

# ***Risk MAP Business Plan For the State of Oregon***

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Cover photo: Levee breach on Grande Ronde River north of Milton-Freewater, 1964. USGS

#### Preface:

As part of the national initiative, FEMA provided state floodplain programs with the opportunity to develop business plans describing potential state involvement in the Risk MAP initiative. The Department of Land Conservation and Development (DLCD), as the state’s lead agency for administration of the NFIP in Oregon, has developed an Implementation Plan to identify how Oregon could participate in and further the objectives of FEMA’s Risk MAP initiative.

## Executive Summary

In 2004 Oregon embarked on the Federal Emergency Management Agency’s (FEMA) nationwide, five-year initiative called Map Modernization (Map Mod), designed to update the nation’s aging floodplain maps. A large percentage of Oregon’s maps, many of them created in the 1980’s and earlier, had never been updated and suffered significantly from out-of-date base data, coarse elevation topography, and out-dated engineering analysis that made some maps nearly useless. As part of this national program, the Department of Land Conservation and Development (DLCD), as the

state's lead agency for administration of the NFIP in Oregon, developed a business plan and led Oregon's participation in the objectives of Map Mod.

FEMA's Map Modernization Program officially ended in 2010. In Oregon, 19 counties and 154 communities have been converted to an all-digital county-wide format. An additional four counties (41 communities) that were initiated in Map Mod remain active and are either in the ordinance adoption phase or are in appeal.

FEMA's Risk MAP (Mapping, Assessment, and Planning) continues where Map Mod ended. This new 5-year program has a broader and more holistic approach, emphasizing not just the delivery of accurate maps but working with communities to understand the causes of flooding and help with mitigation strategies.

Risk MAP offers Oregon an opportunity to re-think the way we deal with natural hazards and our responsibility to Oregonians. With GIS and related functionality at its core, Risk MAP can become the vehicle that offers DLCDC and other state agencies a new dimension, from top to bottom, in how we work with communities. This Business Plan talks about:

- A uniform base for spatial analysis and modeling, bringing together different planning efforts (Natural Hazards, Coastal Division, Urban, Rural, etc.) with the watershed as its functional unit;
- A platform that enhances existing relationships among other state agencies - such as OEM, DOGAMI, Forestry, DEQ - taking advantage of the best each has to offer and not duplicating effort;
- New communication concepts, tools and programs;
- A taxlot-based information system that allows analysis at a local level that has meaning to a community, providing modeling of assessor data, planning information, permits, and the built environment to create risk and vulnerability maps that all parties can understand and use;
- A baseline dataset and modeling environment for extreme events, where Climate Change concepts can be brought down to the community level for discussion;
- A consistent way of tracking history of hazard events; and
- An opportunity to model not only risk, but the interaction of hazards.

Most important, Risk MAP is a **Community Map**. While basic hazard framework is provided by the NFIP, DLCDC, and other state agencies, Risk MAP is an opportunity for local input, where the community itself contributes information that makes sense and is important, items that may not rise to the level and scale of FEMA interest but may be recognized "hot spots" and areas of local concern. Risk MAP is built from the community level up. It encourages local planning that is locally used.

The Plan can be a unifying factor for many natural hazard-related activities in Oregon by helping to:

- Create a systematic **baseline** natural hazard inventory, watershed-focused, designed around state-of-the-art LiDAR, consistent from region to region with pre-determined standards, and delivered in a way that makes sense to the community and is appropriate for planning purposes;
- Coordinate with FEMA and other partners in the sequencing of projects and standardizing new requests;
- Participate with FEMA and CTP's in communicating flood data, such as velocity and flood depths, in ways that are useful to communities;
- Move beyond national standard data and focus on a tax lot-based information system that allows analysis at a local level, providing modeling of assessor data, planning information, permits, and the built environment to create a vulnerability map that all parties can understand and use;
- Use Risk MAP as a database, appropriate for geographically tracking incidents, needs, etc.
- Use Risk MAP to provide the basis for community hazard mitigation plans, making them living, constantly evolving and adaptive strategic tools rather than static documents that are revisited once every five years.
- Provide an opportunity to revitalize Goal 7, making it relevant to statewide planning efforts.
- Build a **baseline** of hazards reporting for climate change modeling, providing decision support tools to communicate community vulnerability brought about by climate change.
- Promote natural hazard information and risk mitigation products; and
- Build and improve partnerships with agencies, organizations, universities, private sector and media. In particular, the following agencies and groups (see page 7) potential play a central role to the success of Risk MAP :

**DOGAMI**, mapping, science  
**DLCD**, working with communities and Goal 7  
**GEO**, technical, digital platform, web  
**OEM**, hazard mitigation and response  
**OPDR**, hazard mitigation plans

Coordination with these groups (without interfering with their core business functions) is a major theme of this Business Plan. This will be accomplished through partnerships with FEMA, other federal agencies as appropriate, key state agencies, and local communities. These partnerships will be used to leverage contributions (e.g. data, labor, etc.) and to produce better maps at a lower cost.

# 1. Purpose of Risk MAP Business Plan

The purpose of this business plan is to present a proposal for year 2011 and beyond of how the State of Oregon can satisfy FEMA expectations for Risk MAP and how the program can evolve to become a centerpiece of natural hazards planning. The plan describes State contributions to the Risk MAP philosophy as well as some of the unique opportunities available. The plan proposes that DLCD continues to act as the lead agency for the State - and, significantly - partner with other key agencies to capitalize on the diverse skills necessary to make the program successful. While some program costs are discussed, implementation is dependent on federal funding and on the leveraging of partnerships that are currently forming as projects are considered. The present uncertain nature of the State budget and resources suggest that staffing at the State level will remain status quo for the near future and successful partnerships will become all the more important in Risk MAP's success.

## 1.1 Vision

Map Modernization was about creating a product. Risk MAP represents a process. Map Modernization, while significantly improving the quality and readability of floodplain maps, was largely about digitizing maps. Risk MAP, however, is characterized by a full alignment of FEMA's programs - from discovering local needs, mapping with better base data, working with community representatives in assessing risk and vulnerability - with planning and mitigation considerations woven throughout.

Risk MAP concerns the community, making maps and information available in a way that that makes sense, is understandable, and is usable.

As outlined in FEMA publications, Risk MAP is about:

- *Addressing gaps in flood hazard data.*

In practical terms this means continuing the work of Map Modernization, identifying areas of dated and/or inconsistent mapping and updating high-priority areas with new mapping (especially coastal and levees);

- *Measurably increasing the public's awareness & understanding.*

This can be accomplished through a combination of enhanced products, tools, and outreach - which includes maintaining a presence in the community *before* the scoping/discovery process even begins;

- *Leading effective engagement in Mitigation Planning.*

With Risk MAP as a "living database", mitigation plans and strategy can be continuous and adaptive;

- *Providing an enhanced digital platform.*

This includes data, tools, applications, strategies, a digital library of events and actions - and a means to maintain it all;

- *Aligning Risk Analysis programs and developing synergies.*

For Oregon this means coordinating the FEMA stream of funding in Oregon into a more synchronized effort – from the mapping to enforcement of NFIP regulations to the hazard mitigation plans and projects - and all the pieces in between; and

- *All-hazards approach.*

Evolving to deliver flood hazard data in support of the National Flood Insurance Program, and supporting the distribution of geospatial data of all natural hazards.

## **1.2 Mission/Guiding principles for Oregon’s Risk MAP program**

Oregon’s Risk MAP Goal: To create an “all-risk” map-based information system that laces the separate but related efforts of natural hazard identification, assessment, and mitigation strategy into a more coordinated environment that makes sense - and is accepted - at the community level.

### **- Five overall perspectives are emphasized -**

#### **1) A process change from Map Mod - alignment of FEMA activities in state**

Risk MAP is an opportunity for FEMA-funded State programs to work in a more coordinated fashion. The DLCD has recognized four State agencies and a Program coordinated through the University of Oregon as leaders and core partners in the Risk MAP effort. In a way, they represent the distinct parts of Risk MAP itself:

***Mapping and Science:*** The Oregon Department of Geology and Mineral Industries (DOGAMI) The Agency’s function is to serve as the centralized source of geologic information in Oregon for the public and all levels of government. DOGAMI identifies and quantifies natural hazards and also works to reduce the risk of earthquakes, tsunamis, landslides and coastal hazards through a comprehensive and broad-reaching mitigation strategy. Among the many objectives:

- Identify existing landslides with LiDAR imagery, and map areas susceptible to future landslides;
- Effect earthquake risk reduction through hazard mapping and vulnerability assessments;
- Complete and update maps of shoreline variability, coastal erosion and tsunami hazards;
- Coordinate data collection and distribution following natural disasters; and
- Advocate for and implement the application of LiDAR in flood hazard mapping.

***GIS Data and Standards:*** The Geospatial Enterprise Office (GEO) provides GIS coordination for state agencies, host and maintain Oregon's Digital Spatial Data Library, facilitate and promote GIS standards efforts, and assist with coordination of GIS activities for Oregon.

**Statewide Planning:** The Department of Land Conservation and Development's (DLCD) mission is to support all communities in creating and implementing comprehensive plans that reflect and balance the statewide planning goals, the vision of citizens, and the interests of local, state, federal and tribal governments. In particular, Statewide Planning Goal 7 requires local governments adopt comprehensive plans (inventories, policies and implementing measures) to reduce risk to people and property from natural hazards. In addition, the DLCD's Natural Hazards program serves as the state's coordinating agency for the National Flood Insurance Program (NFIP).

**Hazard Mitigation Planning:** Oregon Emergency Management (OEM) is the agency responsible for coordinating and facilitating emergency planning, preparedness, response and recovery activities with the state and local emergency services agencies and organizations. The Partnership for Disaster Resilience (OPDR), through the University of Oregon, is a coalition of public, private, and professional organizations working collectively toward the mission of creating a disaster resilient and sustainable state. OPDR has established a statewide Pre-Disaster Mitigation (PDM) planning program that provides both funding and technical assistance to local governments for the development and/or update of natural hazard mitigation plans. Local natural hazards mitigation plans must be reviewed and approved/re-approved by the Federal Emergency Management Agency (FEMA) every 5 years.

## **2) Create a "credible" map:**

- A product that clearly demonstrates risk, is transparent, believable, and serves as a foundation for community action;
- Shows as much quantitative data as possible (providing data-rich maps);
- Encourages flexibility in scope of projects;
- Apply lessons learned from the Map Modernization program;
- Provide enough information to allow users to reach their own conclusions; and
- No surprises!

## **3) Community representation - Engage local government/citizens early on by:**

- Including communities in the decision making process. The goal is to be in the community, talking about Risk MAP – and listening – before any new studies are discussed;
- Encouraging a transition to a local "Discovery" process (FEMA's Identifying Community Needs process);
- Providing that all hazard data is consistent and continuous throughout the State; and
- Discovering local needs, use local data (users can use their own base maps).



#### **4) Encourage the collection of *high-quality* LiDAR; leverage technology**

- As DOGAMI's Coos County pilot mapping project demonstrates (preliminary maps expected March 2011) the availability of high-quality LiDAR allows for superior mapping, the development of valuable derivative products, and increased public acceptance;
- Leverage LiDAR, StreamStats, and digital base to create easy-to-use applications and tools for professionals and the public;
- Over time create a geodatabase profile that is current and evolving for each community in the state;
- Letters of Map Change (LOMCs), including Letters of Map Revision (LOMRs) and Letters of Map Amendment (LOMAs), are integrated with other digital effective flood hazard information and are no longer separate products;
- Perform and support analyses that captures risk by taking a look at the built environment and future conditions;
- Creating a "Community Map", incorporating local knowledge; and
- Information-rich websites with authoritative data.

#### **5) Build towards a multi-hazard and vulnerable population identification**

- Quantifiable Risk Assessment performed using HAZUS-MH risk assessment with methodology for each hazard to determine estimated losses at the tax lot level, to be accomplished for every HUC-8 watershed in the state with direct and indirect economic losses estimated; and
- Set the stage for climate change research.

#### **1.3 DLCD will support the RiskMAP initiatives in the following ways:**

- Participate in mapping project "Discovery" and outreach;
- Assist with identification of suitable base map data;
- Promote FEMA's RiskMAP initiative;
- Cooperate with DOGAMI on FEMA CTP project development;
- Ensure that DOGAMI RiskMAP products are adopted by local jurisdictions, when appropriate;
- Assist local jurisdictions with use of RiskMAP products; and
- Communicate with FEMA and CTPs about local issues with maps and suggestions for improvement.

## 2. Background and Status of Oregon's Floodplain Maps

### **2.1 Map Modernization Overview**

FEMA's Map Modernization (Map Mod) program, which operated in Oregon from 2004 to 2010, was directed at improving and updating the nation's flood hazard identification maps. DLCD, the lead agency for administration of the NFIP in Oregon, served as the lead agency for the state initiative, working cooperatively with multiple mapping partners to carry out map modernization activities. The goals were to address some of the more significant issues of the mapping program that resulted in a lack of creditability with the public and challenges for providing good customer service.

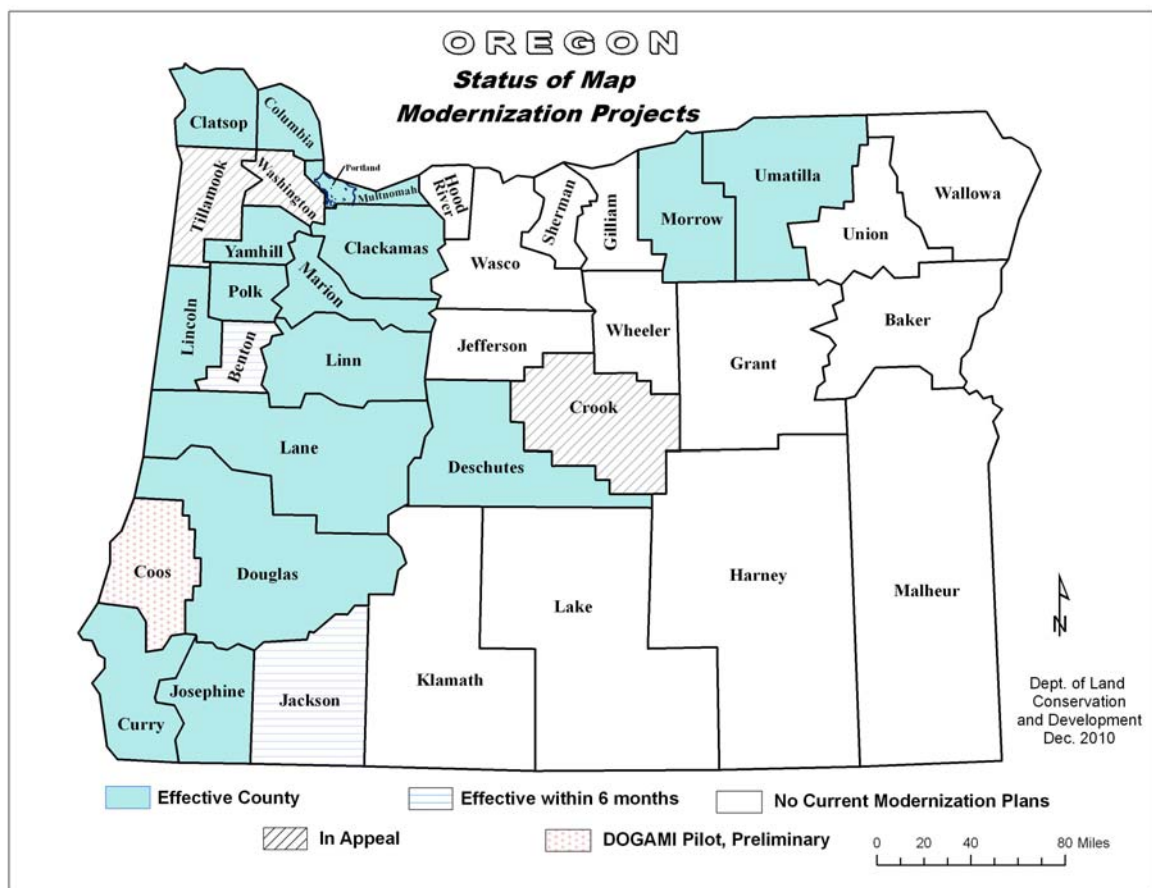
Generally speaking, Oregon's maps were no different than those in the rest of the nation. Of the two hundred fifty eight (258) Oregon cities and counties that participate in the NFIP, in 2004 it was estimated that over seventy percent of these communities had FEMA maps that were outdated.

In 2004, project goals were:

- Work toward a seamless floodplain layer for the entire state supported by a geospatial database;
- Increase effectiveness and efficiency of the floodplain mapping process;
- Ensure public access, particularly for local governments and state agencies, to the best available data in order to support floodplain management;
- Develop and maintain capacity at the state-level to provide high quality customer service to local mapping partners and FEMA;
- Empower Oregon's NFIP communities to participate in the Map Modernization initiative; and
- Produce all maps for Oregon's NFIP communities in Digital Flood Insurance Rate Map (DFIRM) format (with paper option).

### **2.2 Map Mod Status, December 2010:**

The Map Modernization program ended in 2010 and has brought much of Oregon's NFIP mapping "into the 21<sup>st</sup> century." By spring, 2011, most of Western Oregon and three of Oregon's eastern counties will have floodplain maps in digital format. When Washington, Tillamook, and Crook Counties (all in appeal) become effective within a year, approximately 95% of the state's population will be represented by digital maps. All but one community successfully updated and adopted their flood ordinance before their maps became effective; the one exception corrected the problem within one week.



### 2.3 Lessons Learned

The new digital maps for Oregon have been well received through the state, although Map Modernization was not without problems. The levee certification process was an unwelcome surprise to many communities. The reason for moving flood zone lines due to re-delineation was not always well communicated and to some gave the mapping the perception of less science and more whimsy. The map delivery and review process was occasionally frustrating: length of time between scoping and delivery of preliminary maps was long; the length of time in appeal without clear reason was trying; and the inability of some counties with limited staff to review a large number of maps in the short time provided resulted in incomplete evaluations. In addition to the above, DLCD's outreach efforts were often frustrated by not having clear information on exactly where better elevation was used, and why some areas were studied in detail while others not. Finally, and perhaps most aggravating from the community perspective, are the projects that lay in limbo for no apparent reason (Washington County's maps have been in preliminary format for over 3 years).

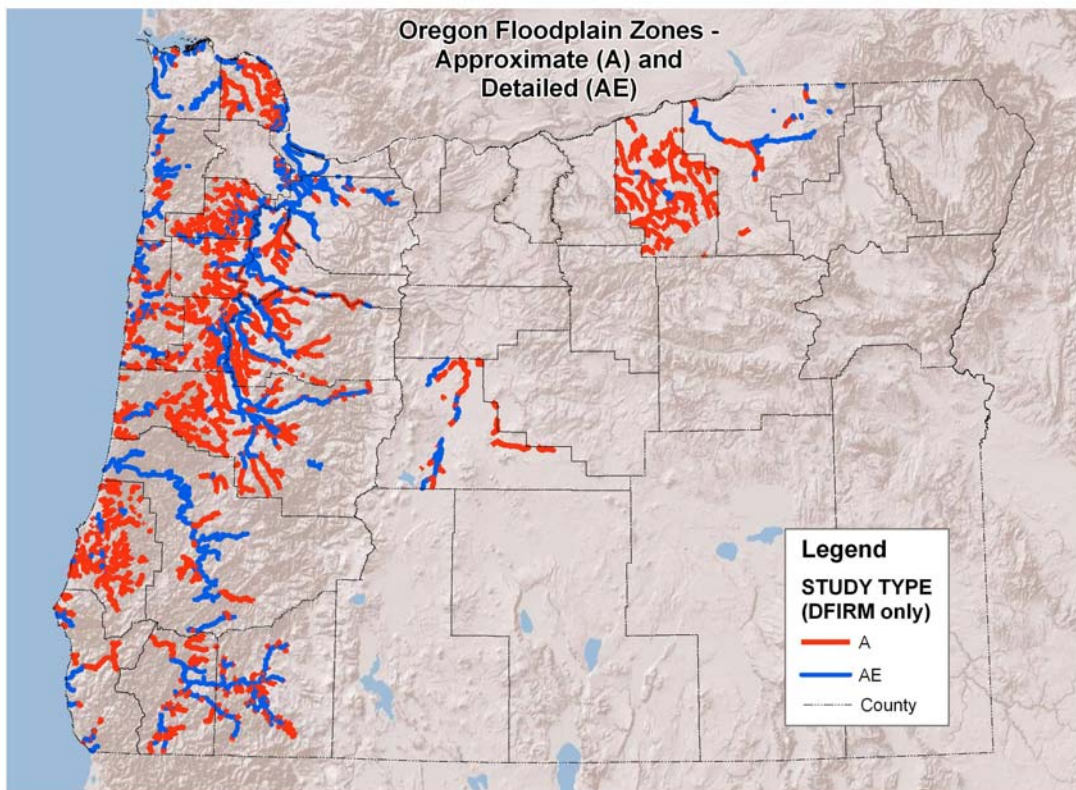
The above examples are well documented and do not need elaboration, but are important in that they usually have the same common denominator – *lack of communication*. For the DLCD and other cooperating groups who have significant

investments in community interaction, Risk MAP offers an opportunity to build on the momentum of Map Mod and rebuild some of the relationships that may have been tested.

“Going digital” can be a double-edged sword and the GIS environment will offer new challenges. The ability to overlay data with an orthophoto provides a dramatic improvement in the usefulness of FIRMs and the opportunity to accurately display information. Yet while paper maps could often provide uncertainty, they also provided a sense of anonymity. While many of the problems of the paper maps were solved going digital, the process has exposed others, most notably:

### 2.3.1 Approximate “A” Zones

“A” Zones - approximate studies which do not have base flood elevation established and are mapped without the benefit of engineering detail – make up about 61% of the digitized floodplains in Oregon. Adding in the Eastern Oregon maps that have not been updated, that percentage rises to about 70% for the state.

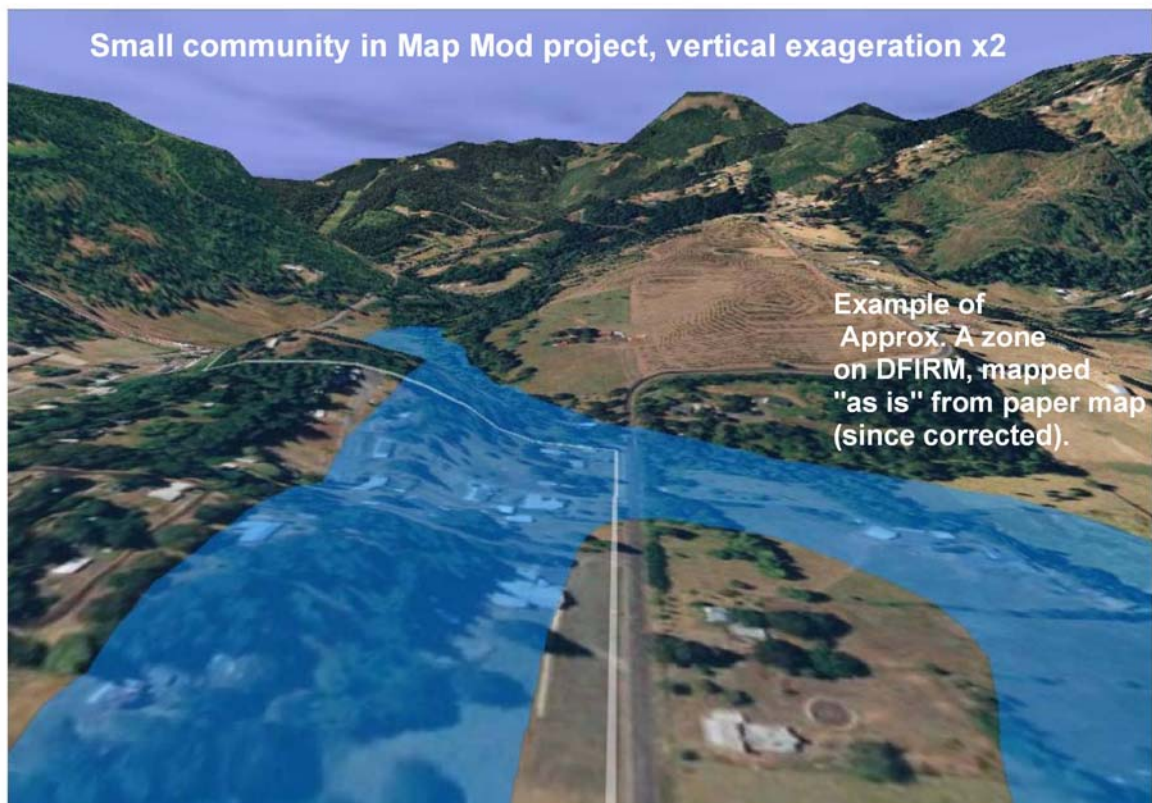


One of the purposes for updating floodplain maps was to incorporate new detailed studies. However, in Map Mod the amount of streams with new detailed studies



was relatively modest and the old approximate A Zone delineations were brought “as is” into the new maps. Not surprisingly, floodplain delineations of approximate A Zones occasionally do not follow contour data.

Using GIS, it is easy to integrate USGS topographic data onto the new maps for comparison. Consequently, while dozens of community maps have been updated since Map Mod began, the accuracy of approximate A Zones has not substantially improved. The map below is an example of an approximate A Zone that was lifted from the old maps and geo-referenced to a new digital base map. The new mapping carried over the errors of the earlier mapping.



A total of about 160 Oregon communities have all or some portion of their population relying on “approximate” A Zone data without the benefit of accurate topographic data .

With tools like Google Earth available to the public , property owners can easily use digital floodplain data, but also can more easily find evidence to initially challenge the legitimacy of the mapping, sometimes with good reason. Approximate A zones

can on occasion stand out as “climbing” a hillside, and it is not always clear to staff whether the issue is with different DEMs being used between the Google Earth-type application and those in the FEMA modeling, or there is a legitimate problem. A challenge to all who use and represent DFRIMs is to understand the limitations of these tools and when they are or are not appropriate to use for “modeling.”

#### LiDAR vs traditional elevation data

LiDAR adds a dramatic improvement to the credibility of the mapping products. For projects that were completed before LiDAR was available, it was generally understood that the next mapping opportunity would include a LiDAR base. However, for some projects that had LiDAR delivered during development of the project, it was difficult for communities to accept the product when it was known superior elevation data was available. Risk MAP projects will place a high priority on superior quality elevation information. Discovery and outreach at project start need to clearly set expectations.

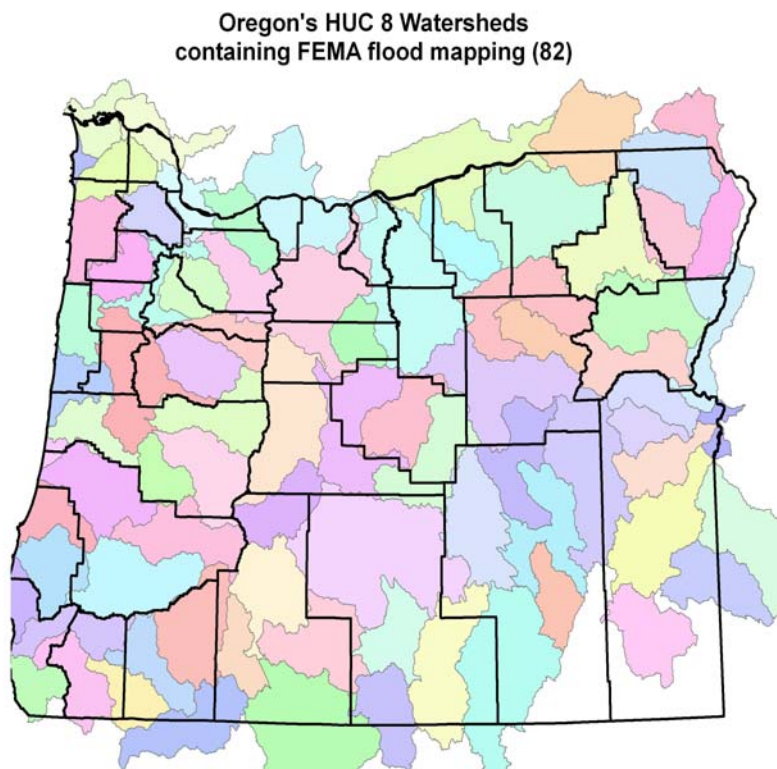
### 3. FEMA's Risk MAP Strategy

FEMA has outlined Risk Assessment Data Development and Analysis strategies for Risk MAP in a series of draft and final Procedure memos. Together they represent a distinct departure from Map Mod in how projects are approached and executed.

#### 3.1 Watershed Approach

In the past, FEMA performed its floodplain mapping on a community basis. During Map Mod, it updated maps for an entire county. For Risk MAP, FEMA will shift to producing its studies and maps on a watershed basis. This watershed approach is consistent with other federal agencies such as the Environmental Protection Agency (EPA) and the Natural Resources Conservation Service (NRCS), as well as Oregon's Department of Environmental Quality (DEQ) and offers significant advantages over using FEMA's traditional community approach. The watershed as the basic unit should reduce discontinuities within communities; provide a consistent methodology to determine when an area should be studied or re-studied; and allow various groups to communicate about watershed issues more coherently.

FEMA is using the USGS Hydrologic Unit Code (HUC) classification system of hydrologic drainage basins as the basis for its watershed approach; specifically, the HUC 8 watershed. When warranted, especially in coastal and levee areas, there will be flexibility to use other, smaller HUC boundaries. Oregon has 90 HUC 8 watersheds wholly or partly in the state. Of these, 82 contain FEMA floodplain mapping, 46 are partly in digital format, and 41 are digitally complete.



The watershed approach will present some challenges to Oregon. There will be circumstances when a community rests in multiple watersheds (at least 35 Oregon cities, including 4 of the six largest in population, straddle at least one HUC 8 watershed). In these circumstances it may be important to weigh the impact to the community of mapping only a portion of a jurisdiction (strictly by watershed) rather than including areas outside the watershed. Since map and flood ordinance adoption is conducted on a community basis, carefully planned “Discovery” and outreach will be required to make sure communities understand what is changing (and not changing) when new maps are adopted.

## **3.2 Elevation Data Strategy**

As an important component of Risk MAP, FEMA intends to devote considerable resources to acquiring elevation data. In the past data may have been acquired on an ad-hoc basis; now will have a formalized procedure. A major consideration for this effort is in placing a high priority in partnering large-scale elevation data acquisitions so that the cost-share targets for acquiring and processing elevation data can be achieved.

### ***3.2.1 Oregon’s Elevation Data Acquisition Strategy***

High quality elevation data, along with base map imagery, has become a foundational piece of Oregon’s natural hazards mapping. High quality elevation data is essential for developing reliable base flood elevations, delineating flood hazard areas, and assessing risk. Digital elevation data also assists in developing actionable mitigation plans and communicating community flood risks to local officials and the public.

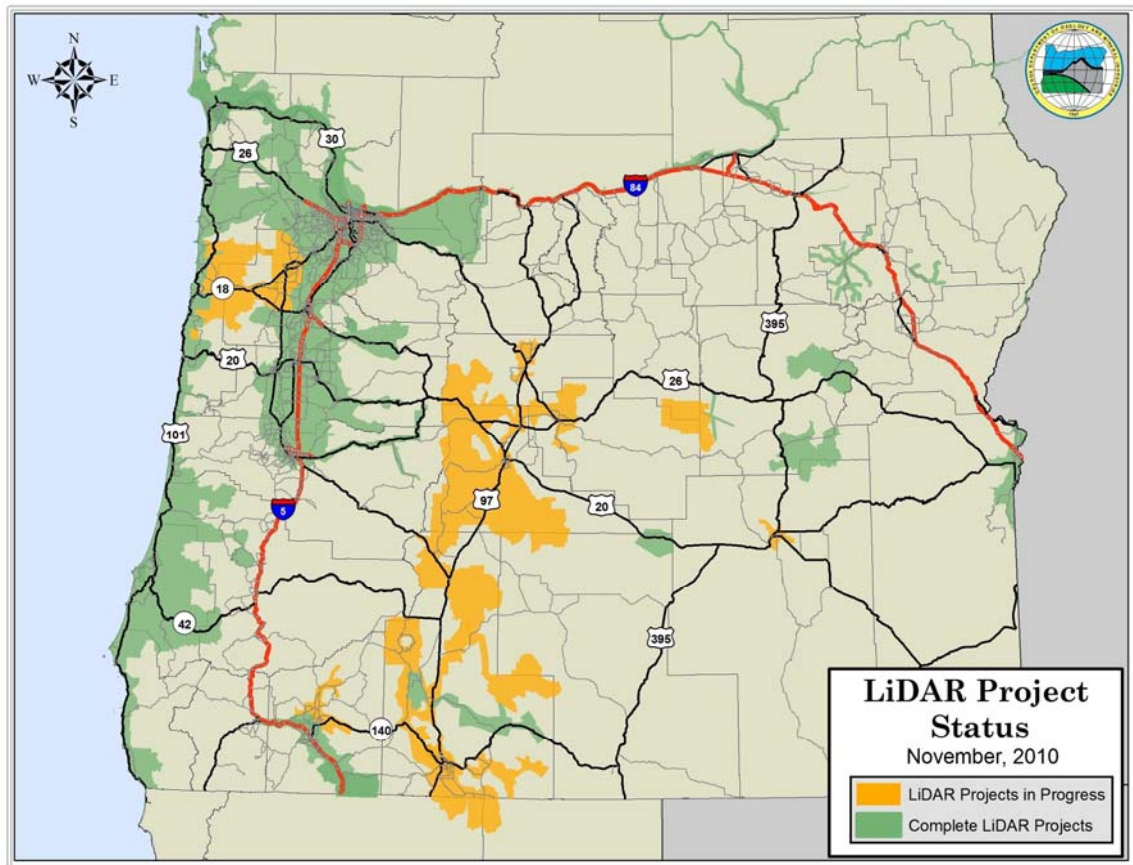
#### **Oregon LiDAR Consortium**

Oregon is a leader the nation in the promotion of LiDAR acquisition. To help meet the needs of identifying geologic hazards, managing forests, farmlands, fish, streams and fires, the Oregon Legislature in 2006 requested DOGAMI to lead the collection high quality LiDAR data throughout Oregon. Consequently, the Oregon LiDAR Consortium (OLC) was formed to bring together funding partners and to help promote the use of the new LiDAR data.

This program represents a major focus of DOGAMI staff. The Business Plan for the consortium is based on pooling funds and needs for data to leverage the best price for data collection and guarantee the highest standards and quality assurance. DOGAMI has had success in building federal, tribal, state, and community LiDAR funding partnerships, and in total, these partnerships help account for over 8,600 square miles of the South Coast, Willamette Valley, south I-5, and eastern Oregon areas. High resolution LiDAR is now available over 20% of the state, covering about 90% of Oregon’s population. However, only about 55% of the state’s floodplains are covered by LiDAR. Areas that are represented by some of the oldest, least



accurate maps in the state have had little improvement in elevation since their original mapping in the 1980s.



**Oregon LiDAR Consortium Goals:**

- Large contiguous areas
- Anchored by interested parties
- Supplemental funding from additional partners
- Common benefit of shared acquisition

DOGAMI carries out its own quality control program to test the data, and will not accept data that do not meet the specifications.

**3.2.2 Oregon's Challenge: Continued Partnerships and Standards**

Elevation Data Partnerships: A cooperative, partnership-based approach is needed to balance Risk MAP's needs with national, State, and local needs, obtain cost-effective elevation products, and appropriately share responsibilities for meeting multiple stakeholder needs. As with overall program priorities, partner contributions will be a factor in FY11 elevation data priorities. While DOGAMI and the LiDAR Consortium are very active with outreach, DLCD intends to include LiDAR acquisitions and potential on the Risk MAP website (a "bulletin board" approach), referring to DOGAMI where appropriate.

### Higher Accuracy Elevation Data Needed

In recent years the emergence of accuracy standards, a better understanding of the technology, and wider exposure have shown the value of improving the accuracy of LiDAR of earlier years. DOGAMI and the OLC have been actively involved in informing Oregon's user community the value of very high accuracy standards (vertical errors < 6", horizontal < 8"). DOGAMI's multi-hazard work with coastal erosion, migration channels, volcanic hazards, and the Coos County floodplain mapping all illustrate the dramatic advantages of superior quality LiDAR. The ability to extract building footprints, establish river migration patterns, and clearly delineate landslides is having an immediate effect on the quality of Risk MAP products.

### Oregon Elevation FIT (Framework Implementation Team)

The Elevation FIT group (see 5.1.1 for explanation of FIT) is working on strategy to guide the development of elevation data in the state. Key FIT objectives include producing an Elevation Stewardship Plan and an Elevation FIT Charter. Other topics:

Pursuing Data Development - Work began evaluating alternate options for acquiring elevation data for the rural areas and developing a matrix for review by the group, i.e., a tool to assess options and reach consensus. Options currently include 1) IFSAR, 2) lower density LiDAR, 3) deriving DEMs from existing NAIP, and 4) including DEMs in upcoming flights. Selective criteria under consideration for the matrix currently include 1) cost, 2) quality, 3) value supporting common needs, and 4) reusability, i.e., public elevation information with no restrictions on use or distribution preferred.

Including Bathymetry - The team is discussing updating the current elevation standard, to include and reference bathymetry:

- building on domains and feature types to accommodate vector data, e.g., 1) spot depth/elevation points, 2) contour lines (depth contours or isobaths), cross-sections and breaklines such as thalweg, channel, shelf, top of bank; and 3) polygons to delineate water's edge and mapping extents.

Pursuing Data Sharing - Evaluating methods to provide on-line web services to best available elevation data ; initiating a pilot to evaluate web based services with NASA, following up their offer to host LiDAR data for the state and pursuing methods to provide OSS access via WorldWind (preliminary stages); investigating other solutions such as ArcGIS Server, identifying policy issues needing attention, e.g., clarifying national security interests, clarifying 'public information', etc. and in general refining policy to encourage the sharing of publicly-funded elevation data cross the state.

### **3.3 Engineering and Mapping**

FEMA is approaching Risk MAP project prioritization in a combination of ways, including considering risk and need (population and population growth, housing units, flood insurance policies and claims, number of federal disasters, local knowledge, historical data, etc.), the availability of high quality elevation data (LiDAR), and community contribution. In a nationwide study (soon to be released for Oregon) FEMA is deriving current flood risk using a level 1 HAZUS Annualized Flood Loss Estimate.

#### **Coordinated Needs Management Strategy**

CNMS (Coordinated Needs Management Strategy) is FEMA's comprehensive new strategy for establishing mapping needs. FEMA is evaluating its inventory of stream and coastal miles nationwide and establishing which miles meet a status of New, Validated or Updated Engineering Analysis (NVUE) compliant. Currently, each stream segment is characterized as NVUE compliant, not NVUE complaint, or unknown. The default is "compliant." Therefore, before FY11, all unknown segments of streams were compliant. It must be positively demonstrated that a need exists for a stream to be mapped; otherwise it will be assumed that no need exists. Some of the factors considered when establishing compliance are age of last study; are the flood discharges still accurate, or has the basin changed; and has basin development and land use altered the hydrologic model and erosion cycle?

FEMA has committed to Congress that 80 percent of the miles in its inventory will meet this standard. Currently, based on a countywide evaluation of NVUE data, FEMA estimates that 51 percent of its inventory is compliant with NVUE nationwide. To reach 80 percent, FEMA will restudy 183,000 miles of stream or coastline nationwide during Risk MAP. Only modernized maps are eligible for CNMS database. Oregon has 6,300 stream miles currently listed in CNMS (not counting coastline miles). This database is being built by CTPs, and it is important that DLCD and other State Agencies participate in the project to assure its accuracy.

**3.3.1 Flood Risk Products:** The standard non-regulatory products that will be created under Risk MAP and used by FEMA's stakeholders include:

- Flood Risk Database
- Flood Risk Report
- Flood Risk MAP

Flood Risk Products serve as the delivery mechanisms for the Flood Risk Datasets and information developed within a Risk MAP study. Typically these Flood Risk Datasets include but are not limited to:

- Changes Since Last FIRM
- Depth & Analysis Grids
- Flood Risk Assessment data

Although the Risk MAP program is conceived on a HUC-8 watershed flood hazard and flood risk analysis framework, it is also recognized that there will be occasions where a watershed approach is not appropriate. Examples include site-specific levee analysis, coastal analysis, sub-watershed analysis, and stream segment analysis. As a result, Flood Risk Products and Flood Risk Datasets are intended to be scalable to support the variability of project requirements and available funding. DLCD will work with CTPs and communities to help determine which products and datasets are appropriate.

**Base and Enhanced Flood Risk Datasets:** While Flood Risk Products are standard (i.e. Flood Risk Report, Flood Risk MAP, and Flood Risk Database), Flood Risk Datasets are not. Flood Risk Datasets include base elements and may include enhanced element options. “Base” elements are defined as minimum Flood Risk Datasets that shall be developed during the process of a new or revised Risk MAP project. On a discretionary basis, enhanced Flood Risk Datasets may also be developed for project areas depending on several factors, including, but not limited to the following:

- The project area has been identified as having a high relative flood risk
- Readily available local data
- Additional non-FEMA funding contributions

‘Base’ Flood Risk Datasets are

- Changes Since Last FIRM analysis and data development
- Flood Depth & Analysis Grids development
- Flood Risk Assessment analysis and data development

### **3.3.2 Coastal Engineering and Mapping**

The focus of the Risk MAP engineering and mapping effort through FY14 is to update the flood hazard identification for 100 percent of the Nation’s populated shoreline so individuals living along the coast have their coastal flood risk identified using the same level of detail.

Oregon has 336 miles of coastline, bordered by 7 counties and approximately 20 incorporated cities. DOGAMI has been selected as the responsible mapping partner to produce a DFIRM and FIS report for the coastal and selected riverine reaches of Clatsop, Tillamook, and Lincoln Counties, and develop new and/or updated flood hazard data. A watershed report for affected reaches and basins will be created and distributed, as appropriate.

## 4. Information Technology Systems, Data

Since the writing of the 2004 Map Modernization Business Plan for Oregon GIS capabilities have improved dramatically. GIS data is much more common and robust, and websites have grown exponentially. High quality LiDAR data is improving the credibility of the flood insurance study and allowing us to look at the landscape in new and integrated ways. The digital platform offers an extraordinary opportunity to build an entirely new suite of tools. The following are key goals for the information technology systems that will support Risk MAP:

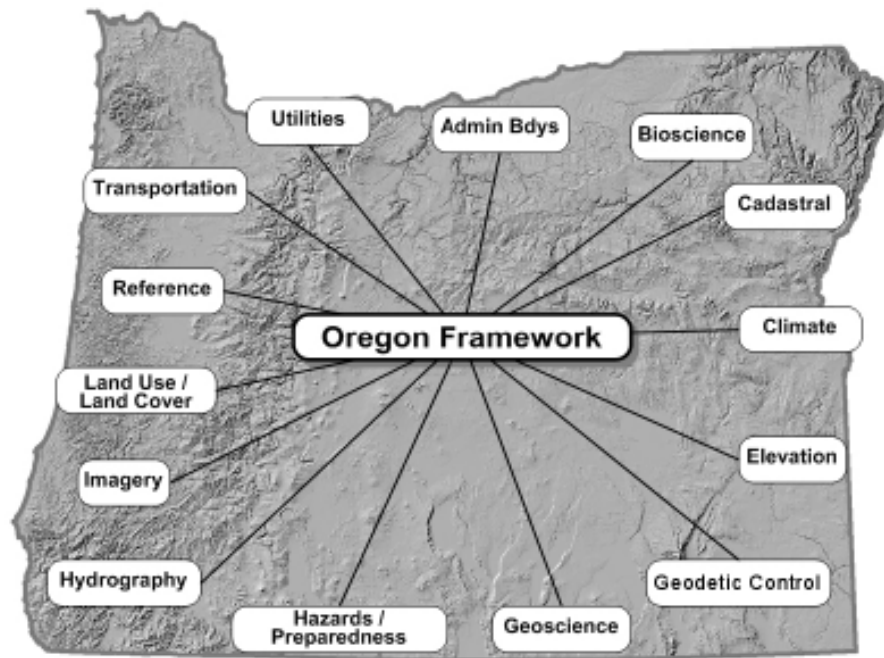
- Expand the statewide floodplain coverage supported by a geospatial database that is maintained at the state-level via partnerships among DLCD, DOGAMI, DASGEO/ OGDC, and others;
- Expand the ability to distribute flood maps, through web-based printing and from in-house at DLCD's Floodplain/Natural Hazards program;
- Continually incorporate improved base layer data into the geospatial database.
- Participate with State FIT in developing standards;
- Routinely incorporate Letters of Map Change (LOMCs) into the system instead of waiting for a new mapping project;
- Work with FEMA and NFIP communities to address digital map use for regulatory purposes;
- Move beyond national standard data and focus on a tax lot-based information system that allows analysis at a local level providing modeling of assessor data, planning information, permits, and the built environment to create a vulnerability map that all parties can understand and use;
- Build a digital base of accurate data, GIS tools (such as HAZUS), that can be fully utilized for analysis; and
- Take advantage of free viewer tools such as Google Earth and ArcGIS Explorer that can use data packaged as part of the Risk MAP program.

DLCD is confident that the State can reach these goals. Fortunately, Oregon has several advantages:

**4.1.1 GEO** GIS is successful in Oregon due largely to the existence of the Oregon Geospatial Enterprise Office (GEO) - an established state clearinghouse for GIS information. A statewide GIS coordinator located within the Oregon Department of Administrative Services manages GEO and coordinates the GIS activities of all state agencies, local governments, and academic institutions in Oregon.

GEO works with and staffs the Oregon Geographic Information Council (OGIC), created by Executive Order and composed of representatives from state agencies, local governments, and federal agencies. The Council discusses and approves resources and standards for development of share information and tools that prevent duplication of data. The Council developed the *Oregon Strategic Plan for Geographic Information Management*, which calls for the establishment of a Framework Implementation

Teams (FIT) and the design of an inclusive data standards development process. Currently there are fourteen primary Framework data themes with over three hundred people in the various groups:



Oregon's FIT is closely aligned with the National Spatial Data Infrastructure initiative, led by the Federal Geographic Data Committee (FGDC) and the President's Office of Management & Budget. Oregon's FIT is focused on development and stewardship of the national GIS framework themes and seven commonly needed Oregon data themes. Nearly every one of these themes is important to Risk MAP's success, and DLCDC will continue to participate with all relevant committees.

#### **4.2 Community Profile**

DLCDC, through the Risk MAP program, will in 2011 begin to create a Geodatabase that profiles each community in the state. This will be part of a process that compliments the building of hazard mitigation plans, and sets the stage for the "Community Map" concept (see below). It also is part of a larger DLCDC goal in building a digital library of land use history and an ability to track current land use issues. From the perspective of floodplain mapping and FEMA's community "Discovery" process, there is an advantage in having much of an area's data and land use topics of interest already available before FEMA's local meetings process takes place.

The “Community Profile” will be in coordination with other State and Federal Agencies and the many Framework Implementation Teams. Maintenance and data sharing agreements are already in place for much of the data of interest; others, like taxlot and assessor data, are being developed. Ideally, it is the communities themselves that will play an important role in updating data. Some of the objectives, datasets, and needs (the following partly supplied by OEM):

Community Assistance Visits (CAVs) - Meeting Specific short term use:

*Objective:* Identify and discuss property location as it pertains to the flood plain

*Data:* FEMA Flood data (effective & preliminary) including panels, parcels, elevation, policy holders, BFEs, Stream Names, jurisdictional data, transportation data. FIRM cross section locations, and previously mitigated properties (elevations and open space in perpetuity parcels).

Flood Study Meetings (Both Scoping & Review) - Long-term Application:

*Overall Need:* Communicate issues effecting risk and communicate study results of flood study;

*Data:* Risk Map Data (Depth Grids, Risk Grids, changes since last FIRM), parcels HAZUS output, land use data, USGS Gage locations & historic data, levees (including Provisionally Accredited levees), stream names, dams, repetitive loss data, claims data, environmental data, DFIRM data including panel, parcel data, past disaster data, LiDAR coverage information (date acquired and resolution); and areas of recurring debris flows and avalanches (most are generally heavy precipitation / flood induced).

Environmental

*Overall Need:* Assess Environmental Impacts to flooding and identify environmental hazard multipliers;

*Data:* Risk Map data, national register of historic properties & landmarks, archeological predictive modeling, registry properties, underground/above ground storage tanks, wetlands, superfund sites, mitigation banking areas, critical energy infrastructure (gas lines, power transmission, fuel terminals and storage, etc.)

Disaster

*Overall Need:* Assess flooding status, plan for and track perishable data acquisition, and communicate impact assessments; past, historic flooding by extent and elevation. Mapping depiction of DOGAMI’s survey of buildings at seismic risk. Tsunami inundation extent.

*Data:* Stream Status & Event Frequencies, Project Worksheets, high water mark data & collection areas tracking, Repetitive Loss, other disaster specific data- landslides, wind damage etc., FEMA flood data (including BFEs), Environmental Data

#### **4.3 Web-based Information**

Since 2004 when Map Modernization began there has been a steady rise in both the use and availability of tools to build websites that provide important opportunities for organizations to serve data and share ideas. This also increases opportunities for the public to be confused to the legitimacy of information, especially when it resides in more than one location. Several strategies will assist in providing consistent and accurate data:

##### **DLCD Risk MAP Website**

Beginning in 2011 DLCD will have an Oregon Risk MAP Website that will act as a coordinating center for Risk MAP activities, intended to communicate ongoing Risk MAP activities at the Federal, State and local levels; provide information on resources, tools and data available as well as project status; direct users to any existing websites maintained by organizations such as Oregon's Partnership for Disaster Resilience, Oregon Emergency Management, Geospatial Enterprise Office, and Department of Geology and Mineral Industries. DLCD is also encouraging community ownership and participation by providing a blog-type forum.

In conjunction with DOGAMI, Oregon Hazards FIT and other agencies, DLCD will establish a "state clearinghouse" of anticipated and planned projects that involve natural hazard mapping. The goal of this clearinghouse is to create a "bulletin board" of projects considered or in progress around the state, providing potential partnerships and significant cost-sharing opportunities.

##### **Oregon Hazards Explorer:**

Oregon Explorer, a collaboration between Oregon State University Libraries and the Institute for Natural Resources, is a web-based natural resources digital library that integrates data from state and federal agencies, local governments, university scientists, and citizens. Oregon Explorer helps inform decisions and actions affecting Oregon's natural environment. In 2008 Phase 1 of the Oregon Hazards Explorer was released - a web-based reporting tool that allows users to access Oregon hazards data from multiple state and federal agencies and report on known hazards for specific areas of interest. Funding for development of the Hazards Explorer was provided by the Oregon Department of Land Conservation and Development through a grant from the Federal Emergency Management Agency.

DLCD will continue to support Oregon Hazard Explorer for up-to-date FEMA GIS flood mapping data. For areas of the state with no DFIRM represented, Q3 data (much of it spatial improved by GEO) with appropriate disclaimers will be displayed. The goal is to digitally represent all of the state's flood mapping. For non-DOGAMI projects, preliminary data will be represented for public review.



Beginning January 2011, the Hazards Explorer will also provide downloading capability of FIRM panels, providing all citizens reliable access to all FIRMs in the state. DLCD takes responsibility of maintaining current status of the panels. A memo of understanding between Oregon State University and DLCD assures that updates will be incorporated.

### **DOGAMI**

DOGAMI's website posts information on their publications, hazards, and is evolving to include web mapping services to enable geologic hazard program to reduce the loss of life and property by understanding and mitigating geologic hazards, serve as a bureau of information and expert technical advisory services, provide a public education program, library and geodatabase, and operate a clearinghouse for hazard event inventory.

The newly introduced Coos County Flood and Natural Hazards Web Tool is an interactive map that shows which parts of Coos County are subject to various natural hazards. Overlays that show flood, tsunami, earthquake, river channel migration, and landslide hazards can be selected and viewed down to the tax lot level. Hazard overlays are draped on a detailed base map made from high-quality LiDAR elevation data acquired by aerial survey in 2008. All hazard layers were developed by DOGAMI using consistent and documented methods and data, and should be considered authoritative for planning purposes. It can be expected that DOGAMI will continue to develop this tool for other project areas.

### **Oregon Geospatial Data Clearinghouse**

One of the key components of the Geospatial Enterprise Office is the Oregon Geospatial Data Clearinghouse, which includes many functions designed to support the Oregon GIS Community:

- Communication mechanisms that help to develop and build a sense of community among the users of GIS technology and geospatial data;
- Metadata repository to ensure that all Framework data sets shared by multiple agencies are properly documented according to accepted standards;
- Geospatial data access and distribution to ensure the easiest possible access to Framework data needed for decision-making;
- Geospatial data archive, coordinated through the Oregon University System library system;
- Internet mapping services to enable all users to view and manipulate data holdings without specialized GIS software or knowledge; and
- Data integration, coordinated through identified data stewards for each Framework dataset. The Oregon Geospatial Data Clearinghouse contains the base map layers required by FEMA and has the infrastructure that is needed for storage and distribution of DFIRMs.

### **Oregon Partnership for Disaster Resilience**

Since 2000, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center has been leading a statewide planning initiative to build capacity for the development of state, regional, and local mitigation plans and projects. Natural hazard mitigation planning occurs in partnership with Oregon Emergency Management, Department of Land Conservation and Development, Department of Geology and Mineral Industries, FEMA Region X, and local governments throughout Oregon. Currently their website the public can:

- View current planning initiatives;
- View existing county and/or city natural hazards mitigation plans; and
- View past mitigation projects / reports.

### **DLCD Digital Data Project**

DLCD is responsible for monitoring and maintaining a data library containing nearly 40 years of planning and development history from every city and county in Oregon. To date, much of the data is stored in a paper format, making the history difficult to efficiently retrieve and research. DLCD recognizes that Oregon's planning data library would provide much greater value to Oregon, its communities, and other organizations if it was stored in an electronic format - ideally geo-coded for mapping, analysis, and display.

Providing consistent data sets over time and from community to community would improve the ability of local governments and agencies to coordinate on planning, development, and for issues relating to community ordinances and hazard mitigation. Over the course of 2011 DLCD will continue to investigate, assisted by Willamette University and others, how the Agency can transition to the digital world. As a beginning, the Agency has recently completed an updated GIS Urban Growth Boundary (UGB) layer for the state, and is working on a zoning/comprehensive plans layer.

### **Geo and Eastern Oregon Viewers**

GEO is experimenting with localized websites in an effort to bring GIS viewing tools to communities that otherwise may not have the capacity to develop them on their own. Five counties currently have basic viewers that allow communities to use imagery and their tax lot/assessor data on-line. GEO and DLCD are cooperating in this effort, partly with the intent of eventually displaying preliminary DFIRMs and related hazard data.

### **Virtual USA (Oregon Emergency Management)**

Developed by the Department of Homeland Security's Command, Control and Interoperability Division in partnership with the response community, the Virtual USA concept aims to improve emergency response by ensuring practitioners at all

levels have immediate access to the information they need to make decisions.

Potential information uses are:

- Mobile data display – First Responders
- Mapping/ Data Visualization: Incident Commanders, City and County EOCs, State AOCs, State ECC, FEMA JFO
- Daily jurisdictional / agency use
- Pre-Event Mitigation planning
- Response Coordination
- Post-Event Recovery Planning

Multnomah County is hosting the pilot of Virtual USA in Oregon. 2011 will be a definitive year for how Risk MAP, and other State and local organizations, interact with this platform.

#### **4.3.1 Challenges for Risk MAP web-based systems**

Ironically, we are moving to a time where there may be too much information on the Internet. At least a dozen websites provide Natural Hazard-related information for Oregon. The challenge for the Risk MAP partners is to coordinate the flow of information with a minimum of duplication. The public, private users, and government agencies need to know where to find the best hazards information available - and often times with little delay. To that end there are at least three efforts underway:

- As mentioned, DLCD's Risk MAP website is to be a coordinator of information, pointing users to the best information possible – ideally the stewards themselves.

- The core Risk MAP Partners plan to meet every few months to discuss various issues, including cooperation and reducing overlap and redundancy of services and data;

- Through the FITs and coordination with the Geospatial Enterprise Office, website development and web services are issues that are receiving more attention.

#### **4.4. Community Contributions**

There is an increasing body of research that identifies the importance of mapping people's historical knowledge of the location, frequency, spatial extent of frequent hazards, and integrating that local knowledge into a database. Community knowledge of local conditions can be collaboratively used to improve community resiliency, cross-check remotely-acquired data, and provide historical spatial information not available from other sources. **Community-based mapping**, or participatory mapping, is a way to build the capacity of communities to identify vulnerable people, areas, and infrastructure, and thereby improve community preparedness for hazards.

Developments in computer technology, programming, and the availability of GIS data have expanded the ability of organizations across the state to generate and use geographic information. The widespread introduction of user-generated data to web-based mapping solutions, like Google Earth/Maps and ArcGIS Explorer, allow a

community of users to generate data and information that can be used to produce highly useful maps and other information. The internet, digital cameras, and global positioning systems now allow non-specialists with expert knowledge about local conditions to collaboratively develop a local knowledge base, which can be used in turn to improve their community environment, including resiliency. In a very real way, the User is becoming the Mapper.

#### **4.4.1 The Community Map (“Folk Map”)**

Risk MAP is understood to be a cooperative effort with different entities. In Oregon it is also considered, rather than a “top-down” approach often associated with Map Mod, a full partnership with communities. DLCD, OPDR, DOGAMI all have a significant and continuing presence in the communities around the state. Even the Geospatial Enterprise Office, by its nature a centralized organization, is reaching out to communities by building localized websites. For Oregon’s Risk MAP partners, cooperation means working *with* communities as well as *for* them. Implementing the concept of working with communities will itself require new thinking in order to develop new approaches to a more effective interaction between science and the community.

DLCD proposes the concept of the community map – or “Folk Map” - a community-owned and maintained GIS portal providing local government/citizens the opportunity to manage geographic information systems and archives that will serve as a window of observed conditions in their community. While basic geodatabase and hazard framework is provided by the NFIP, DLCD and other state agencies, Risk MAP is an opportunity for local input, where the community itself contributes information that makes sense and is important, items that may not rise to the level and scale of FEMA interest but may be recognized “hot spots” and areas of local concern. New ways of capturing information are incorporated, such as citizens themselves using hand-held GIS phones to capture flood events, or developing concepts in websites for local use only. Risk MAP is built from the community level up. It encourages local planning, locally applied.

Over time history data cataloged might provide insight into trends and help establish root causes. Citizen input allows decision makers to take into account a community conciseness which may have been ignored in the past.

#### **Project Proposal**

This project will use these technologies to develop locally-managed geographic information systems and archives that should be of value in hazard events, and critical in building resiliency to hazards.

Risk MAP Partners will create a suite of user tools that are targeted to the community’s ability to input and manage data and track events. These tools may be a traditional GIS platform such as ArcGIS, an Open Source solution, and/or an interactive web tool.

Type of mapping could be:

- “Hot spots” (i.e. manhole cover floods, causing major traffic problems in even minor flooding; localized active landslide, etc.);
- Planned building, development, zoning changes, land use issues;
- Perishable data to support Risk MAP and assessments (such as extent of localized flooding; culvert overflow; high water, inundation areas, pinch points).

Local database becomes a tool for a community to capture history and events that might better allow a case to be made for a state mitigation strategy. Standards will be developed to ensure data quality and consistency. Also explored is how freeform data input can be incorporated, as well as an evaluation of social networking tools as they develop.

Discussions have begun with a few communities to serve as a pilot for the Community Map. By spring of 2011 DLCD will have selected at least two geographically representative locations to test this concept and different approaches, and suggest tools that best engage the community. Project assistance will be provided by Risk MAP partners. A review by fall will determine whether funding will be sought to continue this concept.

## 5. Climate Change

### 5.1 Oregon Climate Change Adaptation

Increasingly, there are indications that climate variability and change are beginning to affect Oregon, including Oregon's marine environments, forestlands, and agriculture. Oregon's natural resources, infrastructure, and people will likely face more severe impacts from climate change over the next several decades. An understanding of how the forces of nature may evolve is critical if we are to adapt and mitigate risk.

In October 2009, Governor Kulongoski asked the directors of several state agencies, universities, research institutions and extension services to develop a climate change adaptation plan. Among other things, the plan would provide a framework for state agencies to identify authorities, actions, research, and resources needed to increase Oregon's capacity to address the likely effects of a changing climate. In December, 2010, in conjunction with the Oregon Climate Change Research Institute (OCCRI), *"The Oregon Climate Change Adaptation Framework"* was released. This Framework lays out expected climate-related risks, the basic adaptive capacity to deal with those risks, short-term priority actions, and several steps that will evolve into a long-term process to improve Oregon's capacity to adapt to variable and changing climate conditions.

### 5.2 Summary of Key Findings and Recommendations

Eleven climate risks were listed in the study and comprise the basic foundation for the adaptation framework. They are categorized according to likelihood levels, recognizing the variability and uncertainty in climate planning. The three levels of *Very likely*, *Likely*, and *More likely than not* correspond roughly to 90 percent, 66 percent, and 60 percent confidence levels, respectively. Each of the 11 Risks identified involve Risk MAP to some degree; the following three are the most directly related:

#### **Risks that are *Very likely than not* to occur:**

##### **Increased coastal erosion and risk of inundation from increasing sea levels and increasing wave heights and storm surges (Risk 6).**

"Increased wave heights, storm surges, and sea levels can lead to loss of natural buffering functions of beaches, tidal wetlands, and dunes. Accelerating shoreline erosion has been documented, and is resulting in increased applications for shore protective structures. Shoreline alterations typically reduce the ability of beaches, tidal wetlands, and dunes to adjust to new conditions.

Increasing sea levels, wave heights and storm surges will increase coastal erosion and likely increase damage to private property and infrastructure situated on coastal shorelands. Coastal erosion and the common response to reduce shoreland erosion can lead to long-term loss of natural buffering functions of beaches and dunes. Applications for shoreline alteration permits to protect property and infrastructure are increasing, but in the long term they reduce the ability of shore systems to adjust to new conditions. Increasing sea levels, wave heights and storm surges will increase coastal erosion and likely increase

damage to private property and infrastructure situated on coastal shorelands. Coastal erosion and the common response to reduce shoreland erosion can lead to long-term loss of natural buffering functions of beaches and dunes.”

**Risks that are *More likely than not* to occur**

**Increased frequency of extreme precipitation events and incidence and magnitude of damaging floods (Risk 10)**

“Extreme precipitation events have the potential to cause localized flooding due partly to inadequate capacity of storm drain systems. Extreme events can damage or cause failure of dam spillways. Increased incidence and magnitude of flood events will increase damage to property and infrastructure, and will increase the vulnerability of areas that already experience repeated flooding. Areas thought to be outside the floodplain may now experience flooding. Many of these areas have improvements that are not insured against flood damage, and thus floods will probably result in catastrophic property damage and losses. Finally, increased flooding will increase flood-related transportation system disruptions, thereby affecting the distribution of water, food, and essential services.”

-And:

**Increased incidence of landslides (Risk 11)**

“Increased landslides will cause increased damage to property and infrastructure, and will disrupt transportation and the distribution of water, food, and essential services. Widespread damaging landslides that accompany intense rainstorms (such as “pineapple express” winter storms) and related floods occur during most winters. Particularly high-consequence events occur about every decade; recent examples include those in February 1996, November 2006 and December 2007.”

Although there is a high degree of uncertainty on the direction of climate change in Oregon, this report illustrates general trends. From a community official and planner’s perspective, it also raises some practical issues:

How do you bring regional climate modeling to the community (taxlot) level where citizens can understand and take action? How do you communicate fuzzy ideas? How do we build resiliency into our communities in order to deal with increased variability in temperature and climate? What are communities going to look like in long-term process? How do we help adapt our communities over time, building resiliency in our built environment? How do we start preparing now even though we don’t know how the trends will develop over the next few decades? FEMA’s hazard mitigation process and strategies are a good place to start, but they tend to rely more on “mitigation” rather than “adaptation.”

### **5.3 Climate Change and Risk MAP:**

The adaptation element of DLCD's climate change strategy will emphasize planning to reduce the risk to life, property and infrastructure from climate-related natural hazards. Since Oregon's planning program relies on the comprehensive plans of cities and counties for its implementation, DLCD's climate change strategy will rely on downscaled information and analysis. Mapping future hazard risks will involve the development of a "planning-scale" decision support system using resources from several sources, in particular DOGAMI, the OCCRI, and several federal agencies.

Merging regional climate science with practical, immediately applicable results will be 2011 focus for DLCD and a PACE Fellow at OCCRI. The role of the PACE Fellow, in part, will be to act as a bridge between the knowledge sets of planners, who need to use climate information, and climate experts, who aren't sure how their analytical products can be used in concrete ways. The Fellow will assist DLCD in identifying appropriate climate parameters and map scales for mapping risks, and lend support in the design of effective map products for showing different levels of climate-related risks.

The foundation for this system, which DLCD anticipates developing during the first half of the PACE fellowship, will consist of a basic ability to identify areas at risk of flooding, using updated climate data and models to represent watershed response to different precipitation events. If this approach appears promising, the DLCD, through Risk MAP, will look to partly fund additional partnership with OCCRI. The value of the PACE fellowship will be in continuing to develop this analytical system for different kinds of hazards. The development of these capabilities will occur within a couple of pilot planning areas. Outcomes will include and high resolution map products of climate risks in several categories.



## 6. Hazard Mitigation Risk Assessment - One Comprehensive Risk Assessment

Communities, state and federal agencies, utilities, and other organizations throughout Oregon develop hazard mitigation, emergency, and recovery plans. Often, individual risk assessments do not use the newest information available or take advantage of technology, such as GIS. Many plans are developed without the benefit of coordinated efforts between separate but related groups, such as watershed management groups and emergency managers.

DLCD's goal is to include Risk MAP as means to achieve Statewide Planning Goal 7 requirements (Areas Subject to Natural Hazards – see Appendix 1), and a basis for community hazard mitigation strategies – providing community plans that are living, constantly evolving and adaptive strategic tools rather than static documents that are revisited once every five years.

### 6.1 All Hazards Mapping

Risk MAP is funded by the National Flood Insurance Program, and naturally flood assessment for insurance purposes plays a major component of this initiative. However, FEMA notes in its Risk MAP Statement of Objectives that “The infrastructure developed during Map Mod will continue to evolve and be used to deliver flood hazard data in support of the National Flood Insurance Program (NFIP) and will also support the distribution of geospatial data *of all hazards* (italics added), including those that are man-made.” Oregon's community's comprehensive plans and hazard mitigation plans require an evaluation of all hazards. Currently there is no mechanism to assist communities in meeting these requirements. Oregon is committed to an all-hazards approach and sees Risk MAP as a central component to that end.

### 6.2 DOGAMI Pilot Risk MAP Project Example

In 2009 FEMA obligated \$1,012,960 to DOGAMI to fund high-resolution coastal topographic data development using LiDAR, flood insurance rate map re-delineation, hydraulic coastal flood analysis, integration of multiple natural hazard data layers for Coos County, and LiDAR data acquisition for Clatsop and Tillamook counties. This “pilot project” bridges the Map Mod components with Risk MAP:

#### ***Map Mod Re-delineation Components***

- Develop new topographic data incorporating LiDAR
- Develop base map, including LiDAR-based digital elevation model (DEM)
- Re-delineate Digital Flood Insurance Rate Maps (DFIRMs), including coastal zone
- Produce “new” DFIRM products
- Assist FEMA and DLCD with community outreach

#### ***Pilot Risk MAP Component***

Identify, evaluate, and disseminate multi-hazard data based on new mapping:

- flooding and channel migration zone hazards
- 100-yr and 500-yr flood hazard loss estimation (HAZUS)
- landslide hazards
- earthquake hazards, including liquefaction and ground shaking amplification
- tsunami inundation hazards
- costal erosion hazards
- deliver multi-hazard maps in paper and digital format using online web tool

The preliminary results of the DOGMAI Coos County project show how LiDAR greatly improves the accuracy of mapping of floodplains and other natural hazards. Other projects along the Oregon coast and the Upper Sandy River demonstrate the ability of LiDAR to both provide accurate elevation data and penetrate ground cover to expose landslide terrain and river migration channels.

Previous mapping of the flood hazard was performed in the mid-1980s using best available elevation data that was limited in most cases to USGS topographic maps – often with elevation contour intervals no better than 40 feet. Even with very accurate hydrologic and hydraulic information, reliably locating which structures are prone to flooding is impossible with such coarse elevation data. LiDAR acquired in Coos County provides vastly improved precision, allowing for the creation of 1-foot contour intervals. Using this high-quality elevation data, DOGAMI re-mapped the flood hazard with such detail that individual structures can be readily identified as "in or out" of the flood hazard zone.

As part of this project, DOGAMI restudied approximate riverine (A) zones using discharges modeled by USGS StreamStats program. StreamStats is a web-based GIS application created to provide users with access to an assortment of analytical tools useful for water-resources planning and management. The program:

- Allows users to easily obtain streamflow statistics, basin characteristics, and descriptive information for USGS data-collection stations and user-selected ungaged locations;
- Delineated the drainage-basin characteristics for the delineated basin; and
- makes the process of computing basin characteristic and streamflow statistics for un-gauged location faster, accurate, and consistent.

Building new approximate A zones using StreamStats with LiDAR for a topography base has significant potential for a number of applications. Determining a BFE at any point within A zones will have great utility for community Planners and land owners. Over the course of 2011 DLCD and Risk MAP partners will determine the costs of using StreamStats in other areas of the state where approximate A zones have been identified as needing refinement.

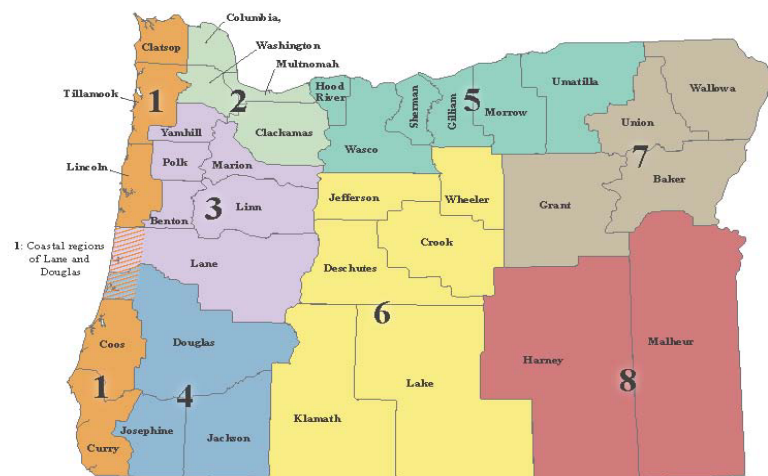
### 6.3 Identify, Catalog Other Related Forms of Risk

While not every area of the state can be inventoried as thoroughly as the Coos County project, a standardized, GIS-based, hazard inventory could be accomplished on a regional basis. Such a “catalog” of natural hazards and supporting documentation would enhance the regional assessment methodology to identify, define and measure the diverse set of inter-related and inter-dependent vulnerabilities and risks across the state’s geographic, social and political boundaries. Additionally, a comprehensive risk assessment approach aligns with the Emergency Management Accreditation Program (EMAP), the National Fire Protection Administration (NFPA), and the 1600 Standard on Disaster/Emergency Management and Business Continuity Program. All place value on comprehensive, multi-purpose risk assessments. Application and enforcement of the State Land Use Planning Goal 7 would fundamentally benefit from a current and maintained database of natural hazards. Finally, statewide emergency management planning efforts will benefit from unified, comprehensive assessments of jurisdictional risks at a regional level.

**6.3.1 The Partnership for Disaster Resilience** develops over half the community hazard mitigation plans in the state, and, along with DLCD, DOGAMI, and GEO, is well-positioned to help lead the coordination of a hazards inventory and comprehensive risk assessment with communities. Working with **Oregon Emergency Management**, OPDR has established a statewide Pre-Disaster Mitigation (PDM) planning program that provides both funding and technical assistance to local governments for the development and/or update of natural hazard mitigation plans. Local natural hazards mitigation plans must be reviewed and approved/re-approved by the Federal Emergency Management Agency (FEMA) every 5 years. Jurisdictions with FEMA-approved natural hazards mitigation plans receive access to federal mitigation funding programs. OPDR’s PDM planning activities systematically occur within 8 regions throughout the state over a 5-year period. In 2011, OPDR plans to begin working with Region 5, followed by Regions 6 and 7 in 2012.

Ideally, Risk MAP product development and delivery within the PDM planning regions one year before OPDR’s arrival could be mutually beneficial. In the natural hazards mitigation planning (or plan update) process, OPDR can assist jurisdictions in

understanding or modifying Risk MAP products, as needed. Likewise, Risk MAP



products will assist OPDR in the development, or improvement of local natural hazards risk assessments.

### **6.3.2 Project Opportunity:**

In 2011, DLCD will continue the discussion already begun on how to develop objective, regional, all-hazard risk assessments to supplement and enhance Oregon's current all-hazard risk assessment methodology. The project opportunity is to select a region of the state that will be undergoing a natural hazards mitigation plan update in the near future. With the assistance of DOGAMI, DLCD's Regional Representative(s), communities and related groups (such as Watershed Councils), all natural hazards and associated documentation will be inventoried. This process is very similar to the new "Discovery" phase of FEMA mapping; the important difference is that this is targeted regionally for all hazards, and will be maintained and have multiple users.

This project will test the integration of multidisciplinary and multi-jurisdictional planning efforts. By integrating existing and emerging GIS and risk assessment technologies with a complete hazards dataset (including local input), the development of new risk assessment methodologies to meet the needs and scales of various planning processes can be evaluated. Ideally, the all-hazard risk assessments developed as part of this project will over time be continued through integration into all community comprehensive plans and emergency management planning activities. The milestones for sustaining the products will include the regularly scheduled update cycles for required hazard mitigation plans. Furthermore, the methodology developed will be available to all other jurisdictions within the state of Oregon.

Risk MAP will support the development of the Mitigation Planning database which will provide the ability to store, track, and manage mitigation plans. In the near-term, Risk MAP will make available all FEMA-approved mitigation plans through a GIS-based plans data map available through a website. In the long-term, mapping, risk assessment and planning databases may be integrated to allow simpler user access to community level information under all Risk MAP programs.

## 7. Oregon's Floodplain Mapping Strategy, 2011

Risk MAP issues for Oregon for 2011 and beyond can be categorized as “mapping” and “policy.” Specific project proposals are discussed in Chapter 9.

### 7.1 Mapping Issues

#### Refine and update floodplain mapping costs

DLCD is developing planning-level cost estimates for updating floodplain maps in the HUC 8 watersheds in Oregon. As we learn more of the Risk MAP process and as CNMS results become available, these estimates will be shared, updated and refined. Compared with the risk in other Oregon and national watersheds, several of Oregon's watersheds have minimal needs for updated floodplain maps, and could easily be combined with work being done in adjacent watersheds. Required and discretionary products associated with the Risk MAP Program need to be defined and a general cost formula identified.

#### Collaborate with FEMA and local communities to develop a Risk MAP mapping plan for approximate A zones

Simply upgrading unnumbered “A” Zones would result in a significant percentage of Oregon's floodplains coming into compliance with the FEMA NVUE standards. As noted in Section 7.2, there are opportunities to use StreamStats (and perhaps combine watersheds studies) consistently to improve mapping. DLCD will work with FEMA and local officials to develop a rational plan for to achieve mapping updates.

#### Change maps

Change maps showing areas that have changed since the last mapping have been the most requested product of the DLCD for each Map Mod project. Where Q3 data has been available, selected areas flood zones have been repositioned to represent in a general sense where mapping has changed. Change maps since the last mapping are now required as part of the base product delivery for new projects. However, for areas without a previous DFIRM to use as comparison (most of eastern Oregon) there is no expectation of a comparison. For projects where the CTP does not deliver a change map, DLCD will continue to create one for communities by adjusting the Q3 data to the closest approximate fit.

Related, Oregon's land use law “Measure 56” requires that landowners be notified when a change in land-use laws might limit the use of their property. Changes to flood maps usually initiate this mandate. For small communities without resources identifying properties potentially affected can be a problem. DLCD will continue, when requested and the data is available, to assist these communities by using GIS to select the appropriate tax lots and create a mailing list.

### Stream Centerline for Eastern Oregon

The Coordinated Needs Management Strategy (CNMS) is a method FEMA uses for evaluating its inventory of stream and coastal miles nationwide and establishing which miles meet New, Validated or Updated Engineering Analysis (NVUE). It is very useful as a GIS dataset to display stream centerlines and show the relationship to various layers of interest. However, in order to be compliant with NVUE quality standards, a stream must be digital (modernized). Much of Eastern Oregon does not have a stream centerline inventory displaying where streams are represented by a SFHA. This makes it difficult to evaluate the study and mapping needs of these remaining areas of the state still represented by paper maps, or compare watersheds in order to prioritize projects.

Over the course of the next year DLCD will begin mapping Eastern Oregon stream centerlines that overlie the SFHA, based on the National Hydrologic Data, Q3 data, and cross-checked with the FIRMs. Beginning and ending points of river miles will be captured, as well as river miles. The intent of the project is not to replace or even provide base material for CNMS, but rather build a database for DLCD to evenly represent the entire state for demonstrating mapping needs and as well as provide an important layer for planning purposes.

## **7.2 Policy Issues**

### Developing Alternative Funding Sources

DLCD has many objectives for its Risk MAP strategy. Perhaps the overriding priority must be to develop a method for leveraging other funding sources to supplement FEMA funding. It is clear FEMA funding sources will not cover the estimated costs of Oregon's Risk MAP proposals, nor will there be much in the way of additional resources from the state available in the near future. All of the parts of the Risk MAP initiative will need the coordinated efforts of each of the core partners described in this state plan. DLCD staff has identified state, local and federal agencies as additional potential partners with an interest in pursuing mutually beneficial mapping projects. It will also take significant outreach to the private and non-profit organizations that have an interest in communities and their vitality.

Components important to developing Oregon's Floodplain Mapping Strategy are:

- Developing a plan for initiating the Risk MAP Discovery process for HUC 8 watersheds;
- Definition of products associated with and required by the Risk MAP program applicable to Oregon communities;
- An updated evaluation of flood risk;
- Continued review and update of the CNMS database;
- Continued development of costs associated with floodplain mapping based on HUC 8 Watersheds;

- Increased collaboration between FEMA, the state and local communities to identify mapping priorities for the Risk MAP program;
- Continuation of business plan updates; and
- Incorporation of related risk factors into the Risk MAP program.

#### Develop a Plan for Initiating the Risk MAP Discovery Process

Discovery is a new methodology taking the place of, and expanding upon, the scoping process used in Map Mod. Discovery occurs after FEMA's annual planning and budgeting cycle, when watersheds of interest have been selected for further examination. The discovery guidance does not describe activities occurring as part of that cycle, since they are part of national planning activities which may be revised each fiscal year. The draft guidance released in September 2010 outlines discovery activities occurring once a watershed has been selected for further examination.

DLCD and the Risk MAP Partners will collaborate with FEMA Region 10 to prioritize a list of HUC 8 watersheds to complete discovery during the time frame of the Risk MAP program. Actual completion of discovery for all HUC 8 watersheds in Oregon will be conditional upon availability of funding. DLCD will work towards identifying alternative sources of funds and in kind matching to complete discovery activities.

#### Update State Business Plan

Any plan should be considered a living document, and the implementation of this plan requires the cooperation and support of many mapping partners. This business plan is being published in draft form and presented to the mapping community. This is to encourage discussion of Oregon's mapping needs, solicit comments from state and federal agencies, and build a consensus for developing a unified mapping effort. This will be an ongoing effort; the plan will be reviewed each year to assess its effectiveness and make changes when necessary.

#### Automatic adoption clause

When FEMA provides an NFIP-participating community with new flood hazard information in a DFIRM and/or FIS Report, the community is required to adopt or amend its floodplain management regulations to reflect and administer based on the new data and effective date. This requirement to adopt each and every revision to the DFIRM and or FIS can place a significant burden on communities. (With data for most of the state now in digital format the ability to update maps will be easy, but crossing watershed boundaries, etc. complicate the adoption process).

To avoid these complications, many communities around the county use an automatic adoption clause that references the current map in effect at the time of adoption and "any future revisions thereto" or similar language.

In 2004, the Office of the Attorney General provided information that "automatic adoption" is an unconstitutional delegation of authority for Oregon communities.

Oregon requires public hearings for adoption and amendment of land use ordinances, and a Flood Damage Prevention Ordinance is considered a land use ordinance. Therefore, communities must amend their flood damage prevention ordinances every time FEMA revises the maps for that community.

To address this issue, in 2011 DLCD will consider drafting statutory language for the purpose of complying with the Federal requirement that communities administer their Floodplain Management Development Ordinance according to the most current flood data. From a certain point on, each time the community's DFIRM or FIS Report is revised, the new or revised DFIRM and FIS Report automatically become part of the ordinance, without further action on the part of the community. This provision is contained – and encouraged - in FEMA's model NFIP ordinance. FEMA would prefer that ordinances be written to automatically adopt future amendments to FIRMs and the corresponding FIS by including language such as “and all subsequent revisions” in the floodplain ordinance. By including this language, the local government would be deferring adoption of revisions to FIRMs and their FIS to the federal government.

#### Availability of State GIS data layers

Taxlot/Assessor - The tax lot layer has been identified as one of the key base layers within the State Framework. Counties provide their tax lot data to the Department of Revenue (DOR) for the purpose of achieving their ORMAP funding. Historically this data is not shared with other state agencies *unless* DOR receives specific authorization from the County Assessor to release the data.

Recently, the Oregon Geographic Information Council (OGIC) Cadastral FIT Data Sharing workgroup, in coordination with the Department of Revenue and GEO, has developed a cadastral data sharing plan and license agreement to share county-level cadastral data with State agencies. For each participating County, DOR will make available to all State Agencies the following cadastral product:

- Tax Lot polygons
- Tax Code boundaries
- Property Ownership tables populated with data as provided under law
- Situs information

Related, the Cadastral Data Sharing Workgroup of FIT has formed Cadastral Data Exchange Standard and adopted GIS a Cadastral Data License Agreement. Eighteen counties have signed Agreements to date; discussions continue. Other groups are involved with cadastral data sharing. While not complete, it appears the uniform sharing of tax lot data is becoming closer to reality, and conversation continues. However, for now using cadastral and assessor data will require one-on-one conversations with many of the counties in the State. Many uses of the data, including deriving HAZUS values and information from the Assessor's real value tables, will remain inconsistent for the foreseeable future.



### Floodplain Data Exchange

Under the direction of the Oregon Geographic Information Council (OGIC), the Oregon Framework Implementation Team delegated development of a Floodplain Data Exchange Standard to the Hazards Framework Implementation Team (Hazard-FIT), which, in turn, delegated the task to the Flood Map Modernization Working Group. This document was completed (Oregon Floodplain Data Exchange Standard, Version 1.0) and endorsed by OGIC in December, 2006. The goal of the Floodplain Standard is to ensure that floodplain data are easily exchanged and usable for flood hazard and mitigation planning at the state and local level, and sets forth standards and a data dictionary for the floodplain element of the Hazard Framework.

Five years of Map Modernization projects have proven the usefulness of the Standard, but have also illustrated the need for it to be updated. Risk MAP brings a new way of using the data, and DLCD will revise the Standard in 2011. DLCD will ensure that floodplain elements remain in sync with FEMA's digital flood insurance rate maps and guidelines.

### Natural Hazards Inventory

Oregon has a rich dataset of hazards mapped and/or documented through DOGAMI, OPDR and their library of Hazard Mitigation Plans. The first step in planning for recovery is the identification, assessment and prioritization of risk. This project will enhance Oregon's recovery capability by providing an objective, regional risk assessment approach (see 7.3).

### Reconciling Endangered Species Act and the NFIP

As the result of a lawsuit brought by the National Wildlife Federation in federal court in Washington, the court has ordered that FEMA consult with the National Marine Fisheries Service (NMFS) under the Endangered Species Act. As a result, a biological opinion was issued by NMFS in 2008 calling for larger setbacks along rivers and streams, tougher regulation of development in or near flood plains and in many cases requiring individual projects to consult with NMFS prior to project approval. The same issue is now being addressed in Oregon and other states, and a strategy will need to be developed to address this issue. New ways of looking at the environment, using GIS with high-quality LiDAR to better delineate habitat and channelization, should be investigated as part of a solution set.

### Building Footprint or Structure Point database

As DOGAMI has demonstrated in the Coos County project, products derived from high-quality LiDAR have given Planners an unprecedented ability to look at the landscape in more detail. In particular, building footprints extracted from LiDAR, especially when populated from the Real Value database of County Assessors, gives a very detailed view of where vulnerable structures are in a community. Creating footprints in LiDAR area should be a high priority in new projects. As an alternative, some counties and communities are creating a point address file of the location of SITUS addresses,

created manually by viewing orthophotos. While not quite as precise as building footprints, point addresses give a good sense where the primary structure may be located – especially important on large taxlots. The Oregon FIT Structures group is discussing footprint and point location data as part of the state standards.

#### Social Media Tools

YouTube, Twitter, Facebook are all social media tools that are changing the way we communicate, as well as using podcasts to deliver learning tools. Region 10 is beginning to deploy these strategies. DLCD sees the potential for these tools for Risk MAP and will continue to investigate them as part of its *two-way* communication strategy. Progress will depend partly on policy and protocol established by the State.

#### Work closer with CAP-SSSE

DLCD Natural Hazards program serves as the State coordinating agency for the National Flood Insurance Program (NFIP) through an agreement with the Federal Emergency Management Agency (FEMA). Oregon has 258 cities and counties that are subject to flooding, and all participate in the NFIP thereby making flood insurance available to their residents and businesses.

The NFIP has three basic components: - flood hazard mapping, floodplain insurance, and floodplain regulations. Map Mod focused on the first of these, flood hazard mapping; however, Risk MAP is trending towards incorporating all aspects of the NFIP. From the perspective of Oregon's Natural Hazards Program it would appear that the activities of NFIP and Risk MAP significantly overlap. DLCD welcomes the discussion of more closely coordinating these two grants to improve service to the public.

#### Dams and Levees

The Coastal associated with DLCD is nearing completion of an exhaustive inventory of all levees along the Oregon coast, which will be incorporated in the Risk MAP geodatabase when complete. DLCD will engage with Region 10 on how to continue this research, as well as work with other Federal and State agencies in coordinating risk assessments for communities downstream from dams.

## 8. Future Mapping Projects

In consultation with the communities and others around the state, DLCD has identified several areas that have a need for new or updated mapping work, as well as enhancements or corrections to existing DFIRMs.

The majority of proposed studies identified in this plan are based on FEMA's trifecta formula for prioritization of future mapping projects. For FY11, FEMA will prioritize Risk MAP projects on a watershed (HUC-8) basis using 3 factors: Risk, Need, and the availability of topographic data. This information has been compiled for each watershed throughout the nation. A watershed's overall score is determined by:

- Risk and Need are weighted at 45% each. Topo accounts for the remaining 10%
- Risk is derived from two sources; the "Atlanta Factors" and the Average Annualized Loss Study
- Need is derived from CNMS Phase 2.5 data
- Topo availability is derived from the national elevation inventory

In addition to studies identified by this methodology, DLCC presents several perspectives as alternatives to the Watershed approach; the cost to benefits gained may make any of these approaches desirable:

- Finishing Map Mod - parts of projects that are incomplete;
- Building Floodways where missing in AE zones;
- Systematically improving Approximate "A" zones with StreamStats; and
- Retiring paper maps, regardless the availability of LiDAR (beginning with the northeast corner of the state, preparing the groundwork for the regional update of community Hazard Mitigation Plans).

A challenge in communicating these needs is to place them in a degree of importance, in a way that accurately relating to CNMS. Another challenge is how to propose projects that make sense at the local level but do not meet FEMA's methods of approaching a project.

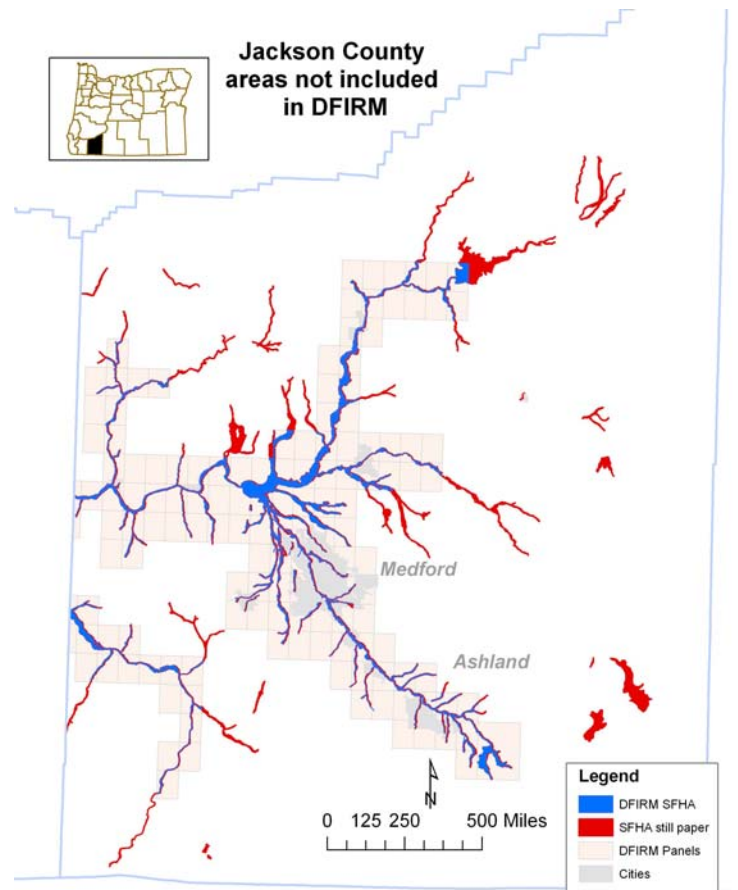
**8.1 Outstanding MAP Mod Issues** The first set of needs are independent of the Watershed approach and fill gaps from Map Mod that needs addressing. We consider these projects the highest priority, as they significantly impact the usability of the DFIRMS delivered in 2010.

### Cannon Beach

Correct GIS data for maps effective in 2010. An 'offset' of about 50 feet of the previously effective floodplains was discovered with the DFIRM GIS data. The DFIRM panels are not affected and are correct. FEMA has investigated the issue and discovered that the year-2000 orthophotos used for the project had a registration error. The data is internally consistent, but cannot be overlaid with any other data for the region surrounding Cannon Beach. Since the problem is a registration error with the photos themselves, the data cannot be simply re-projected to correct the problem.

### Jackson County

DFIRMs created for the county inexplicitly covered only part of the mapped area; rural areas were not updated and left in "paper" format. This provides an awkward situation for communities who use these maps, especially in areas where the maps overlap.



## 8.2 Watershed-centered projects - Sequencing Recommendations

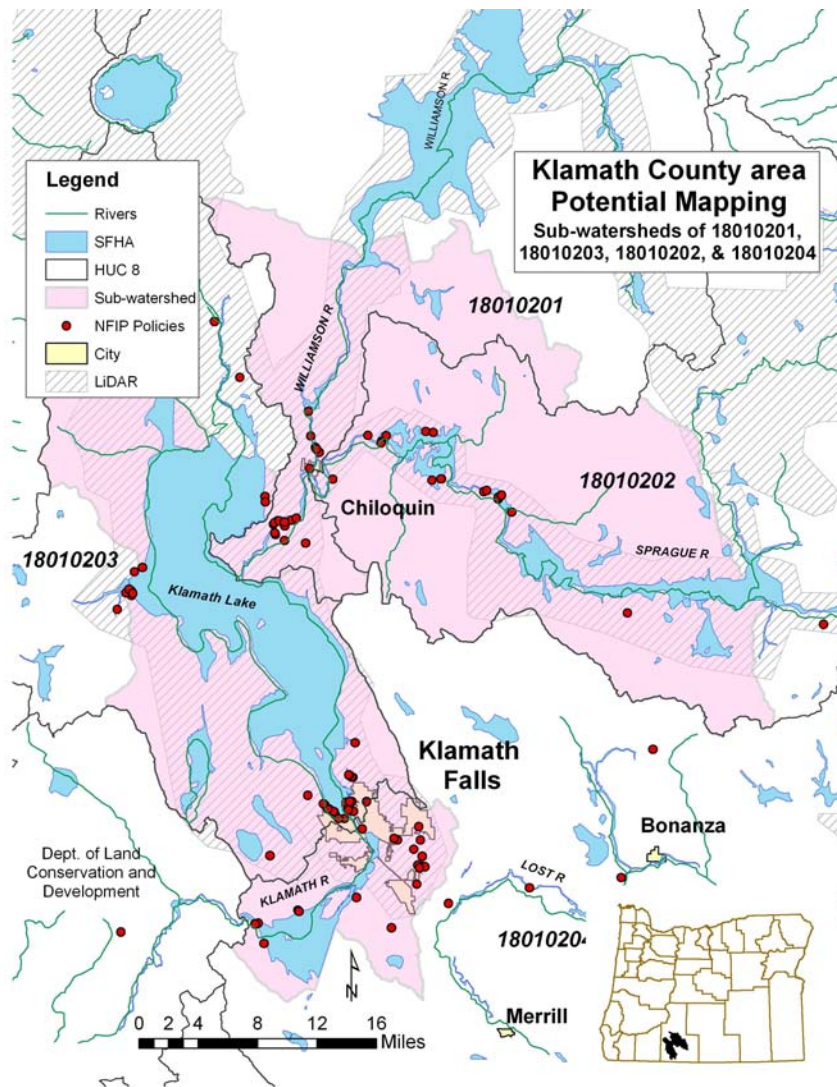
The following projects are or will be conceived as Watershed-based. Projects already scoped, listed for 2009 sequencing, or otherwise identified, are included to give a full view of needs and relate to each other. The order presented generally relates to importance. DLCD encourages a discussion with Region 10 on the flexibility of boundaries for study. With small exceptions to the Watershed concept entire communities could be included in a project that otherwise would be a jurisdictionally divided study.

### 1) Klamath County

#### Klamath Falls-centered

Current: paper maps (70 panels), mostly mapped in 1984 with no updates. There are approximately 296 miles of SFHA mapped, 117 miles currently with LiDAR. There are 36 NFIP policies in the four sub-watersheds identified as priority (Williamson River below Klamath Marsh, Sprague River Valley, Klamath Lake, and Lake Ewauna-Upper Klamath River). Current maps are inadequate for the growth seen in the past few decades, especially in the Sprague River area where there are nine subdivisions with around 1,200 Rural Residential zoned lots. The County is considering mapping floodplains themselves.

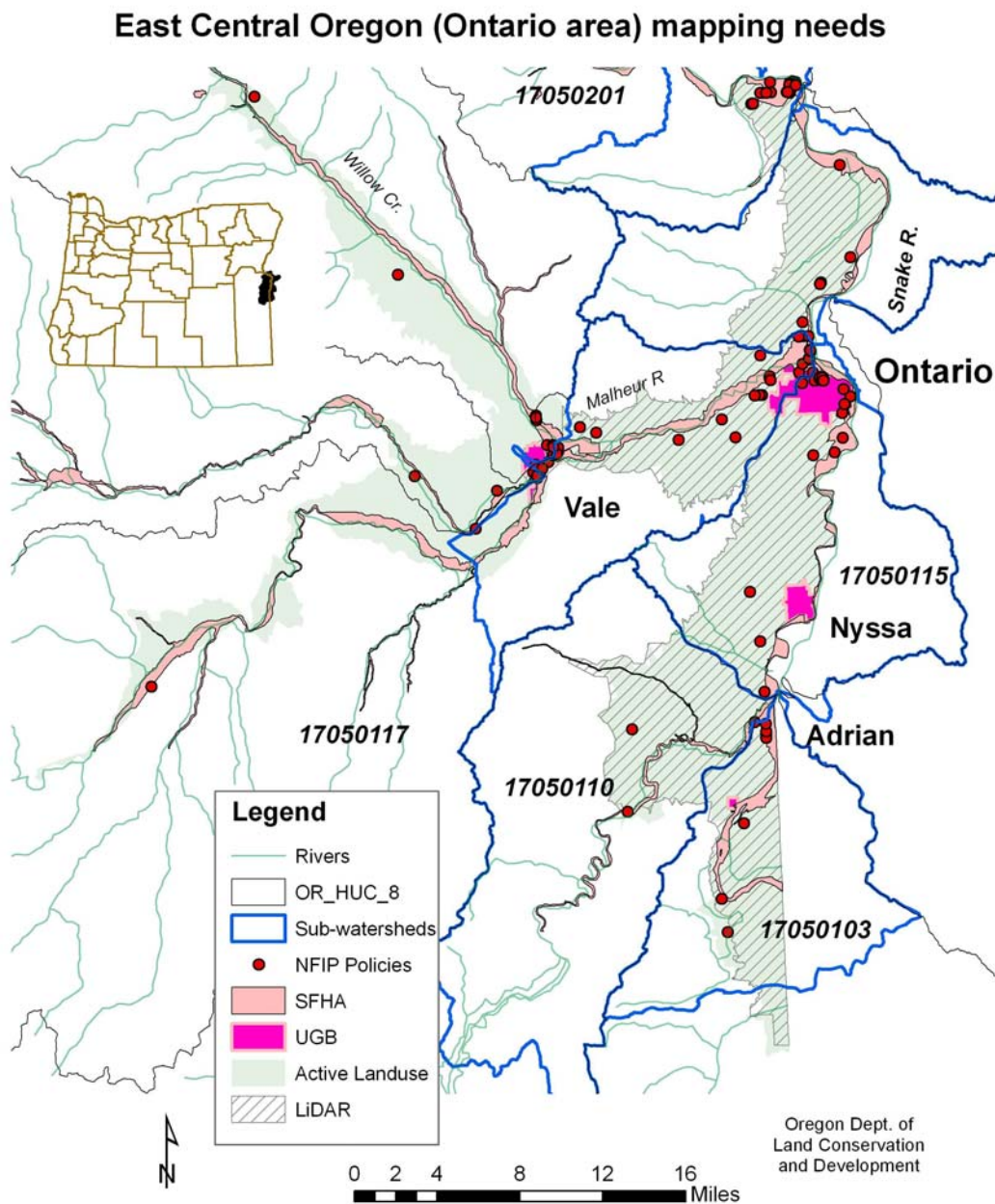
This project was scoped in 2010, with discussion of potential detailed work/redelineation/ Zone A refinement where topo exists.





## 2) Ontario/Vale

This area borders the Snake River and has development pressure from neighboring Idaho. It is the first of the 3 regional areas spanning I-84 and the major population corridor in NE Oregon. As the areas of importance straddle HUC 8 watersheds, six sub-watersheds are identified as needing mapping, encompassing 24 panels. Almost all panels date to 1984. Scoping was done in 2010.



### 3) Hood River County and Wasco County

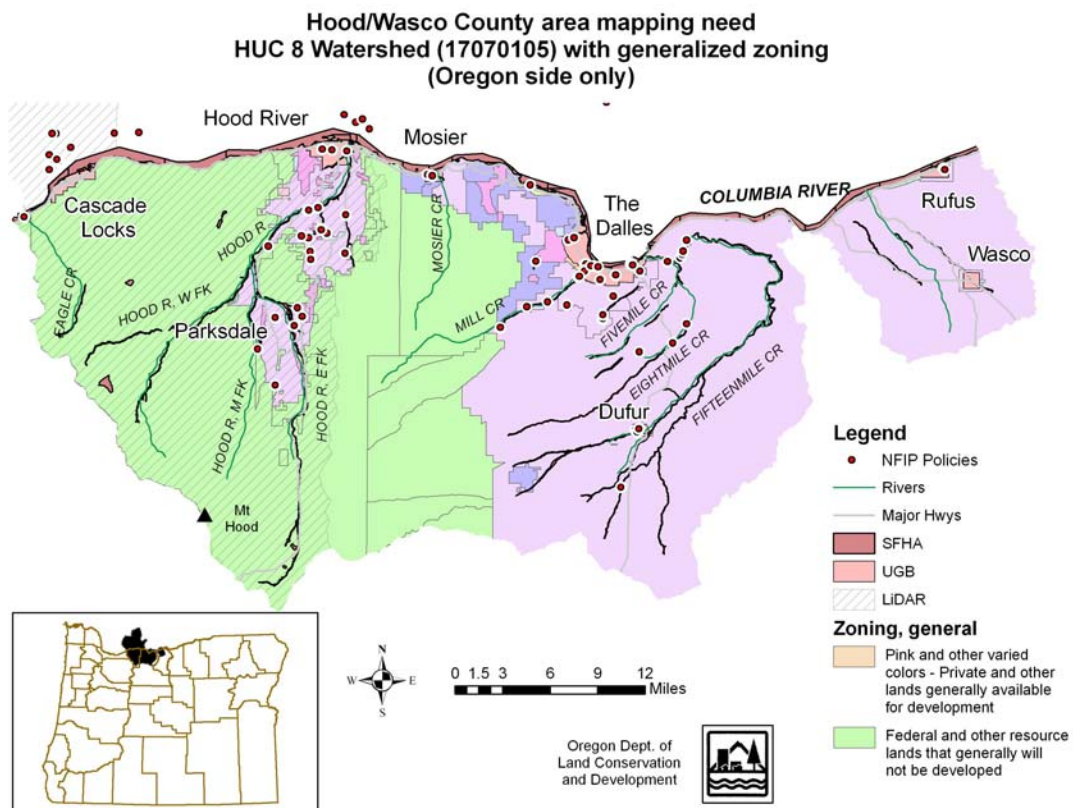
Current: paper maps (72 panels), generally 1984 with some updates in 2002. Maps are difficult to get in paper format, are in the early “floodway” style format, and not available for download from the Map Service Center.

This area has had five major disasters declared in less than 20 years.

There are approximately 296 miles of SFHA mapped, 117 miles currently with LiDAR.

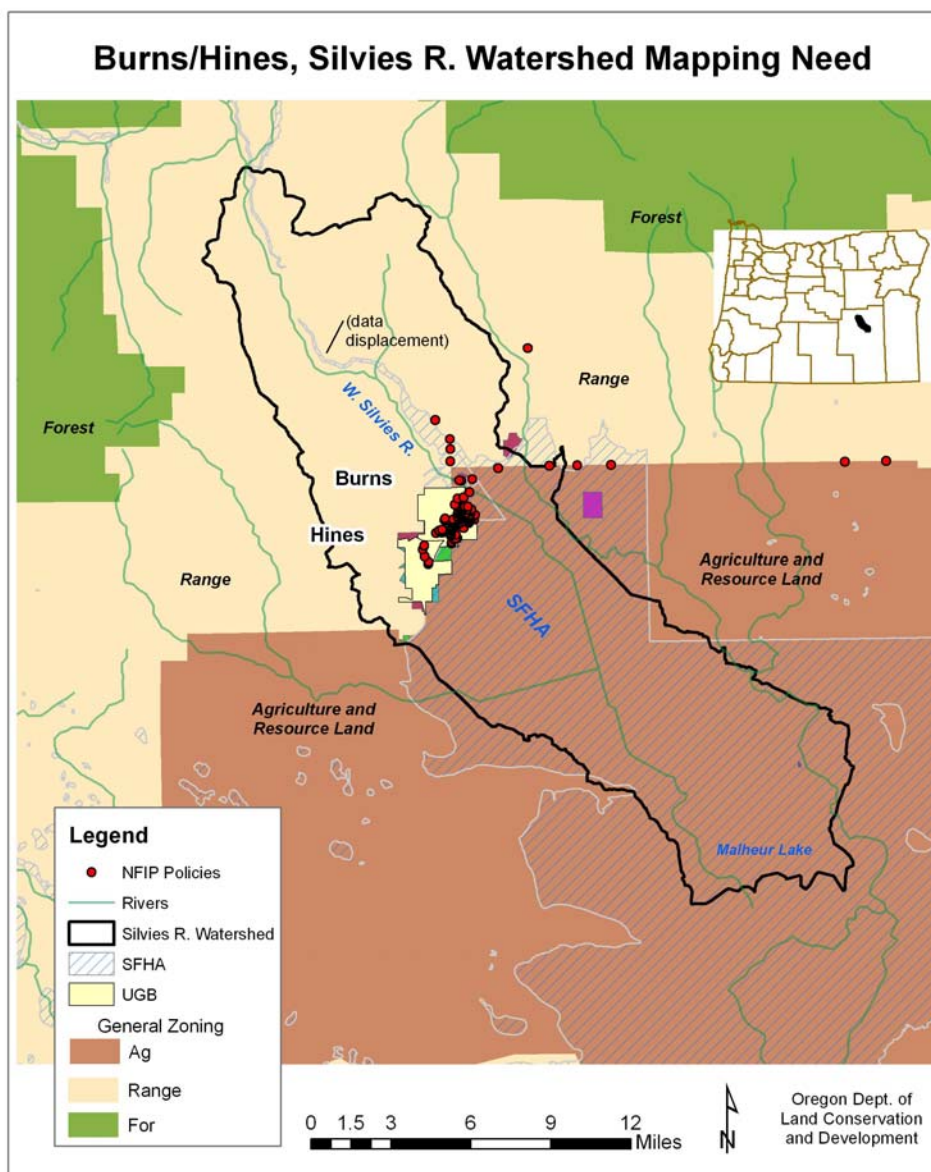
The Hood River valley has had significant development pressure, and current maps do not adequately reflect land use changes. A primary issue is the lack of land that can be developed, and what does coincide with potential flood hazards. The inability to clearly demonstrate flood hazards is a factor in approximately one-third of development projects.

From Hood River’s Mitigation Plan: “Historically, flooding occurs along one or more of the County’s waterways every few years, suggesting a **high probability of occurrence**. Because of the relative land area and population affected, the County is exposed to **moderate vulnerability**. The frequency of flooding, the potential for simultaneous flooding events, plus the historical record of recurrent flooding and cumulative costs, all suggest the assignment of a *moderate risk rating*.”



#### **4) Burns-Hines**

These adjacent communities border the large Malheur Lake/marsh region with the conjunction of the W. Silvies River. The number of NFIP policies in the Urban Growth is about the highest in the state - 259 of the 269 NFIP policies in the area. The area represented is a sub-watershed of the HUC 8 as this is the concentrated area floodplain hazards with a population. This is also confirmed by the County Planner. The SFHA bisects the UGB. LiDAR is now available for this area.





## 5) Benton/Linn Counties (Corvallis/Albany area)

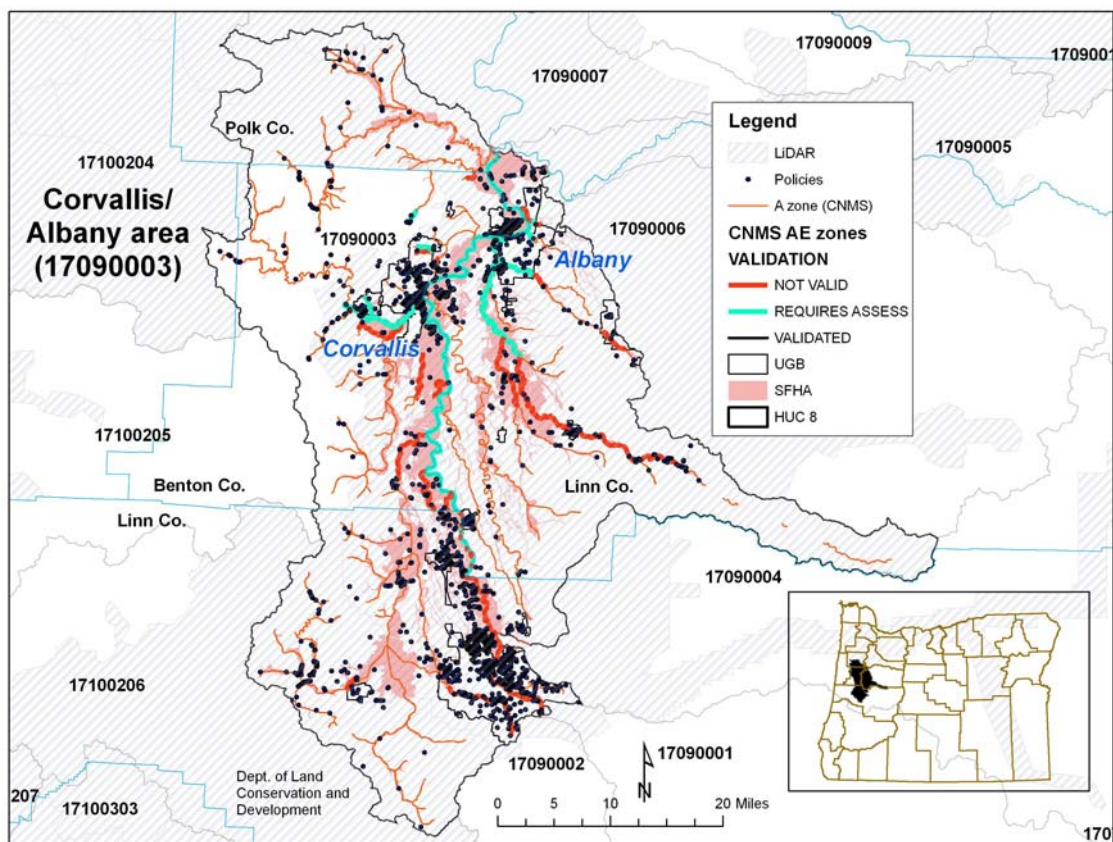
Last mapped 2008.

Justification:

-Large number of policies: 3484 policies, of which 1067 are not in any flood zone; 1420 within 100 feet of an A zone; 1161 in an AE zone; 2678 policies in UGB; and 37 policy payouts;

-High percentage of low-lying topography, especially east of the Willamette River, provides uncertainty with current elevation base; area now has almost complete LiDAR coverage.

-116 miles of AE zone are not valid, another 109 miles requires assessment; 627 are in A zone, with numerous issues in both counties with inconsistent A zone/topography.



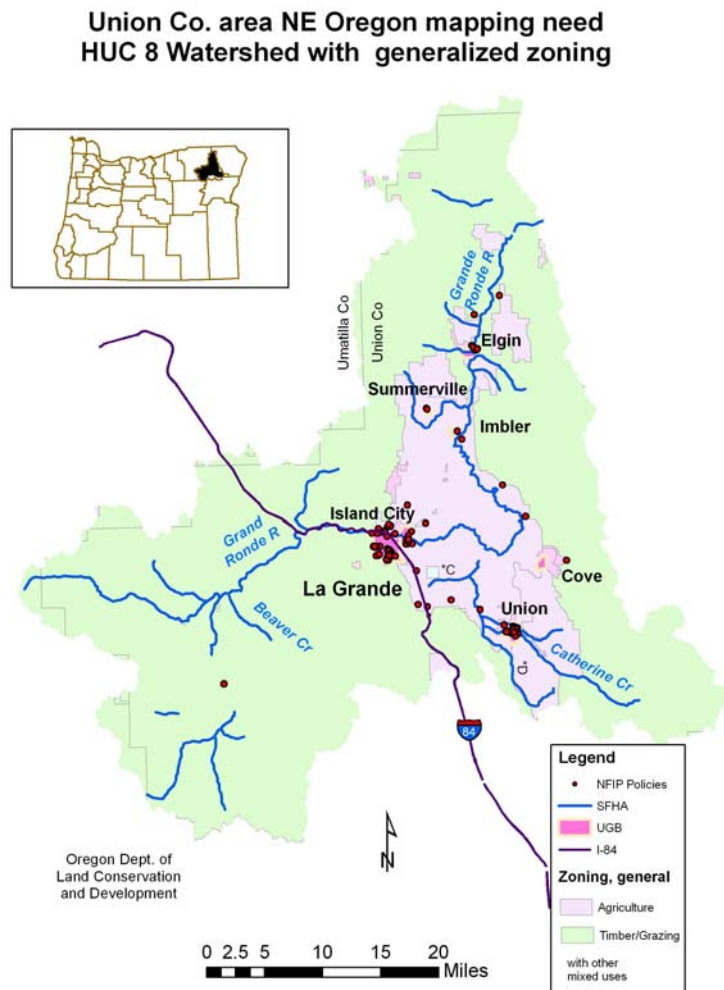
### Pre-disaster mitigation planning area 7 (NE Oregon)

A major tenant of Oregon's Risk MAP program is to align FEMA's related programs into a coherent strategy. Hazard Mitigation Plans are reviewed every 5 years, and Oregon is broken into 7 regional planning areas. Chapter 6 discusses bringing together planning and mapping into a more coordinated activity, it would be of benefit to all groups to prioritize the regional mapping.

Planning Region 7 will begin its update cycle in 2012. The project proposed here recommends placing this project high on the list in order that preliminary maps might be available to assist the planning process. The focus is on the two un-modernized areas in NE Oregon that generally trend along the growth corridor of I-84. Ideally, mapping would happen in concert with the collection of all-hazard data.

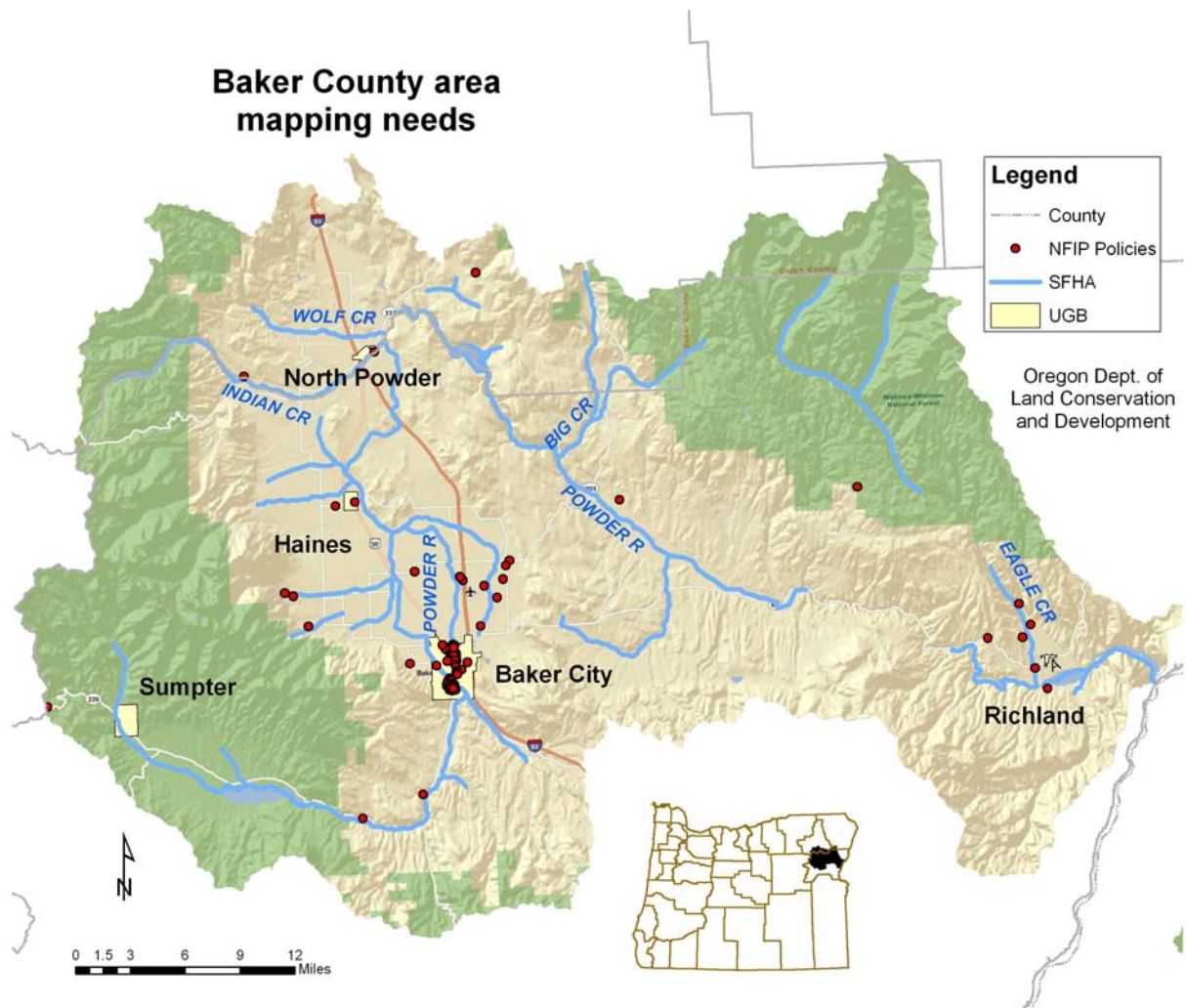
### 6) Union County area

La Grande was last mapped in 1998, but the remainder of the county's maps are the oldest effective maps in the state, created in 1980.



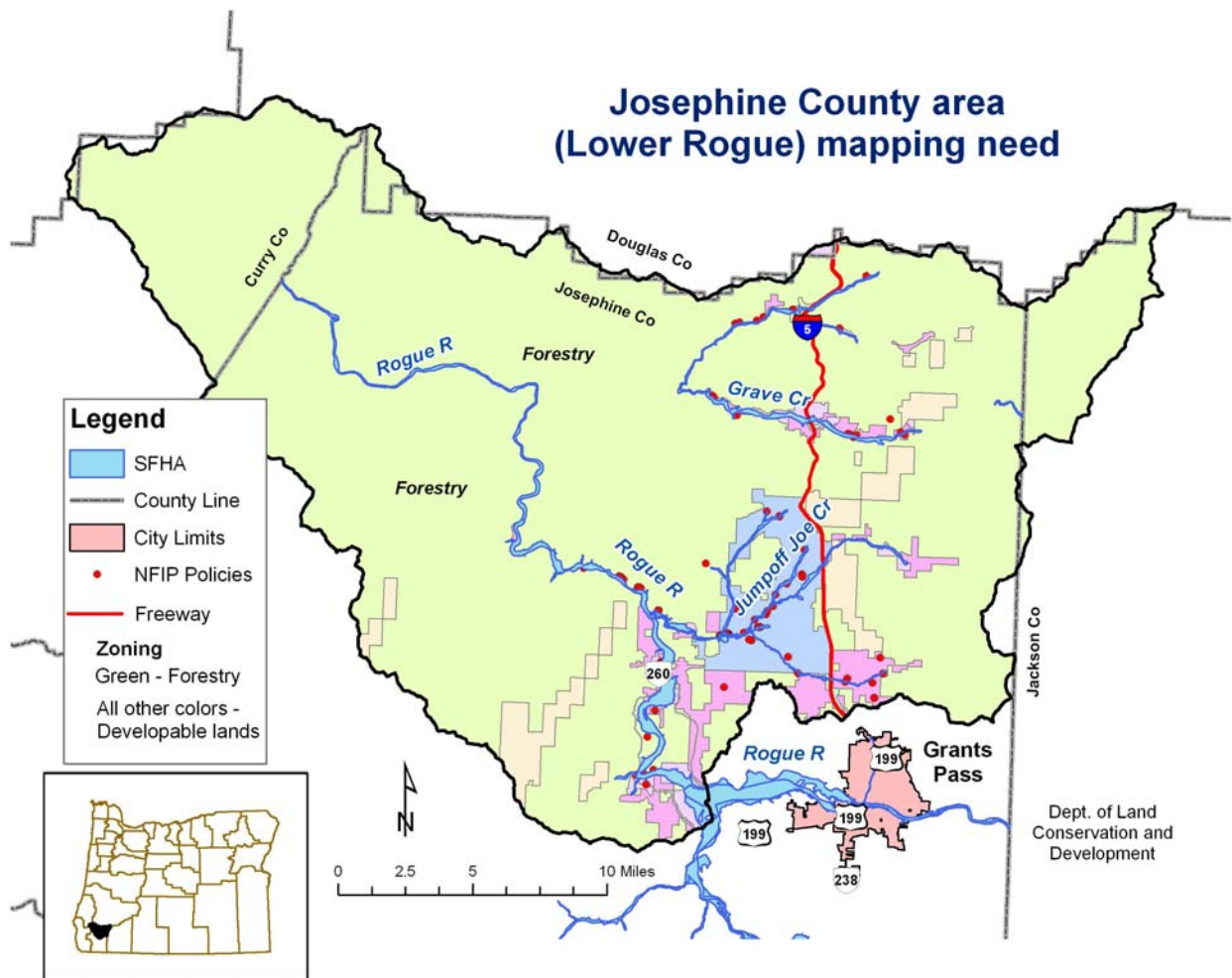
### 7) Baker County area

Baker City has high percentage of NFIP policies, some of the oldest maps in state, mapped in 1982.



### 8) Josephine County area

The area trending west and north of Grants Pass is active for housing development and other uses. As the map below demonstrates, much of the land is zoned for potential development, especially areas bordering the SFHA. The County has discussed this as a priority.

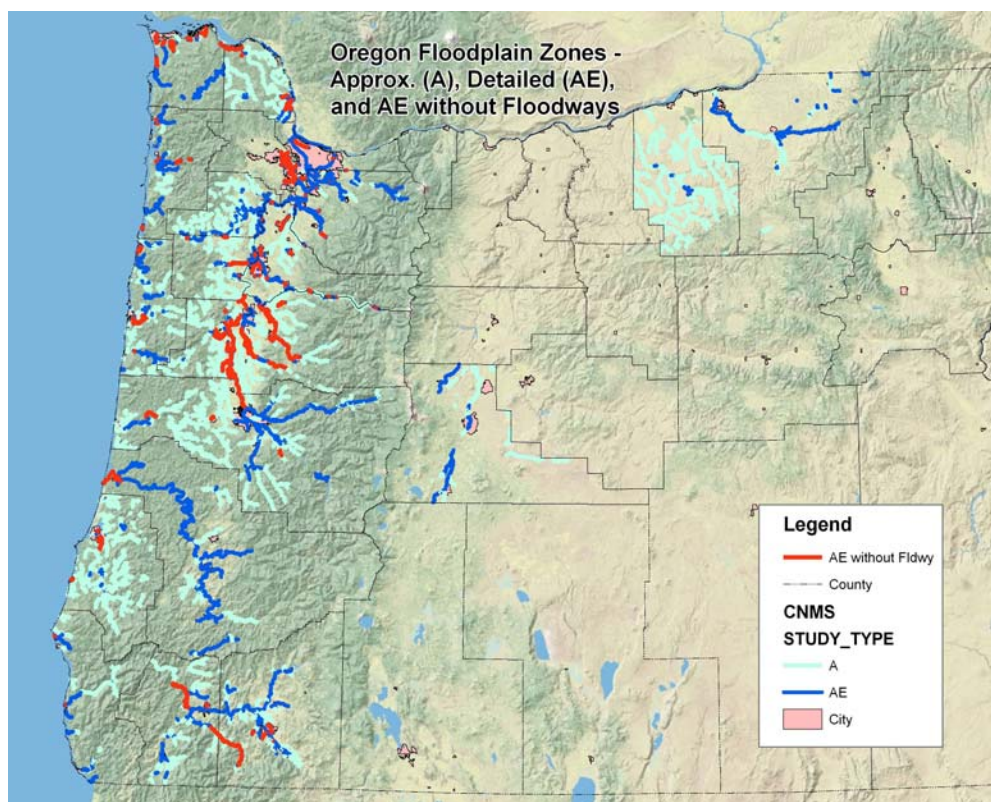




### 8.3 Potential State-wide Projects - Independent of Watershed approach

#### Detailed “AE” Zones without Floodway

Aside from areas where it doesn’t make sense to have a floodway designation (many coastal estuaries, etc.), there are approximately 136 stream miles in Western Oregon with an AE designation that doesn’t have a corresponding floodway (82% not valid, 17% requires assessment, and 1% valid; CNMS may underestimate the total stream value by about 25%). This causes difficulty with communities attempting to regulate their flood zones. The cost to systematically calculate a floodway, at least in high priority areas, may be minimal compared to the benefits for the communities. Columbia County, Ashland, and Seaside, and others have requested reviews of their floodways. If mapping AE zones with missing floodways was a possible course of action, DLCD would identify other high priorities in the state.



#### Approximate “A” Zones

As mentioned earlier, 69% (2,737 of 3,978 CNMS miles) of approximate A zones in the state are now in areas with LiDAR coverage. DLCD recommends that FEMA, DOGAMI, and DLCD investigate the costs involved with systematically remapping LiDAR approximate A areas with StreamStats. This single project, although involved, would

eliminate much ambiguity and improve the integrity of floodplain maps at a significant cost savings to a full watershed approach.

### **Readjust Q3 data**

Significant portions of Eastern Oregon's FIRMs have not been updated since they were originally mapped in the 1980s. Q3 data is available for much of this area, but its well-known spatial discrepancies make it nearly unusable for even for general planning purposes. In 2008, GEO [georeferenced and digitized the FEMA maps](#) for much of the southeastern portion of the state, using orthophotos as reference. The resulting product, while not for regulatory purposes, is far superior to the raw Q3 data and is usable for communities for planning purposes.

Seven counties in the north central part of the state remain in their original Q3 format. Some portions of that area are likely to be remapped in the next few years; other areas may not for several years. For 2011 DLCD will solicit ideas on how to fund the remapping of the remaining parts of the state to "planning" standards. LiDAR is available for portions and may be helpful.

The following are the estimates on the amount of time needed to georeference and digitize remaining Q3 areas. Estimates are by county rather than watershed:

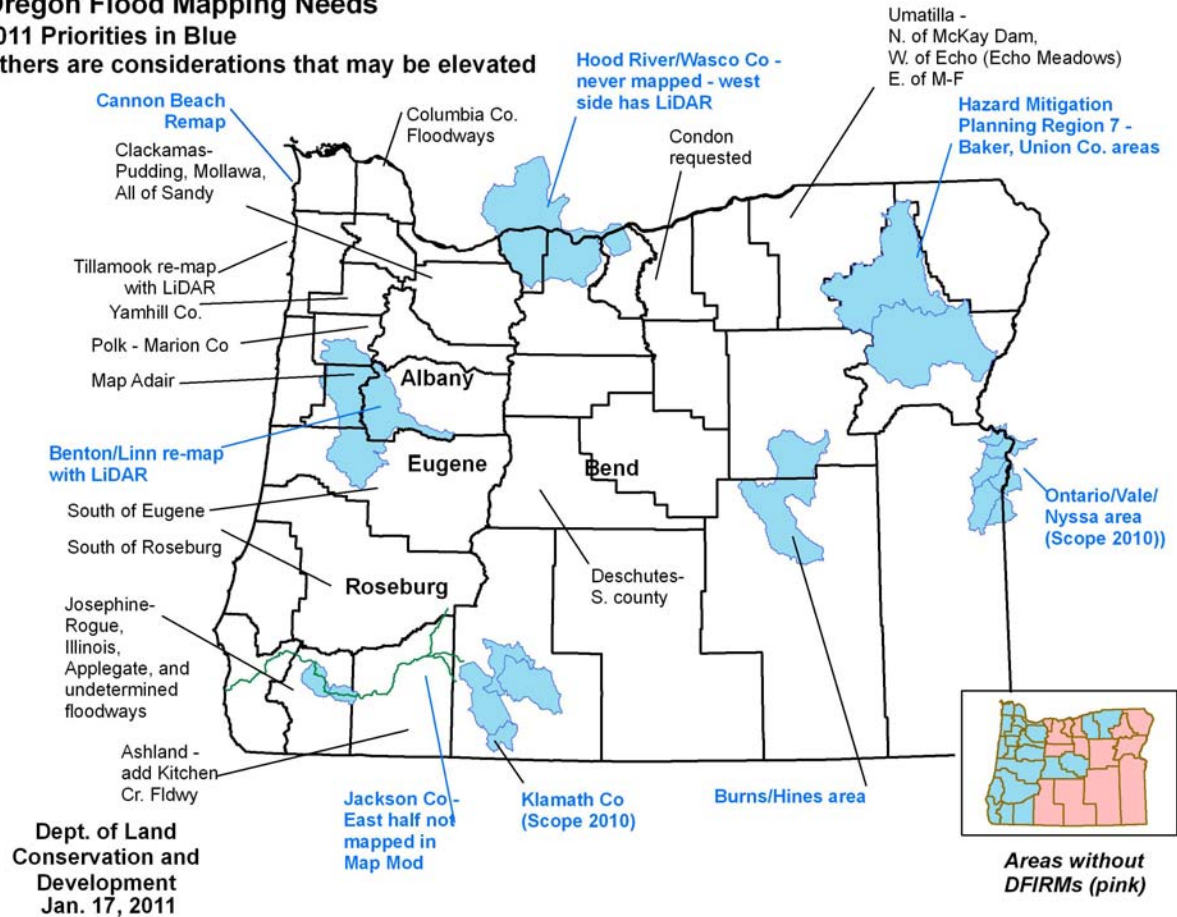
- Hood River – 1 week
- Wasco – 1.5 weeks
- Sherman – 1 week
- Gilliam – 2.5 weeks
- Wheeler – 1.5 weeks
- Jefferson – 1 week
- Wallowa – 1 week

## Summary of requested areas for mapping and/or additional consideration

### Oregon Flood Mapping Needs

#### 2011 Priorities in Blue

Others are considerations that may be elevated



## Table 1 - Summary of Proposed Mapping Projects

Project scope may be defined as either the entire HUC 8 watershed or sub-watersheds if conditions warrant.

Rank	1	2	3	4	5	6	7	8
<b>Project</b>	<b>1) Klamath</b>	<b>Ontario-Vale area</b>	<b>Hood River Wasco Co. (OR side only)</b>	<b>Burns area –</b>	<b>Benton-Linn- Lane Co. area</b>	<b>Union Co. area</b>	<b>Baker Co. area</b>	<b>Josephine</b>
<b>Primary HUC 8 Watershed</b>	Lost 18010204	Snake- Payette 17050115	M.Columbia Hood 17070105	Silvies 17120002	U.Willamette1 7090003	U. Grande Ronde 17060104	Powder 17050203	L. Rogue 17100310
<b>Partial HUC 8? (See Map)</b>	Y	Y	N	Y	N	N	N	Y
<b>Project sq miles</b>	1,249 sq mi	1,143 sq mi	1,150 sq mi	237 sq mi	1,871 sq mi	1,636 sq mi	1,707 sq mi	581 sq mi
<b>Decile</b>	6	8	5	8	2	7	6	8
<b>Map type/Last mapped</b>	Paper, 72 panels, mostly 1984	Paper, 41,for entire area, mostly 1986	Paper,72 panels, mostly 1984	Paper , 27, 1984	DFIRM, 2008	Paper, 63, most 1980, La Grande 1998	Paper, 21 panels, most 1982,	DFIRM 2009
<b>SFHA miles</b>	NA	160	264	Silvies R	850	225	272	100
<b>Watershed population</b>	53,000 (83% in UGB)	30,200 (65% in UGB)	42,300 (54% in UGB)	6,050 (85% in UGB)	387,500 (89% in UGB)	23,900 (83% in UGB)	15,200	15,900
<b>Number of towns, largest</b>	2 Klamath Falls, Chiloquim	4, Ontario, Vale, Nyssa, Adrian	7, (The Dalles, Hood River)	2 (Burns, Hines)	18 (Eugene, Corvallis, Albany)	7 (La Grande, Union)	5 (Baker City)	0 (Grants Pass near)
<b>NFIP Policies</b>	130	150	97	269	3483	185	178 (143 in Baker City)	106
<b>Disasters &lt; 20 years</b>	2	1	5	1	5	0?	0?	0?
<b>LiDAR (planned or completed)</b>	60%+; probably more needed	22%; probably more not needed	37% (west side); more needed east	30%; more probably not needed	86%; more not needed	Minimal; more needed	Minimal; more needed	100% coverage
<b>Advanced Risk Assess. Need?</b>	Possible	No	Yes	No	Yes	Possible	Possible	No



## **Appendix A**

### **DLCD/State Authorities for Floodplain Management**

#### **Risk MAP, 2011 Business Plan**

December, 2010 Appendix A

### **DLCD's Mandate for Floodplain Management – Risk MAP**

#### **ORS 197, 215, 227: Oregon Land Use Statutes**

Oregon Revised Statutes (ORS) Chapters 197, 215 and 227 address land use planning. ORS 197 requires counties and cities to develop and administer comprehensive land use plans and land use regulations. ORS 197 also establishes the Department of Land Conservation and Development (DLCD) as the state's land use planning agency. ORS 215 and 227 address county and city authorities for land use planning.

#### **OARs Chapter 660: Oregon Land Use Rules**

Chapter 660 of the Oregon Administrative Rules (OAR) contains rules for the statewide land use planning program. OAR 660-015 is the rule that adopts the statewide planning goals as the state's primary land use policies. Local comprehensive plans and land use regulations developed and administered under the above reference statutes must comply with the statewide planning goals.

#### **Goal 7: Areas Subject to Natural Disasters and Hazards**

Goal 7 (OAR 660-015-0000) is the statewide planning goal that directs local governments to address natural hazards in their local land use programs. Goal 7 addresses multiple types of natural hazards, including floods (coastal and riverine). The Goal imposes several broad requirements on local governments:

- 1) develop inventories of hazardous areas for inclusion in the local comprehensive plan;
- 2) adopt land use policies to address known areas of natural hazards;
- 3) enact land use regulations based on hazard inventories and plan policies to protect life and property from losses associated with development in hazard areas; and,
- 4) update inventories, policies, and land use regulations on a periodic basis to reflect new information and changing circumstances in the community.

Goal 7 addresses flood hazards by stating that "local governments will be deemed to comply with Goal 7 for coastal and riverine flood hazards by adopting and implementing local floodplain regulations that meet the minimum National Flood Insurance Program (NFIP) requirements. In evaluating the need for additional local policies or regulations to address flood hazards, local governments are directed to consider:

- 1) the frequency, severity and location of the hazard;
- 2) the effects of the hazard on existing and future development;
- 3) the potential for development in the hazard area to increase the frequency and severity of the hazard;
- 4) the types and intensities of land uses to be allowed in the hazard area
- 5) the need to avoid development in hazard areas where the risk to people and property cannot be mitigated; and
- 6) the need to prohibit the siting of essential facilities, major structures, hazardous facilities and special occupancy structures in identified hazard areas

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Under Goal 7, local governments are strongly encouraged to also consider a number of guidelines for natural hazards management including the following:

- 1) the benefits of maintaining hazard areas as open space, recreation and other low density uses;
  - 2) the beneficial effects that hazards can have on natural resources and the environment;
  - 3) the effects of development and mitigation measures in identified hazard areas on the management of natural resources;
  - 4) programs to manage storm water runoff as a means to help address flood and landslide hazards;
  - 5) limiting placement of fill in floodplains;
  - 6) prohibiting the storage of hazardous materials in floodplains or otherwise providing for safe storage of such materials;
  - 7) elevating structures above the elevation required by the NFIP and the state building code;
  - 8) non-regulatory approaches to natural hazard management; and
  - 9) requiring site-specific reports for development, appropriate for the level and type of hazard.
- In addition to Goal 7, statewide planning Goals 17 and 18 establish additional authority and requirements for coastal communities.

#### **Goal 17: Coastal Shorelands**

Goal 17 (OAR 660-015-0010) addresses conservation, protection, and appropriate development of Oregon's coastal shorelands. The goal also aims to reduce hazards to human life and property and adverse effects to water quality and habitats resulting from the use and enjoyment of Oregon's coastal shorelands.

#### **Goal 18: Beaches and Dunes**

The purpose of Goal 18 (OAR 660-015-0010) is conservation, protection, and where appropriate, development on or restoration of the resources and benefits of coastal beach and dune areas. The goal also addresses the need to reduce hazards to human life and property from natural or man-induced actions associated with beach and dune areas.

#### **DLCD State Coordinator Function - National Flood Insurance Program**

DLCD is the State of Oregon's designated coordinating agency for purposes of administering the NFIP in Oregon. Under a continuing agreement with the FEMA, DLCD works cooperatively with FEMA to ensure that Oregon communities remain in compliance with the NFIP and associated state requirements. DLCD provides technical assistance to Oregon communities regarding the NFIP and related floodplain management issues. DLCD also coordinates with other state agencies and programs that affect floodplain management within the state. Community participation in the NFIP requires the adoption and enforcement of a floodplain management ordinance that controls development in the floodplain.

Participation in the NFIP has been accepted by Land Conservation and Development Commission (LCDC) as sufficient to comply with Statewide Planning Goal 7 for flood hazards. (See earlier discussion under Goal 7.)

### **DLCD/LCDC Strategic Plan**

The Land Conservation and Development Commission (LCDC) adopted a strategic plan that identifies a vision, mission, goals and objectives for work by LCDC and the Department. The strategic plan is supported by a series of performance measures that address the goals and objectives laid out in the plan. The following mandates found in these documents support DLCD's proposal to pursue involvement in the FEMA map modernization initiative:

*1) Objective: Increase the percentage of environmental resources and natural hazards that are mapped, protected, and appropriately considered in buildable land inventories.*

Relation to Risk MAP: The above objective can be better achieved if updated, easy to use flood hazard maps are available to Oregon communities.

*2) Objective: Increase the efficiency and effectiveness of the department's services to citizens, local governments, and agencies.*

Relation to Risk MAP: Implementation of the state participation strategy outlined in Oregon's business plan for Risk MAP would allow for more efficient and effective service to local communities in terms of flood hazard mapping.

*3) Objective: Expand funding sources to support new initiatives and on-going efforts while maintaining baseline funding for core programs.*

Relation to Risk MAP: Implementation of the state participation strategy outlined in Oregon's business plan for Risk MAP is contingent on DLCD's ability to obtain additional federal funding to support flood hazard mapping. DLCD has stated that baseline funding for core programs, including federal funds received under FEMA's CAP-SSSE program, cannot cover the costs associated with Map Modernization. The plan also explains how Legislative and other approvals would be required before any additional federal funds could be accepted by the Department.

*4) Performance Measure: Percentage of urban areas that have updated buildable land inventories to account for natural resource and hazard areas.*

Relation to Risk MAP: Buildable lands inventories adopted by Oregon communities could more accurately account for hazard areas if updated, easy to use flood hazard maps were available.

*5) Performance Measure: Percentage of state agencies with programs affecting land use that have agreed with DLCD on a process to align strategic goals, objectives, performance measures and agency projects.*

Relation to Risk MAP: Efforts with other state agency programs.

*6) Performance Measure: Number of stakeholder groups, including state, local, and tribal governments, who actively participate in workgroups that advise LCDC or DLCD on policy, operations or projects.*

Relation to Risk MAP: The state participation strategy outlined in Oregon's business plan for Risk MAP accounts for continuing stakeholder involvement in the Risk MAP process.

## **Other State Authorities for Floodplain Management**

### **Building Codes Division (BCD) State Building Codes**

The Oregon Building Codes Division (BCD) adopts statewide standards for building construction that are administered by the state and local municipalities throughout Oregon. The One and Two- Family Dwelling, Structural Specialty, and Manufactured Dwelling codes contain requirements to elevate a building at least one foot above base flood elevations as shown on FEMA maps. These building codes also contain provisions for flood proofing, underfloor drainage, and directing stormwater away from buildings. ORS 455.447 and the State Structural Code also establish restrictions on the location of essential facilities in tsunami inundation zones along the coast subject to flooding following an earthquake. Essential facilities include hospitals, fire and police stations, emergency response facilities, and special occupancy structures, such as large schools.

### **Office of Emergency Management (OEM) Hazard Mitigation**

“The purpose of Oregon Emergency Management (OEM) is to execute the Governor's responsibilities to maintain an emergency services system as prescribed in ORS 401 by planning, preparing and providing for the prevention, mitigation and management of emergencies or disasters that present a threat to the lives and property of citizens and visitors to the State of Oregon.” OEM coordinates and facilitates emergency planning, preparedness, response and recovery activities with the state as well as local emergency services agencies and organizations.

OEM directs the work of the Interagency Hazard Mitigation Team, of which DLCD is a member. The full membership of the IHMT is listed below:

- Governor’s Natural Resources Office
- Department of Administrative Services, Risk Management Division
- Department of Agriculture
- DCBS - Building Codes Division
- DCBS - Insurance Division
- Economic and Community Development Department
- Department of Environmental Quality
- Department of Fish and Wildlife
- Department of Forestry
- Department of Geology and Mineral Industries
- **Department of Land Conservation and Development**
- Division of State Lands
- Oregon State Police, Office of Emergency Management
- Oregon State Police, Office of State Fire Marshal
- Public Utility Commission

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- Department of Transportation
- Water Resources Department

The IHMT mission is to understand losses arising from natural hazards and to recommend strategies to mitigate loss of life, property, and natural resources. Support for hazard mitigation and education are key goals for the IHMT. One way that the IHMT has worked towards this mission has been through development of the *State of Oregon Hazard Mitigation Plan*.

## **Department of Environmental Quality – 401 Water Quality Certification Program**

The Oregon Department of Environmental Quality (DEQ) is responsible for water quality certification under section 401(a) of the federal Clean Water Act. This certification is required as part of the federal wetlands permitting process (e.g. U.S. Army Corps of Engineers, Section 404 of Clean Water Act). DEQ also participates in the DSL Removal and Fill permit process described above.

**Division of State Lands (DSL) Removal and Fill Program**

Oregon's Removal-Fill Law (ORS 196.800-990) requires individuals who remove or fill 50 cubic yards or more in "waters of the state" to obtain a permit from the DSL. "Waters of the state" are defined as "natural waterways including all tidal and non-tidal bays, intermittent streams, constantly flowing streams, lakes, wetlands and other bodies of water in this state, navigable and non-navigable, including that portion of the Pacific Ocean which is in the boundaries of this state." In State Scenic Waterways or areas designated by DSL as essential indigenous anadromous salmonid habitat, most removal fill activities require a permit, regardless of the number of cubic yards affected.