <p>Estimated Cost of Salmon Recovery: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the Nisqually 3-Year Work Plan, submitted May 2014.</p>
Deschutes	<p>Assessed value: Thurston County Hazard Mitigation Plan, 2013.</p> <p>Cost of Flood Risk Reduction: Thurston County does not have an estimate for the Deschutes because the County focuses flood management activities on programmatic actions, such as floodplain regulations, and does not plan capital projects.</p> <p>Estimated Cost of Salmon Recovery: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the South Sound 3-Year Work Plan, submitted May 2014. Cost estimate is a range from \$67.7 million to \$87.7 million. Cost estimate is for the Deschutes floodplain areas only and does not include Kennedy-Goldsborough (WRIA 14), W Sound nearshore, or WRIA 12. The cost estimate does not include the total cost of restoration of Capitol Lake/Budd Inlet, which could be as high as \$200 million.</p>
Skokomish	<p>Assessed value: Mason County Hazard Mitigation Plan, 2010.</p> <p>Cost of Flood Risk Reduction: No costs available online.</p> <p>Cost of Salmon Recovery: USACE General Investigation (GI) Ecosystem Restoration cost estimate is out for public comment in Spring 2014. The cost of the GI is \$41 million dollars. Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the Hood Canal 3-Year Work Plan, submitted May 2014. The \$23.6 million includes projects that are consistent with the USACE GI and are focused on completing assessments and implementing projects. However, these estimated costs are for local priority projects and do not necessarily overlap with the projects USACE is committing to move forward. The cost estimate includes 12 projects.</p>

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<p>Hood Canal</p>	<p>Assessed Values: At the end of the report development period, it was determined it was possible to conduct an analysis to determine these numbers. There was not time to complete the analysis.</p> <p>Cost of Flood Risk Reduction: Duckabush and Dosewallips have a flood plan, but the recommendations are programmatic. Cost estimates for capital projects are not included in the plan or prepared by county staff.</p> <p>Cost of Salmon Recovery in Floodplains: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the Hood Canal 3-Year Work Plan, submitted May 2014.</p>
<p>Elwha</p>	<p>Assessed value: Information on assessed values in the Elwha watershed floodplain area was not available at the time of report development. As with Hood Canal, an analysis could be done to determine assessed values in the future.</p> <p>Cost of Flood Risk Reduction: The Clallam County planning director confirmed in May 2014 that there is no a flood risk reduction planning process or perceived need for one at this time. There is very little development in the floodplain.</p> <p>Cost of Salmon Recovery in Floodplains: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the North Olympic 3-Year Work Plan, submitted May 2014. Costs do not include Physt River restoration and flood risk reduction efforts, which are a high priority locally but fall outside the scope for this report.</p>
<p>Dungeness</p>	<p>Assessed value: Information on assessed values in the Dungeness watershed floodplain area was not available at the time of report development. As with Hood Canal, an analysis could be done to determine assessed values in the future.</p> <p>Cost of Flood Risk Reduction: Data from the Dungeness River Comprehensive Flood Hazard Management Plan, 2009. Costs confirmed by Clallam County Planning Manager. Personal communication with Steve Gray, May 2014</p> <p>Cost of Salmon Recovery in Floodplains: Cost estimate derived by Puget Sound Partnership Ecosystem Recovery Coordinator staff from the North Olympic 3-Year Work Plan, submitted May 2014. Costs do not include Physt River restoration and flood risk reduction efforts, which are a high priority locally but fall outside the scope for this report.</p>

## APPENDIX B: CURRENT “BEST PRACTICES” FOR COORDINATING GRANTS AND FACILITATING MAJOR CAPITAL PROJECTS

Granting agencies have been implementing practices for a number of years to promote integration and coordination. There are many examples of current practices that are helping to improve coordination, facilitate project development, and streamline grant processes. These current efforts are good models that could be built on or expanded in future years.

### 1) Coordinating or stacking Federal and state restoration funds

There are a number of efforts underway to pool state and Federal funds and/or encourage cross-agency collaboration. This can be done at the program level or at the project level and it can be done at various stages of the funding process (RFP stage, project review, and/or during grant administration). Some examples include:

- The Estuary and Salmon Restoration Program (ESRP) has issued requests for proposals that combine state capital budget funds with Federal funds. Both NOAA and EPA funds have been funneled through this state program, increasing the leverage of the state program and simplifying the grant process for applicants. In this example, the Federal agencies essentially provided Federal matching funds at the program level.
- There are several examples of programs that utilize inter-agency review panels. EMD’s Hazard Mitigation Grant Program routinely invites other agency representatives to help review project proposals. During the spring of 2014, the Department of Ecology invited representatives from other agencies to review grant proposals for the Floodplains by Design grant program. Inter-agency review panels help facilitate coordination, highlight the multiple-benefit nature of many projects, and can help agencies identify conflicts as well as opportunities for synergies among funding sources.
- The Recreation and Conservation Office (RCO) routinely bundles multiple funding sources into a single grant award, which dramatically simplifies grant administration for project sponsors. For example, the Smith Island Restoration Project has 8 different state and Federal grants for project construction. The RCO has issued a single grant contract. When the project receives a new grant, the RCO simply amends the grant contract to add another funding source. Project sponsors enthusiastically support integrated grant contracts. RCO Grant Managers also play a critical role in coordinating funding sources and grant agreement timelines and often act as a clearinghouse for grant information.

### 2) Mechanisms to incentivize and better support larger, phased projects

Several grant programs have already acknowledged how difficult it is for project sponsors to assemble the funding needed for large complex restoration projects,

especially multi-phase projects. Some examples of programs and/or program features which are intended to support these types of projects include:

- The Estuary and Salmon Restoration Program (ESRP) designates certain projects as “portfolio projects.” Large multi-phase projects initially apply for feasibility funding. Once a project has passed the feasibility stage, it is eligible to be designated as a portfolio project, which gives the project a green light for future funding through the program. Portfolio projects submit requests for the next phase of the project but *they do not to go through the entire application process again*. This arrangement has greatly assisted implementation of numerous large projects.
- The Puget Sound Partnership established the PSAR Large Capital Project Program in 2012 to provide a boost to projects that would otherwise have difficulty raising the necessary funding through existing programs with small grant maximums. Demand for the program was very high in the initial round, and it has funded a number of high priority projects around Puget Sound.
- The SRFB implemented a new policy several years ago that is intended to facilitate project development. The board waived the match requirements for “design only” projects where the request was less than \$200,000.

### 3) Ensuring adequate and flexible funding for corridor-scale planning and project development

Several grant programs provide flexible funding for corridor-scale project development, including:

- PSAR Project Implementation and Development Awards (PIDA) Program: The PIDA program was established by the Puget Sound Partnership in 2013 to support existing salmon recovery projects or to develop new projects for future funding requests. Each watershed was eligible to request up to \$200,000 to advance priority capital work, and funds were awarded through a regionally-competitive process. This kind of upfront flexible funding helps support project development.
- The Floodplains by Design competitive grant round during the spring of 2014 provided very flexible project funding. Preliminary results show that this funding helped “fill in the gaps” on a number of important projects that had difficulty finding enough funds through other single purpose grant programs.