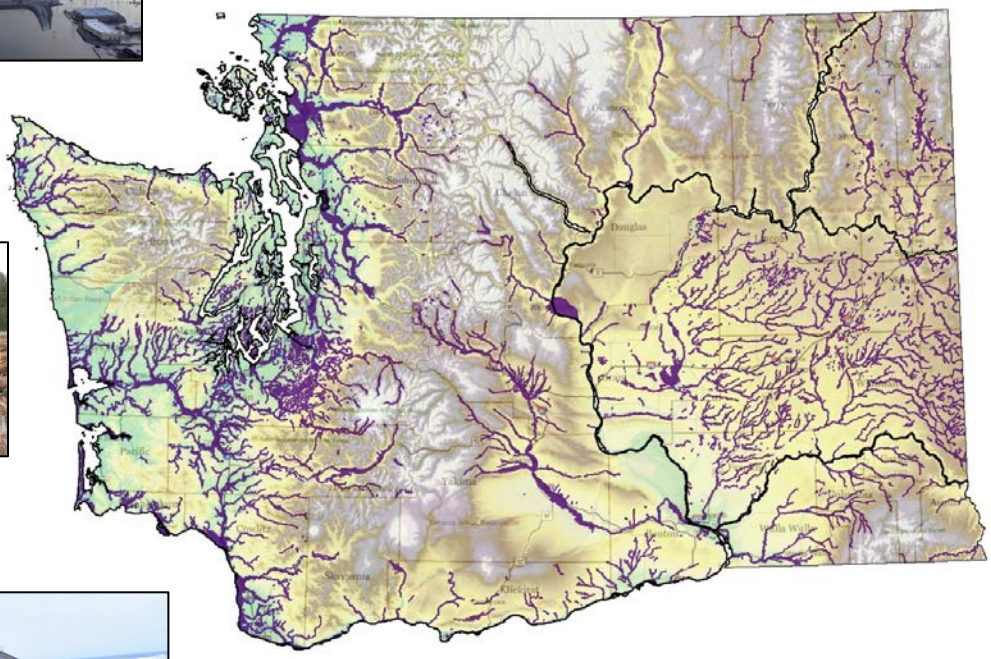
RiskMAP
Increasing Resilience Together

State of Washington

RiskMAP

Business Plan – 2016 Update





DELIVERS QUALITY DATA THAT INCREASES PUBLIC AWARENESS

AND LEADS TO ACTION THAT REDUCES RISK TO NATURAL HAZARDS

Washington State Department of Ecology
Shorelands and Environmental Assistance Program
Washington State Department of Ecology
PO Box 47600 - Olympia, WA 98504-7600
This business plan was prepared by the Washington State Department of Ecology for the Federal Emergency Management Agency under a Cooperating Technical Partners (CTP) grant to provide Risk MAP program management and mapping functions.

WA State Business Plan History

Version Number	Version Date	Purpose	Author
Version I	April 2005	Five-year Plan	WA State Dept. of Ecology
Version 2	January 2006	Update	WA State Dept. of Ecology
Version 3	August 2007	Update	WA State Dept. of Ecology
Version 4	September 2008	Update	WA State Dept. of Ecology
Version 5	October 2009	Update	WA State Dept. of Ecology
Version 6	December 2010	Risk MAP Plan	WA State Dept. of Ecology
Version 7	January 2012	Update	WA State Dept. of Ecology
Version 8	March 2015	Update	WA State Dept. of Ecology
Version 9	June 2016	Update	WA State Dept. of Ecology

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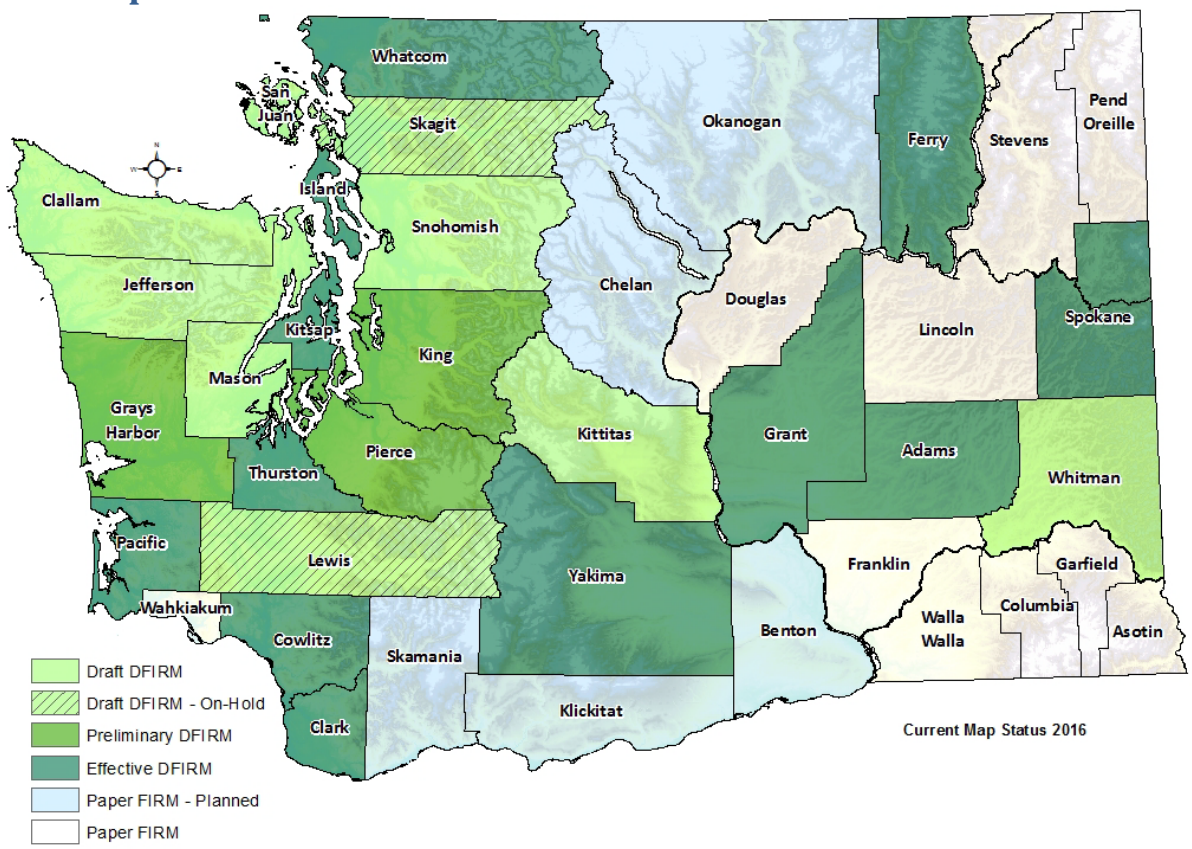
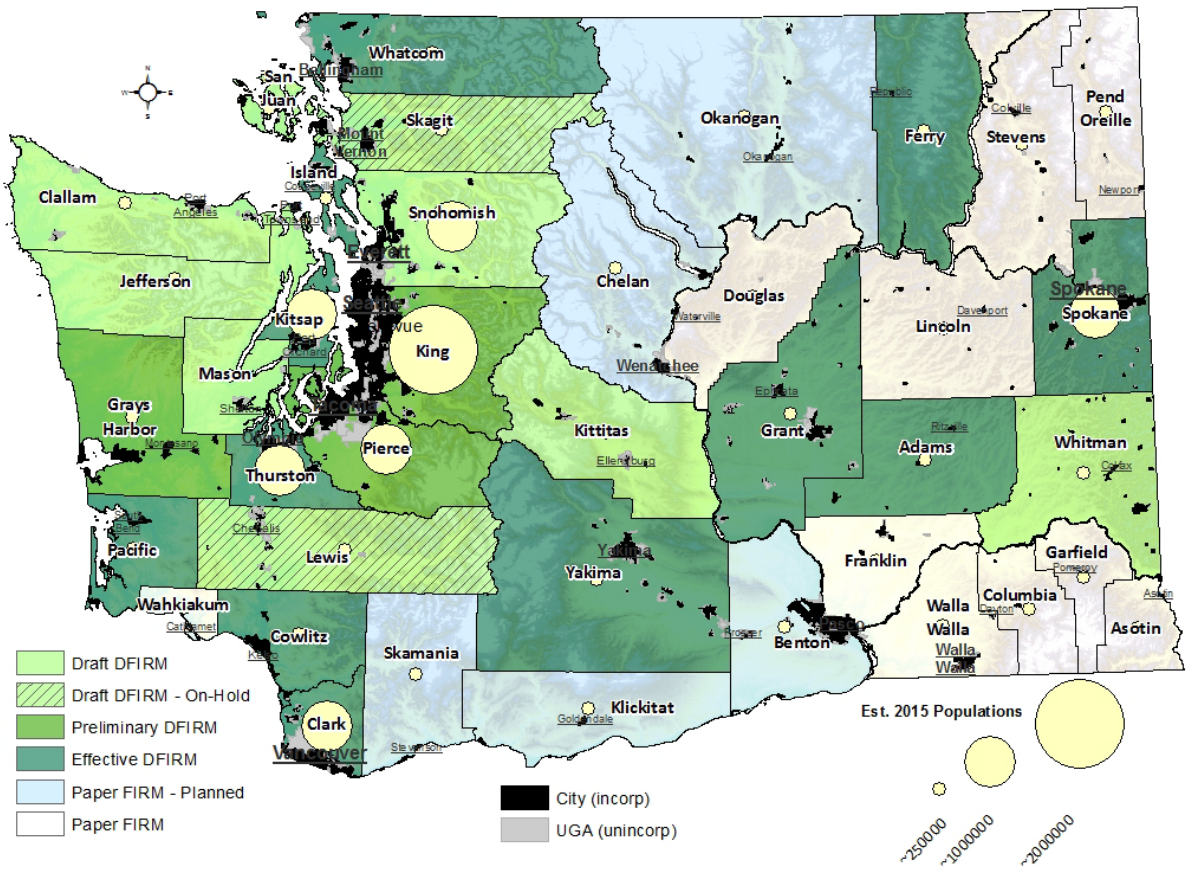
State Snapshot



Digital data in the foundation of Risk MAP enabling a suite of risk analysis tools and products to support communities in their mitigation efforts. Risk MAP's intent is to increase a community's level of resilience with quality data that compels action. Following ten years of Map Modernization efforts in Washington State, as of January 2016, 24 of 39 Counties have some form of Digital Flood hazard data. 12 Counties have fully effective maps, 3 are preliminary, and 9 more have draft maps.

All projects are countywide, 80% or 466 of 579 communities have some form of digital map. 92% of Washington's population has some form of modernized digital map where Risk MAP can be deployed. Most jurisdictions are using the draft and preliminary GIS data in their planning and emergency management operations as best available information.

Seventeen of the top twenty most populated Counties have some form of digital flood hazard map for use in their communities. These digital products serve 6.5 million residents, or 93% of the State's population.

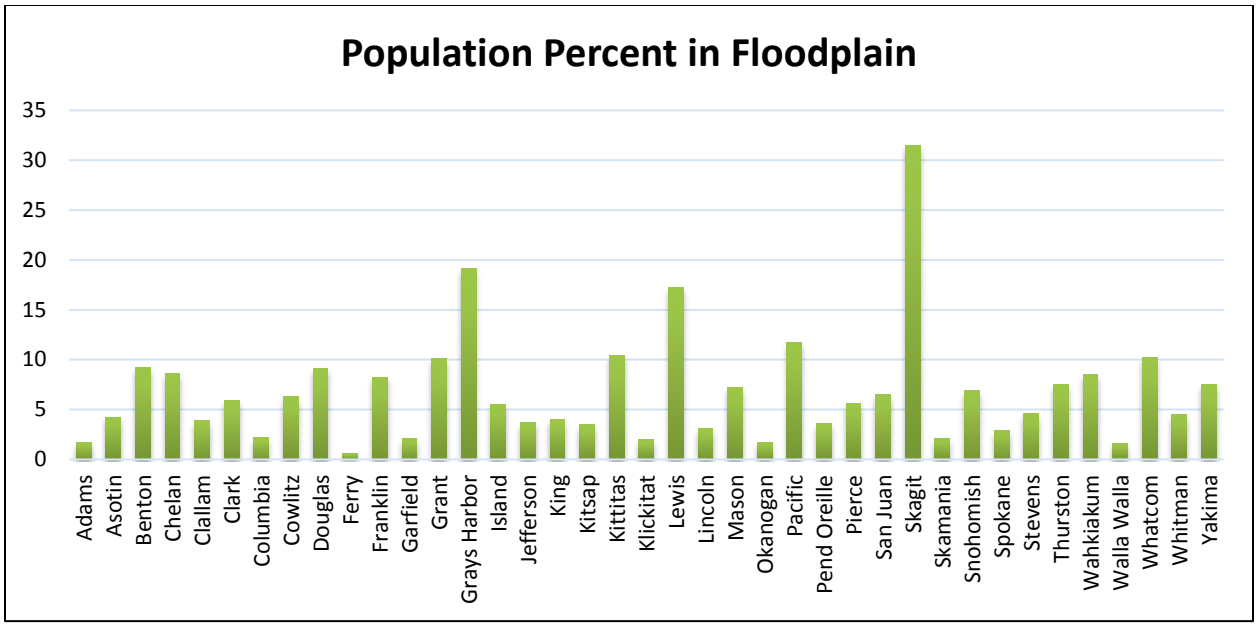


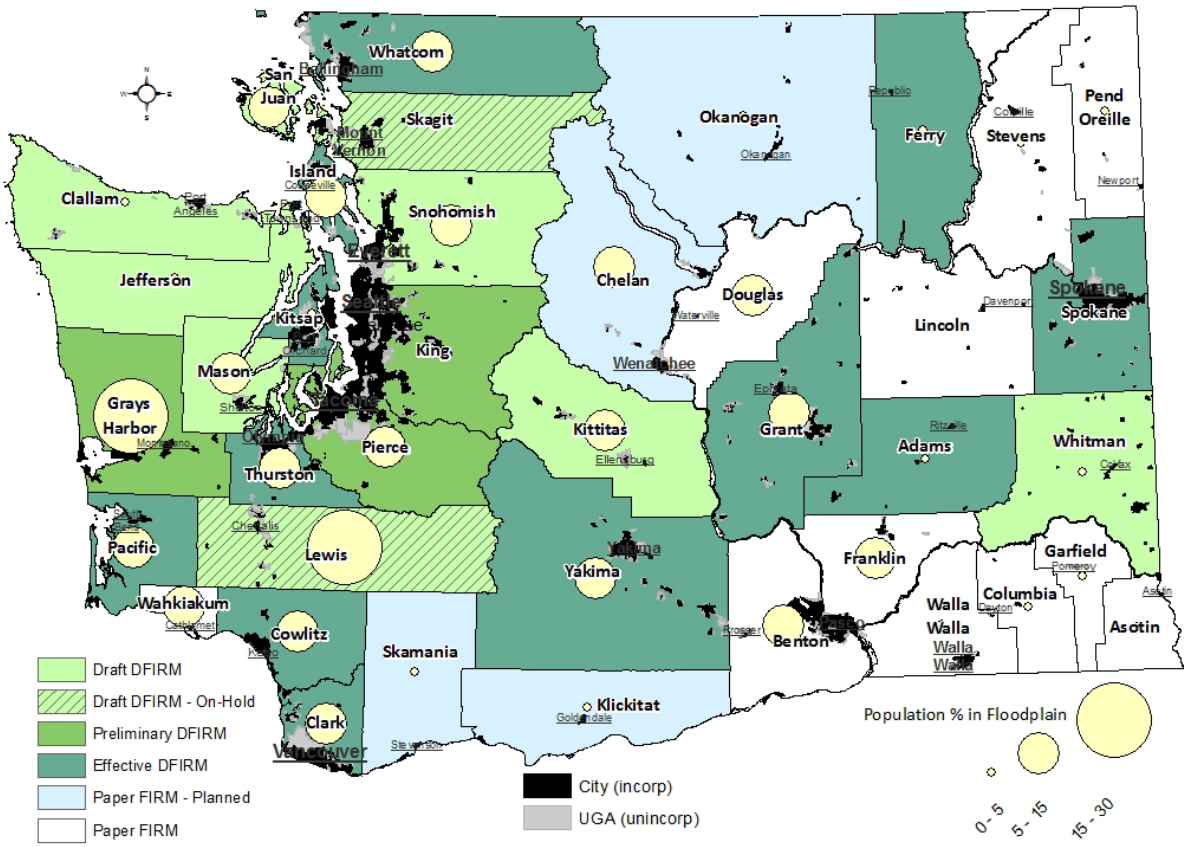
2015 JURISDICTIONS & CURRENT MAP

Draft DFIRM, 147	Effective DFIRM, 178	Paper FIRM, 106	Preliminary DFIRM, 98

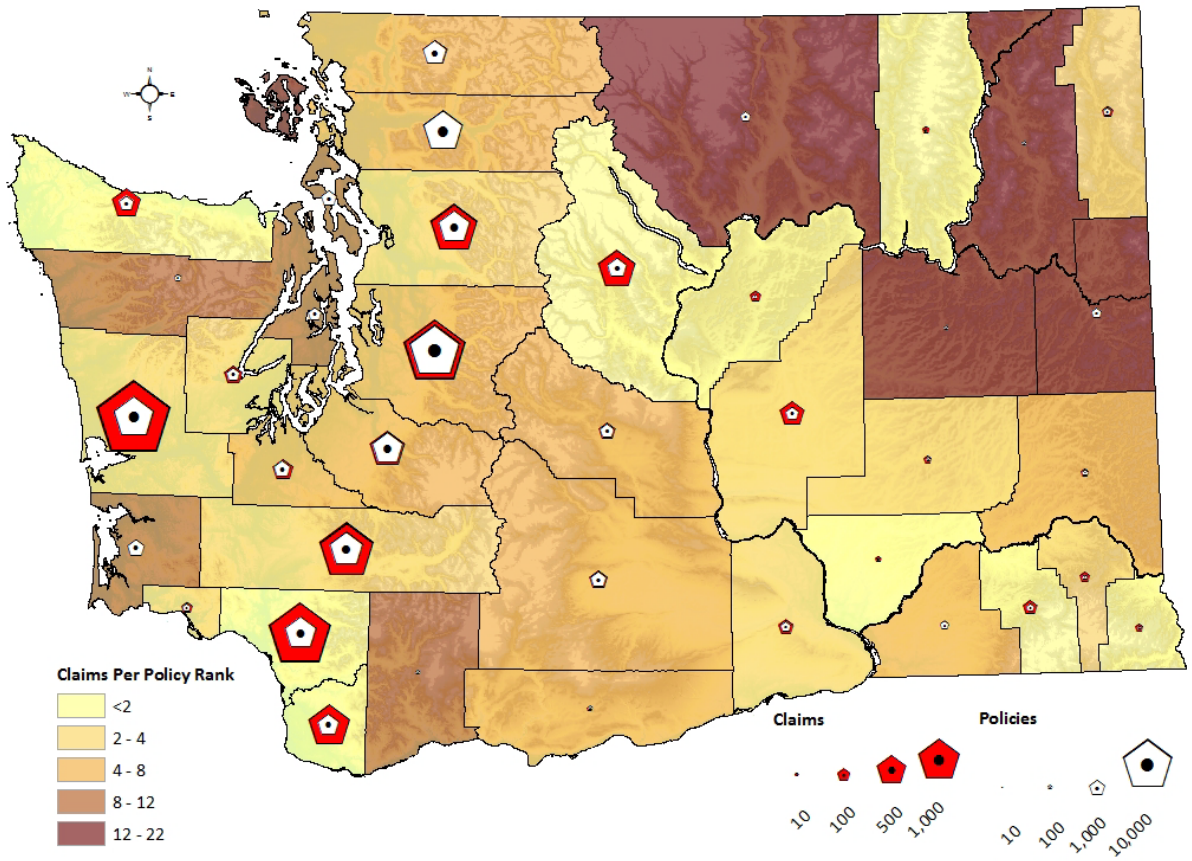
2015 POPULATIONS & CURRENT MAP

Draft DFIRM, 1206703	Effective DFIRM, 2228367	Paper FIRM 621262	Preliminary DFIRM, 2911861

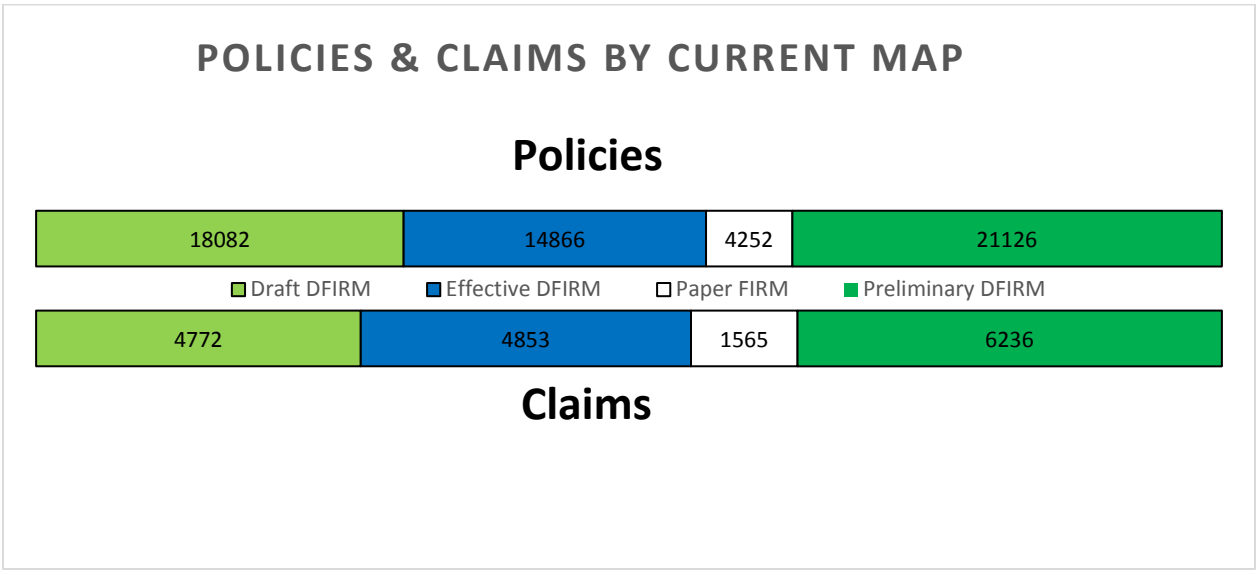




Populations in the floodplain is an excellent indicator of existing risk. This data comes from the State Dept. of Health through their Washington Tracking Network. This map plots the percent of populations in the floodplain by County.



Washington State ranks high in NFIP policies and claims relative to its population. This map compares the number of claims filed and policies in force as of 1978 and relatively ranks the Counties across the State.



Executive Summary

Washington State continues to leverage its strong, long-standing relationship with FEMA Region X and our mutually beneficial responsibilities and programs in flood hazard reduction and mitigation. Through the Cooperating Technical Partnership (CTP) Program and the implementation of this eighth mapping business plan update, the Washington State Department of Ecology (Ecology) is prepared to advance FEMA's Risk MAP Program and meet the ultimate objective of increased resiliency to flooding and other natural hazards. Over the past fifteen years, Ecology has assembled a dedicated team of mapping, analysis, and planning experts combined with robust IT and online mapping applications that continue to advance our agency's programs and policies. As a prime Risk MAP objective, Ecology plans to deliver quality data that increases awareness and leads to action that reduces risk to life and property. Washington State faces unique challenges in and around our floodplains. Levees, endangered species, and coastal areas are all current issues this plan addresses while planning for success projects.

Like many states, Washington has historically managed flood risk by building levees. Today, levees of various sizes provide flood protection to hundreds of communities throughout the state. In addition to the currently utilized functions, the age and original design of Washington's levees vary considerably. Some older levee systems were built with what is now considered substandard materials. Many older structures also were designed to provide lower levels of protection than needed today. Further, some communities have developed many areas behind older levees. A failure of one of these levees will affect a greater number of people and businesses than in the past. In 2010, Ecology completed a Flood Protection Study and statewide inventory of its larger levee systems. This inventory is one of the first steps towards better managing levees and flood risk in Washington. The report synthesized information about levees in Washington for the first time and includes the most current data available on the location of large levee systems and what level of protection the levees are designed to provide. Additionally, the inventory catalogs which levees in the state have been accredited and de-accredited by FEMA. The statewide levee inventory is used as part of a levee mapping prioritization strategy within this plan.

The Federal Endangered Species Act (ESA) provokes conscious awareness and actions to minimize the impacts from human development. Ecology incorporates Federal ESA spatial data into its Watershed Risk Rank Portfolio and mapping prioritization tool. The ESA in Washington gets some assistance from the state's Shoreline Management Act (SMA) under the National Marine Fisheries Service (NMFS) biological opinion. Under the NMFS opinion, floodplains (and all potential channel migration areas) are areas deemed 'protected' from adverse effect to endangered species from human development. Ecology publishes '*a Framework for Delineating Channel Migration Zones*.' This technical guidance document is for planners and a practitioner

who is delineating Channel Migration Zones (CMZs) for purposes of erosion hazard management and outlines a methodology based on up-to-date, peer-reviewed research, and should be used to map CMZ's for ESA impacts.

Climate change affects our thousands of miles oceanic and Puget Sound coastlines. New HAZUS analysis techniques present data that communicate areas relatively sensitive to sea level rise. Accompanying climate change in Washington is glacial retreat that leads directly to increased sediment loading on most rivers draining from the Cascade Mountains. This added sediment is a major factor contributing to increased flood frequencies in Washington. Ecology helps to address this dynamic with **LI**ght Detection **A**nd **R**anging (LiDAR) high resolution digital topography that easily penetrates most vegetation and provides mapping applications with the best overbank topography available at any cost. Ideally, all Risk MAP projects begin with LiDAR acquisition using various funding mechanisms at local, State and Federal levels.

Ecology embraces a shared responsibility toward community resiliency. This Risk MAP business plan provides a clear direction, approach, vision, and resources to address the underlying need for advanced mapping, analysis, and planning in a dynamic, complex, and often risky environment. Risk MAP delivers on what is often lacking to implement long-term mitigation strategies by providing quality data and expertise that compels action to reduce risk to life and property.

Relationships Build Resilience

Ecology has supported FEMA in the management and implementation of its mapping and risk analysis programs for over fifteen years by providing statewide resources and dedicated expertise to FEMA Region X. Through this plan, a detailed scope of work, and coordination agreements, Ecology will continue to build on the successes of Map Modernization while delivering on new Risk MAP objectives.

Purpose of this plan

This 2016 business plan details how the Department of Ecology plans to meet the goals of the Federal Emergency Management Agency's (FEMA) Risk MAP Program and what resources Ecology will dedicate to meet Washington's unique and growing need for natural hazard information. This plan includes a brief history to flooding in Washington and Ecology's role as a Cooperating Technical Partner (CTP), summarizes the Risk MAP Program to date, provides a strategic path forward, includes project implementation, stakeholder considerations, localized and long-term challenges, and demonstrates some core complimentary functions Ecology offers to the Risk MAP Program and ultimately to flood prone communities across the state.

Flooding in Washington State

Since 1956, Washington has received 33 Presidential Disaster Declarations for flooding with each county in the state receiving at least one declaration. The state received over $855 million in federal disaster assistance for combined hazards since 1996. These floods severely impact local businesses and economies as work stops and damage is addressed. The potential highway closures have devastating effect on the movement of essential goods, trade and people across the state. For example, the US Army Corps of Engineers (USACE) Skagit River Flood Damage Reduction Feasibility Study determined a 100-year flood event could devastate Skagit County's economy with damages exceeding $1 billion. Road, railroad, and pipeline transportation jeopardized by a severe flood event would force business and manufacturing shutdowns and close major commuter routes. During the 2007 series of severe storms, 20 miles of I-5 were shut down for four days resulting in economic impacts surpassing $1 billion. In Skagit County alone, over 14,200 structures are at risk of flooding with a total property value exceeding $4.3 billion. Potential total losses from a single flood event could be as great as $2 billion.

Development in the floodplains can have dire implications for lower income populations. The impacts of flooding are more burdensome for low-income residents and small businesses, which are often under-insured and with little reserve available for recovery. Recent changes in the rate structure of the National Flood Insurance Program have resulted in significantly higher premiums and unaffordable housing for those living in risk areas. The increased frequency of flooding due to climate change will exacerbate economic stresses statewide.

Flood events also have numerous impacts on the natural environment, including in-stream habitat, increased contaminants, buried fish spawning habitat, destroyed shellfish beds, changing patterns of erosion and sediment in the floodplain, and increased landslide risk. Historically, floodplain protections and development have been at odds with habitat conservation goals. In particular, healthy floodplains are a key component for salmon health, as they promote salmon growth and increased productivity, among other benefits. Due in part to efforts to remove salmon from the Endangered Species list, the state Floodplain by Design program (FbD) is utilized to restore floodplain function, enhance the capacity to store and safely move water during flood events, and improve habitat.

Sea-level rise is occurring along the Puget Sound, adding coastal flooding to the already severe riverine flooding impacts. At a station in Seattle, the trend of monthly mean sea level from 1900 to 2008 is +0.8 inches per decade. Mote et al. (2008) used a medium climate scenario and projected sea-level to rise in Puget Sound by 6" - 50" in 2100. RiskMAP has the potential to use the updated NRC SLR estimates for sea-level rise analysis.

State Land Use Policies & Programs

WA State Dept. of Commerce limits urban growth areas into floodplains

In 2009, the Washington State legislature enacted RCW 36.70A.110 declaring the expansion of an urban growth area is prohibited into the one hundred year floodplain of any river or river segment that: (i) Is located west of the crest of the Cascade mountains; and (ii) has a mean annual flow of one thousand or more cubic feet per second as determined by the department of ecology.

Shoreline Management Act

Washington's Shoreline Management Act was passed by the State Legislature in 1971 and adopted by voters in 1972. The overarching goal of the Act is "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines." There are three basic policy areas to the Act: shoreline use, environmental protection and public access. The Act emphasizes accommodation of appropriate uses that require a shoreline location, protection of shoreline environmental resources and protection of the public's right to access and use the shorelines (RCW 90.58.020).

Floodplains by Design & State Coordinated Investments

Floodplain Management and Control 2013-2015 Grants Program

The 2013 Washington State Legislature provided Ecology with $50 million in grant funds for multi-benefit floodplain management grant projects. $38.75 million of that fund was provided to eleven specified multi-benefit floodplain projects in the Puget Sound basin. Through a competitive process, Ecology awarded an additional $11.25 million in grant funds towards thirteen multi-benefit floodplain management projects across the state. These grants support a new holistic approach that addresses both reducing flood hazards to people and property, and improving habitat and the natural function of our floodplains. Learn more about the Floodplain Management and Control 2013-2015 Grants Program

Floodplains by Design

Floodplains by Design is a new approach designed to integrate flood hazard reduction with ecosystem benefits, and help leverage investments from other funding sources. Ecology is working with local project proponents to prepare a proposed FbD funding list for future funding. This list will support Ecology's request to continue FbD funding at the $50 million level in the FY 2015-2017 State budget.

Learn more about Floodplains by Design 2015-17 Budget Proposal

Washington State Flood Facts

Washington is among the most flood-prone states west of the Mississippi River. In Washington, the costs of flood damages exceed the cost of all other natural hazards. Washington State flood facts:

- In 1997, Washington had the highest number of declared flood disasters in the country.
- Washington ranks high in flood insurance policies - 57,000 policies providing $13 billion in insurance coverage.
- Over 30% of flood insurance policies are outside the mapped Special Flood Hazard Area.
- Washington experienced 34 percent growth in the number of flood insurance policies between October 2009 and September 2010, the second fastest growing state in the country.
- More than $500 billion has been spent on restoration and repair, recovery efforts, and preventative measures since 1980.
- In Western Washington, the actual occurrence of a flood on any river system that drains to the Puget Sound is roughly every 4.5 years.

History of Floodplain Management in Washington

- In 1935, the Washington State Legislature enacted the nation's first State Flood Plain Management laws in the United States.
- In 1968, the US Congress established the National Flood Insurance Program.
- In 1969, the state Legislature passed a measure prohibiting construction of residential structures in floodways.
- In 1989, the State Legislature granted Ecology authority to manage state flood plains and required the state to establish “minimum state requirements for floodplain management that equal the minimum federal requirements for the national flood insurance program.” The only exception is the state floodway prohibition.
- In 2000, Ecology became a CTP to FEMA’s Map Modernization Program and continues the partnership in the Risk MAP program.

Dept. of Ecology - Floodplain Management Program

The Washington Department of Ecology is the leading State agency for floodplain management. The floodplain management team consists of one NFIP State Coordinator, a State Risk MAP Coordinator, a fluvial geomorphologist, and five floodplain specialists that support each of Ecology's four regions. The team supports nearly three hundred flood prone jurisdictions across broad stakeholder communities including homeowners & businesses, local, tribal, and regional governments, real estate & tourism, recreation & conservation, and economic & natural resource entities. Ecology provides policy, grants, mapping, geomorphic expertise, and technical assistance to help implement the National Flood Insurance Program, Risk MAP, and sound floodplain management throughout the State. The Floodplain Management Team's main objectives are to maintain and protect natural floodplain functions while increasing resiliency to flood hazards through adaptive mitigation strategies and actions.

Technical Assistance

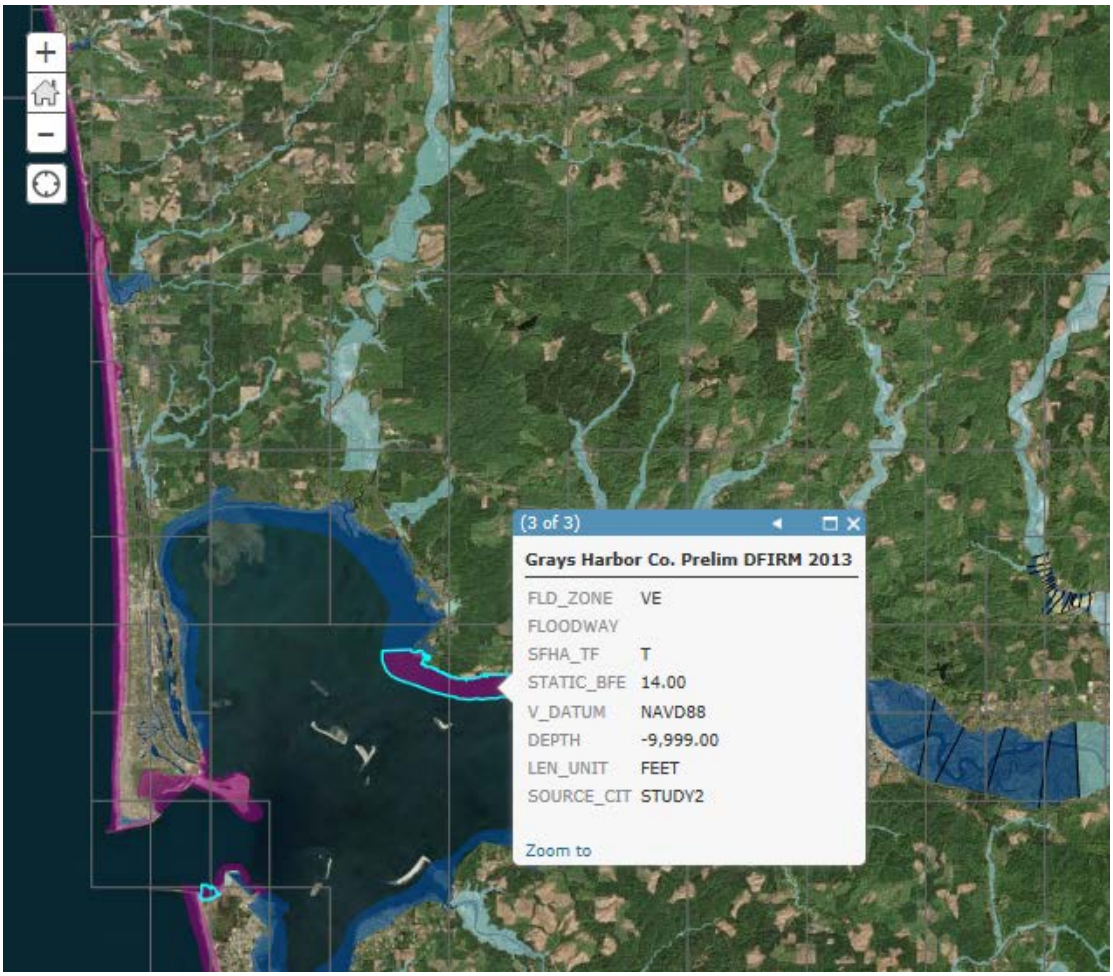
Ecology offers several services to help local governments implement their local floodplain management programs including:

- Flood hazard mapping assistance to individuals, communities, businesses, consultants, academic, and non-profit organizations.
- Training to community staff for managing local flood hazards through Comprehensive Flood Hazard Management Plans, including a guidebook for local governments preparing Comprehensive Flood Hazard Management Plans. The book outlines a step-by-step public process to identify and analyze flood problems, design strategies to solve the problems, and locate funds to implement hazard reduction plans.
- Flood hazard planning and grant assistance to communities with adopted flood mitigation strategies and plans.
- Assistance to local governments and citizens on complying with the state floodway prohibition which prohibits the construction of new residences and substantially improving existing residences in a mapped floodway.
- Assisting local governments in complying with the standards expressed in the National Marine Fisheries Service NFIP Biological Opinion.

Floodplain specialists at Ecology's headquarters in Lacey and regional offices in Bellevue, Lacey, Yakima, and Spokane work closely with local, state, and federal officials on all things floodplain management. When flood disasters are declared, floodplain specialists join State and Federal emergency management officials at joint disaster field offices to collect damage and flood information and recommend where flood-response equipment and materials should be placed. Flood plain specialists also work closely with FEMA and local staff to assess flood maps, storm damage, and flood control structures such as dikes and levees to help prepare requests for federal and state flood disaster assistance.

See the fact sheet for more about Ecology's Floodplain Management Program.

Mapping Assistance



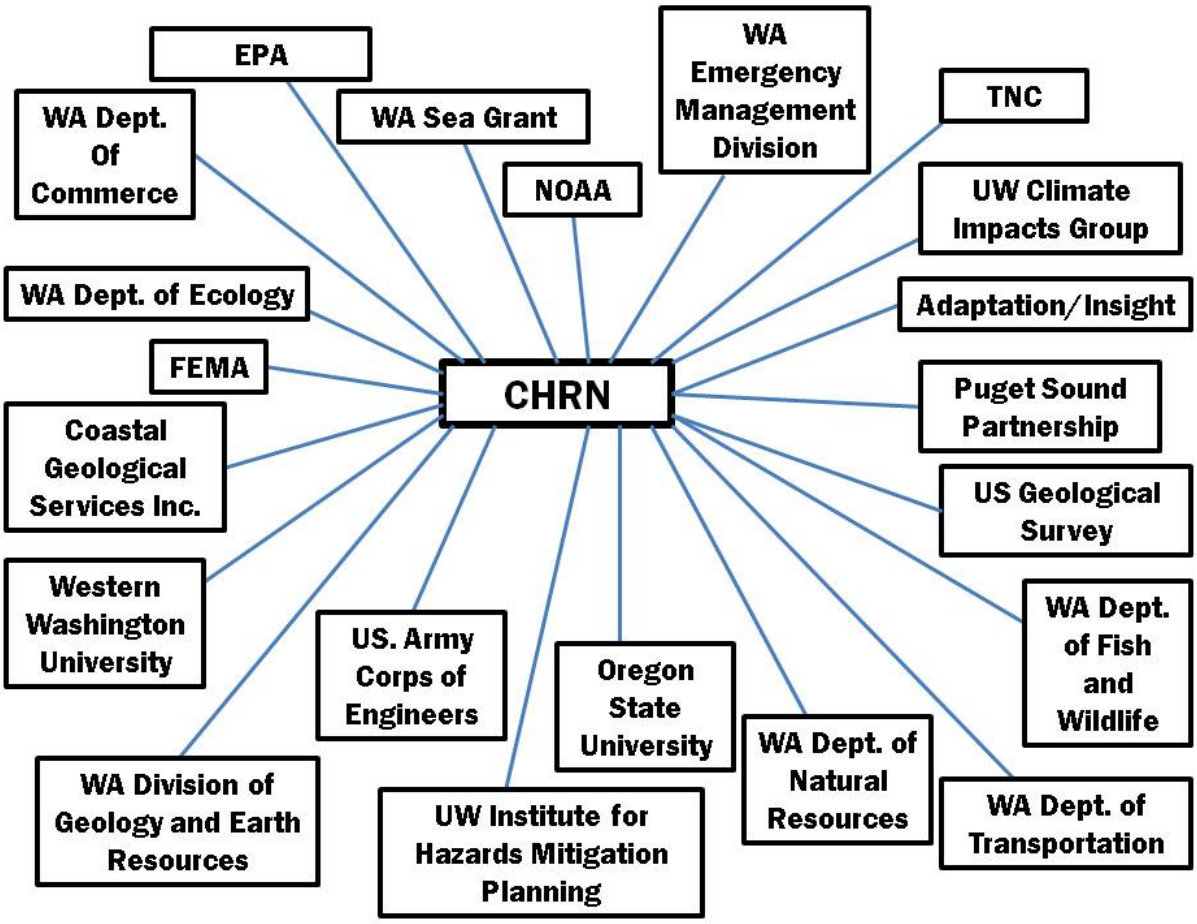
Ecology offers dedicated mapping assistance to all stakeholders of the floodplain. Ecology's Risk MAP Coordinator has been the agency lead in floodplain mapping and analysis for the past fifteen years and is solely responsible for managing flood hazard data for the agency. The Risk MAP Coordinator prioritizes mapping projects, plans for topographic data acquisition, consults with FEMA Region X on national metrics, facilitates community meetings, and deploys mapping applications for both internal and external stakeholders. The stakeholder engagement plan includes homeowners & businesses, local, tribal, & regional governments, real estate & tourism industries, recreation & conservation, and economic & natural resource entities.

WA State Coastal Zone Management Program

The Department of Ecology participates in the federal Coastal Zone Management Program which encourages states to adopt their own management programs in order to meet the goals of protection, restoration, and appropriate development of coastal zone resources. Participating states are required to describe their coastal zone management programs and submit those descriptive documents to the National Oceanic and Atmospheric Administration (NOAA) for approval. NOAA approved Washington's original Coastal Zone Management Program (WCZMP) document in 1976. This revised version of Washington's Coastal Zone Management Program document was approved by the National Oceanic and Atmospheric Administration (NOAA) in February, 2001; Click here to view the PDF.

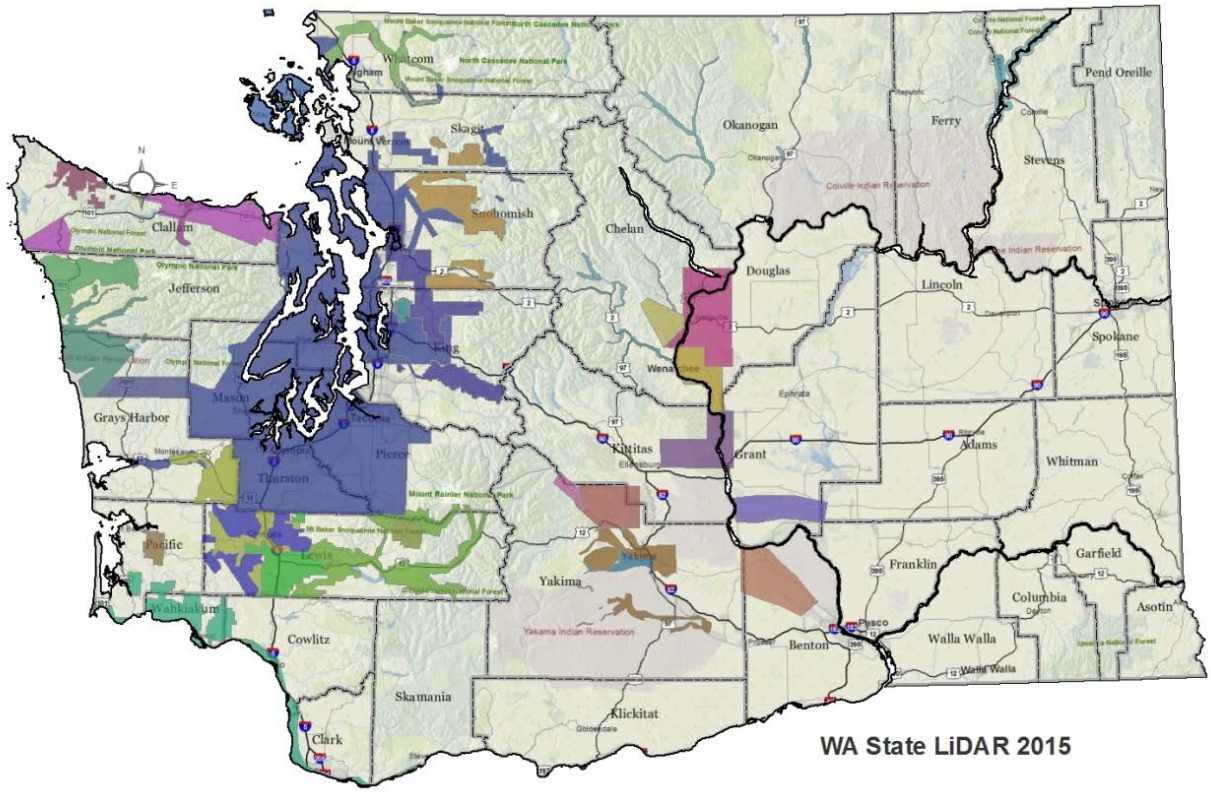
Washington Coastal Hazards Resilience Network

Ecology plans to integrate the Coastal Hazards Resilience Network into Risk MAP planning focusing on outreach and technical assistance to coastal communities. The CHRN is comprised of hazards and climate change practitioners from federal and state government agencies, academic institutions, and nonprofit organizations that are involved in coastal hazard management and/or producing risk and hazard assessments for marine shorelines in Washington State. The primary purpose of the Coastal Hazards Resilience Network (CHRN) is to improve regional coordination, integration, and understanding of coastal hazards and climate change impacts through effective partnerships. Staff from Ecology's Coastal Section will complement this plan by offering specific coordination, integration and understanding of coastal hazards and climate change impacts in Grays Harbor County including coastal erosion analysis at five locations along the Grays Harbor and Quinault Reservation coastline. In addition, the network aims to address multi-hazard planning, preparedness, adaptation, response and recovery through Resilience Phase 2 follow-up and hazard mitigation planning. Since its establishment, the Network has become a useful point of contact for those interested in engaging with other state agencies on coastal resilience issues. Currently, the CHRN has over 50 members from different sectors from around Washington and Oregon.


EPA
WA Dept. Of Commerce
WA Sea Grant
NOAA
WA Emergency Management Division
TNC
UW Climate Impacts Group
Adaptation/Insight
WA Dept. of Ecology
FEMA
CHRN
Puget Sound Partnership
Coastal Geological Services Inc.
US Geological Survey
Western Washington University
WA Dept. of Fish and Wildlife
US. Army Corps of Engineers
Oregon State University
WA Dept. of Natural Resources
WA Division of Geology and Earth Resources
UW Institute for Hazards Mitigation Planning
WA Dept. of Transportation

WA State builds better maps with LiDAR

Washington State has experienced a boom in the development of new laser topography or LIDAR (Light Detection and Ranging). LIDAR technology is accepted by FEMA for mapping and the State currently has over 12,000 square miles of data worth well over $8 million. Most of this data is in low-lying flood hazard areas. Below is a map of the current extent of LiDAR in Washington.



Data resides in the public domain at the Puget Sound LiDAR Consortium with distribution mechanisms in place at the University of Washington. As of 2016, WA State Dept. of Natural Resources will begin acquisition, delivery, and maintenance of future LiDAR efforts. State and local agencies aggressively pursue this data for its partnership values and will generate more data in the future and plans to use its collection of LIDAR data to assist in the effort to use best available topography. The State expressed the need for improve map accuracy and very much supports the efforts made towards accuracy standards and will assist in every way possible to achieve those goals.

Beyond Map Modernization

Flood risk analyses depend on reliable mapping. Mitigation planning also relies heavily on these maps and assessments. A lack of funding permitted some maps to age over twenty and twenty-five years. In Washington State, over half of all FIRM panels were older than fifteen years and in areas experiencing development in and around the floodplain. This trend caused severe backlash from around the nation sparking congress to create a Technical Mapping Advisory Council which provided the following four recommendations:

Develop strong partnerships in NFIP mapping
Ecology has been a CTP for over fifteen years

Increase public awareness and education of flood hazards
Ecology provides focused outreach & programmatic assistance to all flood prone communities in the State on a regular cycle

Use modern and emerging mapping technologies
Ecology's Coastal Atlas and ArcGIS Geospatial Platforms deliver state-of-the-art mapping and aerial imagery applications

Improve NFIP floodplain delineations
Ecology has leveraged the State's robust LiDAR inventory towards hundreds of miles of floodplain redelineations

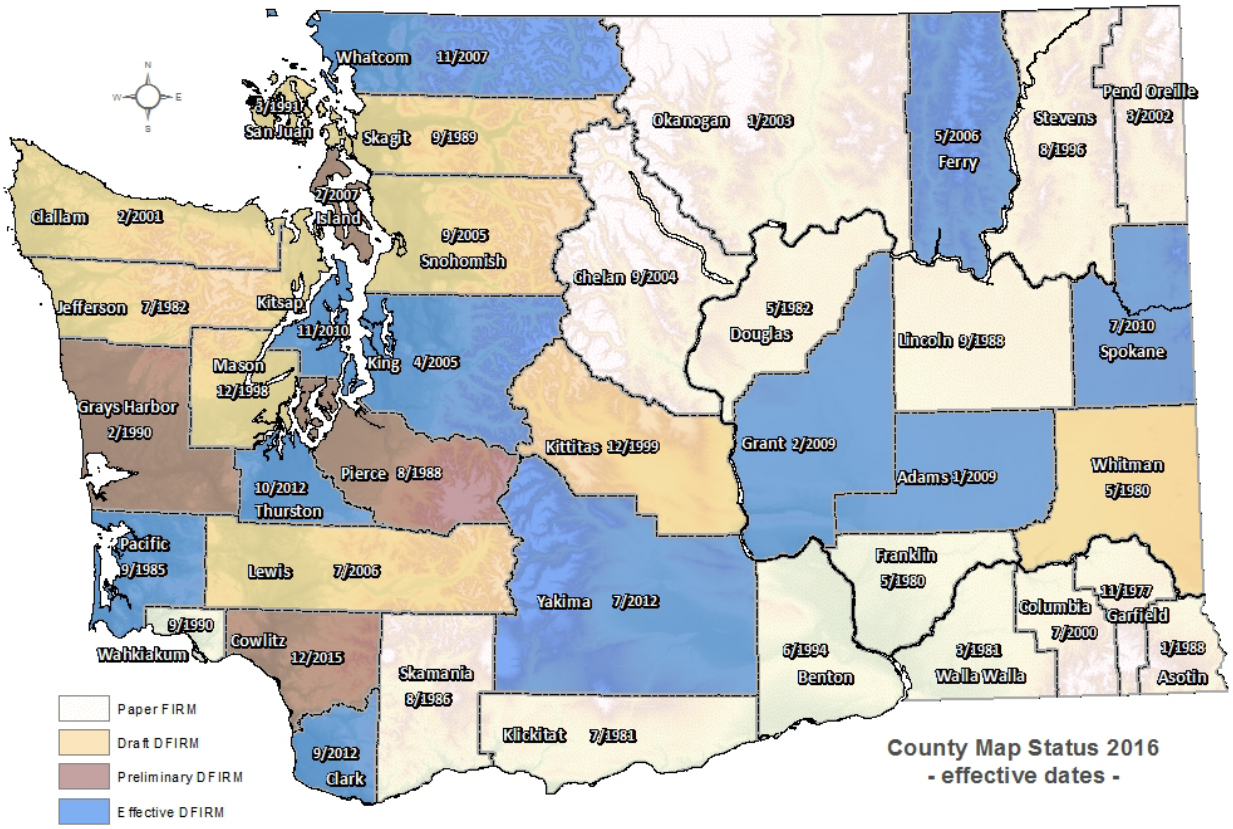
Flood Map Modernization made most of the Nation's flood maps widely accessible through digital platforms. Map Modernization significantly improved the horizontal accuracy of the flood hazard maps and made some focused improvements in base flood elevations. In many areas across the State, mapping improvements were accomplished through Cooperating Technical Partnerships (CTPs) with the State.

Below is a table and maps of the current status for all Counties in the State.

County	Current Map	Effective Date	On Hold	Project Types
Adams	DFIRM	Feb-09		Map Mod DFIRM
Asotin	FIRM	Jan-88		
Benton	FIRM	Jun-94		Discovery
Chelan	FIRM	Sep-04		Discovery
Clallam	Draft Map	Feb-01	LAMP	Map Mod DFIRM Coastal PMR
Clark	DFIRM	Sep-12		Map Mod DFIRM
Columbia	FIRM	July-00		
Cowlitz	Pre-DFIRM	Oct-15		Map Mod DFIRM
Douglas	FIRM	May-82		
Ferry	DFIRM	May-06		Map Mod DFIRM
Franklin	FIRM	May-80		
Garfield	FIRM	Sep-93		
Grant	DFIRM	Feb-09		Map Mod DFIRM
Grays Harbor	Pre-DFIRM	Sep-86		Map Mod DFIRM Coastal Riverine PMR
Island	Draft Map	Feb-07		Risk MAP Coastal PMR
Jefferson	Draft Map	Jul-82		Risk MAP DFIRM Coastal PMR
King	Draft Map	Apr-05	LAMP	Map Mod DFIRM Coastal PMR
Kitsap	Pre-DFIRM	Nov-10		Map Mod DFIRM Coastal PMR
Kittitas	Draft Map	May-81	CTP	Risk MAP DFIRM
Klickitat	FIRM	Jul-81		Discovery
Lewis	Draft Map	Dec-81	LAMP	Map Mod DFIRM
Lincoln	FIRM	Sep-88		
Mason	Draft Map	Dec-98		Risk MAP DFIRM Coastal PMR
Okanogan	FIRM	Feb-03		Risk MAP Discovery
Pacific	Pre-DFIRM	Sep-85		Risk MAP DFIRM Coastal PMR
Pend Oreille	FIRM	Mar-02		
Pierce	Pre-DFIRM	Aug-87	LAMP	Map Mod DFIRM Coastal PMR
San Juan	FIRM	Mar-91		Risk MAP DFIRM Coastal PMR
Skagit	Draft Map	Jan-85	LAMP	Map Mod DFIRM Risk MAP Coastal PMR
Skamania	FIRM	Oct-00		Discovery
Snohomish	Draft Map	Sep-06	LAMP	Map Mod DFIRM Risk MAP Coastal PMR
Spokane	DFIRM	Jul-10		Map Mod DFIRM
Stevens	FIRM	Aug-96		
Thurston	DFIRM	Oct-12		Map Mod DFIRM Risk MAP Coastal Riverine
Wahkiakum	FIRM	Sep-90		
Walla Walla	FIRM	Jan-02		
Whatcom	DFIRM	Nov-07		Map Mod DFIRM Coastal PMR Riverine PMR
Whitman	FIRM	May-80	LAMP	Risk MAP DFIRM
Yakima	DFIRM	Nov-09		Map Mod DFIRM Riverine PMR 2

Current Maps

Ecology continues to support ongoing updates to floodplain mapping and risk reduction efforts in 2016. Several countywide projects are underway and in various stages of completion. Below is a map of the latest project status. Risk Assessments are underway for Chelan, Klickitat, Okanogan, and Skamania Counties which will determine the scopes of work for all four Counties.



Introduction to Risk MAP

Ecology's Risk MAP Program is designed to communicate flood hazard mapping data with additional multi-hazard information to increase public awareness that leads to action and reduces risk to life and property.

The Risk MAP vision is to constantly reduce losses to life and property. The vision for the 4-step RiskMAP life cycle begins with 1). Identifying Risk, 2). Assessing Risk, 3). Communicating Risk, and 4). Mitigating Risk. Risk MAP uses regulatory and non-regulatory products to support mitigation actions. Ecology, EMD, and FEMA track actions identified through Resilience Phase 1 and Actions Advanced in Resilience Phase 2 approximately one year later or when suitable for the local government.

FY16 Targets

This plan directly addresses FEMA's FY2016 Risk MAP Targets:

Quality Data – 2016 projects will initiate updates for 380 unverified and unknown CNMS riverine miles in four watersheds.

Deployment – 2016 projects will serve a population over 115,000 people in two Counties.

Awareness – 2016 Discovery will engage over thirty local officials in twenty communities, two counties, and one tribal government.

Actions Advanced – Ecology's Resiliency phase 2 plans tailored follow-up with Risk MAP communities to move Actions Identified to Actions Advanced in the FEMA Action Tracker.

FEMA's Risk MAP Goals and Objectives

With the experience of Flood Map Modernization's program success and collaborative efforts with affected federal, state and local stakeholders, FEMA developed the following goals and objectives for Risk MAP:

Goal 1: Address gaps in flood hazard data to form a solid foundation for flood risk assessments, floodplain management, and actuarial soundness of the National Flood Insurance Program.

ECOLOGY'S PROJECT SEQUENCING PRIORITIZES URBANIZING AREAS WITH UNMAPPED FLOODPLAINS DIRECTLY SUPPORTING THE NFIP AND THE FLOODPLAIN MANAGEMENT COMMUNITY.

Goal 2: Ensure that a measurable increase of the public's awareness and understanding of risk management results in a measurable reduction of current and future vulnerability to flooding.

ECOLOGY IS ENGAGED WITH JURISDICTIONS AND THEIR UNIQUE STAKEHOLDER COMMUNITIES THROUGHOUT THE RISK MAP PROCESS WITH A PLAN TO TARGET NATURAL HAZARDS MITIGATION USING QUALITY DATA, CREDIBLE SCIENCE, AND MITIGATION SPECIALISTS TO UNITE LOCAL RESOURCES THROUGH ENHANCED PUBLIC AWARENESS AND RISK REDUCTION STRATEGIES.

Goal 3: Lead and support states, local and tribal communities to effectively engage in risk-based mitigation planning resulting in sustainable actions that reduce or eliminate risks to life and property from natural hazards.

ECOLOGY, DEPT. OF NATURAL RESOURCES, STATE EMERGENCY MANAGEMENT, & REGION X ENGAGE COMMUNITIES FROM DISCOVERY TO RESILIENCY WITH MITIGATION STRATEGIES DESIGNED TO SUPPORT LONG-TERM HAZARD MITIGATION PLANNING.

Goal 4: Provide an enhanced digital platform that improves management of limited Risk MAP resources, stewards information produced by Risk MAP, and improves communication and sharing of risk data and related products to all levels of government and the public.

ECOLOGY DEPLOYS STATE-OF-THE-ART GEOSPATIAL MAPPING APPLICATIONS WITH OPEN DOMAIN AND SECURE PLATFORMS. THE WA STATE COASTAL ATLAS CURRENTLY DELIVERS ONLINE INTERACTIVE MAPPING STATEWIDE USING THE BEST EFFECTIVE, PRELIMINARY, AND/OR Q3 DATA WHERE MAPS ARE NOT YET MODERNIZED.

Goal 5: Align Risk Analysis programs and develop synergies to enhance decision-making capabilities through effective risk communication and management.

ECOLOGY IS INTEGRATING OUR COASTAL HAZARDS RESILIENCE NETWORK INTO THIS RISK MAP PLAN BY LEVERAGING COASTAL RESOURCES AND EXPERTISE FROM SEVERAL PARTNERS INCLUDING, WA DEPT. OF NATURAL RESOURCES, UNIVERSITY OF WASHINGTON CLIMATE IMPACTS GROUP, & THE SW WASHINGTON COASTAL MONITORING AND ANALYSIS PROGRAM.

Risk MAP Partnership Agreement

This Risk MAP Partnership Agreement is used to document the regulatory and non-regulatory tools that communities involved in a Risk MAP Project will receive, specify mitigation technical assistance to be provided, identify roles and responsibilities for all parties involved, list the data to be provided with associated deadlines and expectations of the study results, and provide a projected timeline and an explanation of what is expected from project partners at each major milestone. The Agreement provides documentation of FEMA's commitment to the project and the commitments of the communities to the Risk MAP Project. By signing the Agreement, the stakeholders and project partners acknowledge that they understand and commit to the project scope. This plan will highlight Washington State's commitments.

Working together on a Risk MAP project, FEMA Region X, the State of Washington, the Counties and cities within the project area will identify, assess, communicate, plan for, and mitigate risk. The information provided by these projects can be used by these communities to enhance their hazard mitigation plans, make informed decisions to improve resilience to natural hazards, and raise awareness about local risks to hazards so that they are better informed and prepared to take actions to reduce their risk.

This Partnership Agreement outlines how these project partners will achieve success in key activities and goals:

- FEMA, the State, the Communities , STARR, and CERC will commit to maintain open communication and a productive dialog during the Risk MAP project,
- FEMA and the State will support communities by capturing value-added ambitions for how the project outputs will be incorporated into ongoing activities in order to reduce risk and build more resilient communities.

Communication and Coordination

FEMA, the State, STARR, and CERC will:

- Provide quarterly status reports outlining the current project status, changes to future study status, key accomplishments to date, identified risks, and next steps via a letter provided electronically to each community floodplain administrator and Chief Executive Officer.
- Enhance the Communities ability to communicate about hazards and associated risk to people who live and work within their communities and the coastal area by providing templates and outreach materials for local use, quarterly updates on project progress, and recommendations for implementation upon request.
- Contact the Communities at least two weeks in advance of a proposed meeting date via email.

The State will:

- Provide information, clarification, and resources to support participation in the project, upon request.
- Make FEMA aware of any potential risks to the data development or project progress, and act as liaison to the Communities by providing information and resources upon request.
- Support risk assessment data and product development as needed.
- Engage in post-resilience follow-up.

Disaster Response Activities

FEMA and the State will:

- Provide the Communities with any findings/recommendations resulting from the event identify areas of mitigation interest and ultimately support the community in their recovery efforts.
- Support the Communities in prompt disaster response by coordinating internally and providing resources.
- Provide the Communities with suggested guidance for collecting and documenting this information.

Mitigation Planning Activities

FEMA, Ecology, EMD, and CERC will:

- Discuss with the communities how existing flood hazard data and available tools can be used to enhance the hazard mitigation plan.
- Share mitigation planning and/or implementation best practices, provide information about resources available to support mitigation actions, and assist in the development of an action item list to facilitate mitigation activities.

The State will:

- Coordinate annually to align agency directives such as hazard mitigation planning, shoreline management, and Risk MAP to focus mitigation efforts at the local level.
- Support FEMA and the Communities by providing information, clarification, and land resources to support mitigation planning efforts or obtaining funding, upon request.

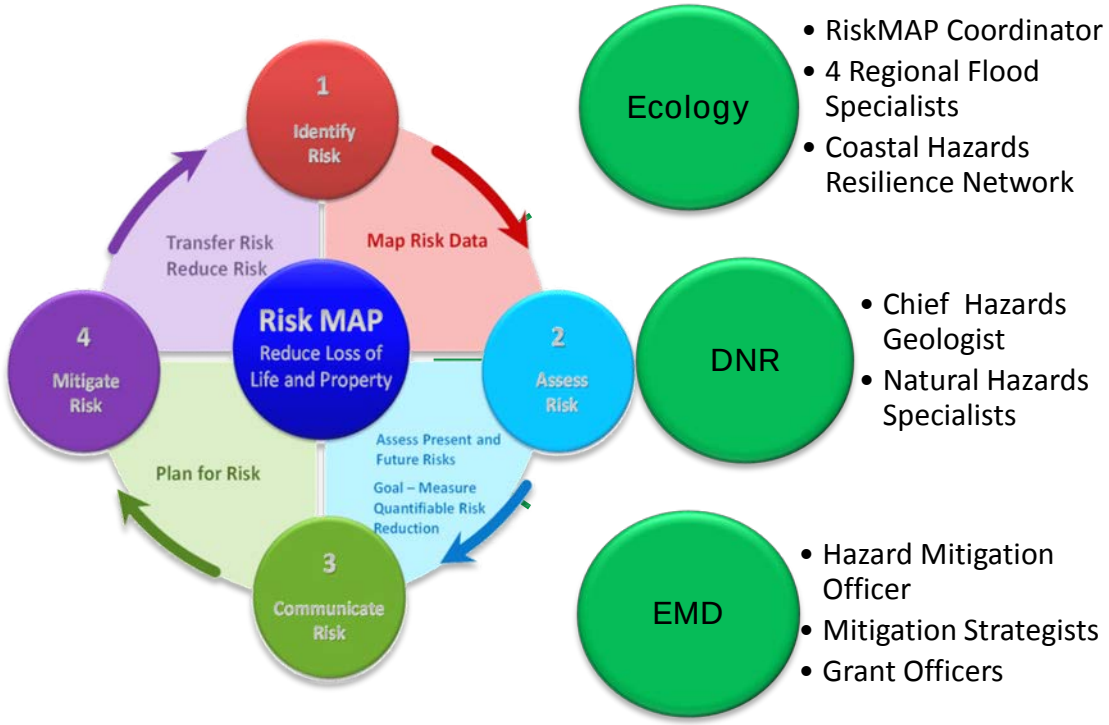
State Agency Involvement

Washington State has been a full-participating partner since 2000 performing several tasks including riverine restudies, DFIRM production, topographic data development, redelineation, program & project management, and outreach & education. Ecology serves as lead entity with sister agency support from DNR (Dept. of Natural Resources) and EMD (Washington Military Dept.). Ecology serves as a constant presence for the communities and is involved throughout the Risk MAP process from Discovery to Resiliency Phase II. Ecology dedicates a Risk MAP Coordinator and one of four regional floodplain specialists to every project.

DNR provides the State's Chief Hazards Geologist and senior hazards specialists. DNR serves as the landslide, earthquake, and tsunami expert generating the multi-hazard risk report under a CTP grant. DNR is involved at the Discovery and Resiliency phases providing geologic and wildfire expertise.

EMD dedicates a State Hazard Mitigation Officer and one or more mitigation & recovery strategists. EMD is engaged at the Discovery and Resiliency Phases as well as grants and mitigation specialists. Washington State also receives the full breadth of natural hazard specialists, mitigators, planners, insurance, and risk analysis experts from Region X for every project. Ecology works closely with Region X on all aspects of project sequencing, planning, execution, and delivery of all projects.

Washington State agency structure is divided amongst the three agencies that serve the Risk MAP program as shown below:

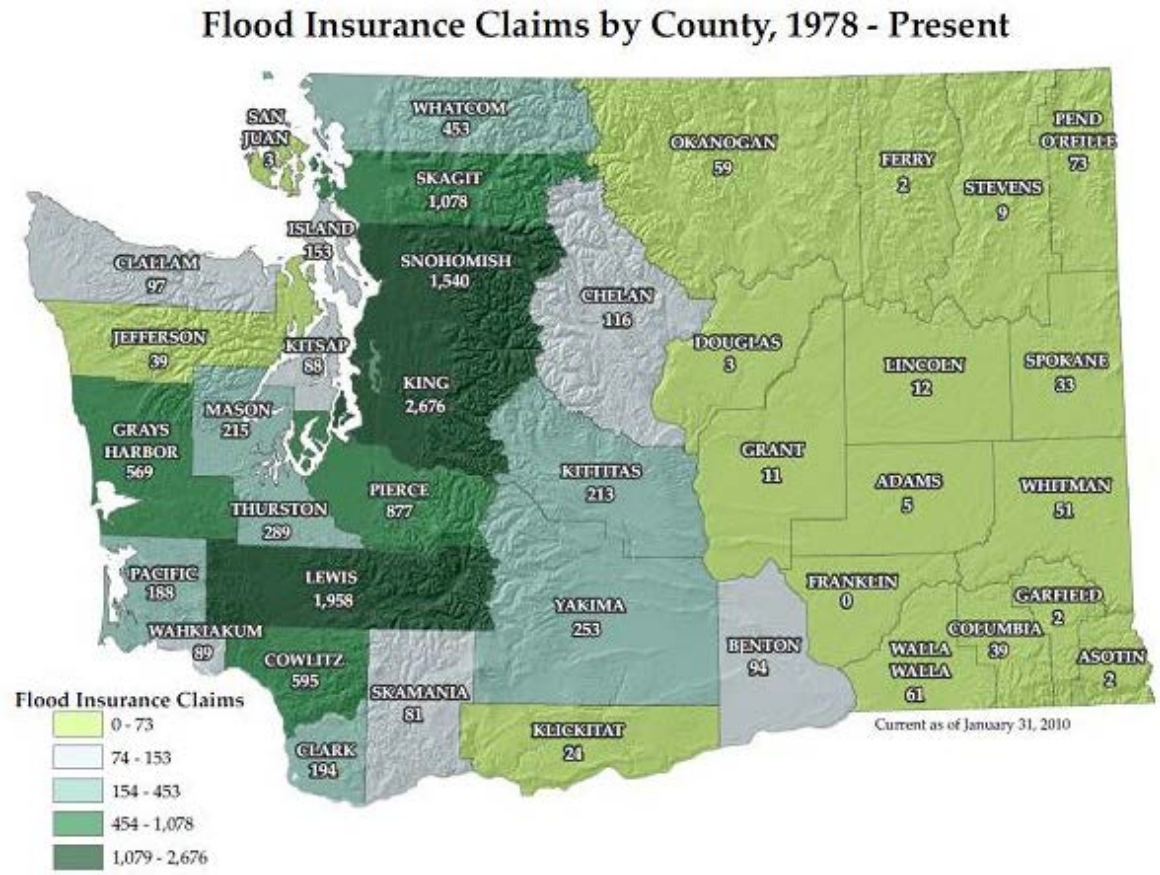


Risk MAP Global Program Management

Ecology engages in most all of the program management activities eligible through the CTP agreement. Primary areas of focus are managing mapping projects, outreach & communication with local government, topographic data development (LIDAR), and Inter-Agency Coordination. This plan addresses topographic data development, stakeholder engagement strategies, levee priorities, a mass zone A approach, and areas subject to ESA. Below are FEMA's Global PM activities:

- Inter-Agency Coordination
- Program Management Activities
- Project Management Activities – Discovery thru Resiliency
- Stakeholder Communication & Outreach
- LiDAR - Topographic Data Development
- Resilience Workshops & Mitigation Planning Technical Assistance
- WA Coastal Atlas & ArcGIS Global Mapping Outreach
- Mass Zone A Planning with Coordinated Needs Management Strategy

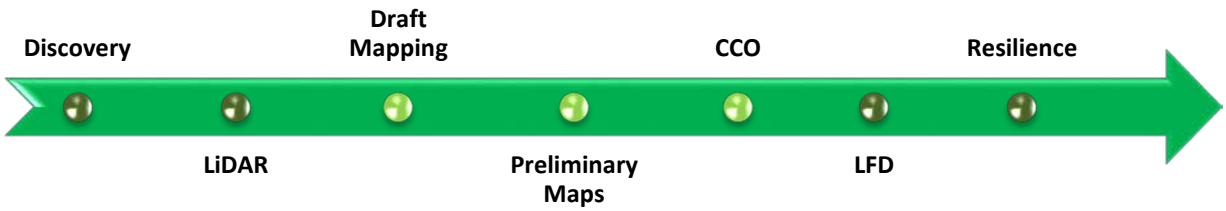
Ecology plans mapping activities, outlines project movement from discovery to resiliency with tailored community engagement plans.



Global outreach for mapping is provided through Ecology's Coastal Atlas and the agency's Risk MAP Website.

Primary Players & Key Decision Points

Ecology's Risk MAP Coordinator is the State lead throughout the project. Ecology coordinates heavily with the 'Core Team' consisting of FEMA, the study contractor, STARR, DNR, EMD, local CTP's, Ecology, and outreach coordinator CERC to plan the project through five phases. This team is in constant communication throughout all phases of the project. A typical Risk MAP project begins with [1.]Discovery, [2.] Draft Maps, [3.] Preliminary Maps, [4.] Public Open House, and [5.] Resilience Workshop. Community staff meetings are held within each phase, at least one public meeting following the preliminary phase, and an elected officials briefing and staff workshop to finish the project. Below is a typical Risk MAP project timeline relative to FEMA's KDP's (Key Decision Points). A KDP is essentially a quality control process of programmatic checks from key players along a project timeline. The timeline indicates the project phases, KPD's, and State players involved in the project at any given phase.



KDP 0: Initiates Flood Risk Project with planning and LiDAR acquisition;

- Ecology coordinates LiDAR acquisition

KDP 1: Flood Risk Project is ready for the Discovery process;

- Ecology, DNR, & EMD attend Discovery

KDP 2: Preliminary Flood Insurance Rate Maps & FIS development

- Ecology attends Draft Map Meetings; DNR begins Risk Report

KDP 3: Preliminary FIRM and FIS to the community

- Ecology attends Flood Study Review Session

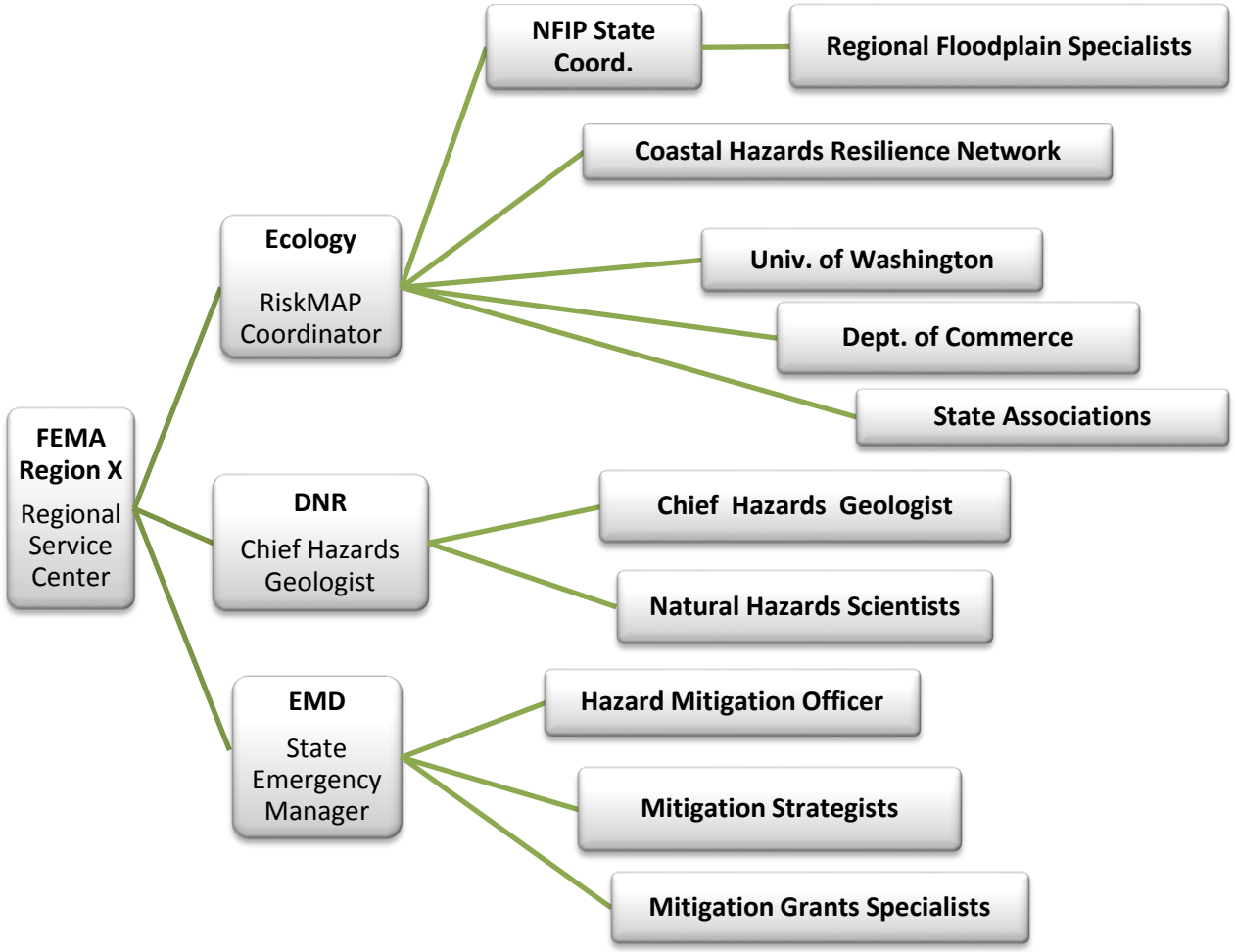
KDP 4: Initiates an Appeal Period

- Ecology Attends Community Coordination Officer Meeting

KDP 5: LFD is issued

- Ecology, DNR, EMD attend Resilience Meetings; DNR or PTS generate the Risk Report

Other State Players & Partners
Complimentary agencies, players, and disciplines include the University of Washington, State Dept. of Commerce, and several State Associations including: the Associations of Cities and Counties, the Municipal Research Center of WA, and the Northwest Floodplain Managers Association. Below is a diagram of Washington State's structure and primary partners:



Stakeholder Approach

Washington's stakeholder community is somewhat unique due to contrasting geography, geology, landuse laws, susceptibility to multiple natural hazards, endangered species in the floodplain, vulnerability to sea level rise, cultural & archeological significance, diverse economies, and national and international relationships. Our main objectives are to maintain and protect natural floodplain functions while increasing resiliency to natural hazards through adaptive mitigation strategies and actions.

The Floodplain Management Team supports nearly 300 flood prone jurisdictions. Communities are the State's primary clients that are ultimately responsible for actions that reduce risk. It is

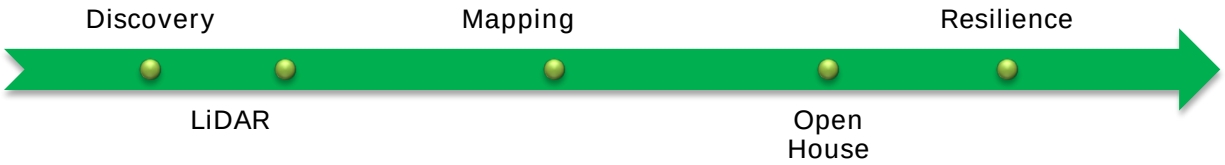
the State's responsibility to engage stakeholders early and often with clear direct messaging that encourage proactive applications of Risk MAP products and analysis.

Below is an outline of the State's stakeholders and when the State plans stakeholder outreach:

During Discovery, Ecology teams with CERC to work directly with each community on outreach plans that focus on local stakeholder involvement, local needs, challenges, and strategies tailored to the stakeholder's involvement and impacts from revised mapping. This often clarifies the objectives and gains trust across the community.

Planned Project Course

Projects typically begin at Discovery and move through three or four phases before a project is ready for a resilience workshop. Discovery begins a multi-step process of community engagement, revised flood hazard mapping, and mitigation with the overarching goal of increased community resilience to natural hazards. Discovery is data mining, project scoping, and community engagement. LiDAR is acquired if discovery justifies the need for re-mapping. Mapping is divided into draft and preliminary status with community and stakeholder engagement following each phase. Resilience, and the ideology, is defined to frame the project course. A practical approach as defined by the local governments is phased into two engagement strategies. Resilience Phase I occurs after the map revisions are final, GIS layers are produced, and risk data is compiled. A briefing of the elected officials and a workshop with staff is held to identify mitigation opportunities or 'Actions Identified'. Resilience Phase II is held approximately one year later or when suitable for the communities to integrate actions into their planning elements. Mitigation activities 'identified' and 'advanced' are then entered into the Action Tracker.



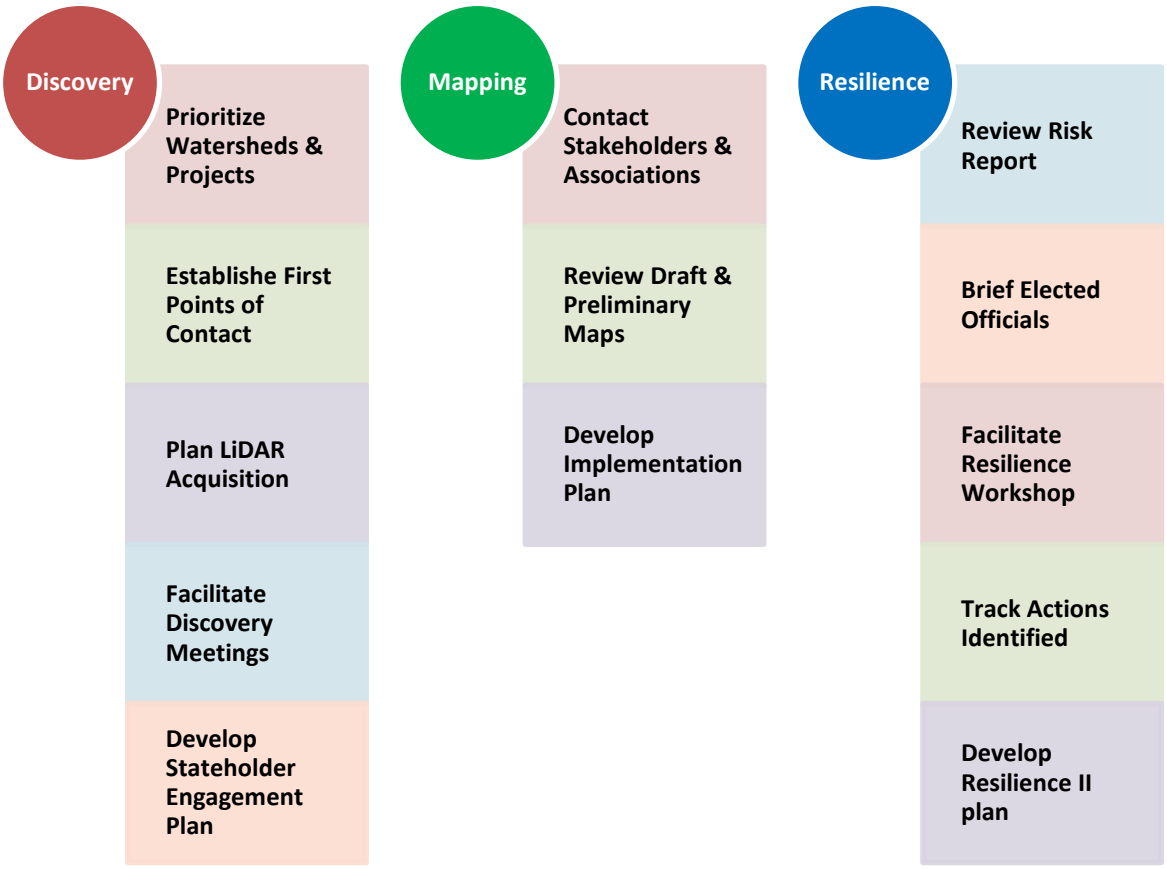
Discovery is the process of data collection and analysis with the goal of initiating a Risk MAP Project. Discovery begins with a Core Team project planning meeting consisting of FEMA RAB & FM&I, RSC, Ecology, DNR, EMD, CERC, and STARR. The State makes the first Points of Contact (POC's), introduces the Risk MAP Program, and details the process.

Local Official Engagement

Community engagement from the State occurs as early as possible, is critical to local participation, and sets the tone for the Discovery process and possibly the entire project. The Risk MAP Coordinator makes the first contact with the communities with the primary goal of reaching all appropriate staff and stakeholders in the community to engage in this effort. Key points to discuss during the first POC's are:

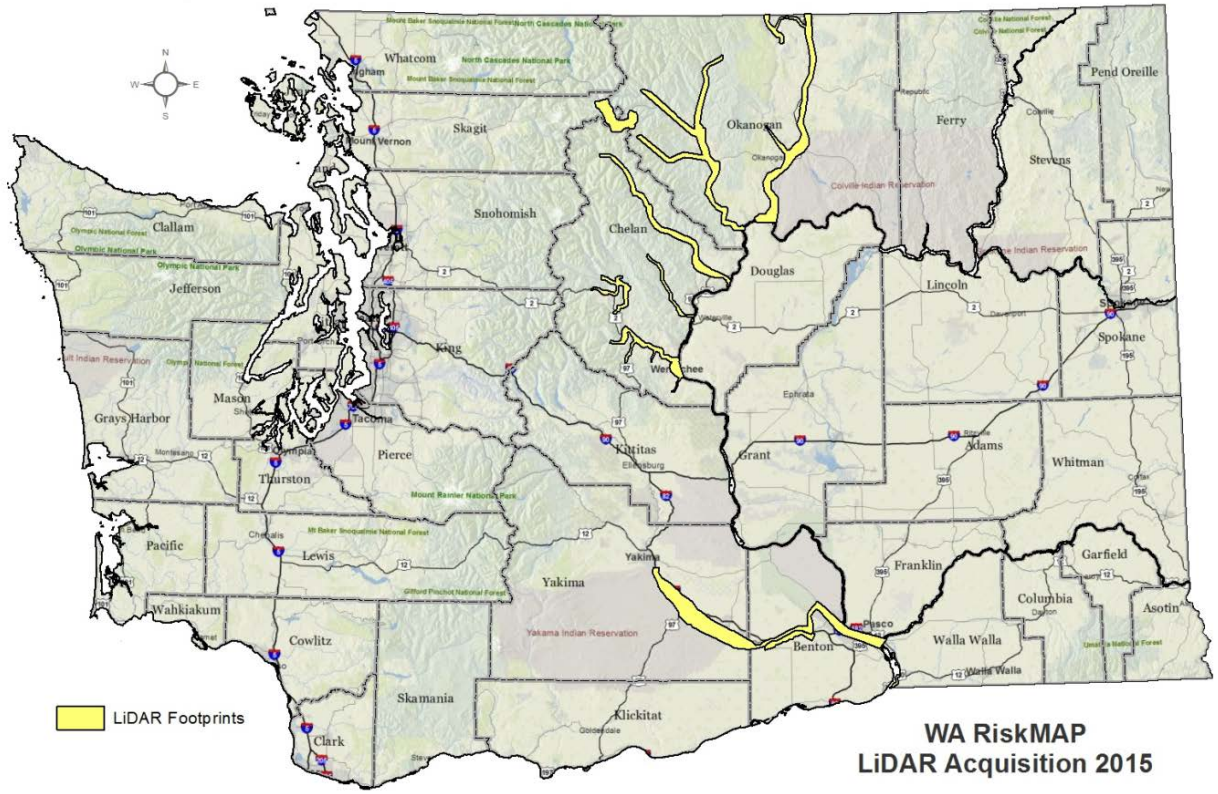
- introduce Risk MAP, statewide plan, & players
- include multi-hazard & non-regulatory products
- inform of upcoming project objectives and schedule
- discuss risk analysis & mitigation planning
- next steps, interviews, discovery meeting schedule
- specific areas of interest to the communities
- challenges or potential obstacles

Below is a diagram of Ecology activities by phase:



CERC takes the lead on Discovery interviews following the first POC's. CERC captures all relevant information from local staff, compile existing data, and prepare maps for the Discovery Meeting. The Discovery meeting brings together all disciplines involved in natural hazards planning, response, and mitigation at a local government facility to discuss what the team learned from our discussions and outline a scope of work for the project. This meeting is intended to introduce the project to community leaders, build consensus, and outline a path toward the final resilience workshop. The Core Team dedicates a good portion if its resources in the preparation for the Discovery meeting.

LiDAR Acquisition



Topography 'LiDAR' data is the backbone to flood mapping and all Risk MAP projects should, if not must, begin with topographic data development and LiDAR data is the preferred standard for digital topography. Ecology prioritizes topographic data collection with guidance from FEMA Region X on current metrics and future mapping plans. 2016 begins a new relationship with WADNR for LiDAR data collection and management. The data will eventually reside at the Puget Sound LiDAR Consortium for distribution or through a new WADNR portal.

Flood Hazard Mapping

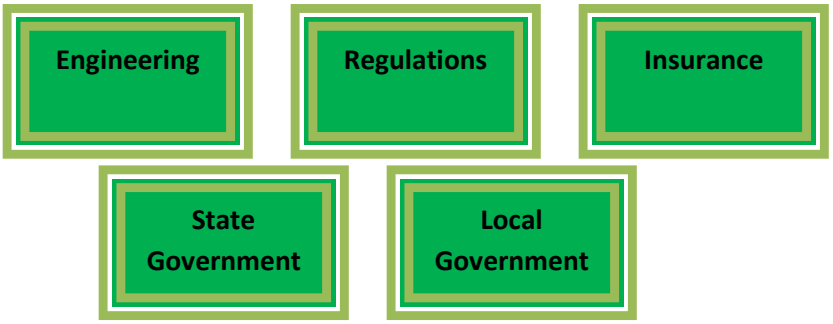
Currently, all mapping is the responsibility of FEMA's study contractor or local CTP's and performed in two steps with community staff meetings at the end of draft and preliminary mapping. Ecology's Risk Map Coordinator and the State Regional Specialist attend both meetings. Within the mapping phase, FEMA has improved the process by introducing a draft map to the communities prior to starting the comment/appeal periods. This allows FEMA to address some mapping issues without entering the appeal period and is proving to be worth the risk of delaying the process. Communities appreciate the extra effort FEMA is taking with respect to draft mapping and the willingness to re-examine the mapping following feedback from the communities. This effort strengthens the relationships throughout the process, builds credibility, and increases local ownership of the resulting maps and products.

a. Draft map roll-out - Flood Study Review Session (FSR)
b. Preliminary map roll-out - Community Coordination Officer meeting (CCO)

Following consensus at the draft map phase, the process moves to the preliminary map phase. A 30 day comment period begins at the CCO meeting followed by a 90 day appeal period. Once the mapping satisfies the community and FEMA's guidelines, an evening public open house is scheduled to share the new mapping to the public, property owners, and stakeholders. Ideally, communicating preliminary maps to the public begins shortly following the CCO meeting to allow the full 90 days to appeal.

Open House Format

The open house format has been very successful in Washington State. The audience first hears a brief intro from FEMA about what the project did, who did the work, what it means to stakeholders, and what can be done about it. The venue then breaks into groups of staff with specific areas of expertise. Property owners typically begin at the GIS table to get a printed map of their parcel with the floodplain overlaid atop an aerial photograph. Property owners can then move to the insurance table for assistance on flood policies and rates information tailored to their needs. Other tables include State and Local governments, engineering, and floodplain regulations.

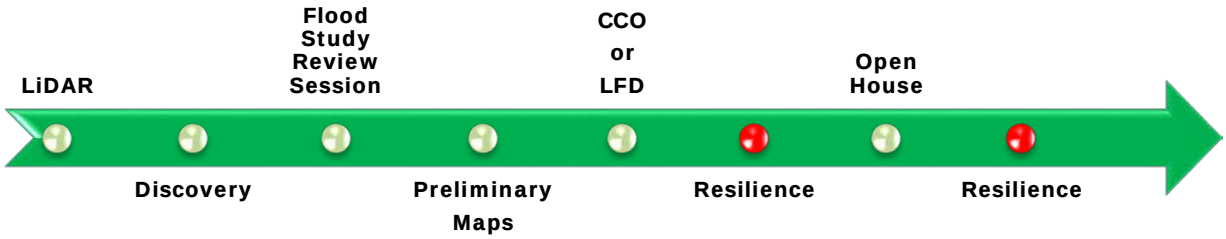


Resilience - Phase I

Resiliency meetings are the final leg of the Risk MAP process. Ecology hosts the meetings and introduces the Risk MAP Program to both elected officials and community staff. For coastal communities, the Ecology leverages its Coastal Hazards Resilience Network focusing on mitigation, outreach, and mitigation planning. WADNR performs HAZUS analysis for flood and seismic events, conducts vulnerability assessments for wildfire, landslide, tsunami, and analyzes other potential hazards including drought and volcanoes. The results are summarized in the Risk Report highlighting high risk facilities and locations. WA Emergency Management Division takes time during the presentation portion of the meeting to communicate funding opportunities available to communities pre and post disaster. Finally, jurisdictions break into community work groups with mitigation experts and facilitators with the goal of identifying mitigation actions that could reside in a mitigation plan. These breakouts can be the most productive portions of the effort if local staff participation is high. Maps and HAZUS results are available by community at each table and each community will have a facilitator to guide the discussion. Some topics of discussion include:

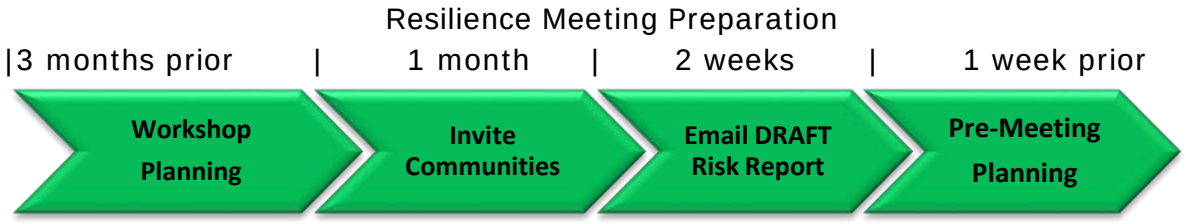
- What are you most concerned about in your community?
- What actions do you currently take to reduce risk and mitigate hazards? What plans do you have in place?
- What additional actions can you take?

The Resilience Phase ideally begins after the CCO or the Open House.



Resilience Planning

Ecology begins coordinating with Region X on Resilience planning approximately three months prior to the meeting to define roles and responsibilities. Ecology typically makes the first POC to identify a local sponsor and plan logistics. Below is a timeline of the coordinated efforts:



Mitigation action is the ultimate outcome and metric FEMA uses to report success in Risk MAP. These actions are generated from HAZUS output, maps, tables, and from discussions at the resiliency meetings. 'Actions Identified' with potential to 'Actions Advanced' are entered into FEMA's Action Tracker by the Risk MAP Coordinator.

Multi-Hazard Risk Analysis

Risk Reports are generated by WADNR or the PTS and detail HAZUS risk analysis results for Risk MAP projects and are used extensively throughout resiliency phases. All results, databases, and maps used to generate risk reports are provided in the Risk Assessment Database which is included with the report. The Risk Report has two goals: to inform communities of their risks related to certain natural hazards and to enable communities to act to reduce their risk. State and local officials are encouraged to use the summary information provided in this report in conjunction with the data in the risk database, to:

• *Update local hazard mitigation plans, shoreline master programs, and community comprehensive plans* – Planners can use risk information in the development and/or update of hazard mitigation plans, comprehensive plans, future land use maps, and zoning regulations. For example, zoning codes may be changed to better provide for appropriate land uses in high hazard areas.

• *Update emergency operations and response plans* – Emergency managers can identify low risk areas for potential evacuation and sheltering. Risk assessment information may show vulnerable areas, facilities and infrastructure for which planning for continuity of operations plans (COOP), continuity of government (COG) plans, and emergency operations plans (EOP) would be essential.

• *Communicate risk* – Local officials can use the information in this report to communicate with property owners, business owners, and other citizens about risks and areas of mitigation interest.

• *Inform the modification of development standards* – Planners and public works officials can use information in this report to support the adjustment of development standards for certain locations.

• *Identify mitigation projects* – Planners and emergency managers can use this risk assessment to determine specific mitigation projects. For example, a floodplain manager may identify critical facilities that need to be elevated or removed from the floodplain. The intended audience for this report includes, but is not limited to Local Elected Officials, Community Planners, Emergency Managers, and Public Works Officials

Risk assessments analyze how a hazard impacts the built environment, population, and local economy. In hazard mitigation planning, risk assessments are the basis for mitigation strategies and actions. A risk assessment defines the hazard and enhances the decision making process. The risk assessments in the report are completed using a FEMA's risk assessment tool, HAZUS, which estimates losses to flood and earthquake for specific buildings. A complete list of every building is incorporated into the HAZUS model. Other hazards are assessed through a vulnerability assessment. To assess potential community losses the following information is collected:

- Local assets or resources at risk to hazard
- The physical features and human activities that contribute to that risk
- Location and severity of the hazard

The report contains the following types of risk analysis to help describe and visualize the risk for a variety of hazards at the jurisdictional levels:

- Coastal Flood Risk Assessment: HAZUS Estimated Loss Information
- Earthquake Risk Assessment: HAZUS Estimated Loss Information
- Landslide Risk Assessment: Vulnerability Assessment
- Tsunami Risk Assessment: Vulnerability Assessment
- Volcano & Wildfire: Vulnerability Assessment

Ecology's Risk MAP Coordinator is HAZUS certified in the flood and earthquake modules and plans to perform HAZUS analysis in coordination with Region X.

Resiliency - Phase II

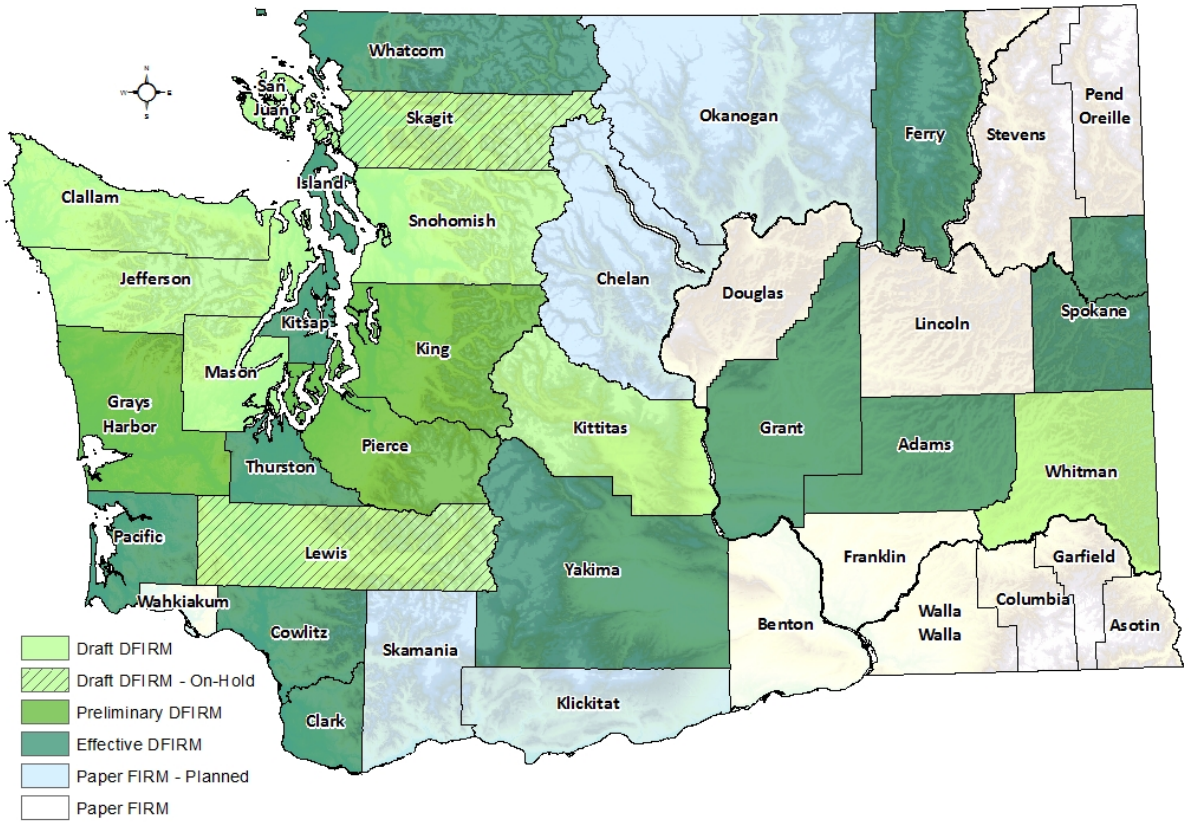
Ecology plans to lead the Phase II effort. The approach schedules meetings with Risk MAP communities approximately one year following the resiliency meeting or as suitable with a plan update. Ecology plans to further develop 'Actions Advanced' through the next hazard mitigation planning cycle or other planning elements. One Ecology area of focus will be to help the communities digest and prioritize the extensive GIS data in the multi-hazard risk database.

FEMA's Action Tracker is the tool used to input 'Actions Identified' and 'Actions Advanced'**.** Ecology will be the lead tracker of actions with assistance from WAEMD and DNR as appropriate.

Community Engagement and Risk Communication

The objective of Community Engagement and Risk Communication (CERC) activities are to help build risk awareness and understanding at the local level, increase a community's ability to communicate risk, support local efforts to reduce risk to natural hazards, and keep communities and other stakeholders engaged throughout the Risk MAP process. All CERC activities are strategically deployed throughout the Risk MAP lifecycle and vary depending on the community-specific needs and vulnerability to natural hazards. The Risk MAP Coordinator serves as a constant presence for communities and takes a lead role in activities including: identifying Points of Contact or 'key players', meeting preparation & facilitation, community coordination, mapping and GIS technical assistance, stakeholder engagement, conference calls and webinars, draft map & preliminary map reviews and meetings, public open house events, resiliency workshops, inter-agency coordination, and other community specific interests such as levees and LiDAR.

Below is a map Risk MAP project by type:



Meetings & Process Facilitation

The State Risk MAP Coordinator will be the face of the Discovery process, making the first point-of-contact with community staff engaged in floodplain management, mitigation planning, or emergency management activities and will remain as a constant presence throughout the project. Ecology will host meetings and facilitate decision making including planning, presenting, community coordination, and any associated follow up.

Mitigation Support

Ecology plans to leverage Risk MAP data, decision support analyses, products and processes to support communities in advancing mitigation actions using the Risk MAP database. Ecology will produce an action implementation plan for each Discovery project in FEMA's Action Tracker.

Communication and Outreach

Communication with communities occurs early and often, first by the State Risk Map Coordinator followed by CERC and PTS. Outreach includes stakeholder identification, elected official briefings, community resources such as the Assoc. of Cities and Counties, the Municipal Resource Service Center of Washington (MRSC), conservation districts, and academic institutes.

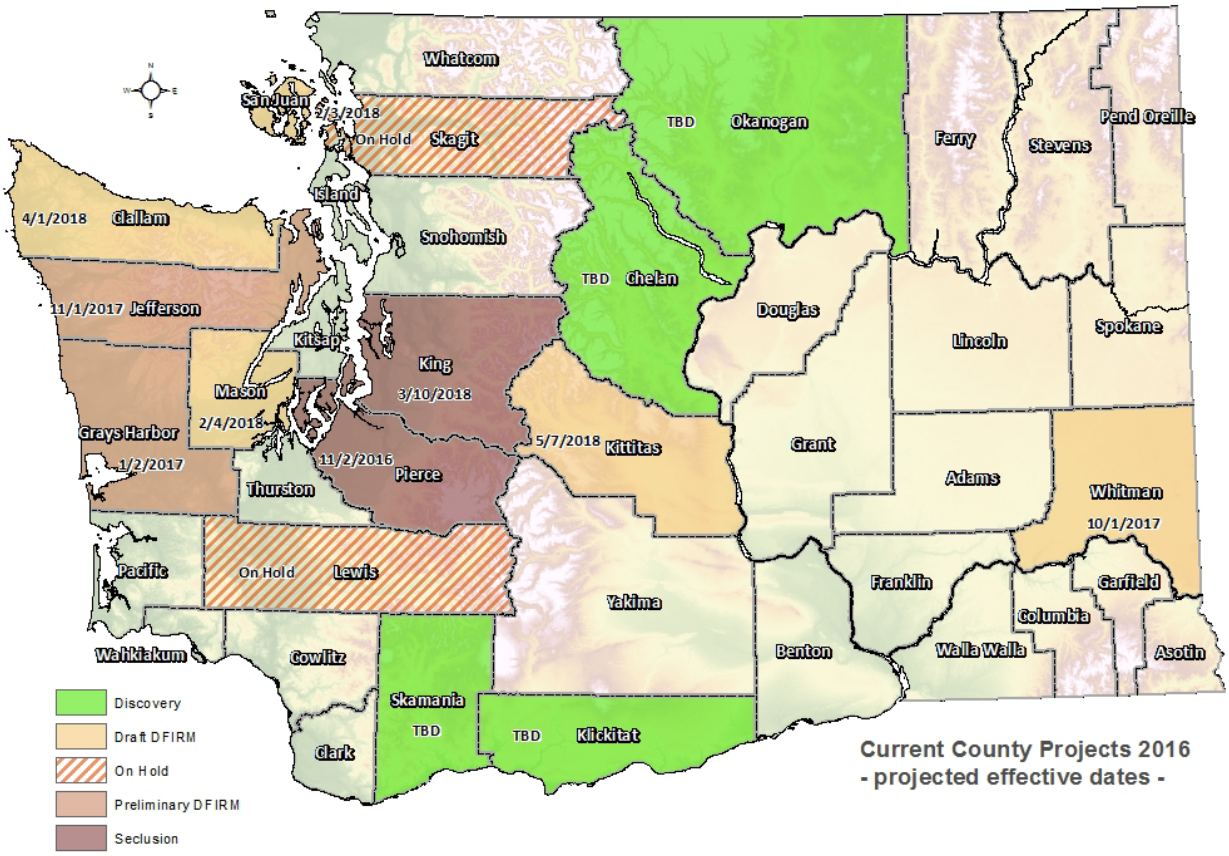
Community engagement

Community engagement is critical to the success of any project that affects a broad landscape of stakeholders and must be sensitive to the regulatory responsibilities and economic impacts that result from hazard mapping. Ecology works very closely with Region X and CERC to seek out and plan for both potential challenges and opportunities for success. Community engagement process:

1. Community participation is the first and foremost objective beginning with Discovery and first points of contact. The goals are to broaden the audience by specifically inviting complimentary players such as emergency management personnel, planners, and stakeholders with involvement in floodplain management decisions. Discovery is the time to understand the highest challenges, worst case scenarios, as well as explore every opportunity to engage with the communities.
2. Draft map meetings are a key step towards understanding and consensus on a path forward. Ecology posts draft maps online for communities to review and share with stakeholders.
3. Resilience begins the community action phase. A primary focus is to gain support from the elected officials from the beginning and communicate the importance of their leadership as the project moves towards implementation.
4. Actions advanced from the resilience phase are the ultimate metric. All efforts throughout the Risk MAP process are aimed at risk reduction.

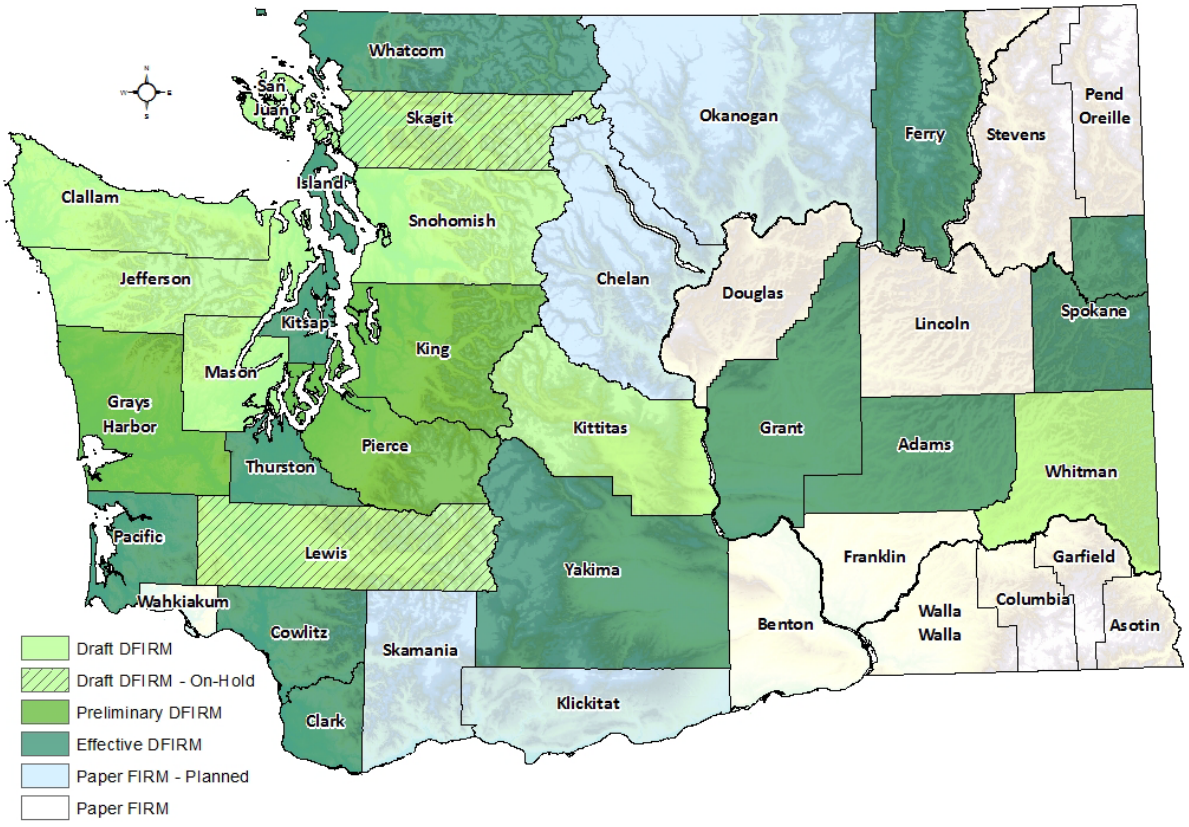
Risk MAP Deployment 2016

RiskMAP projects are currently deployed in twenty-two Counties with a focus on coastal updates throughout Puget Sound, the Strait of Georgia, and the Pacific Coast. This includes Clallam, Grays Harbor, Jefferson, King, Kitsap, Mason, Pacific, Pierce, San Juan, Skagit, Snohomish, Thurston, and Whatcom Counties. Countywide revisions are complete or nearing completion in Clallam, Cowlitz, Grays Harbor, Island, Jefferson, King, Kitsap, Mason, Pacific, Pierce, San Juan, Thurston, Whatcom, Whitman, and Yakima Counties. Riverine studies are underway in Grays Harbor County (Lower Chehalis River), Thurston (Deschutes), and Yakima County (Ahtanum, Cowiche, and Naches). Kittitas County is elevating their floodplain management activities by becoming a Cooperating Technical Partner with FEMA. Pierce and King Counties are moving forward with seclusion while Lewis and Skagit Counties are on hold due the levee analysis and mapping procedure.



RiskMAP Approach

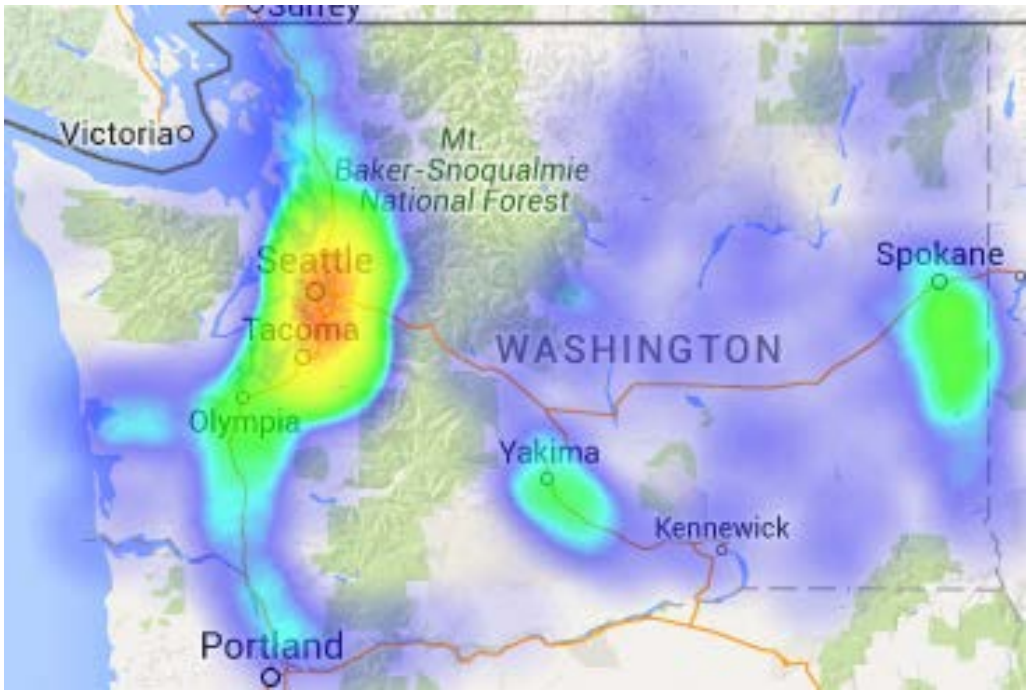
Discovery begins a multi-step process of community engagement, revised flood hazard mapping, and mitigation with the overarching goal of increased community resilience to natural hazards. Discovery is data mining, project scoping, and community engagement. Mapping is divided into draft and preliminary status with community and stakeholder engagement following each phase. Resilience, and the ideology, is defined to frame the project course. A practical approach as defined by the local governments is phased into two engagement strategies. Resilience Phase I occurs after the map revisions are final, GIS layers are produced, and risk data is compiled. A briefing of the local elected officials and a workshop with staff is held to identify mitigation opportunities or 'Actions Identified'. Resilience Phase II is held approximately one year later or when suitable for the communities to integrate actions into their planning elements. Mitigation activities 'identified' and 'advanced' are then entered into the Action Tracker.

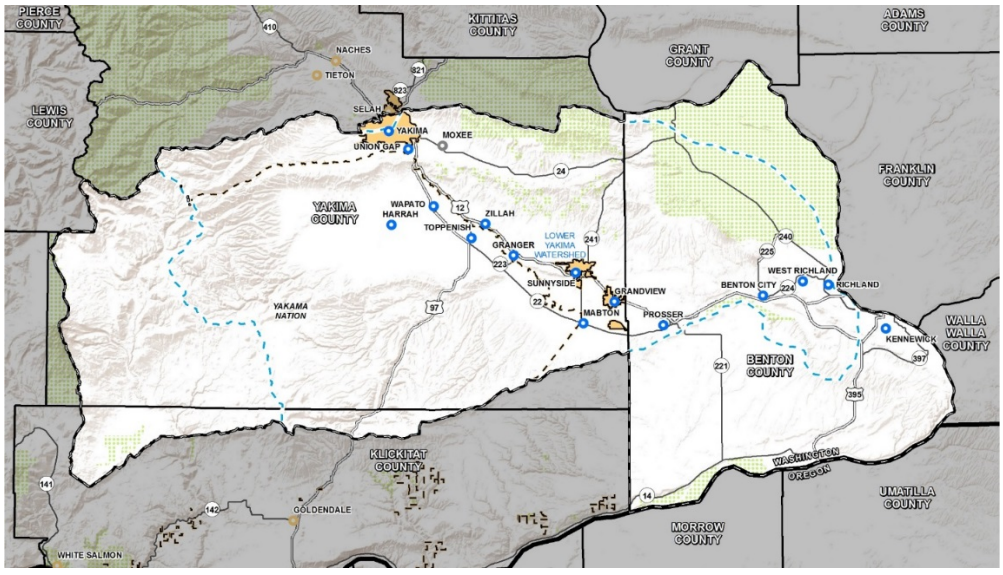


Current Projects 2016

2016 Risk MAP Projects

Risk MAP 2016 will launch Discovery in the Lower Yakima Watershed. The project will engage sixteen communities, two counties, and one tribe. The project is expected to result in a new countywide DFIRM for Benton County as well as the full suite of Risk MAP maps, tools, and products for all jurisdictions. The map below comes from the census bureau showing areas of Washington with the greatest population growth over the last 15 years highlighting the lower Yakima Watershed.





Lower Yakima Watershed plus Benton County

Current Risk MAP Projects online

Ecology's primary mapping tools are the WA State Coastal Atlas and ESRI® ArcGIS.com. Both online applications are managed by Ecology and deliver an interactive mapping experience open to the public with address search functions, access to GIS data, and several background options. Below are links to maps online and a table of current CERC projects.

Clallam Co. 2015 Draft Coastal Floodplains

Clark County 2012 Effective FEMA Floodplains & 2015 Lower Columbia Sandy Preliminary Floodplains

Cowlitz Co. 2015 Effective Floodplains

Grays Harbor Co. 2017 Effective Floodplains

Island Co. 2017 Effective Floodplains

Jefferson Co. 2015 Preliminary Floodplains

Kitsap Co. 2017 Effective Floodplains

Lewis Co. 2010 Draft Floodplains

Mason Co. 2016 Preliminary Floodplains

Pacific Co. 2013 Effective Floodplains

San Juan Co. 2015 Preliminary Floodplains

Spokane Co. 2010 Effective Floodplains

Thurston Co. 2012 Effective Floodplains

Whatcom Co. 2015 Preliminary Floodplains

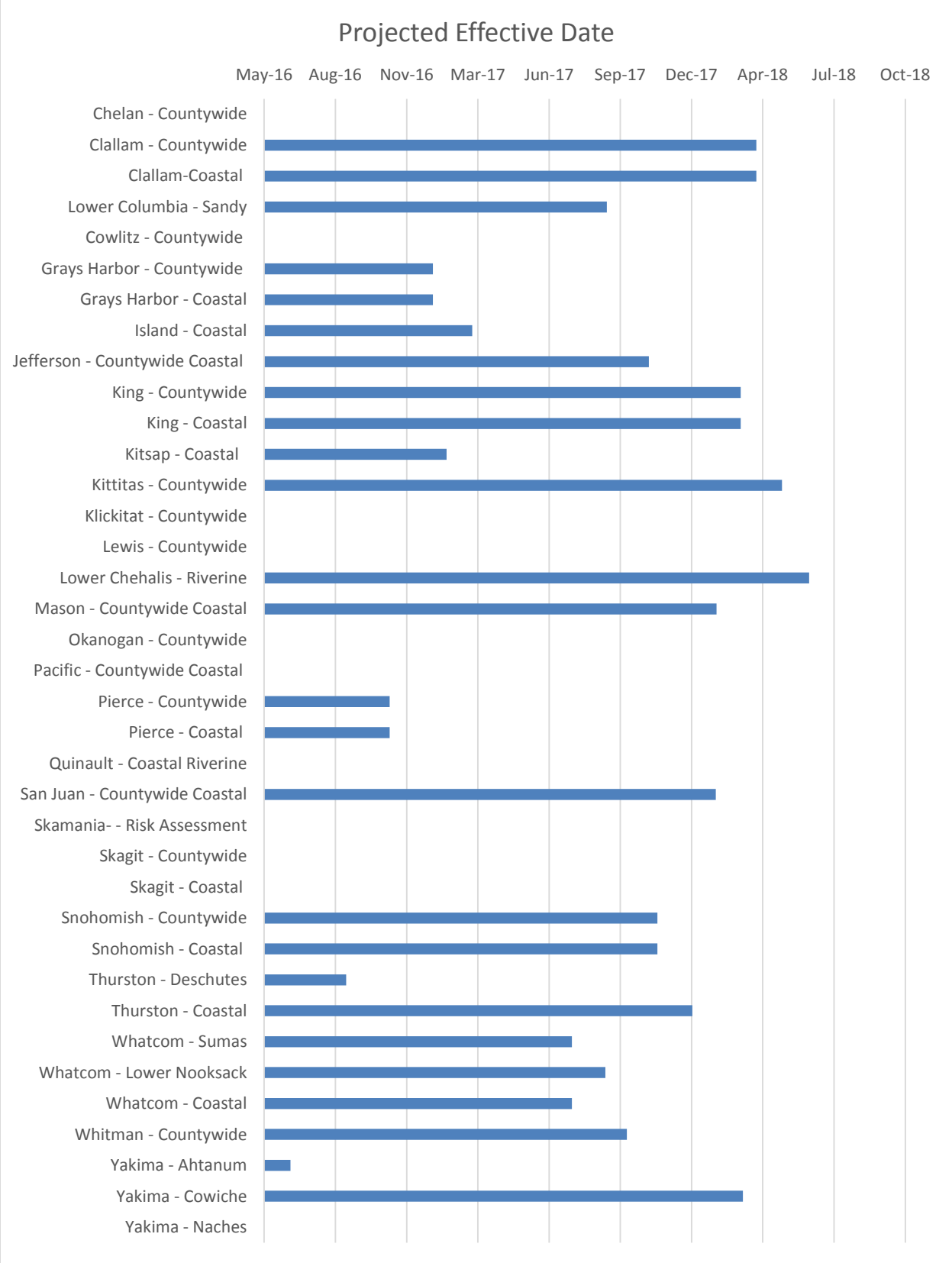
Whitman Co. 2016 Draft Floodplains

Yakima Co. 2009 Effective Floodplains

Project	On Hold	Type	Draft Map	Projected Prelim.	Projected LFD	Projected Effective
Clallam	x	Countywide Coastal				
Cowlitz		Countywide		Aug-13	Jun-15	
Grays Harbor		Countywide Coastal Riverine		Aug-11		
Island		Coastal	Oct-14	Feb-15	Nov-15	Apr-16
Jefferson		Coastal				
King	x	Countywide Coastal		Feb-13		
Kitsap		Coastal		Nov-14	Aug-15	
Kittitas	x	Countywide				
Mason		Countywide Coastal		Jun-15		
Pacific		Countywide Coastal		Nov-14	Sep-15	
Pierce		Countywide Coastal		Dec-14	Sep-15	Mar-16
San Juan		Countywide Coastal	Mar-15	Dec-15	Jul-16	
Skagit		Countywide Coastal	Dec-14	Feb-15		
Snohomish		Countywide Coastal	Feb-14	Feb-14		Apr-16
Thurston		Coastal Riverine	Jun-15	Sep-15	Jun-16	Dec-16
Whatcom		Coastal Riverine 2	Jan-15	Feb-15	Nov-15	
Whitman	x	Countywide				
Yakima		Riverine 2		Oct-11	May-15	

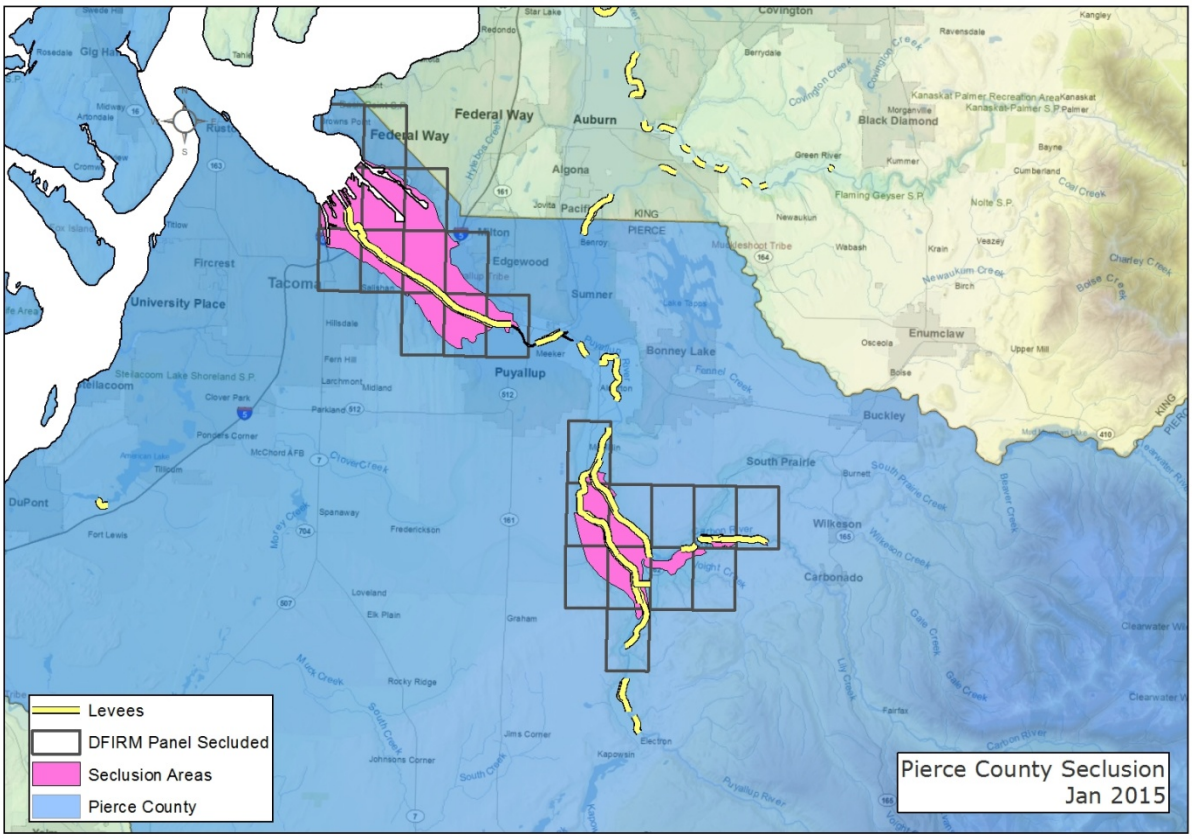
2017 RiskMAP Projects

2017 Schedule	Watershed	LiDAR Collection	Draft Map	Preliminary Map	Public Open House	Resilience Workshop
1	Chelan	X		X	X	
2	Clallam			X	X	X
3	Island					X
4	Kittitas			X	X	X
5	Klickitat		X			
6	Lower Chehalis	X		X	X	X
7	Mason				X	X
8	Okanogan	X	X			
9	San Juan				X	X
10	Skamania		X			
11	Snohomish				X	X
12	Thurston				X	X
13	Whatcom (Coastal/Sumas)					X
14	Whatcom (Nooksack)			X	X	
15	Whitman				X	
16	Yakima (Cowiche)			X	X	X
17	Yakima (Naches)		X	X	X	X


Projected Effective Date
May-16
Aug-16
Nov-16
Mar-17
Jun-17
Sep-17
Dec-17
Apr-18
Jul-18
Oct-18
Chelan - Countywide
Clallam - Countywide
Clallam-Coastal
Lower Columbia - Sandy
Cowlitz - Countywide
Grays Harbor - Countywide
Grays Harbor - Coastal
Island - Coastal
Jefferson - Countywide Coastal
King - Countywide
King - Coastal
Kitsap - Coastal
Kittitas - Countywide
Klickitat - Countywide
Lewis - Countywide
Lower Chehalis - Riverine
Mason - Countywide Coastal
Okanogan - Countywide
Pacific - Countywide Coastal
Pierce - Countywide
Pierce - Coastal
Quinault - Coastal Riverine
San Juan - Countywide Coastal
Skamania- - Risk Assessment
Skagit - Countywide
Skagit - Coastal
Snohomish - Countywide
Snohomish - Coastal
Thurston - Deschutes
Thurston - Coastal
Whatcom - Sumas
Whatcom - Lower Nooksack
Whatcom - Coastal
Whitman - Countywide
Yakima - Ahtanum
Yakima - Cowiche
Yakima - Naches

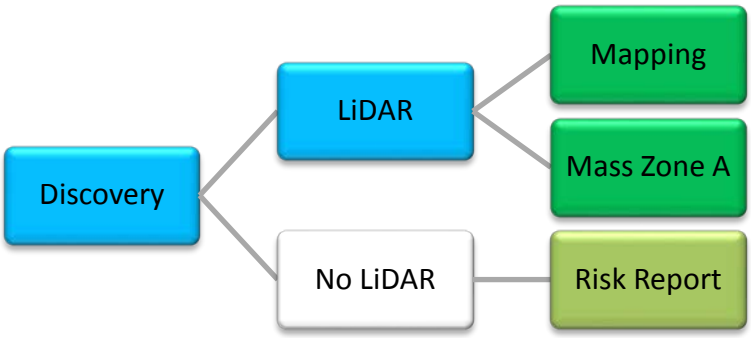
Seclusion

Seclusion is the process of with-holding panels affected by the LAMP (Levee Analysis and Mapping Procedure) and allowing the remaining DFIRM panels to go effective. The map below illustrates the concept of seclusion and the panels affected. Pierce County is the first to pursue seclusion in Washington and King County will soon follow. Below is a map of the panels secluded in Pierce County. Secluded panels will contain the current effective floodplain delineation prior to this update.



Future Risk MAP Project Planning

Ecology's role in global program management and CERC activities guides communities along the path to resiliency. Risk MAP project sequencing flows logically through three phases of the program leading to actions advanced. Project planning begins with the Watershed Risk Portfolio and incorporates several risk factors. The portfolio relatively ranks all watersheds using these factors to determine a relative risk rank. A series of other planning elements are incorporated as needed including topographic data development, CNMS & NVUE values towards mass Zone-A modeling, Levee and LAMP priorities, and the endangered species act. ESA affected watersheds are generally communicated and not used to rank watersheds.



Project Sequencing

Several factors can drive the mapping priorities including National and Regional metrics such as coastal hazards, NVUE, and levee mapping policies. This plan attempts to stay focused on the needs of the State's flood prone communities while integrating flexibility to take positive steps towards equity in flood hazard information to the public and detail where population growth is inevitable. The Watershed Risk Portfolio incorporates risk factors into a spatial database for analysis and prioritization of mapping projects. The remainder of the plan addresses the four principle stages of a Risk MAP project: Discovery, LIDAR, Mapping and Mass Zone A priorities, as well as levees and ESA.

Ideally, LiDAR is acquired when mapping and/or mass Zone A modeling are funded. This requires some forward thinking and a staggered approach to acquisition in advance of mapping. Mass Zone A modeling is prioritized by combining CNMS Zone A data with LOMA data is GIS and ranking areas high in both. Mass Zone A priorities are watersheds that are either not likely to get mapped soon and have high ratios of CNMS and LOMA data. Or, areas previously mapped via a straight digital conversion and have a high LOMA count and high CNMS values of Zone A mileage. Mapping priorities are primarily driven by the risk ranking in the portfolio.

Watershed Risk Portfolio

This Portfolio was revised for the FY2016 Business Plan Update. The revised portfolio incorporated new census data to produce population trends by HUC8.

Introduction

This Risk Assessment is a product Ecology's Risk MAP Business planning process. Ecology heavily engages in digital and spatial platforms to assess flood hazards that provide instant quantitative information spatially across the state with capabilities to assess evolving risk factors. The purpose of this assessment is to establish a statewide risk-based evaluation by watershed to be used as a foundation for future planning and sequencing efforts. The assessment was developed and delivered in a digital report with searchable tables and a GIS geodatabase with links to tables for evaluating attribute data and database-driven mapping capabilities.

Risk Assessment Process

FEMA provided the spatial datasets used by FEMA headquarters and Regional offices used for the Coordinated Needs Management Strategy (CNMS). The CNMS spatial data for Washington is not complete and Ecology could not support the validation of streams in the database and determined to generate this assessment based on factors that could be validated, and spatially represented by watershed. The remaining spatial data from FEMA was examined for quality and accuracy. Some datasets were slightly modified to accommodate for errors and data gaps.

Risk Assessment Factors

Three risk assessment factors were developed and assigned to FEMA's Federal HUC8 level watersheds:

- Total Populations, Population Growth, & Population Density 50%
- NFIP Policies, Claims, and Claims per Policy 30%
- Floodplain Area & Percent of the Watershed 20%

Population data comes from Federal Census Bureau. Ecology recalculated total population values into population density values by watershed area and generated an attribute in the HUC8 GIS data table representing population factors.

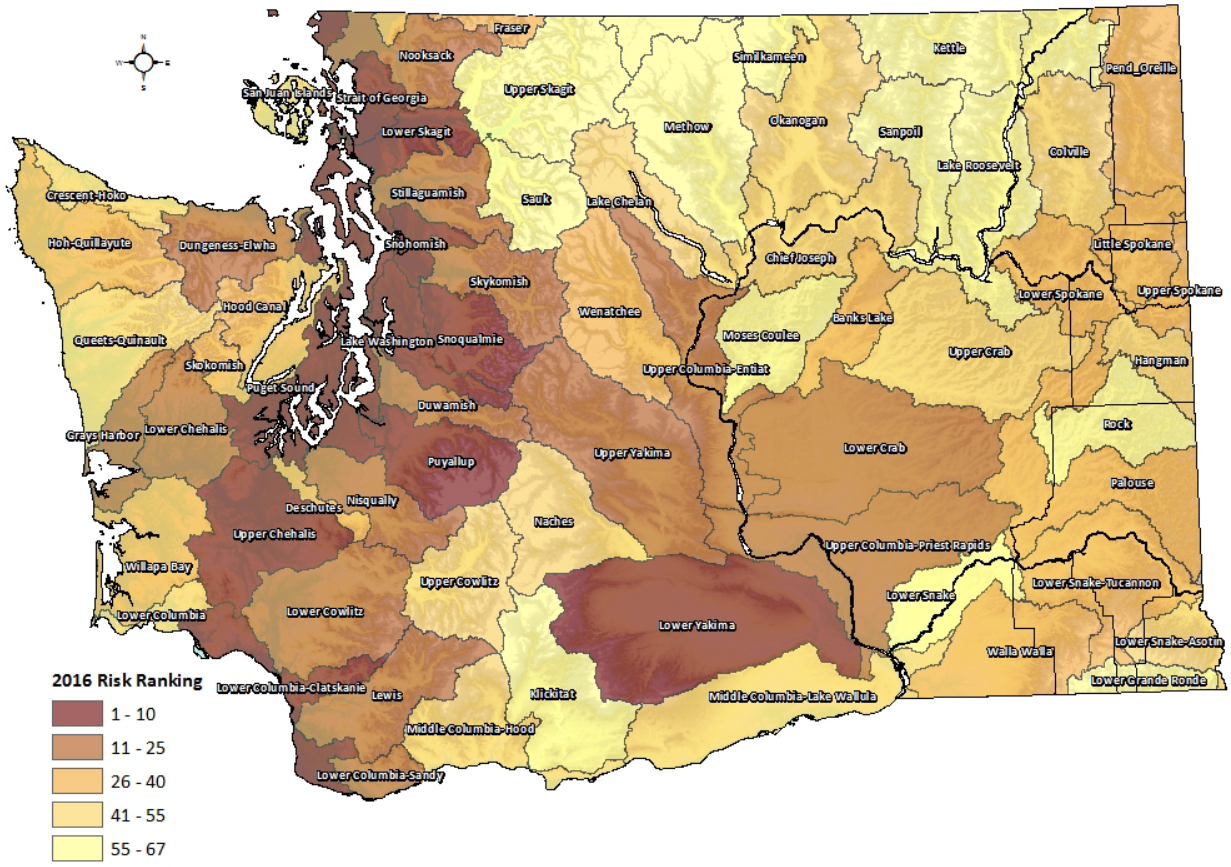
FEMA provided NFIP policies and claims data in a spatial point file feature with attribute tables. Policies and claims point features were spatially joined to the HUC8 watershed data table as an attribute of total policies and claims per watershed.

Ecology generated the floodplain area attribute by intersecting FEMA's Q3 data with the HUC8 watershed spatial data and calculated the percent floodplain to watershed area in the attribute table. Census blocks intersecting HUC8 boundaries were calculated at 50% on each side to avoid duplication of population totals. Therefore, population values are estimated.

Watershed Ranking
Total numbers and areas were avoided and a weighted scheme was developed to emphasize risk factors with greater influence on risk concentrations. Population factor were assigned a sixty percent weight as the predominate risk factor.
NFIP policies and claims were allocated thirty percent weighted value and floodplain area given ten percent of the scheme.

For quality control, the weighted method was removed and equal quantities were ranked to evaluate the sensitivity of the weighted approach. All of the top twenty watersheds remained in the top twenty with emphasis given to large unpopulated floodplain deltas that understates the value of population density as a predominate risk factor.

All three weighted factors were sorted and assigned a relative value from one to sixty seven with the highest risk watersheds assigned the lowest values. The three rankings were summed equally and again assigned a rank value with the highest risk watersheds assigned the lowest values. The resulting assessment assigned a value to sixty seven of the State's seventy one watersheds. The top twenty at-risk watersheds are mapped below. A full assessment and portfolio were delivered to FEMA Region X as a separate report and database and published to ArcGIS.com here [2016 Watershed Risk Portfolio].

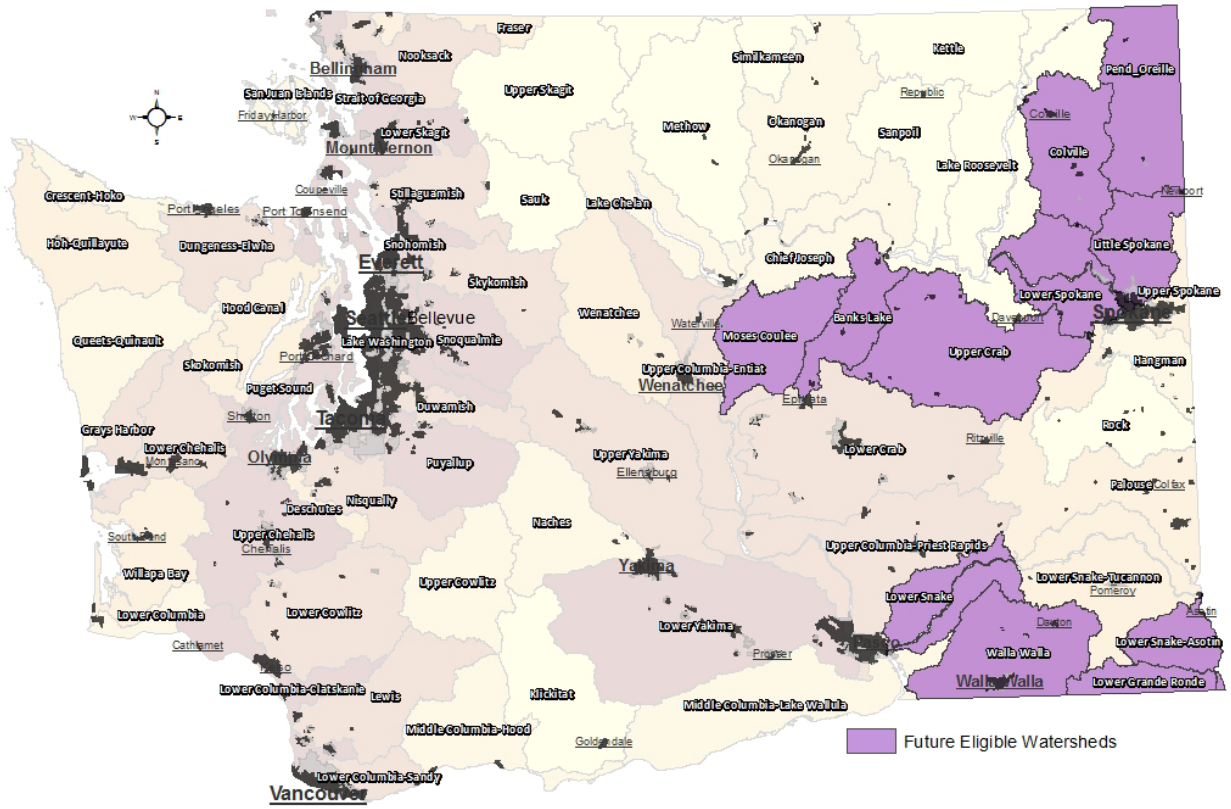


2016 HUC8 Watershed Risk Ranking

HUC8 Name	Pop Rank	Policy Claims Rank	Floodplain Rank	Weighted Rank	Final Rank 2016
Lower Columbia-Clatskanie	3	2	12	4.5	1
Upper Chehalis	13	5	3	8.6	2
Puget Sound	1	19	16	9.4	3
Snohomish	7	16	7	9.7	4
Lake Washington	2	12	31	10.8	5
Puyallup	6	14	18	10.8	6
Lower Yakima	5	21	20	12.8	7
Strait of Georgia	10	28	2	13.8	8
Lower Skagit	20	13	1	14.1	9
Snoqualmie	17	6	19	14.1	10
Lower Crab	15	18	9	14.7	11
Lower Cowlitz	25	4	8	15.3	12
Grays Harbor	32	1	10	18.3	13
Nooksack	21	23	6	18.6	14
Lower Chehalis	33	7	4	19.4	15
Upper Yakima	23	20	15	20.5	16
Duwamish	4	35	42	20.9	17
Nisqually	14	38	14	21.2	18
Stillaguamish	27	17	13	21.2	19
Lower Columbia-Sandy	19	15	39	21.8	20
Lewis	30	3	30	21.9	21
Upper Columbia-Priest Rapids	9	39	32	22.6	22
Upper Columbia-Entiat	18	8	61	23.6	23
Dungeness-Elwha	22	11	49	24.1	24
Skykomish	34	9	33	26.3	25
Walla Walla	26	24	35	27.2	26
Deschutes	16	40	37	27.4	27
Upper Spokane	8	58	36	28.6	28
Little Spokane	11	54	41	29.9	29
Willapa Bay	38	26	22	31.2	30
Palouse	28	47	17	31.5	31
Wenatchee	37	10	53	32.1	32
Hood Canal	29	30	46	32.7	33
Banks Lake	50	29	5	34.7	34
Lower Spokane	12	65	60	37.5	35

HUC8 Name	Pop Rank	Policy Claims Rank	Floodplain Rank	Weighted Rank	Final Rank 2016
Pend Oreille	49	31	23	38.4	36
Fraser	48	34	25	39.2	37
Lower Snake-Tucannon	42	33	43	39.5	38
Hoh-Quillayute	52	42	11	40.8	39
Skokomish	60	22	21	40.8	40
Hangman	24	63	50	40.9	41
Middle Columbia-Lake Wallula	31	60	38	41.1	42
Okanogan	35	51	47	42.2	43
Colville	36	62	34	43.4	44
Crescent-Hoko	54	36	28	43.4	45
Upper Cowlitz	62	25	29	44.3	46
Lake Chelan	46	32	64	45.4	47
Naches	40	48	56	45.6	48
Upper Crab	51	52	24	45.9	49
San Juan Islands	41	59	40	46.2	50
Queets-Quinault	57	27	48	46.2	51
Lower Columbia	55	46	26	46.5	52
Middle Columbia-Hood	39	57	55	47.6	53
Chief Joseph	43	43	67	47.8	54
Lower Snake-Asotin	45	41	65	47.8	55
Klickitat	47	55	59	51.8	56
Lake Roosevelt	44	61	58	51.9	57
Kettle	56	44	57	52.6	58
Upper Skagit	65	37	45	52.6	59
Rock	58	64	27	53.6	60
Methow	53	56	52	53.7	61
Lower Snake	59	50	54	55.3	62
Sauk	63	53	44	56.2	63
Moses Coulee	64	45	63	58.1	64
Sanpoil	61	49	66	58.4	65
Similkameen	66	66	51	63.0	66
Lower Grande Ronde	67	67	62	66.0	67

Watershed Eligibility & Project Sequencing



RiskMAP project sequencing begins with FEMA National and Regional priorities then looks to the State and this portfolio for guidance on future project sequencing. Projects are selected by watershed although mapping continues to produce countywide maps if discovery finds support for a RiskMAP project. 2015 initiated discovery in the Wenatchee and Chelan watersheds in central Washington. The Lower Yakima watershed was selected in 2016. Below are watersheds eligible for future projects.

HUC8	Sq. mi.	Population Rank	Policy & Claims Rank	Floodplain Rank	Rank_2016
Banks Lake	616.18	50	29	5	34
Colville	1017.71	36	62	34	44
Little Spokane	688.436	11	54	41	29
Lower Grande Ronde	341.387	67	67	62	67
Lower Snake	702.845	59	50	54	62
Lower Snake-Asotin	443.027	45	41	65	55
Lower Spokane	874.894	12	65	60	35
Moses Coulee	930.674	64	45	63	64
Pend_Oreille	1266.24	49	31	23	36
Upper Crab	1857.52	51	52	24	49
Walla Walla	1294.27	26	24	35	26

Levee Approach

Ecology has been working with Region X on likely criteria to help prioritize and rank projects affected by the Federal LAMP policy. A communities interest to show the flood hazard behind levees is likely to be the biggest driver, followed by readiness to proceed/or not, and likelihood of success. Other factors included:

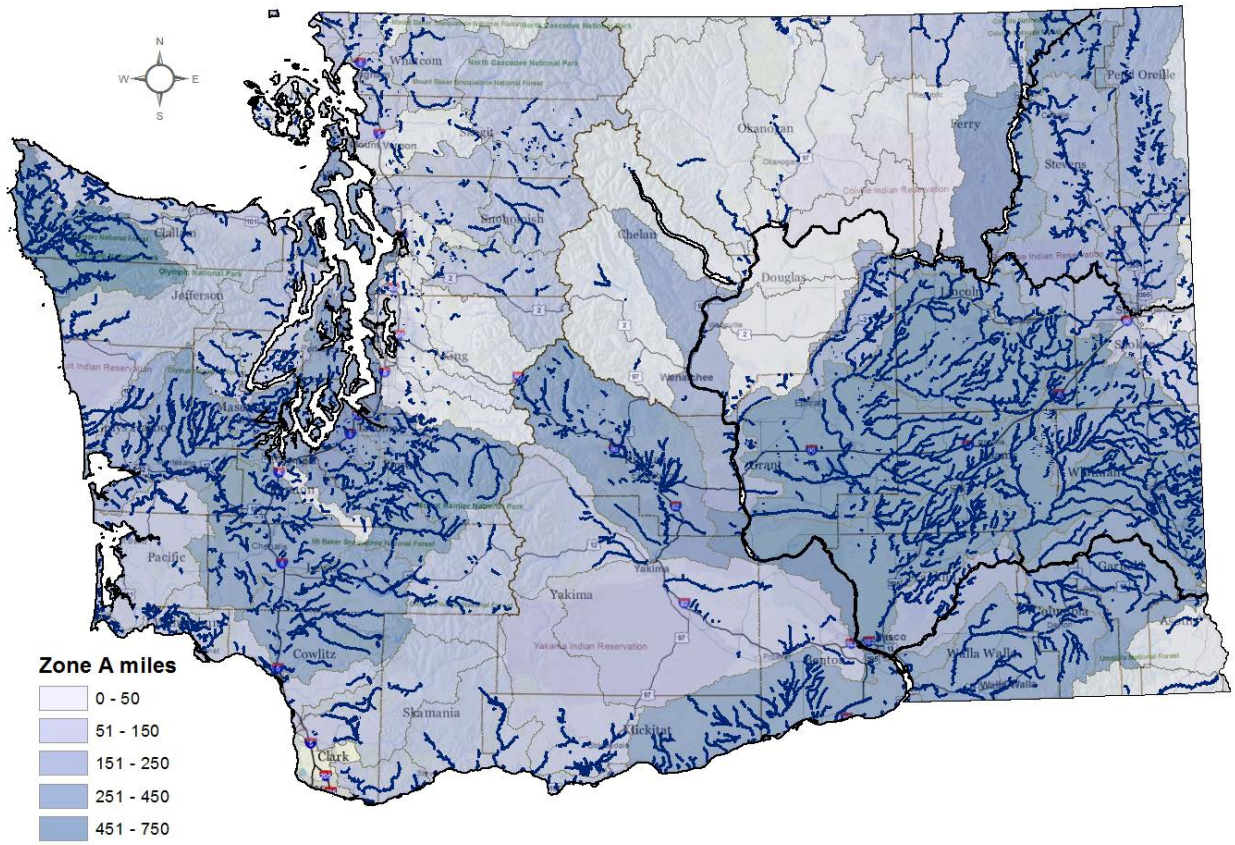
- interest by the community on FEMA's maps and to get it done accurately
- Levees that have the least impact on flood elevations going first
- levees where the community is clear that they are not planning on providing certification
- Population impacted, political, and environmental issues

Below are communities with potential impacts from LAMP:

Levee System	County	Levee Status	Comments	Miles	State Priority
Columbia R. Coal Creek	Cowlitz	Accredited	accreditation pending	6.29	Low
Cowlitz 2 (Woodland)	Cowlitz	Accredited	accreditation pending	13.23	Med
Lexington	Cowlitz	Accredited	accreditation pending	2.61	Med
Longview	Cowlitz	Accredited	accreditation pending	22.60	Med
Moxee Drain	Yakima	Accredited	Shown as providing protection	0.77	Low
Kelso	Cowlitz	Accredited	accreditation pending	9.53	Low
Auburn	King	De-accredited	PAL	2.17	High
Kent	King	De-accredited	De-accredited	12.00	High
Lower Puyallup	Pierce	De-accredited	Seclusion 2015	14.43	High
Cedar River	King	De-accredited		1.33	High
Dungeness Meadows	Clallam	De-accredited	accreditation letter sent 2009	0.71	Med
Elwha	Clallam	De-accredited	accreditation letter sent 2009	1.37	Low
Castle Rock	Cowlitz	PAL	Certification pending review	2.75	Med
Colfax	Whitman	PAL	extension request 2010	6.38	Low

Mass Zone A Approach

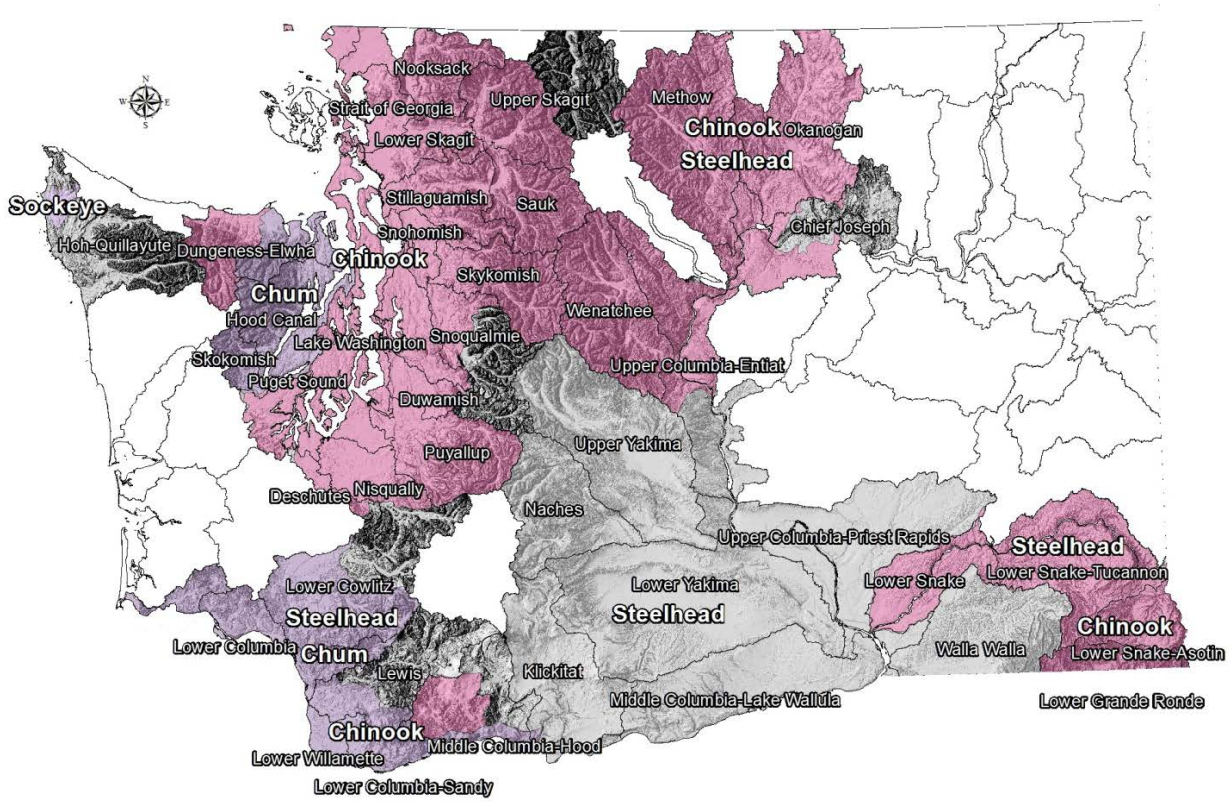
Mass Zone A modeling is prioritized by combining CNMS Zone A data with LOMA data in GIS and ranking areas high in both. Mass Zone A priorities are watersheds that are either not likely to get mapped soon and have high ratios of CNMS and LOMA data. Or, areas previously mapped via a straight digital conversion and have a high LOMA count and high CNMS values of Zone A mileage. Washington's zone A floodplains are mapped below:



Watershed	Watershed Risk Rank	LOMAs	Zone A miles	Mass Zone A Rank	Current Map
Lower Crab	31	35	734	1	DFIRM
Palouse	36	20	728	2	FIRM
Upper Crab	43	2	659	3	FIRM
Upper Columbia-Priest Rapids	33	19	568	4	Partial DFIRM
Upper Chehalis	4	165	362	5	DFIRM on-hold
Hoh-Quillayute	37	24	465	6	Tribal
Upper Yakima	23	77	388	7	Draft DFIRM
Lower Cowlitz	19	31	407	8	DFIRM
Lower Chehalis	10	36	387	9	DFIRM

Endangered Species Act

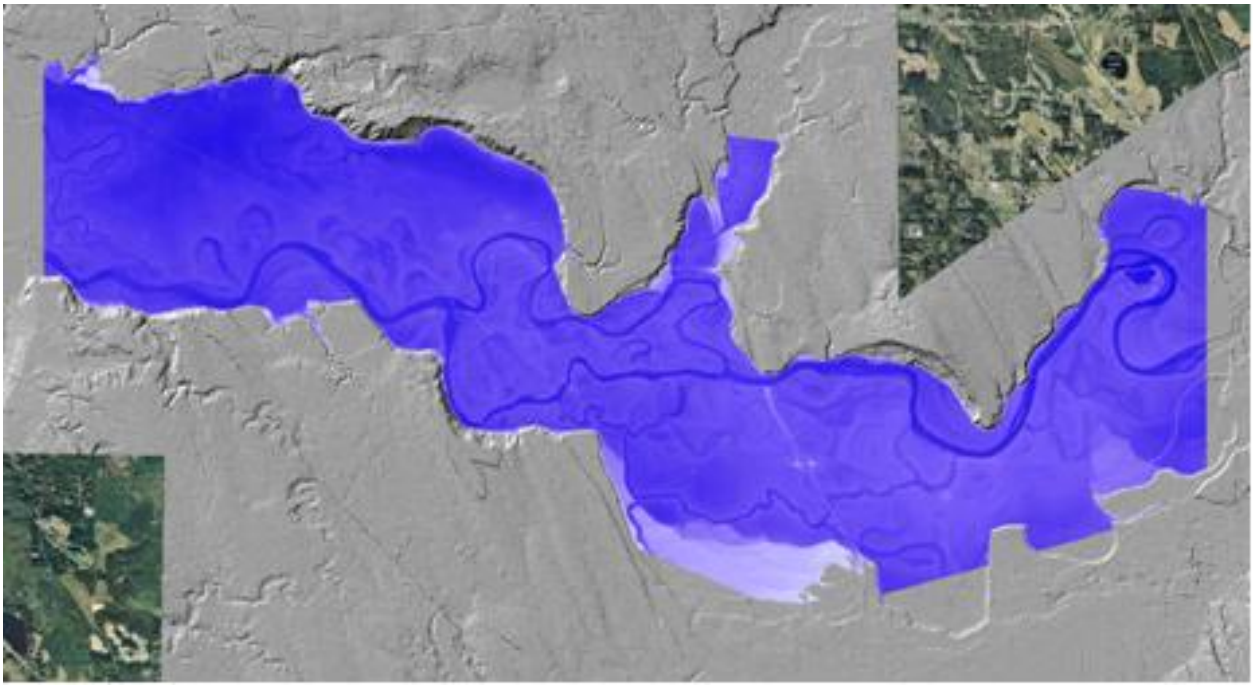
FEMA updated the national algorithm to include a field that indicates if the area coincides with listed endangered species in Washington and Oregon. The dataset allows Region X to view this information in GIS as part of the Region's study prioritization and during the Discovery effort. Ecology developed a Statewide Watershed Risk Assessment that reflects prioritization for studies on a watershed basis based on risk, available topography, and identifies the presence of listed endangered species by HUC8 watershed.



Watersheds with listed ESA presence

Channel Migration Zone Assessments

River floodplains and channel migration zones (CMZs) are ecologically productive areas heavily impacted by development. Their importance is detailed in the National Marine Fisheries Service Biological Opinion declaring the Federal Emergency Management Agency (FEMA) program results in "take" of Puget Sound Chinook salmon and steelhead. Flood hazards consist of both inundation and erosion (channel migration). Understanding the extent of a CMZ is critical to assessing risks to development as well as habitat. The Shoreline Master Program (SMP) requires identifying CMZs but this has not been done for over 550 miles of Puget Sound shorelines. Moreover, already completed CMZs methods and delineations are not consistent and often do not address future erosion risks and the loss of historic CMZ areas due to development. Current methodologies do not include evaluating future channel response to altered hydrologic and sediment regimes from climate change and development. Tasks include updating the CMZ mapping methodology, map areas for baseline trend analysis, and develop technical assistance for integrating with SMP and floodplain management and restoration/protection strategies including climate change scenarios.



CMZ patterns extracted from LiDAR using relative water surface elevation models

Ecology is working with Region X on strategies to integrate CMZ and coastal erosion mapping into Risk MAP to assist communities affected by the NMFS ESA Biological Opinion and coastal erosion.