

9.4 Planning Process

9.4.8 LCDC and DOGAMI Governing Board Joint Meeting, September 2013



Meeting Notice

Land Conservation and Development Commission



Meeting:

Thursday, September 26, 2013

8:30 a.m.

Land Conservation & Development
Agriculture Building
Basement Hearing Room
635 Capitol Street
Salem, OR 97301

BAM Subcommittee:

Thursday, September 26, 2013

11:30 a.m.

Land Conservation & Development
Agriculture Building
First Floor Conference Room
635 Capitol Street
Salem, OR 97301

Meeting:

Friday, September 27, 2013

8:30 a.m.

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Thursday, September 26, 2013, 8:30 AM – Basement Hearing Room

Item 1 Approve Agenda

Item 2 Public Comment

This part of the agenda is for comments on topics not scheduled elsewhere on the agenda. The chair may set time limits (usually three minutes) for individual speakers. The maximum time for all public comments under this agenda item will be limited to 30 minutes. If you bring written summaries or other materials to the meeting please provide the commission assistant with 20 copies prior to your testimony. The commission is unable to take action, at this meeting, on items brought to their attention in this forum.

Item 3 Director's Report

The commission will receive an update by the director on recent matters concerning the department.

Jim Rue, Director

Public Testimony

Briefing

Item 4 Performance Evaluation of the DLCD Director

The Director's Performance Evaluation Subcommittee will report to the commission on the recommended criteria and process to be used for the evaluation of the director, as well as the schedule for the evaluation process.

Carrie MacLaren, Deputy Director

Public Testimony

Action

Item 5 Oregon Department of Forestry Presentation

The commission will receive an update from the Oregon Department of Forestry on the state of forests in Oregon. Included will be a discussion of land use change, impacts of climate change and issues of concern.

Katherine Daniels, Farm & Forest Specialist

Public Testimony

Briefing from ODF

Item 6 Amendments to Oregon Administrative Rule chapter 660, division 18

The commission will consider adoption of rule amendments to OAR chapter 660, division 18, Post-acknowledgment Plan Amendments, to allow electronic submittal of notices regarding proposed and adopted changes to comprehensive plans and implementing regulations.

Rob Hallyburton, Community Services Division Manager

Public Testimony

Action

Item 7 City of Portland Periodic Review

The commission will hear an appeal of the director’s approval of the City of Portland’s Periodic Review Task 2 submittal consisting of several amendments to the city’s comprehensive plan inventories and analyses. The specific amendment subject to this appeal is the Economic Opportunities Analysis inventory and analysis of employment land supply and need.

Anne Debbaut, Metro-area Regional Representative

Public Testimony

Hearing/Action

11:30 AM – First Floor Conference Room

Budget and Management Subcommittee

The subcommittee will discuss the department’s current budget information. The subcommittee will report to the full commission during the commission meeting.

Teddy Leland, Administrative Services Manager

No Public Testimony

Briefing

Noon – Joint LCDC & DOGAMI Lunch

1:00 PM – Basement Hearing Room – LCDC & DOGAMI Joint Meeting

The Governing Board of the Department of Geology and Mineral Industries (DOGAMI) will meet jointly with Land Conservation and Development Commission (LCDC) to increase mutual understanding of the two departments, to receive presentations on areas of overlap, and to consider increased collaboration. Staff presentations will cover four specific topics:

1. Tsunami Hazards
 - George Priest, DOGAMI Geologist
 - Matt Spangler, DLCD Senior Coastal Policy Analyst
 - Steve Lucker, DLCD Natural Hazards Mapping Specialist
2. Floodplains
 - Jed Roberts, DOGAMI Flood Mapping Coordinator
 - Chris Shirley, DLCD National Flood Insurance Program Coordinator
3. State and Local Hazard Mitigation Plans
 - Rachel Smith, DOGAMI Project Operations Manager
 - Marian Lahav, DLCD Natural Hazards Planner
4. Landslide Hazards
 - Bill Burns, DOGAMI Engineering Geologist
 - Steve Lucker, DLCD Natural Hazards Mapping Specialist

No Public Testimony

Briefing

Friday, September 27, 2013, 8:30 AM – Basement Hearing Room

Item 8 Business Oregon, Impacts of SB 246 & 253

Paul Grove, government relations manager for the Oregon Business Development Department (dba Business Oregon), will present a briefing regarding the status and impact of this legislation.

Tom Hogue, Economic Development Policy Analyst

Public Testimony

Briefing from Business Oregon

Item 9 City of Damascus Comprehensive Plan

The commission will consider appropriate actions to respond to the failure by City of Damascus to comply with the commission's enforcement order 13-CONT-COMPLY-001828.

Jennifer Donnelly, Metro-area Regional Representative

Public Testimony

Action

Item 10 CIAC/LCDC Joint Meeting

Bob Rindy, Policy Analyst

Public Testimony

Briefing

Item 11 LOAC/LCDC Joint Meeting

Amie Abbott, Commission Assistant

Public Testimony

Briefing

Item 12 Initiate HB 2254 Rulemaking/Appoint Rule Advisory Committee

The commission will begin the administrative rule process required by legislation enacted in the 2013 session. HB 2254 requires LCDC to adopt rules with 18 months in order to establish an optional streamlined urban growth boundary amendment process. This item will include appointment of a rules advisory committee.

Bob Rindy, Policy Analyst

Public Testimony

Briefing/Action

Item 13 Policy Agenda

This is the second meeting for LCDC to consider and adopt its policy agenda (including a list of anticipated rulemaking for the 2013-15 biennium).

Bob Rindy, Policy Analyst

Public Testimony

Briefing/Action

Item 14 Commission Business

The commission will receive an update on the Budget and Management Subcommittee. The commission will consider the appointment of Mary Stern to the LOAC.

Leland, Administrative Services Manager

Public Testimony

Action

Item 15 Other

The commission reserves this time, if needed, for other business.

Oregon's seven-member Land Conservation and development Commission, assisted by the Department of Land Conservation and Development, adopts state land use goals, assures local plan compliance with the goals, coordinates state and local planning and manages the coastal zone program. Commissioners are unpaid citizen volunteers appointed by the governor and confirmed by the senate. Commissioners are appointed to four-year terms and may not serve for more than two consecutive terms. The statute establishing the commission, ORS chapter 197, also directs that members be representative of the state. The commission meets approximately every six weeks to direct the work of the department.

Current Commissioners:

Bart Eberwein (Portland)
Tim Josi (Tillamook)
Jerry Lidz (Eugene)
Sherman Lamb (Talent)

Greg Macpherson, Vice-chair (Lake Oswego)
Marilyn Worrix, Chair (McMinnville)
Catherine Morrow (Bend)

The meeting location is accessible to persons with disabilities. To request an interpreter for the hearing impaired or for other accommodations for persons with disabilities, please make requests at least 48 hours before the meeting to Amie Abbott at (503) 934-0045, amie.abbott@state.or.us, or by TTY: Oregon Relay Services (800) 735-2900.

Public Testimony:

The commission places great value on testimony from the public. Those items on the agenda indicated for public testimony are the topics where public comment will be accepted.

People who wish to testify are requested to:

- Complete a Testimony Sign Up Form provided at the meeting handout table;
- Provide a written summary two weeks in advance of the meeting to amie.abbott@state.or.us. If you are unable to supply materials in advance, please bring 20 copies to the meeting for distribution to the commission, staff and members of the public;
- Recognize that substance, not length, determines the value of testimony;
- Endorse, rather than repeat, testimony of other witnesses with whom you agree.

Because of the uncertain length of time needed, the commission may address an item at any time in the meeting. Anyone wishing to be heard on an item without a set time should arrive when the meeting begins to avoid missing an item of interest. Topics not on the agenda may be introduced and discussed during the Director's Report, commission Business and Reports or Other.



Oregon

John A. Kitzhaber, M.D., Governor

Department of Land Conservation and Development

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www.oregon.gov/LCD



TO: Land Conservation and Development Commission
FROM: Jim Rue, Director
SUBJECT: **Joint LCDC/DOGAMI Meeting, September 26, 2013**

I. Introduction

The Governing Board of the Department of Geology and Mineral Industries (DOGAMI) will meet jointly with Land Conservation and Development Commission (LCDC) to increase mutual understanding of the two departments, to receive presentations on areas of overlap, and to consider increased collaboration. Staff presentations will cover four specific topics:

1. Tsunami Hazards
2. Floodplains
3. State and Local Hazard Mitigation Plans
4. Landslide Hazards

This staff report includes an overview of DOGAMI, a description of the relationship between the two departments, outlines of the four presentations, and information about additional areas of overlap. Background reports are attached for each of the four presentations.

II. Overview of DOGAMI

Mission: To provide earth science information and regulation to make Oregon safe and prosperous.

DOGAMI produces geologic information including maps and reports that are used to understand natural hazards and regulate mining.

A. Natural hazards

DOGAMI helps Oregonians understand and prepare for earthquakes, tsunamis, coastal erosion, landslides, floods, and other geologic hazards. The goal is to reduce risk, damage and loss by acquiring and organizing comprehensive descriptions of natural hazards throughout the state of Oregon.

B. Regulation

DOGAMI is the lead regulator for mining including oil, gas, geothermal energy, metals, industrial minerals, sand, gravel, and crushed stone. Regulations are based on consideration of a wide range of issues including environment, reclamation, conservation, economics, engineering,

and technical issues. The goal is to prudently regulate mining activities to protect the environment and people of Oregon.

C. Funding

DOGAMI receives a relatively small amount of general funds (roughly \$2.5 million) and relies primarily on grants and contracts to conduct geologic studies. Over the 2011-2013 biennium, DOGAMI received approximately \$3.8 million from federal, state and local partners to fund LIDAR acquisition. In addition, it received 22 federal grants totaling approximately \$4.9 million, and 20 other contracts totaling approximately \$1.5 million.

D. Additional information

The DOGAMI Strategic Plan provides a good overview of these missions:
www.oregongeology.org/sub/pub&data/dogami-stratplan-2009-2015.pdf

Additional information is online at:
www.oregon.gov/dogami
www.oregongeology.org

III. Relationship, Roles and Responsibilities

The diagram below shows a general overview of how state agencies fit together in the hazard mitigation process. It cannot capture all the complexities of individual projects, but is at least a starting point to discuss the relationship. This diagram is primarily describing the process for local governments in Oregon, but would apply to some degree to other entities involved in hazard mitigation (e.g. tribes, state agencies, utilities, non-profits or businesses). The table along the bottom of the diagram shows three broad stages (science, planning and implementation) and lists specific steps in the process.



DOGAMI plays a large role in the science stage gathering physical data and modeling the natural processes that can lead to disasters. This data suggests potential actions that could mitigate the risk, and is used to evaluate the alternatives, so DOGAMI plays a role in the planning stage too.

DLCD plays a fairly small role in the science stage (e.g. requesting data). DLCD plays a large role in the planning stage. Many potential mitigation actions involve land use decisions. Evaluating the alternatives involves weighing many factors that are covered in the local

comprehensive plan (e.g. housing, economic development, transportation, public services, natural resources). The decisions about which alternatives to pursue are often made in the context of an amendment to the comprehensive plan, an amendment to development regulations, or a stand-alone hazard mitigation plan. DLCD may play a smaller role in the implementation (e.g. commenting on the review of individual developments within a floodplain). DLCD also provides significant technical assistance to local governments especially in the coastal zone. Technical assistance addresses coastal erosion (i.e. Neskowin), shoreline stabilization issues on the coast, advice on planning for tsunamis, and special projects addressing community resiliency.

The Oregon Office of Emergency Management (OEM) plays a large role in implementation because they are the primary conduit for federal money to take actions that mitigate risks (e.g. purchase and demolish buildings in the floodplain, elevate buildings above expected flood levels). OEM also plays an important role in earlier steps because the federal requirements for what can be funded shape all of the decisions. More information is online at:

www.oregon.gov/OMD/OEM

The Oregon Partnership for Disaster Resilience (OPDR) is part of the Community Service Center at the University of Oregon. OPDR uses students in a service learning model to prepare hazard mitigation plans for local governments. More information is online at:

csc.uoregon.edu/opdr

Local governments are the central player in the hazard mitigation process; however their involvement can vary over the steps. Local governments generally lack the expertise to identify and map hazards, although they may have important information about historic disasters. Local governments are often uniquely situated to identify vulnerabilities, both physical assets that in hazardous areas and the socio-economic vulnerabilities of a community. Identifying potential mitigation actions will involve local knowledge of what is feasible, but also bringing in innovations from other communities. Evaluating the alternatives will also be a mix of local information with technical analysis of the costs and effectiveness. Making the decisions is where the local government plays the largest role. Implementation depends on continued attention by the local government, but almost always depends on money from outside sources.

IV. Presentation Outlines

A. Tsunamis

Presentation by

George Priest (DOGAMI Geologist)

Matt Spangler (DLCD Senior Coastal Policy Analyst)

Steve Lucker (DLCD Natural Hazards Mapping Specialist)

1. ORS 455.446 (SB 379) Line

ORS 455.446 requires DOGAMI to establish a regulatory line and specifies uses that are not permitted below the line. DOGAMI's board may be re-evaluating the line to determine if it should be moved given new data about potential tsunami sizes.

2. Inundation Mapping

DOGAMI has just completed new tsunami inundation maps for the entire Oregon coast showing inundation zones that are much larger than on prior maps due to improved information about Cascadia megathrust earthquakes that have occurred over the past 10,000 years.

3. Tsunami Planning Manual

DLCD is developing guidance for local governments planning for areas potentially affected by tsunamis as shown on the new DOGAMI tsunami inundation maps.

4. Oregon Resilience Plan

The 2011 legislature directed the Oregon Seismic Safety Policy Advisory Commission (OSSPAC) to prepare a plan “that reviews policy options, summarizes relevant reports and studies by state agencies, and makes recommendations on policy direction to protect lives and keep commerce flowing during and after a Cascadia earthquake and tsunami.” Staff from both DOGAMI and DLCD participated in the process. The plan was submitted to the 2013 legislature, and the result was Senate Bill 33 which creates the Task Force on Resilience Plan Implementation. The task force is directed to report by October 2014 on “a comprehensive and robust plan to implement the strategic vision and roadmap of the Oregon Resilience Plan.”

B. Floodplains

Presentation by

Jed Roberts (DOGAMI Flood Mapping Coordinator)

Chris Shirley (DLCD National Flood Insurance Program Coordinator)

1. National Flood Insurance Program (NFIP)

1. What is the NFIP?

The NFIP provides flood insurance to individual property owners in communities that choose to participate. To participate, a community must adopt development regulations for floodplain that reduce the risk and meet NFIP standards.

2. DLCD Role as State Floodplain Coordinator

DLCD has been designated by the NFIP to help local communities participate in the NFIP. Duties include: 1) Technical support & training; 2) Floodplain mapping assistance; 3) Compliance monitoring; 4) Post-flood support.

3. Endangered Species Act (ESA)

Floodplains are near rivers, which means that development in floodplains could affect endangered salmon species. The NFIP is consulting with the National Marine Fisheries Service to determine how to avoid negative effects.

4. Base Flood Elevation (BFE) Determinations

In many rural areas, the extent of potential flooding has been mapped, but the potential level of the floodwater has not been determined. DOGAMI has developed methods to determine these elevations, and the two departments are exploring ways to implement these methods.

2. Floodplain Mapping and RiskMAP

5. Discovery Process

This process involves local governments in decisions about the need for new floodplain maps.

6. Flood Insurance Study

These studies can be very detailed or more approximate depending on the needs identified in the discovery process. The result is a new floodplain map that is adopted by the local government.

7. Mitigation Planning

New floodplain maps can also be used to identify potential mitigation actions.

8. Ongoing Coordination

The two departments are working together on a statewide database of floodplain mapping data.

C. State and Local Hazard Mitigation Planning

Presentation by

Rachel Smith (DOGAMI Project Operations Manager)

Marian Lahav (DLCD Natural Hazards Planner)

1. Background

The federal government requires state and local government to have a hazard mitigation plan in order to receive certain federal funds. The state plan must be updated every three years, and DLCD is coordinating the process to adopt an updated plan in 2015. Individual sections are written by staff at state agencies that participate in the Inter-agency Hazard Mitigation Team (IHMT).

2. Plan Approval Process

Once the IHMT has accepted the updated plan, it will be reviewed by the Federal Emergency Management Agency (FEMA). With FEMA approval, the governor adopts the plan.

D. Landslide Hazards

Presentation by

Bill Burns (DOGAMI Engineering Geologist)

Steve Lucker (DLCD Natural Hazards Mapping Specialist)

1. Background

Landslides are a significant natural hazard throughout Oregon. Recently DOGAMI did a detailed study the risks of landslides in Clackamas County.

2. DOGAMI's Role

DOGMAI developed a protocol to use lidar data to inventory historic landslides and identify areas susceptible to future landslides.

3. DLCD's Role

Statewide Planning Goal 7 provides a mechanism for DLCD to require local governments to respond to new data hazards. DLCD also plays a role helping local governments determine how to respond to the new data. In Clackamas County, DLCD and DOGAMI will develop a model code that cities can use to regulate develop in landslide areas.

V. Other Overlapping Areas

A. Coastal Erosion

1. Technical Assistance:

DLCD has a full-time Coastal Shores Specialist (Laren Woolley) who works closely with state agency partners including DOGAMI to help coastal communities address coastal processes and hazards as part of their comprehensive land use plans and implementing ordinances. Coastal staff provides technical support to local governments in such things as assessing development proposals and other land use decisions involving hazard areas, and planning for areas affected by coastal hazards consistent with statewide planning goals.

2. DOGAMI Coastal Analyses

Coastal staff works with DOGAMI staff (Jonathan Allen) to develop coastal hazard products such as dune and bluff coastal hazard maps, tsunami hazard mapping, and sediment loss and transport analysis. Many of these have been funded through NOAA Coastal Zone Management grants that DLCD receives.

B. Coastal Hazards and Processes Working Group (CPHWG)

DLCD and DOGAMI co-chair the Coastal Hazards and Processes Working Group, whose members include staff from OPRD, DOGAMI, and DLCD; consulting geologist practitioners; local land use planners; and academic and environmental organizations. The CHPWG meets at least annually to exchange information about coastal processes and hazards, provide input to state agencies, and to assist in developing tools to address coastal hazard risks.

C. Mining Regulations

DOGAMI and DLCD have overlapping activities regulating mining, especially aggregate mining that is subject to Goal 5.

VI. ATTACHMENTS

1. "Tsunami Hazards" background report
2. "Floodplains" background report
3. "State and Local Hazard Mitigation" background report
4. "Landslide Hazards" background report



Tsunami Hazards

Coastal Hazard Presentation Handout LCDC/DOGAMI Governing Board Meeting September 26, 2013

ORS 455.446 (SB 379) line

The DOGAMI Governing Board is required by ORS 455.446 to determine the tsunami inundation zone which is used to determine building code requirements. These statutes were enacted in 1995 as a result of Oregon Senate Bill 379; the regulatory maps are thus sometimes referred to as “SB 379 maps.”

These regulatory maps are not intended for emergency evacuation purposes and do not necessarily represent tsunami inundation from a worst-case event. Rather, the maps show the best estimate of tsunami inundation from a typical or most likely tsunami originating from earthquakes on the [Cascadia subduction zone fault](#) (located on the seafloor near the Oregon coast). The regulatory maps are based on scientific knowledge available in 1995.

ORS 455.446(1) (a) provides that certain types of new buildings may not be constructed within the tsunami inundation zone:

- Hospitals and other medical facilities having surgery and emergency treatment areas (ORS 455.447(1)(a)(A))
- Fire and police stations (ORS 455.447(1)(a)(B))
- Communication centers and other facilities required for emergency response (ORS 455.447(1)(a)(G))
- Schools with a capacity greater than 50 persons, including public, private or parochial through secondary level and including child care centers (ORS 455.447(1)(e)(B))
- Colleges or adult education schools with a capacity greater than 500 persons (ORS 455.447(1)(e)(C))
- Jails and detention facilities (ORS 455.447(1)(e)(E))

ORS 455.447(4) requires a consultation process with DOGAMI for certain other types of new buildings that are proposed within the tsunami inundation zone:

- Structures and equipment in emergency-preparedness centers (ORS 455.447(1)(a)(E))
- Hazardous facilities, meaning structures housing, supporting or containing sufficient quantities of toxic or explosive substances to be of danger to the safety of the public if released (ORS 455.447(1)(b))
- Major structures, meaning buildings over six stories in height with an aggregate floor area of 60,000 square feet or more, every building over 10 stories in height and parking structures (ORS 455.447(1)(b))
- Public assembly structures with a capacity greater than 300 persons (ORS 455.447(1)(e)(A))
- Medical facilities with 50 or more resident, incapacitated patients (ORS 455.447(1)(e)(D))
- All structures with a capacity greater than 5,000 persons (ORS 455.447(1)(e)(F))

ORS 455.446 – .447 do not apply to existing buildings, “fire or police stations where there is a need for strategic location,” or where “there is a need for the school to be within the boundaries of a school district.” ORS 455.446 also includes a process for the DOGAMI governing board to grant other exceptions.

In 2009-2010, DOGAMI led two pilot projects aimed at development of a robust, scientifically defensible approach to tsunami inundation mapping for the Oregon coast. Both projects sought to calibrate the latest theoretical tsunami and fault rupture models to available geophysical and geological data with emphasis on offshore and onshore geologic “footprints” of past Cascadia subduction zone (CSZ) earthquakes and tsunamis – the most catastrophic natural hazard facing the Oregon coast.

The first project, led by Dr. George Priest, focused on Cannon Beach where there is a good record ancient tsunami deposits in the Ecola Creek marsh. Dr. Rob Witter mapped the deposits utilizing punch cores thus establishing minimum inundation for Cascadia tsunamis over the last few thousand years. In addition, Dr. Chris Goldfinger of OSU made available a geologic record of CSZ earthquakes gleaned from deposits of sand and silt shaken onto the ocean floor over the last 10,000 years, the relative thickness of each apparently correlating with relative earthquake size. The length of time between these deposits gave another clue about how long the CSZ built up strain before releasing it as fault slip during great earthquakes.

Dr. Kelin Wang of the Canadian Geological Survey, a leading expert on subduction zone fault modeling, produced hypothetical CSZ earthquake deformations that fit these geologic data as well as a wealth of new data on the temperature and shape of the subduction zone. Results of the first pilot project were summarized in DOGAMI Special Paper 41, which made clear that the

10,000-year geologic record is consistent with much wider range of CSZ earthquake and tsunami sizes than was considered in earlier work by DOGAMI and other scientists.

The March 11, 2011 Japanese earthquake is a reminder that ignorance of the full geologic record of local tsunami and earthquake size can lead to disastrous underestimation of the hazard. The second project, led by Dr. Witter, centered on the Bandon area where Bradley Lake held a 7,300-year record of CSZ tsunami deposits. Again, minimum offshore slip to get these deposits into the lake provided another test of the minimum size CSZ tsunami sources but now in southern Oregon where the geology is quite different from Cannon Beach. After both projects were completed, Dr. Witter and coauthors summarized findings in DOGAMI Special Paper 43, which laid out a series of CSZ, and maximum-considered distant tsunami scenarios appropriate for tsunami inundation mapping of the Oregon Coast.

CSZ scenarios finally selected for depiction on published tsunami inundation maps (TIM's) were labeled with "T-shirt" sizes S, M, L, XL, and XXL. The two maximum considered distant tsunami scenarios shown on TIM's are a historical maximum that occurred in 1964 (AK64) and a hypothetical maximum (AKMax) with higher uplift and more efficient focusing of tsunami energy at the Oregon coast than in 1964.

Tsunami evacuation maps depict a maximum considered distant tsunami inundation zone (AKMax) and a local tsunami evacuation zone (XXL). Final hydrodynamic simulations of the seven tsunami scenarios by Dr. Y. Joseph Zhang of OHSU (now of Virginia Tech) benefited greatly from the DOGAMI-led acquisition of lidar for the entire Oregon coast. Dr. Zhang's tsunami model, SELFE, unlike most other models is able to vary smoothly its computational grid size to take advantage of these detailed lidar data where they depict features like jetties and breakwaters that are critical tsunami controls. The result is state-of-art tsunami inundation maps and accompanying digital data that can be used for emergency management, land use planning, and engineering.

Due to these changes, the DOGAMI convened an advisory committee to review the current science and to recommend what, if any, changes needed to be made to the SB 379 line. The committee concluded that given changes in the science of tsunami inundation modeling and lidar-derived elevation maps, the current SB 379 line and maps no longer meet the needs of coastal communities and should be replaced. In addition, the committee recommended that the DOGAMI Board consider adopting the "large" scenario earthquake event, and the associated inundation zone, as identified on the new DOGAMI Tsunami Inundation Maps. The DOGAMI Board will be considering these recommendations on September 26, 2013.

DOGAMI-DLCD Coordination – Implications for land use planning of new tsunami inundation maps for the Oregon coast

Over the last few years, DOGAMI and DLCD met on a number of occasions to discuss the implications of new tsunami inundation maps produced for the 2009-2013 grant from the National Tsunami Hazard Mitigation Program (NTHMP) (administered by NOAA). In the meetings, illustration of, and the scientific basis for, the new inundation scenarios were presented by DOGAMI to inform a discussion of land use planning and emergency management issues.

DLCD Land Use Guide for tsunami resilience

DLCD is currently developing guidance to assist vulnerable communities as they incorporate tsunami resilience into their local land use programs. The land use guide is designed to be tailored by communities to address their individual needs and risk tolerance. It will include sample comprehensive plan text, sample development code text, guidance on resilience financing, incentive concepts, tsunami evacuation planning guidance, and pre-disaster community land use planning.

The guide will focus on integrating evacuation routes into the comprehensive plan and development regulations, limiting uses in hazardous areas, and providing incentives for development which reduces risk and increases resiliency.

There are three reasons for developing the guide at this time. First, it is consistent with federal coastal management priorities that emphasize helping communities address coastal hazards through land use planning. Second, the DOGAMI Tsunami Inundation Maps (TIMs) were completed in June of this year, and communities need assistance in how to apply them locally. Third, the Oregon Resilience Plan identified land use planning strategies

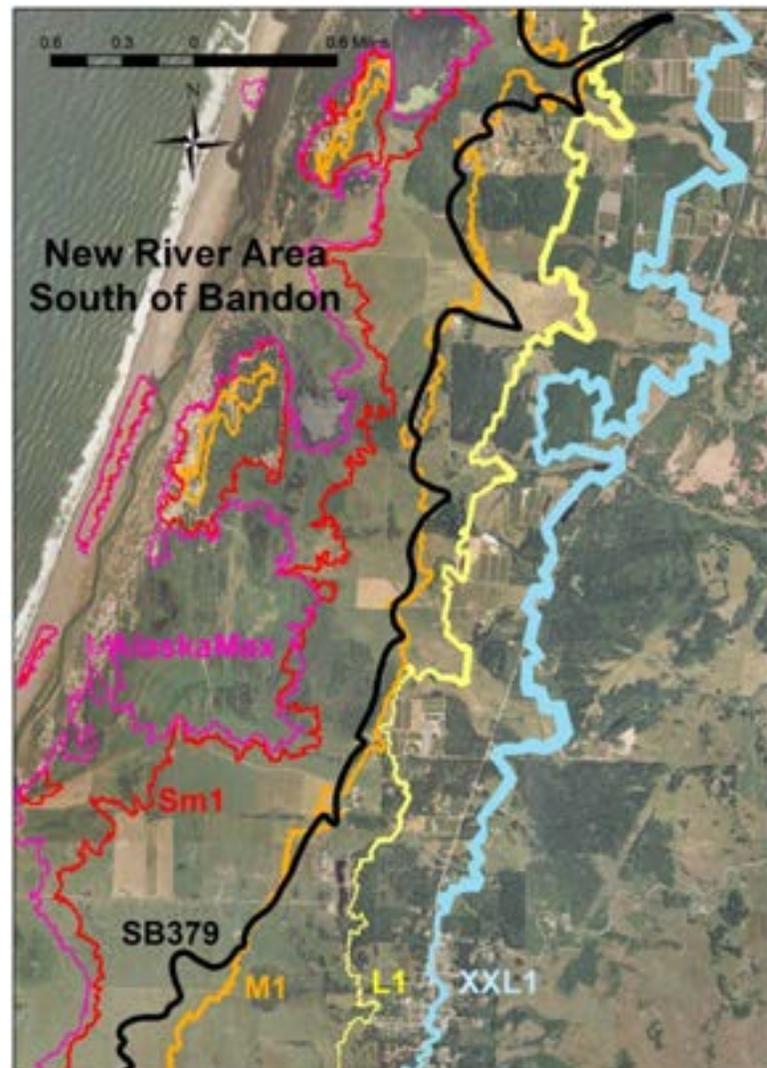
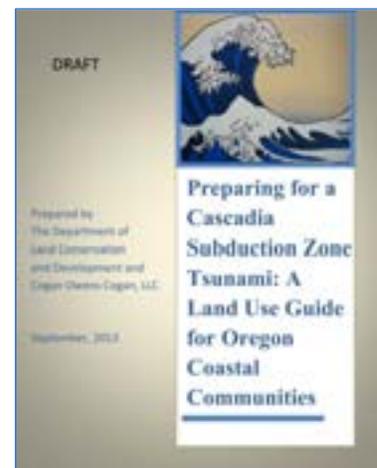
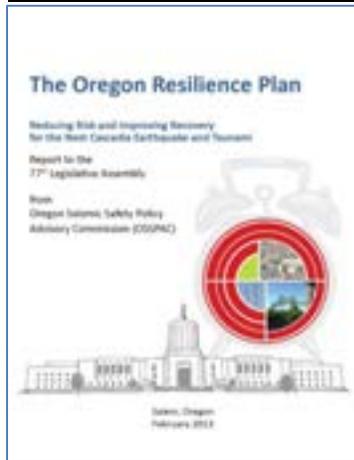


Figure 1 Comparison of currently adopted inundation tsunami zone (SB 379) with new mapping for potential tsunamis from a Cascadia subduction zone mega-thrust earthquake (Sm1, M1, L1, and XXL1) and a distant tsunami (AlaskaMax)



as key components to resilience. The target completion date for the Land Use Guide is January 2014.

Oregon Resilience Plan (OSSPAC)



House Resolution 3, adopted in April 2011, directed the Oregon Seismic Safety Policy Advisory Commission (OSSPAC) to help Oregonians know what to expect from the state's infrastructure should a Cascadia disaster strike this year, and to propose the level of infrastructure reliability that a resilient state should provide. The plan's recommendations – the *Oregon Resilience Plan* - highlight ways to close the gap that separates expected and desired performance - mapping a path of policy and investment priorities for the next fifty years.

Eight Work Groups were charged with three primary tasks: First, determine the likely impact of the scenario earthquake on the assigned sector and estimate the time required to restore functions in that sector if the earthquake were to happen under current conditions. Second, define performance targets for each sector. The targets represent the desired timeframes to achieve resiliency. Finally, provide a series of recommendations to OSSPAC for changes in practice and policy that, if implemented, would ensure that Oregon reaches the desired resilience targets over the next 50 years.

Some OSSPAC recommendations included: comprehensive assessments; charging the Oregon Public Utility Commission to define criteria for seismic vulnerability assessments; completing a statewide inventory of critical buildings; updating inventories of local assets; launching a sustained program of capital investment in Oregon's public structures, including fully funding Oregon's Seismic Rehabilitation Grants; seismically upgrading lifeline transportation routes; establishing a State Resilience Office; and updating Oregon's public policies, including revising individual preparedness from the old standard of 72 hours to a minimum of two weeks.

Because the coast will suffer the worst consequences of this catastrophe, overall recommendations for coastal communities emphasize the following main actions in the next 50 years: consistent and relentless education; investing in hazard mitigation; strengthening critical facilities; and planning for reconstruction and recovery must be done now to provide a strategic vision for restoring the economy and livability of the Oregon coast.

SB33, passed in June, establishes the Task Force on Resilience Planning. The task force is made up of two members of the Oregon Senate, two members of the Oregon House of Representatives, eight members appointed by the Governor, the Director of the Office of Emergency Management or appointee, the chair of OSSPAC, The Director of Transportation or appointee,

and the Public Health Director or appointee. The task force is required to facilitate a comprehensive and robust plan to implement the strategic vision and roadmap of the Oregon Resilience Plan for responding to the consequences of naturally occurring seismic events associated with geologic shift along the Cascadia subduction zone. The task force must report to the legislature by October 1, 2014.



Floodplains

This report addresses two broad topics:

- National Flood Insurance Program
- Floodplain Mapping

National Flood Insurance Program (NFIP)

1. What is the NFIP?

The National Flood Insurance Program (NFIP) was created by Congress in 1968 to minimize rising disaster relief costs to reduce the loss of life and property caused by flooding. The program has four goals: 1) provide affordable flood insurance, 2) stimulate local floodplain management, 3) emphasize less costly nonstructural flood control regulatory measures, and 4) reduce federal disaster costs by shifting the burden from taxpayers to floodplain occupants. The NFIP federally codified the concept of floodplain management and demonstrates a shift in flood damage avoidance measures from keeping water away from people, to keeping people away from water.

If a local community participates in the NFIP, then residents and property owners can purchase flood insurance through the NFIP. Participation in the NFIP is voluntary. To participate, a community must adopt and enforce a floodplain management ordinance that regulates floodplain development according to NFIP standards. In Oregon, all counties participate and nearly all cities with floodplains participate.

A Flood Insurance Study (FIS) is conducted by FEMA to determine the flood hazard present in a community as well as flood zones that will be used to write flood insurance. Data in the FIS is used to produce flood maps called Flood Insurance Rate Maps (FIRMS). FIRMS are the basis for implementing floodplain regulations and are adopted by local government.

FIRMS show areas with at least a 1% chance of flooding each year as the Special Flood Hazard Area (SFHA). These areas are sometimes called the 100 year floodplain, but we avoid that term because it gives the impression that it will be 100 years until the next flood. Some areas within the SFHA are closer to the river and have a much higher risk of flooding each year, but FIRMS do not distinguish the different probabilities within the SFHA. FIRMS often indicate how high flood waters are expected to be if the 1% flood occurs. This is called the Base Flood Elevation (BFE) and is used to regulate development. In an actual flood, waters can be higher or lower than the BFE. Homeowners within the SFHA are required to have insurance if they have a mortgage from a federally backed financial institution (which is nearly all mortgages). Homeowners within the SFHA who do not have a mortgage have the option to purchase flood insurance, and we strongly encourage that they do. Even homeowners outside the SFHA area can purchase flood insurance (at very reasonable rates). A recent study showed that less than 20% of the homeowners who are required to have flood insurance actually had insurance.



Figure 1. The electric meter and heat pumps are elevated above the base flood elevation to comply with a local floodplain ordinance that was adopted as part of participating in the NFIP.



2. DLCD Role as State Floodplain Coordinator

Each state designates a state agency to as the coordinator to guide and enhance local government capabilities to meet NFIP standards. In Oregon, DLCD has been designated. The duties include:

2.1. Technical Support & Training

NFIP rules and standards are complex, and exact. The consequences of errors can be costly to building owners and can put a city or county's floodplain management program in jeopardy. DLCD regularly offers training and technical support to Oregon's floodplain managers and the professionals that support them (surveyors, builders, developers, real estate agents, building officials, etc.).

2.2. Floodplain Mapping Assistance

DLCD and DOGAMI both assist local government with accessing the most reliable flood hazard information available, and offer assistance when errors are found in official information, particularly in FIRMs.

2.3. Program Compliance Monitoring

The NFIP requires that local program compliance be monitored. DLCD is required to conduct compliance reviews under the terms of our grant agreement with FEMA. These Community Assistance Contacts and Community Assistance Visits are structured conversations and site visits, respectively, designed to help DLCD assess local implementation of NFIP development and construction standards. Local programs are required to be modified where deficiencies are found. In these instances, DLCD develops and monitors NFIP compliance plans.

2.4. Post-flood planning support & technical assistance

DLCD is a member of the Oregon Emergency Response System, the group of state agencies called to assist during natural hazard events. DLCD mostly provides technical assistance during flood events. Land use questions may arise, however, from other natural hazard events. In addition, agency resources, such as administrative support or GIS capabilities, may be called upon to support response or recovery.

3. Endangered Species Act (ESA)

FEMA was sued by environmentalists alleging that the NFIP has a negative effect on salmon species that are protected under the ESA because the availability of insurance increases development along rivers. As a result FEMA entered into consultation with the National Marine Fisheries Service (NMFS) as required by the ESA whenever federal agencies operate programs that could support or hinder recovery of threatened and endangered species. That process led to NMFS issuing a biological opinion covering the NFIP in the State of Washington and changes in how FEMA administers the NFIP in Washington. The new procedures were very difficult for local governments to implement, and environmental groups found them to be so ineffective that they filed a second lawsuit. NMFS and FEMA are still in consultation about the NFIP in Oregon, and NMFS has not yet issued a biological opinion covering Oregon. DLCD has been involved to help guide the process to a solution that local governments can implement and that will be effective at protecting endangered salmon. Staff has provided FEMA and NMFS with information on Oregon's land use program and data available from DOGAMI. Staff has also worked to engage city and county planners and engineers on the issue. Successful implementation will likely require more precise mapping of flood hazard areas, a better understanding of channel migration zones, and analysis of areas within a floodplain that are become part of the stream channel during moderate flow conditions. DOGAMI will be an important source for data and analysis on these topics.



just the delivery of accurate maps but working with communities to understand the causes of flooding and help with mitigation strategies. Oregon's expression of Risk MAP continues to underscore the Mapping, Assessment and Planning perspective of the "MAP" acronym, emphasizing the synergy of high-quality mapping with relationships among federal and state agencies and community partners. Integral to effective natural hazards planning are the ideas of: 1) "resilience" and "recovery"; 2) discussions on how to make State Land Use Goal 7 more relevant (while addressing community needs); and 3) addressing planning and mitigation opportunities. Risk MAP will continue to focus on unifying hazard information systems and efforts, building coalitions, and prioritizing areas in need of new Flood Insurance Studies (FIS) – especially much of Eastern Oregon that remains in decades-old paper format.

5. Discovery Process

Prior to performing a new FIS for high priority locales, DOGAMI and DLCD meet with community officials to learn about problems with existing flood hazard maps. Detailed information is captured about past flood events, flood losses, existing hydraulic infrastructure, and planned projects in the floodplain.

Information gathered is used to develop a needs assessment and initial project scope. DOGAMI and DLCD take this opportunity to also educate community officials on the technical aspects of flood studies, flood insurance implications, and mitigation strategies.



Figure 3. Discovery meeting in Rockaway Beach, 2010.

What Works

DOGAMI and DLCD are natural partners for the Risk MAP Discovery Process. Through existing relationships, DLCD connects DOGAMI with floodplain managers for each community. DOGAMI then facilitates Discovery meetings, focusing on FIS issues. DLCD in turn guides the community toward NFIP administration issues that will result from the new FIS.

Availability of lidar is required for updating flood hazard mapping and is therefore a major component of Risk MAP. DOGAMI's management of the statewide lidar program allows DLCD to easily learn where lidar exists or is planned. Future project collaboration opportunities exist between DOGAMI and DLCD as new lidar project areas become identified.

Challenges

Setting accurate expectations is a challenge due to budget limitations, unknown flood study results, and complexity of the NFIP and flood studies.

Future Collaboration

The Risk MAP Discovery process could serve as a model for regular check-ins with communities throughout the state to verify flood hazard information and mitigation strategies are up-to-date. With more state funding, DOGAMI and DLCD could enhance capacity and target communities with demonstrated need, rather than relying on FEMA metrics.

6. Flood Insurance Study (FIS)

After the Discovery phase, DOGAMI works with DLCD and communities to finalize the scope of the FIS. An FIS can be approximate or detailed. Approximate studies involve little or no fieldwork and BFEs are not determined. Detailed studies use considerably more specific hydrologic and hydraulic engineering methods; involve field work; and compute BFEs. Whether an area undergoes an approximate or detailed study is determined by the quality of



local data available. For example, a densely populated community with lidar will undergo a detailed FIS, while only an approximate FIS will be created for a rural town without lidar or other specific hydrologic and hydraulic data.

DOGAMI continues its coordination with DLCDD throughout the life of the study. Draft study results are provided to DLCDD so significant changes to flood hazard maps are understood and communication strategies can be developed. Upon completion of the FIS, the following steps are taken to adopt a new FIRM based on the new FIS:

1. Draft FIS and FIRM are delivered to and reviewed by FEMA
2. Preliminary FIS and FIRM delivered to local community
3. Final Coordination Meeting with local community, FEMA, study contractor and the public
4. Notice of Start of Appeals period in local newspaper
5. 90-Day Appeals Period
6. Appeals adjudicated
7. Letter of Final Determination Review sent to communities (*FIRMs will be effective in 6 months*)
8. Six-month period for local amendment of floodplain ordinance to reflect new maps. Local flood hazard development codes are also reviewed and, if necessary, updated.
9. Final "Official" FIS and FIRMs delivered to community

7. Mitigation Planning Risk Assessments

With the FIS completed and FIRMs updated, DOGAMI uses data on buildings and infrastructure to assess risk at the community level. Exposure and expected economic loss are calculated at the building level for a variety of flood scenarios.

Areas of mitigation interest identified during the Discovery process are examined using the new flood hazard mapping to make informed recommendations on future mitigation actions.

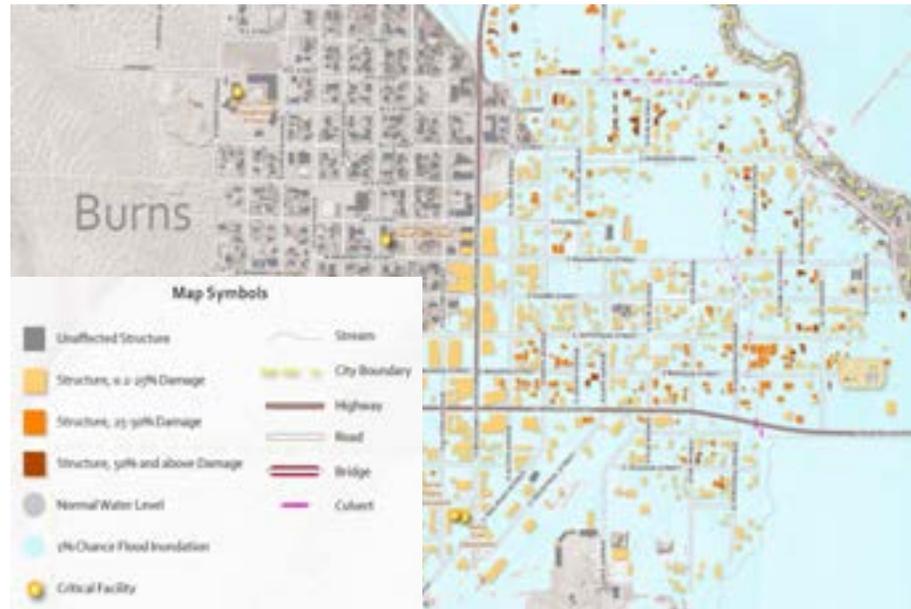


Figure 4. Example of loss estimation and exposure analysis.

Plan & Ordinance Updates

DLCDD and DOGAMI work with communities to incorporate new flood hazard mapping and risk assessments into local natural hazard mitigation plan updates.

What Works

Many communities are working with flood hazard maps that are out of date by thirty or more years. Mapping technology has improved vastly over that period and the precision now afforded can help communities make better informed decisions about floodplain management. Data generated by DOGAMI is shared with DLCDD to help cities and counties understand their flood risk, identify potential mitigation activities and steer new development away from hazardous areas.



Challenges

It is difficult to get communities to think about long-term mitigation strategies when changes to FEMA's regulated flood zone dominate the conversation. Flood insurance can be a crippling cost in many communities and the "in-or-out" of the SFHA approach taken by the NFIP does not aid communities in understanding actual risk. In addition, much of Eastern Oregon remains in paper format, with some mapping and flood studies not updated for over 30 years. FEMA funding for new studies has been significantly reduced for the foreseeable future; non-FEMA sources for floodplain mapping is needed if these lower populated areas are to be addressed.

Future Collaboration

With the recent NFIP reform, it will become more important for DOGAMI and DLCD to pool resources in an effort to help communities understand their options and get updated flood hazard mapping and risk assessments. Our mutual understanding of flood risk and effective risk communication strategies can help citizens move through the complex set of emotions that accompany introduction of new hazard information and maps.

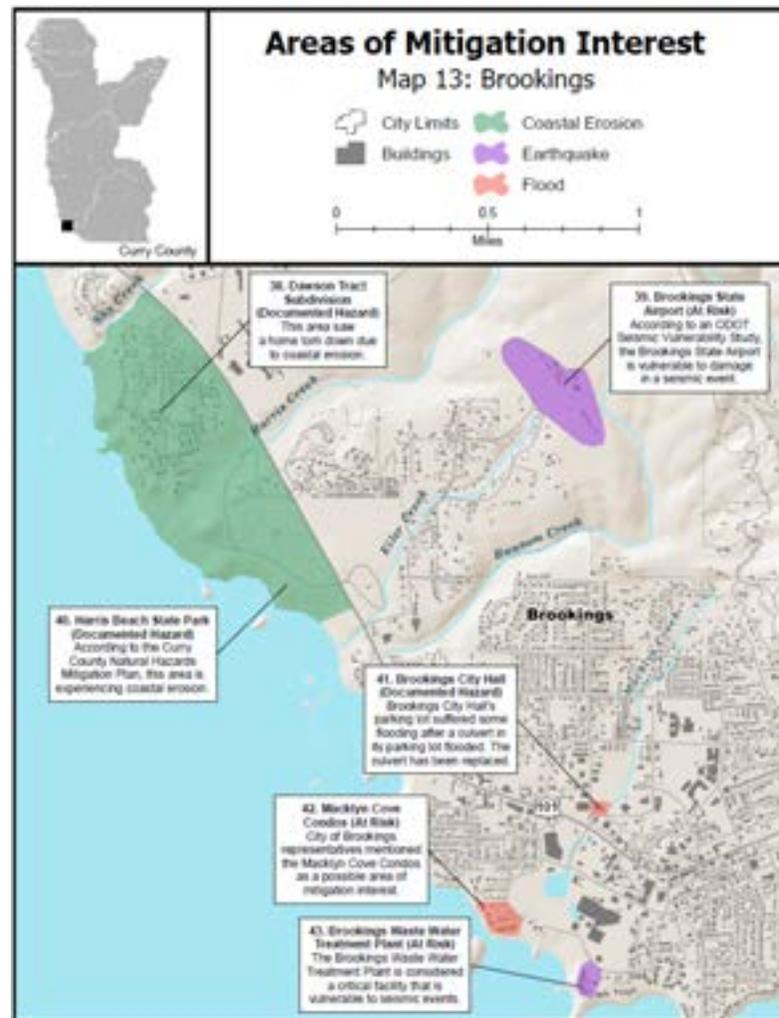


Figure 5. Example map of Areas of Mitigation Interest

8. Ongoing Coordination

Development of Statewide Flood Hazard Database

The Department of Administrative Services Geospatial Enterprise Office has funded DOGAMI over the 2013-2015 biennium to produce a statewide flood hazard database. DOGAMI will be working with DLCD to develop database specifications and a stewardship plan. The database will host all available flood study information for Oregon, high water marks, stream gage locations and much more.

State & Federal Coordination: Silver Jackets

DLCD and DOGAMI have strong roles in the Flood Subcommittee of the Interagency Hazard Mitigation Team, also known as the Silver Jackets. The subcommittee meets every two months with participants from the U.S. Army Corps of Engineers, FEMA, National Weather Service, U.S. Geological Survey, Oregon Water Resources Department and Oregon Emergency Management. The subcommittee focuses on cross-agency coordination on projects, perishable data capture during flood events and post-flood communication strategies. DOGAMI and DLCD will also be working with the subcommittee throughout the development of the statewide flood hazard database.



What Works

Participation with Silver Jackets has allowed DOGAMI and DLCD to work constructively with state and federal partners toward improving flood hazard data and achieving more efficient post-event coordination.

Challenges

Development of specifications for the statewide flood hazard database will require diligence, attention to detail, and great communication in order to lay out a plan for a truly useful tool.

Future Collaboration

Completion of the statewide flood hazard database will allow DOGAMI and DLCD to work from a common data source when addressing floodplain management issues. Continuing participation with Silver Jackets opens the door for new federal funding opportunities and project collaboration.



State and Local Hazard Mitigation

Background

Disasters occur as an interaction among three broad systems: natural systems, the built environment, and social systems. It is impossible to predict exactly when natural disaster will occur, or the extent to which they will affect communities within the state. However, with careful planning and collaboration, it is possible to minimize the losses that can occur from natural hazards. Oregon's State Natural Hazard Mitigation Plan (SHMP) is the vehicle for that planning and collaboration.

Natural hazard mitigation is the combination of short- and long-term actions taken to reduce or eliminate risk of damage to life, property, and resources from natural hazards. Engaging in mitigation activities provides the state with a number of benefits, including reduced loss of life, property, essential services, critical facilities, and economic hardship, and reduced short-term and long-term recovery and reconstruction costs. Oregon's SHMP identifies and prioritizes potential actions for reducing risk of damage from the State's eleven natural hazards: coastal erosion, drought, dust storms, earthquakes, fire, flood, landslide and debris flows, tsunamis, volcanic eruptions, windstorms, and winter storms.

State and local governments must have hazard mitigation plans in place as a prerequisite for certain hazard mitigation and disaster assistance. State and local natural hazard mitigation plans (LHMPs) must be updated every three years and five years, respectively. Oregon's first SHMP was completed in 1992; it was updated in 2000, 2004, 2006, 2009, and 2012. The current update got underway in March 2013 and must be completed by March 2, 2015.

Risk assessment and mitigation strategies are the principle components of the SHMP. The current risk assessment methodology is neither consistent across all hazards nor all scales, complicating identification and prioritization of target areas for hazard mitigation resources. In partnership with the University of Oregon InfoGraphics Lab, the Governor's State Interagency Hazard Mitigation Team (IHMT) has developed a concept for a new risk assessment methodology that would alleviate this issue, but funding to complete development of the model and begin implementation is unavailable at present. The SHMP's mitigation strategy prioritizes potential actions statewide intended to reduce vulnerability to natural hazards.



Plan Approval Process

The Federal Emergency Management Agency (FEMA) provides guidelines and has final approval authority for SHMPs and LHMPs. Oregon's SHMP is developed under the direction of the IHMT whose mission includes understanding losses arising from natural hazards and coordinating recommended strategies to mitigate loss of life, property, economic, and natural resources. The Office of Emergency Management is home to the State IHMT and its Chair, the State Hazard Mitigation Officer. Once approved by FEMA the SHMP becomes part of the State Emergency Management Plan. The process follows these steps:

1. IHMT staff review and revise the 2012 SHMP, creating the Draft 2015 SHMP.
2. IHMT reviews Draft 2015 SHMP.
3. IHMT staff revise the Draft 2015 SHMP as necessary in response to IHMT direction.
4. IHMT approves the Draft 2015 SHMP and submits it to FEMA for review.
5. IHMT staff revise the Draft 2015 SHMP as necessary based on FEMA direction.
6. IHMT approves the Final 2015 SHMP and resubmits for FEMA final approval.
7. FEMA gives "approval pending adoption."
8. Governor adopts Final 2015 SHMP by letter.
9. FEMA gives final approval.

Similarly, LHMPs are developed and adopted locally, reviewed by OEM, then submitted by the local government directly to FEMA for final approval. LHMPs may be individual, joint, or appended to the county's plan. All 36 of Oregon's counties have LHMPs. Of those, 75% are current; 25% will expire in 2014 or 2015.

DLCD/DOGAMI Collaboration: SHMP and Goal 7

DLCD has taken on management of the 2015 SHMP update. DOGAMI is a key partner in this effort, providing the current science and quality GIS data, analysis, products, and reports upon which much of the SHMP is based.

One of the requirements of SHMPs is coordination of hazard mitigation planning at the local and state levels. Another is providing funding and technical assistance to local governments for developing LHMPs. *Statewide Planning Goal 7: Areas Subject to Natural Hazards* also require state agencies to coordinate SHMPs and LHMPs and to provide local governments with hazard inventory information and technical assistance. SHMP and LHMP updates and Goal 7 implementation actions are interrelated and together present clear opportunities for coordination and collaboration; blending DOGAMI's scientific and DLCD's planning expertise.

Under Goal 7, when new hazard information becomes available and DLCD determines that a local response to the new information is necessary, the local government is to incorporate the



new information into its comprehensive plan policies and implementation measures. LHMPs are also incorporated into local comprehensive plans, usually by reference or as an appendix. Ideally, LHMPs would be fully integrated into comprehensive plans, and we are beginning to work toward that goal.

DOGAMI and DLCDC have already begun to create opportunities for coordination and collaboration and to strategize about funding opportunities. These initiatives will pave the way forward for enhanced state and local hazard mitigation planning and implementation through SHMPs, LHMPs, and Goal 7 as well as continued interagency coordination and collaboration at a very high and consistent level.



Landslide Hazards

Background

Landslides are one of the most significant natural hazards in Oregon; they cause tens to hundreds of millions of dollars in losses annually and have caused a number of fatalities. In 1996-1997, several severe storms caused nearly 10,000 landslides in Oregon. At least 700 of these occurred in the Portland metropolitan region where over 100 homes were moderately damaged by or completely lost to landslides. The fatalities, number of landslides, and considerable damage and losses were a wake-up call that Oregon has significant landslide hazards and that we need to reduce landslide risk.

DOGAMI and DLCD have a long history of working together with communities in Oregon to reduce landslide risk. In 2012, Clackamas County contracted with DOGAMI to (1) develop shallow and deep landslide susceptibility maps for Clackamas County and 16 cities; (2) perform a risk analysis; and (3) provide technical support to the County and cities for integrating the mapped landslide information and risk analysis into the local Natural Hazard Mitigation Plans (LHMPs) and landslide hazard regulations.

DOGAMI's Role

Understanding the magnitude, frequency, and spatial distribution of areas where landslides have occurred in the past is a critical step in reducing landslide risk. The primary dataset used to create an inventory of landslides is lidar topography. To create a consistent landslide inventory for Oregon, DOGAMI developed and published a protocol entitled: Protocol for Inventory Mapping of Landslide Deposits from Light Detection and Ranging (lidar) Imagery (DOGAMI Special Paper 42). DOGAMI uses this protocol to create detailed Geographic Information System (GIS) datasets and maps. Once the comprehensive landslide inventory is complete, maps identifying susceptibility (or potential for future landslides) to the various types of future landslides can be created. DOGAMI followed this protocol to produce the landslide inventory maps for the Clackamas County project and used them to produce the shallow and deep landslide maps.

The hazard mapping is performed in cooperation with the local communities (city and/or county and/or state) to insure that they are aware of the forthcoming hazard data and allow the community to review and comment/edit the data. DOGAMI also compiles the landslide data into our Statewide Landslide Information Database (SLIDO) and puts the information onto the web in our interactive web map viewer at <http://www.oregongeology.org/sub/slido/index.htm> so that the public has access to the information.



Figure 1 shows an example of a suite of landslide hazard maps for Oregon City.



Figure 1. Landslide Inventory, Shallow landslide Susceptibility and Deep landslide Susceptibility maps of the City of Oregon City. Each map also comes with accompanying GIS data and detailed methodology and limitations.

DLCD's Role

Under Statewide Planning Goal 7, when DLCD receives new hazard inventories (for example, the new landslide maps from DOGAMI), the department must review the new information and consult with affected local governments to determine whether the information requires a local response. If it does, then the local governments are required to respond within three years. The local response must include evaluation of the risk, public involvement, and amendments to the comprehensive plan or development regulations.

As the first and second tasks of the Clackamas County project were nearing completion, DOGAMI invited DLCD to apply its planning expertise to the third task: assisting the County and cities with integrating this new information into local landslide hazard regulations. The information was integrated into the LHMPs early this year. DLCD and DOGAMI are now working together to develop a model code that local jurisdictions can use as they respond to the new information under the process in Goal 7.

This project presented an excellent opportunity to move Goal 7 implementation forward. In addition to promoting a close working relationship between the agencies, this project spurred discussion about the ways in which we can plan for and enhance future collaborations. For example, regular meetings to discuss projects and information help us prioritize and strategize hazard studies over the long term. Such meetings also promote collaboration on future grants or contracts from their inception, ensuring that both agencies' roles and work programs are coordinated.

Although this project is specific to landslide hazards, DLCD and DOGAMI envision employing this collaboration model for all the natural hazards DOGAMI studies.

Joint Meeting of the

**Department of Geology and Mineral Industries
Governing Board**

and the

Land Conservation and Development Commission

Thursday, September 26, 2013

- Introductions
- Overview of Relationship
- [1 - Tsunami Hazards](#)
- [2 – Floodplains](#)
- [3 - Landslide Hazards](#)
- [4 - State & Local Hazard Mitigation Planning](#)
- Future Collaboration

Joint Meeting of the
Department of Geology and Mineral Industries Governing Board
and the
Land Conservation and Development Commission



LCDC/DOGAMI Governing Board Meeting

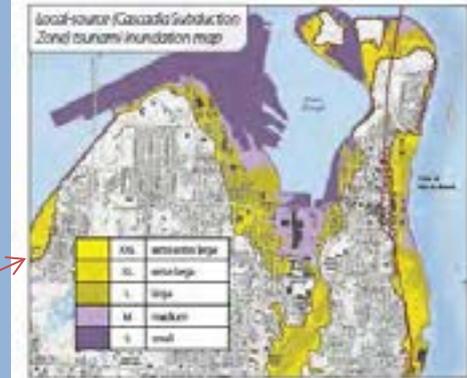
September 26, 2013 (Afternoon Session)

Tsunami Hazards Presentation

Steve Lucker (DLCD), Matt Spangler (DLCD), George Priest (DOGAMI)

DOGAMI Mapping

- New (2009-2010) tsunami inundation maps (**TIM's**) use:
 - New lidar for digital topography
 - New, more accurate tsunami model **SELFE** (Joseph Zhang, OHSU)
 - More accurate Cascadia fault model (Kelin Wang, Canadian Geological Survey)
 - Cannon Beach and Bandon pilot projects to calibrate models to
 - Tsunami deposits for minimum inundation (Rob Witter, DOGAMI)
 - Cascadia Earthquake size and frequency (turbidites studied by Chris Goldfinger, OSU)
 - Other geological and geophysical data
 - New tsunami scenarios :
 - Cascadia (local source) “T-shirt” sizes: **S, M, L, XL, XXL**
 - Gulf of Alaska (distant source) maximum-considered:
 - Historical maximum: **AK64**;
 - Hypothetical maximum: **AKMax**
- New **evacuation maps** show only maximum-considered
 - Hypothetical distant tsunami (**AKMax**) inundation
 - Hypothetical local tsunami (**XXL**) inundation
- **XXL** = 1/10,000- to 1/5000-yr event (~100% of Cascadia events)
- **L** Cascadia scenario (95% of Cascadia events)
 - Produces inundation exceeded only about every 2500 yrs
 - 2500-yr exceedance = proposed ASCE standard for calculation of tsunami forces on critical and essential facilities
- **M** = “most likely” Cascadia event (79% of Cascadia events)
- **S** inundation (26% of Cascadia events) is about equal to **AKMax** inundation



maximum local source (yellow) maximum distant source (orange)

Combine the maximum tsunami scenario from each map ...



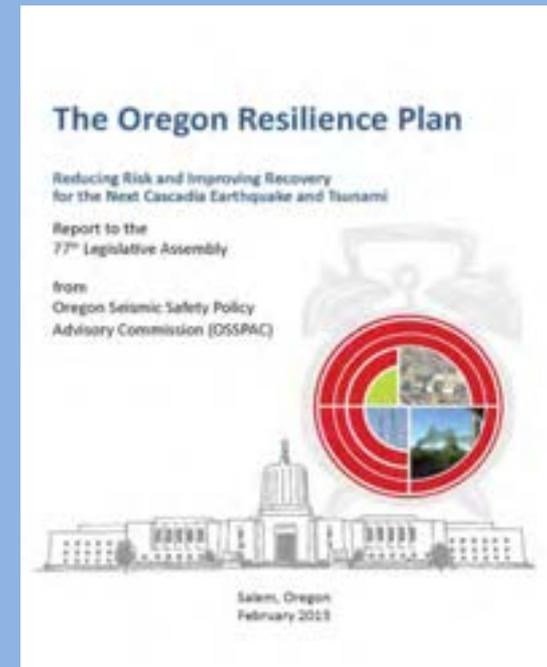
ORS 455.446 (SB 379)

- The DOGAMI Governing Board, by rule, is responsible for determining the tsunami inundation zone which applies to ORS 455.446-447 requirements
- The DOGAMI Governing Board originally adopted the tsunami inundation zone line based on tsunami hazard maps completed in December 1995 to help implement SB 379.
- DOGAMI recently completed a new tsunami inundation maps based on updated understanding of sources for distant and local Cascadia subduction zone tsunamis.
- DOGAMI convened an advisory committee to review options for updating the inundation zone of ORS 455.446
- Advisory Committee Recommendations:
 - Given changes in the science of tsunami inundation modeling and lidar-derived elevation maps, the current SB 379 line and maps no longer meet the needs of coastal communities and should be replaced.
 - The Board should consider adopting the “large” (**L**) scenario earthquake event and the associated inundation, identified on the new DOGAMI Tsunami Inundation Maps, consistent with ORS 455.446.

The Oregon Resilience Plan

Reducing Risk and Improving Recovery for the Next Cascadia Earthquake and Tsunami

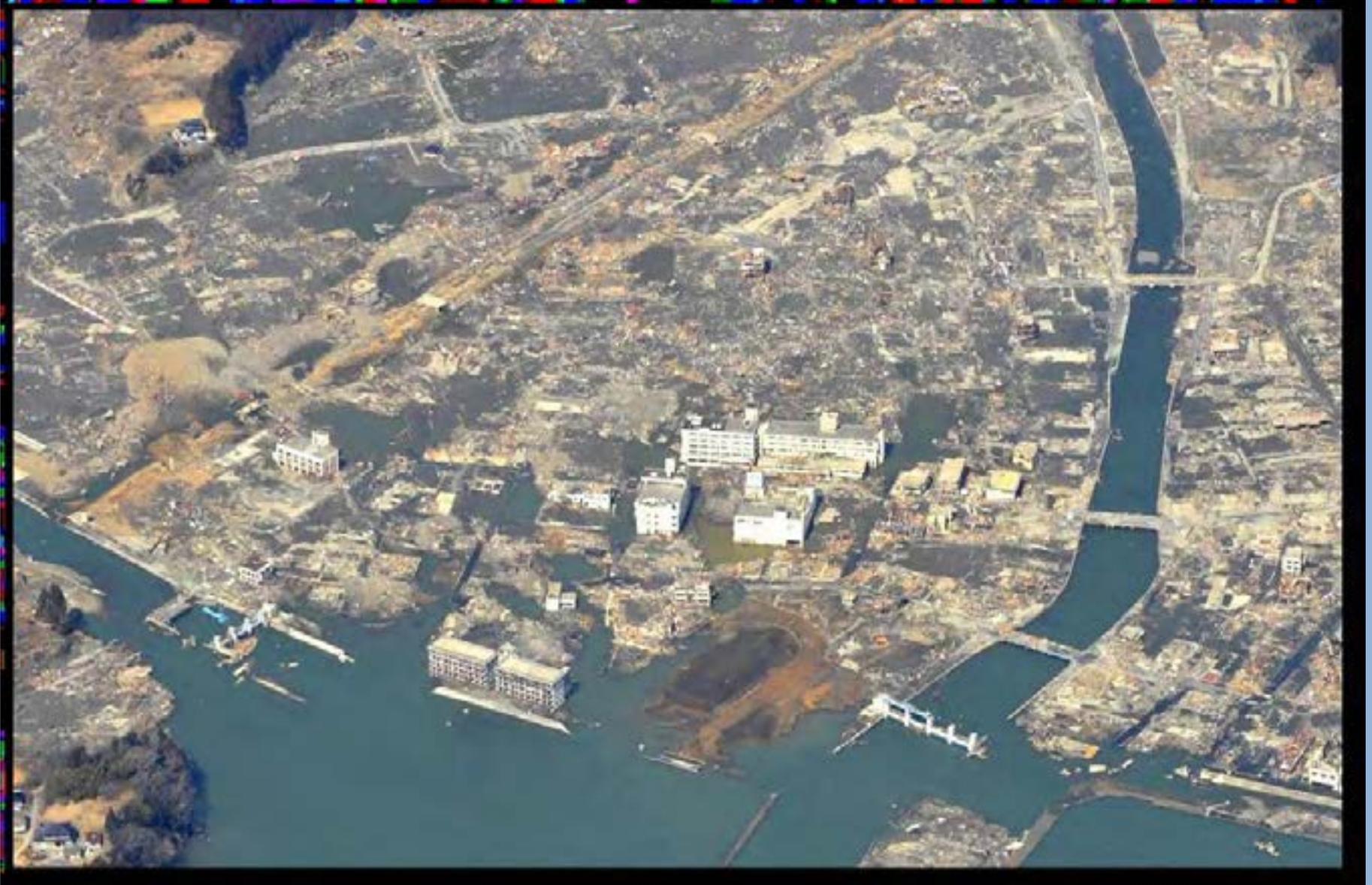
Report to the
77th Legislative Assembly
from
Oregon Seismic Safety Policy
Advisory Commission (OSSPAC)



Oregon Resilience Plan (OSSPAC)

- Impact of M_w 9 (“**M**” scenario) Cascadia earthquake and resilience of current infrastructure
- Resilience/reliability that State should provide
- Investment priorities for the coast over the next 50 years

TSUNAMI ZONE



Oregon Resilience Plan (OSSPAC)

Task Force on Resilience Planning (SB33)

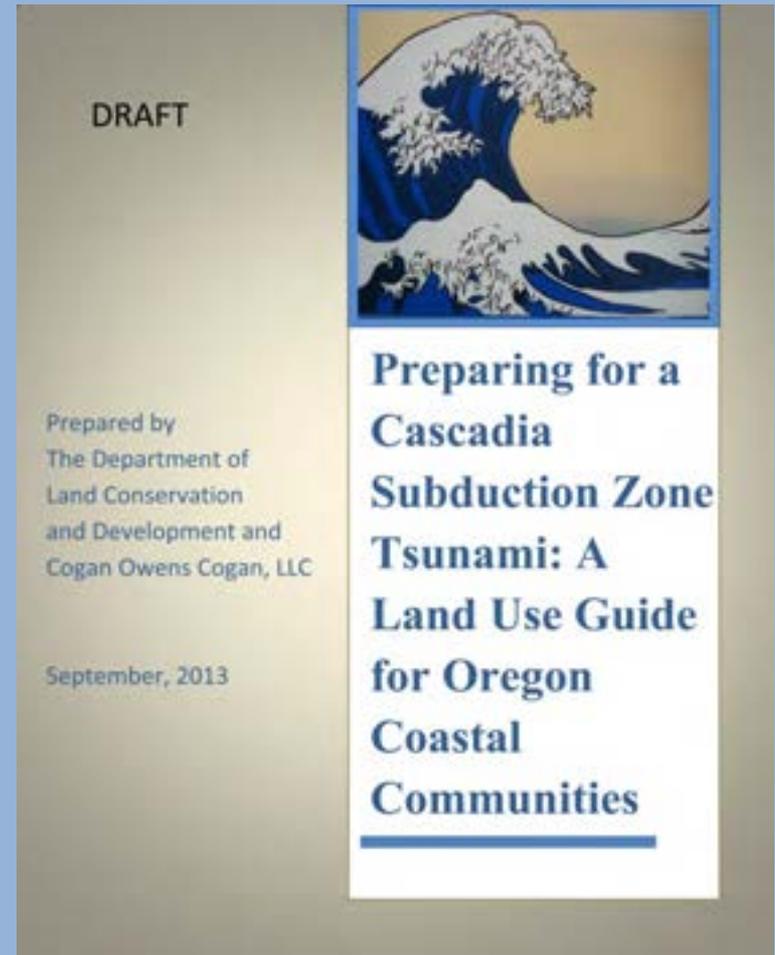
Objectives:

- Comprehensive and robust plan to implement Oregon Resilience Plan
- Report to the Legislature by Oct. 1, 2014

2012-2013 DOGAMI-DLCD Cooperation

- **2012:** Two meetings (and numerous other communications) aimed at explaining to DLCD the TIM tsunami scenarios.
- **2013:** Joint participation in production of the Oregon Resilience Plan.
- **2013:** DLCD on DOGAMI SB379 Advisory Committee.
- **2013:** DOGAMI participation in DLCD-sponsored North Coast Resilience Network meetings.
- **2013:** DOGAMI on DLCD Advisory Committee for development of *Preparing for a Cascadia Subduction Zone Tsunami: Land Use Guide for Oregon Coastal Communities*

“Preparing for a Cascadia Subduction Zone Tsunami: A Land Use Guide for Oregon Coastal Communities”



Land Use Guide:

- DLCD is developing guidance to assist tsunami vulnerable communities in incorporating resilience measures into their local land use programs
- The guidance can be tailored to a community's needs and risk tolerance and will include:
 - Sample comprehensive plan text
 - Sample development code text, and
 - Additional resilience guidance such as:
 - Resilience financing and incentive concepts
 - Evacuation planning guidance
 - Pre-disaster community land use planning
 - Other Resource links

Themes:

- Integrating the development of evacuation infrastructure into the land use and development review process.
- Identifying appropriate limitations on certain categories of uses
- Providing incentives for development designs which reduce risk and increase resiliency.

Responds to:

- Coastal management program emphasis on developing tools to address coastal hazards
- Oregon Resilience Plan Development
 - DLCD participation in plan development
 - Land use planning identified as key resilience component
- New information – DOGAMI Tsunami Inundation maps (TIMs)

Schedule:

- The draft will likely be available to the TAC members for review in November
- January 2014: Target for Land Use Guide Completion
- DLCD staff is prepared to assist any coastal community who desire to use these materials



DLCD is the State's NFIP Coordinating Agency

Each state designates one agency to coordinate, guide and enhance capabilities to meet NFIP standards. Duties include:

- Interagency Coordination on NFIP matters
- Technical Support & Training
 - State agencies
 - Local government officials & planners
 - Support professionals (land surveyors, real estate agents, engineers)
 - Public
- **Floodplain Mapping Assistance**
- Program Compliance Monitoring
- Post-flood planning support & technical assistance
- Implement Endangered Species Act (ESA)



under the NFIP



National Flood Insurance Program

Vernonia, 2007



- NFIP is an insurance, land use, and building construction standards program;
- Local government participation in the NFIP satisfies Goal 7: Flood Hazards; 260 participating counties and cities (only 2 of the remaining 18 cities are minimally flood-prone)
- Effective land use regulations rely on accurate and easily read flood insurance rate maps (FIRMs);
- Recent NFIP Reform, resulting in higher flood insurance costs for some building owners, challenges our ability to explain the value of NFIP to local government and building owners;
- DLCD and DOGAMI need to develop better ways to communicate risk, the consequences of ignoring flood hazards, and the benefit of mitigation.

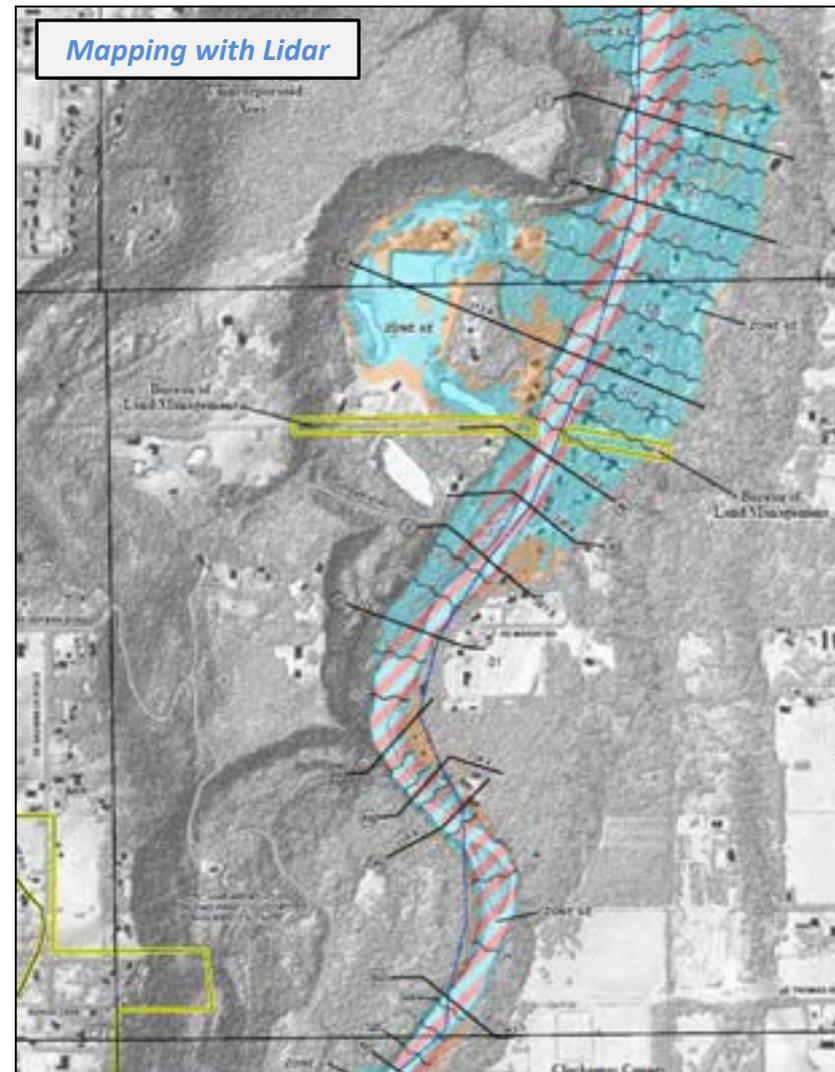


Improved NFIP Mapping

Mapping with Topo Sheets



Mapping with Lidar





Floodplain Mapping & Risk MAP Program

What is Risk MAP?

- MAP = Mapping, Assessment, Planning
- FEMA's new program for delivering flood hazard maps and reports
- Replaces "Map Modernization" program
- Includes traditional regulatory flood insurance studies (focusing on 100-year flood)
- Introduces new non-regulatory hazard maps & assessments
- In Oregon FEMA is funding multi-hazard non-regulatory products
 - Channel migration zones
 - Landslides
 - Earthquake/Tsunami
 - Sea-level rise



Risk MAP process: DOGAMI & DLCD contribute and coordinate at each step



Floodplain Mapping & Risk MAP Program

Discovery Process

- Very little up-front coordination during “Map Modernization” leaving many communities surprised by mapping results
- Discovery starts with in-person stakeholder coordination meetings w/ each community
- Come back to communities for Discovery meeting to present initial project scope
- DOGAMI explains technical details of project; DLCDC explains planning and insurance implications
- Must have buy-in from local communities to move forward with project



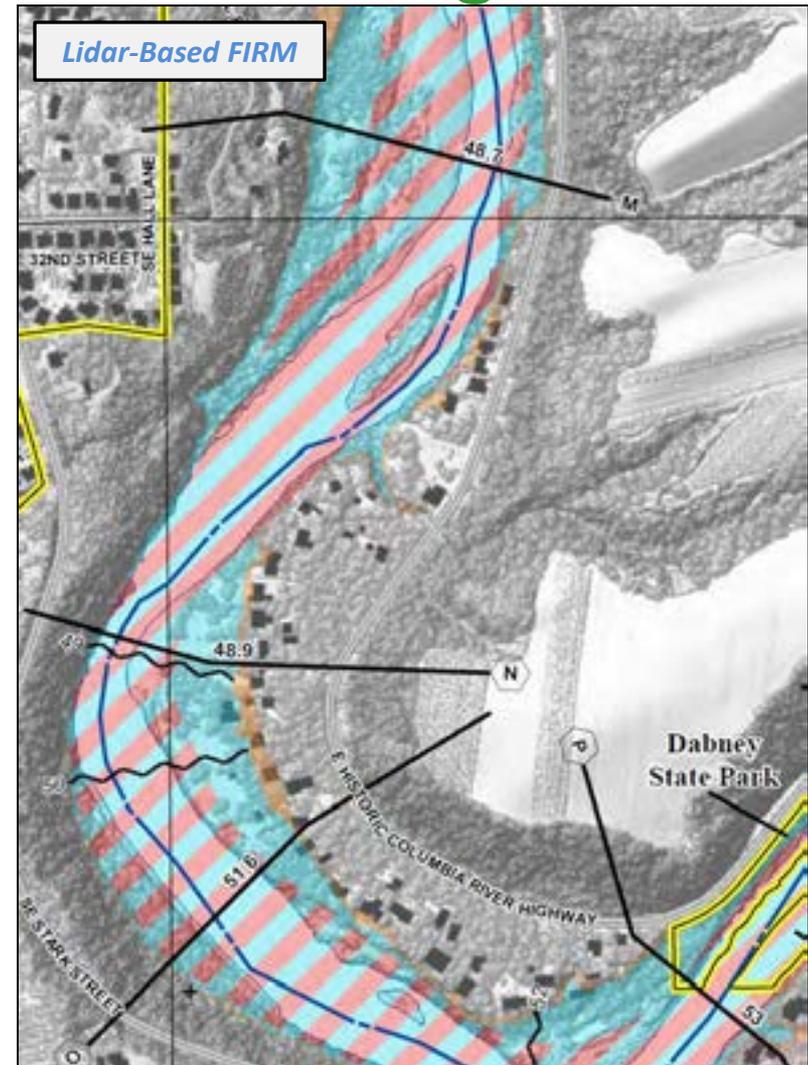
Discovery meeting at Rockaway Beach



Floodplain Mapping & Risk MAP Program

Flood Insurance Studies

- DOGAMI produces new Flood Insurance Study (FIS) report and Flood Insurance Rate Maps (FIRMs)
- Study updates include new hydraulic & hydrologic modeling coupled with lidar topographic data
- DLCD reviews draft information to get ahead of any potentially unwanted results
- DOGAMI initiates flood study review process where communities review drafts before they are issued as preliminary – helps avoid appeals
- Process to adopt new maps take at least a year
- First Flood Insurance Rate Maps in the nation to feature lidar base map with building footprints

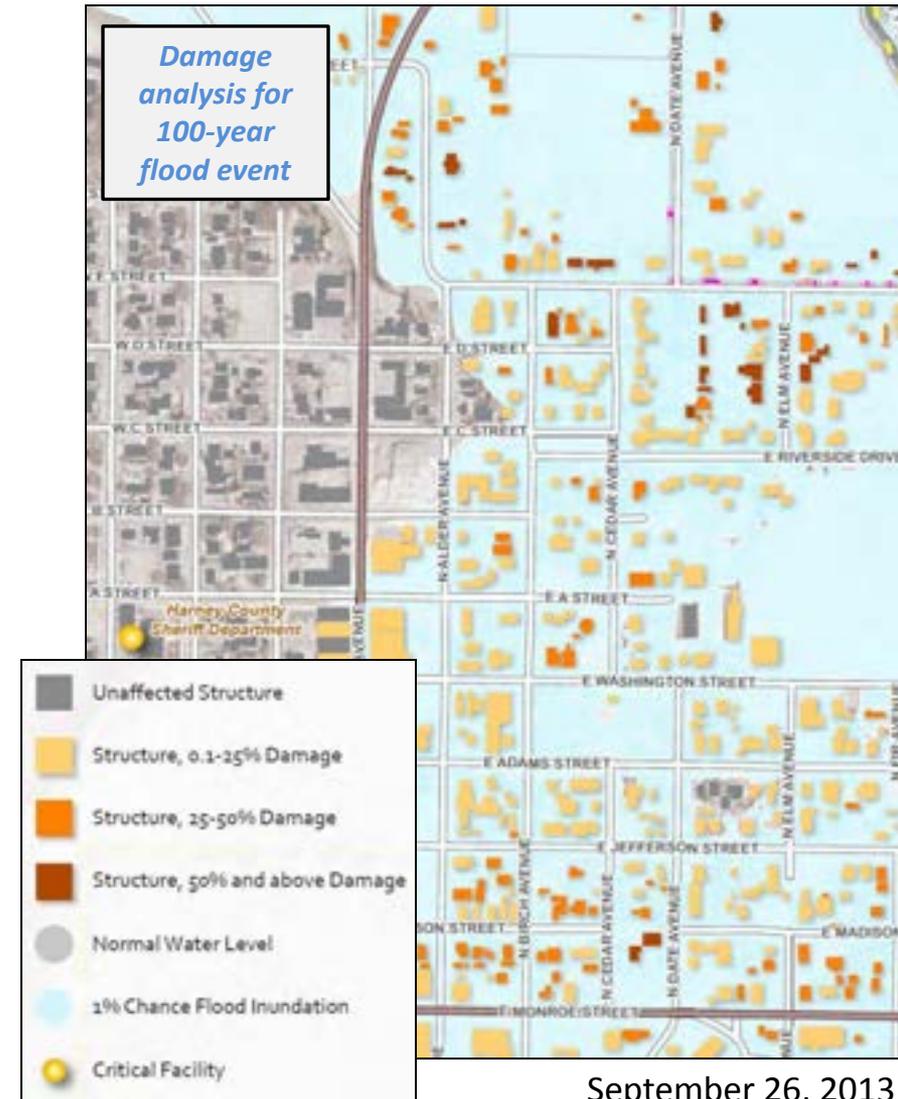
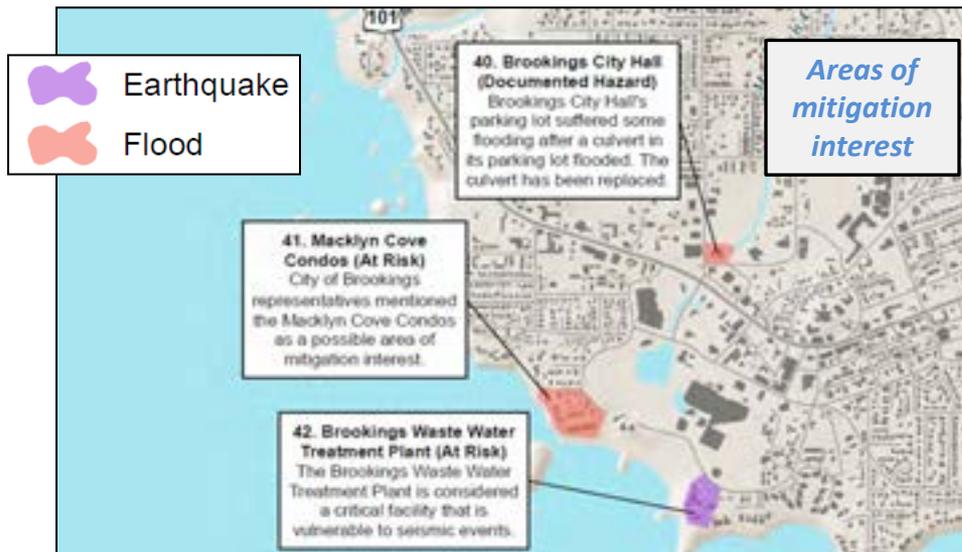




Floodplain Mapping & Risk MAP Program

Mitigation Planning

- Damage and exposure analysis is performed for multi-hazards
- Areas of mitigation interest are identified
- Maps and Risk Report to communities as non-regulatory products to aide in mitigation planning
- Resiliency meeting is held to discuss mitigation actions
- Analysis can be incorporated into mitigation plans





Ongoing Statewide Flood Coordination

- DOGAMI & DLCD are founding agencies in the Oregon Chapter of Silver Jackets
- Serves as flood subcommittee to the Interagency Hazard Mitigation Team
- Silver Jackets national program started by U.S. Army Corps of Engineers
- Many agencies, many different jacket colors – blended to make... silver?
- Focusing on pre-disaster mapping and planning projects, perishable data collection during disasters, and post-disaster unified communication strategies



*DOGAMI & DLCD have signed a charter
with USACE, FEMA, USGS, NWS, and
OEM to form the Oregon Chapter*

Overview of DOGAMI & DLCD Landslide Risk Reduction Activities & Collaboration

Bill Burns, DOGAMI
Steve Lucker, DLCD

Overview

I. Landslides in Oregon

II. DOGAMI's Activities

III. DLCD's Activities

IV. Collaboration/The Future

Landslides 1996-1997

Oregon

Is Landslide Country !

**In fact, Oregon maybe
some of the most
landslide covered
terrain in North America**

3 Storms, ~9,500 landslides

=Big Wake Up

100s Millions \$ Damage, 5 deaths

Significant Problem

Many Different Types of Landslides

Classification or Naming Landslides

Primary Criteria:

1) Type of Material

2) Type of Movement

- ◆ Soil (earth)
- ◆ Rock
- ◆ Debris (mixture)

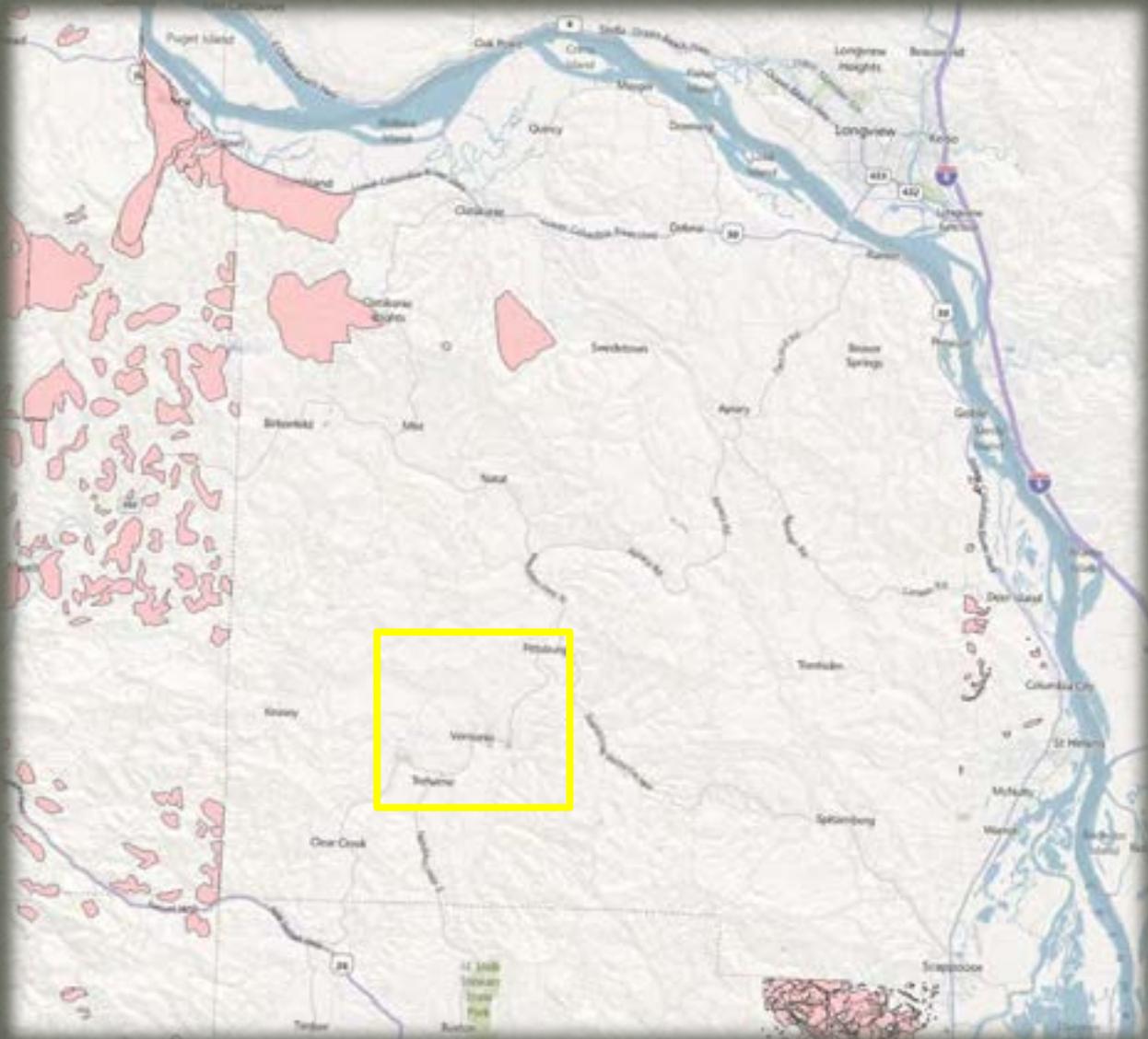
- I. Slides
- II. Flows
- III. Spreads
- IV. Falls
- V. Topples
- Complexes (multiple types)



e.g. Debris Flow, Rock Fall

New Landslide Maps

1. Compile all previous data into a digital database and make readily available to all
 - SLIDO – Statewide Landslide Information Database for Oregon
 - In the 3rd round of updates right now
2. Map areas using lidar – Inventory, then Susceptibility



Columbia County

40 Landslides in
SLIDO - R2



Columbia County

Vernonia Area

Zero landslides in
SLIDO



Columbia County

Bare Earth Hillshade



Vernonia Landslide Inventory

630
landslides!

Inventory of Landslide Deposits from Light Detection and Ranging (Lidar) Imagery of the Portland Metropolitan Region, Oregon and Washington

2012

DMG-23

Inventory of Landslide Deposits

Inventory of Landslide Deposits from Light Detection and Ranging (Lidar) Imagery of the Portland Metropolitan Region, Oregon and Washington

Inventory of Landslide Deposits

Inventory of Landslide Deposits from Light Detection and Ranging (Lidar) Imagery of the Portland Metropolitan Region, Oregon and Washington



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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ABSTRACT
 This report presents the results of a comprehensive inventory of landslide deposits in the Portland Metropolitan Region, Oregon and Washington. The inventory was conducted using Light Detection and Ranging (Lidar) imagery, which provides high-resolution topographic data. The study area covers approximately 1,000 square miles and includes major river valleys such as the Willamette, Clackamas, and Multnomah. The inventory identified over 10,000 individual landslide deposits, which are categorized based on their geomorphic characteristics and potential hazards. The results of the inventory are presented in a series of maps and tables, providing a detailed overview of the distribution and characteristics of landslide deposits in the region. This information is essential for land-use planning, hazard assessment, and emergency preparedness in the Portland Metropolitan Region.

INTRODUCTION
 Landslides are a major natural hazard in the Pacific Northwest, and the Portland Metropolitan Region is no exception. The region's diverse geology and topography, combined with its high population density and extensive infrastructure, make it particularly vulnerable to landslide-related hazards. The inventory of landslide deposits presented in this report is a critical component of the regional landslide hazard assessment and mitigation efforts. By providing a detailed inventory of landslide deposits, this report enables land-use planners, engineers, and emergency responders to better understand the distribution and characteristics of landslide hazards in the region. This information is essential for developing effective hazard mitigation strategies and emergency response plans.

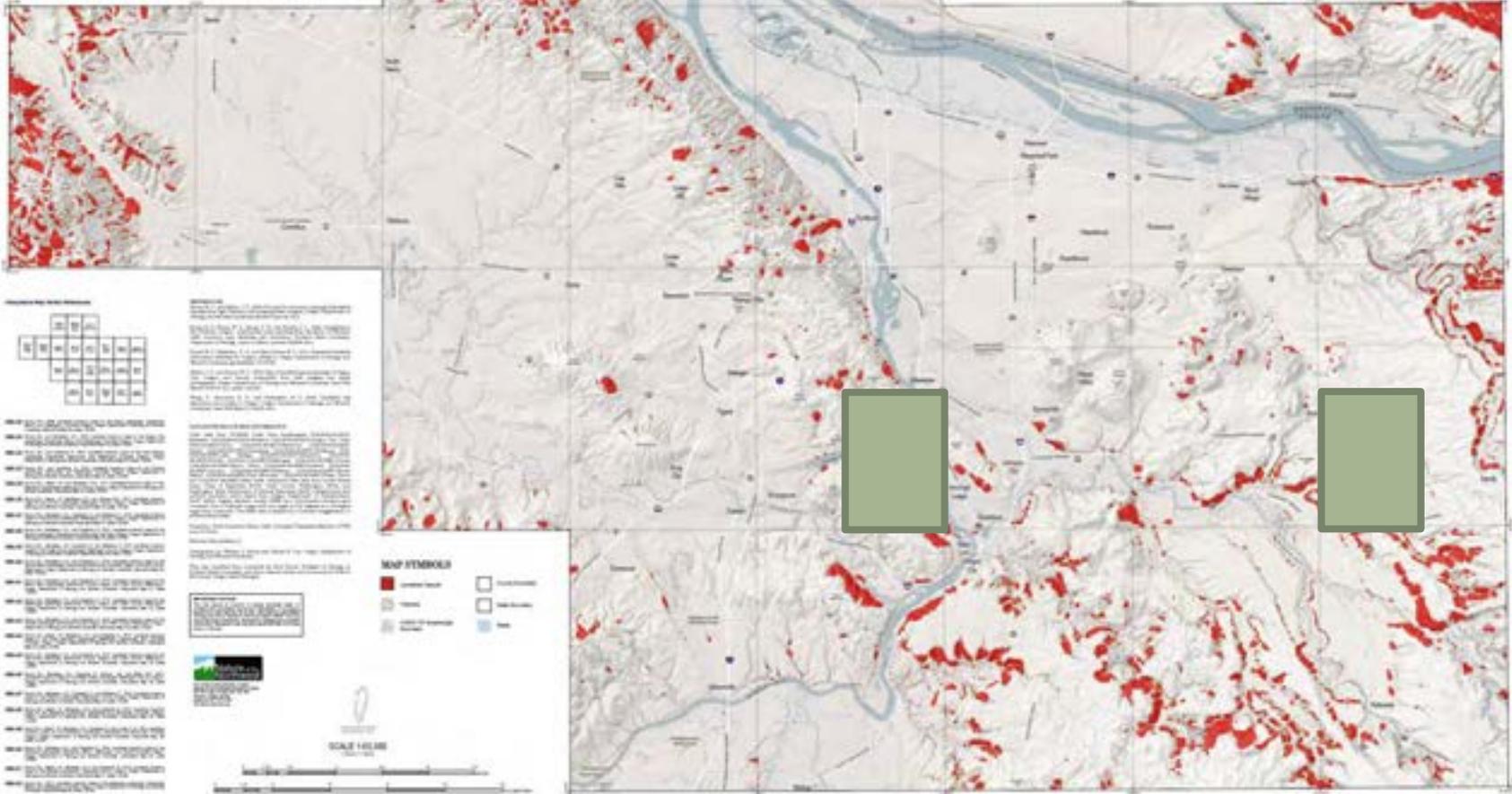
STUDY AREA
 The study area for this inventory is the Portland Metropolitan Region, Oregon and Washington. This region includes the Willamette Valley, Clackamas Valley, and Multnomah Valley, as well as the surrounding mountainous terrain. The study area covers approximately 1,000 square miles and includes major river valleys such as the Willamette, Clackamas, and Multnomah. The inventory of landslide deposits was conducted using Lidar imagery, which provides high-resolution topographic data. The results of the inventory are presented in a series of maps and tables, providing a detailed overview of the distribution and characteristics of landslide deposits in the region.

DATA SOURCES
 The primary data source for this inventory is the National Airborne Laser Swath (NALS) Lidar data, which was collected by the Oregon Department of Geology and Mineral Industries. This data provides high-resolution topographic information that is essential for identifying and mapping landslide deposits. In addition to the Lidar data, the inventory also utilized other data sources, including aerial photography, topographic maps, and geologic maps. These data sources were used to provide context and additional information about the study area and the landslide deposits.

METHODS
 The inventory of landslide deposits was conducted using a series of steps. First, the Lidar data was processed to generate a digital elevation model (DEM) and a slope map. These maps were used to identify areas of potential landslide susceptibility. Next, the Lidar data was analyzed to identify individual landslide deposits. This was done by examining the topographic characteristics of the terrain, such as slope, aspect, and elevation, and by looking for characteristic features of landslide deposits, such as scarps, hummocks, and tailings. The identified landslide deposits were then mapped and categorized based on their geomorphic characteristics and potential hazards.

RESULTS
 The inventory of landslide deposits identified over 10,000 individual landslide deposits in the Portland Metropolitan Region. These deposits are distributed throughout the study area, with a high concentration in the Willamette Valley and Clackamas Valley. The landslide deposits are categorized into several types, including debris flows, debris fans, debris avalanches, and debris slides. Each type of landslide deposit has unique characteristics and potential hazards. The results of the inventory are presented in a series of maps and tables, providing a detailed overview of the distribution and characteristics of landslide deposits in the region.

CONCLUSIONS
 The inventory of landslide deposits presented in this report is a critical component of the regional landslide hazard assessment and mitigation efforts. By providing a detailed inventory of landslide deposits, this report enables land-use planners, engineers, and emergency responders to better understand the distribution and characteristics of landslide hazards in the region. This information is essential for developing effective hazard mitigation strategies and emergency response plans. The results of the inventory also highlight the need for continued research and monitoring of landslide hazards in the Portland Metropolitan Region.



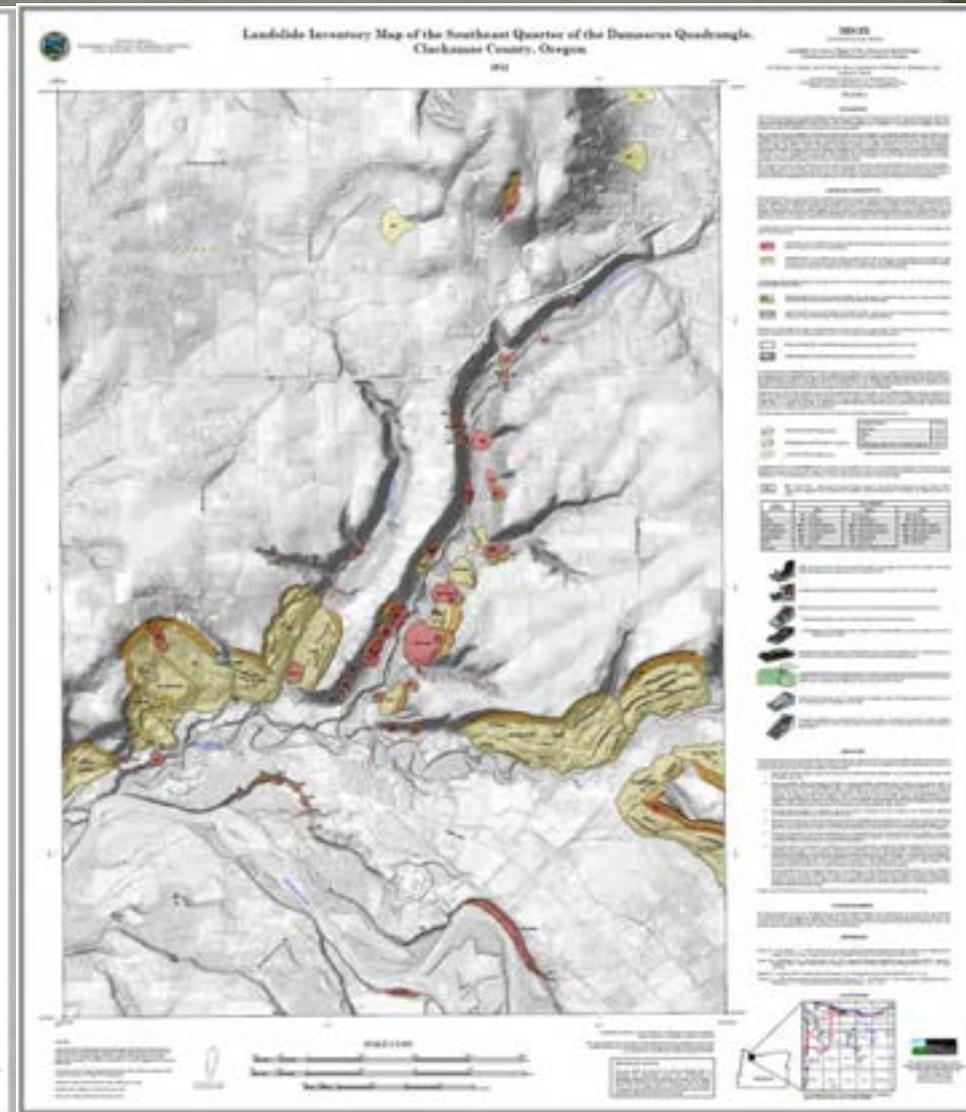
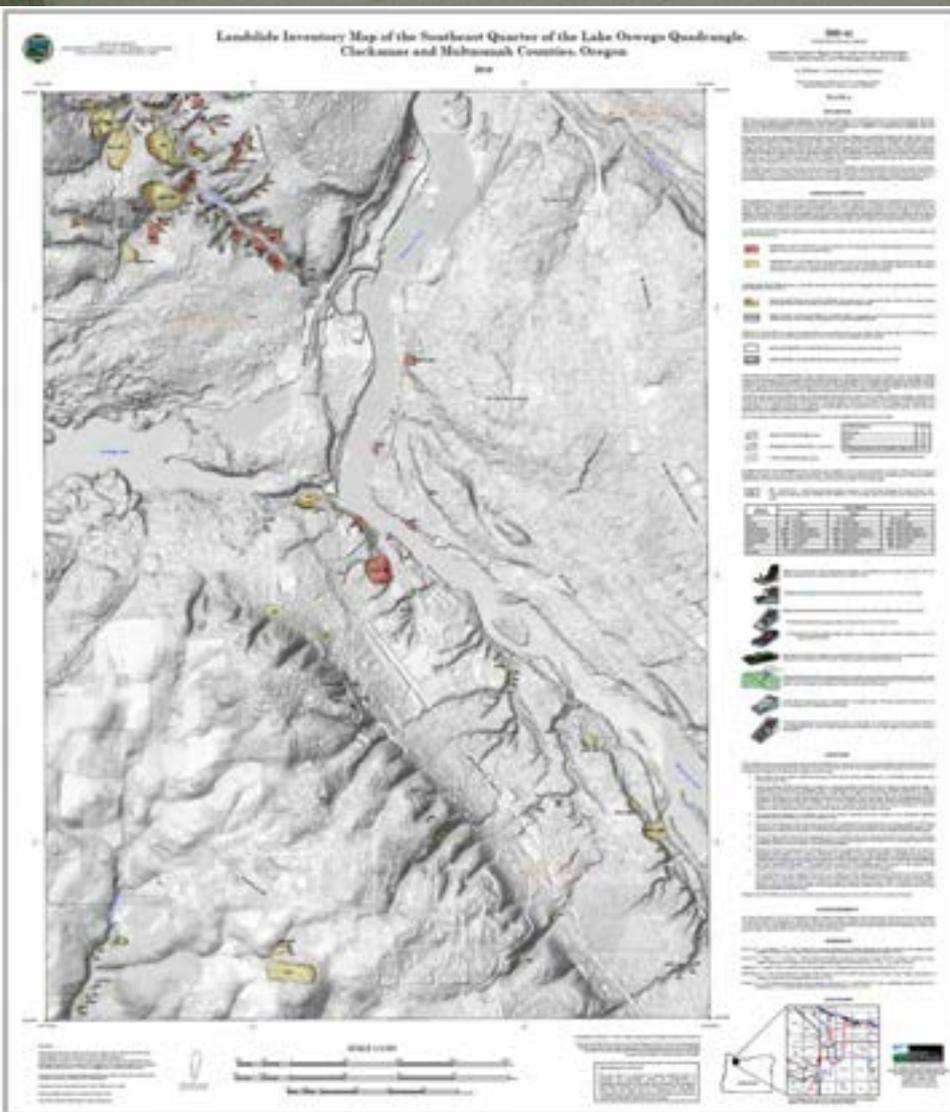
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ACKNOWLEDGMENTS
 The authors would like to thank the Oregon Department of Geology and Mineral Industries for providing the Lidar data used in this inventory. We also thank the staff of the Oregon Department of Geology and Mineral Industries for their assistance in the field and in the laboratory. The authors also thank the reviewers for their helpful comments and suggestions.

REFERENCES
 Oregon Department of Geology and Mineral Industries. 2010. National Airborne Laser Swath (NALS) Lidar Data. www.oregon.gov/odeg

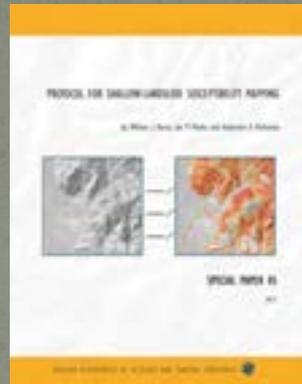
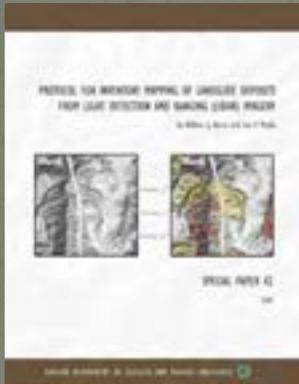
United States Geological Survey. 2000. National Map Accuracy Standards. www.fgdl.gov

88 Maps, 7,081 Landslides !



DOGAMI is Developing a Set of Protocols to Create Landslide Hazard Maps

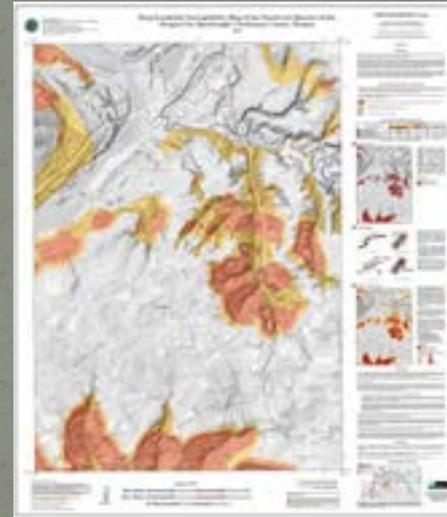
Due Out End of 2013



Map of Existing Landslide Deposits



Shallow LS Susceptibility



Deep LS Susceptibility



Debris Flow Susceptibility

Maps of Places Likely to have Landslides in the Future

Facts from the past

Models that try to predict the future

Think of Landslide Risk Reduction Like Your Health

Can't guarantee we won't have a heart attack,
but we can reduce the likelihood

1. Proactive (Pre-disaster Mitigation)

- Hard to return to “normal” after we have a heart attack
- Same with landslides: Once it happens most have severe economic and other hardships
- No insurance! Everyone sues.

2. Multiple Risk Reduction Activities

- Health = Exercise, nutrition, aspirin, prescriptions...
- Same with landslides = Regulations, education, planning...

Risk Reduction Activities

- ◆ **Public Awareness**
 - ◆ **Everyone needs to be part of the solution**
- ◆ **Development Regulation**
 - ◆ **Regulation would require certain studies and slope stabilization prior to development**
- ◆ **Planning**
 - ◆ **Avoidance in very high hazard areas or alternate land use**

Example: Risk Reduction Regulation



Example: Neighborhood in East Astoria
Small amount of grading caused big problem

Example: Regulation



Example: Regulation



But the map is only the beginning of the conversation...

How is this new information interpreted and applied in a way that makes sense to the community?

Oregon's Statewide Planning Goals and Guidelines

GOAL 7: AREAS SUBJECT TO NATURAL HAZARDS

RESPONSE TO NEW HAZARD INFORMATION

- 1. New hazard inventory information provided by federal and state agencies shall be reviewed by DLCD in consultation with affected state and local representatives.
- 2. DLCD shall notify local governments if the new hazard information requires a local response.
- 3. Local governments shall respond to new inventory information on natural hazards within 36 months after being notified by DLCD, unless extended by the Department.

Goal 7 is considered to be vague and in some ways difficult to implement

STEP	CHALLENGE
New hazard information created	No system for information notification or obtaining and sharing the data
DLCD consults with affected state agencies and local governments	Limited funding for consultation
DLCD decides if local response is necessary	No established criteria
DLCD notifies local government	
Local government responds – 3 years <ul data-bbox="115 1042 888 1256" style="list-style-type: none">• Evaluation• Public Review• Incorporation into Comp Plan and implementation measures	No system or funding in place for: <ul data-bbox="985 1042 1758 1256" style="list-style-type: none">• Providing new hazard information• Providing technical assistance<ul data-bbox="1081 1156 1738 1256" style="list-style-type: none">• Interpretation & Application• LHMP/Comp Plan Integration

Looking Ahead to Solutions – need for a hazards planning framework

- The discovery and assessment of hazards information
- Preferred methodologies and tools to assess community vulnerability and risk
- The trigger to initiate local hazards planning under Statewide Planning Goal 7
- How to assist communities that *request* assistance
- The proliferation of, access to, ownership and maintenance of hazards information
- Etc.

Collaboration is the Key !

- Today: Beginning to collaborate
 - Example: Clackamas County landslide risk reduction project
 - Task 1: Created suite of landslide hazard maps
 - Task 2: Performed multiple risk analysis
 - Task 3: Implementation/Use of data
 - Called in DLCDC
 - Delayed roll-out of maps so we can collaborate on producing a model code for reducing risk from landslides

How We Get There:

- DOGAMI and DLCD prioritize future mapping
- DOGAMI produces the maps
- DOGAMI and DLCD coordinate on technical aspects
- DLCD helps local governments incorporate maps into the planning process
- Capacity - Respond to other requests for assistance on hazard mitigation from other local jurisdictions
- Oregon Landslide Workgroup – Create a landslide specific group that shares information and works together to reduce risk
- Connect with other state efforts (e.g., implementation of the Oregon Resilience Plan)

Collaboration Requires Funding

- DOGAMI has scientific expertise. DLCD has planning expertise.
- We need to collaborate to better serve communities.

State and Local Hazard Mitigation Planning

Joint LCDC/DOGAMI Governing Board Meeting
September 26, 2013

Marian Lahav, DLCD Natural Hazards Planner
Rachel Smith, DOGAMI Project Operations Manager

Natural Hazard Mitigation

Short- and long-term actions taken to reduce or eliminate risk of damage to life, property, and resources from natural hazards.

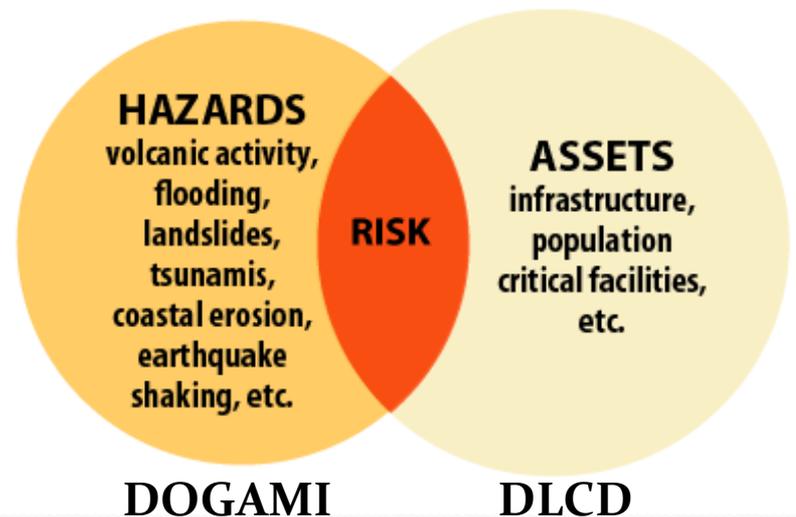
DOGAMI's MISSION:

Provide earth science information and regulation to make Oregon safe and prosperous.

DLCD's MISSION:

Help communities and citizens plan for, protect, and improve the built and natural systems that provide a high quality of life.

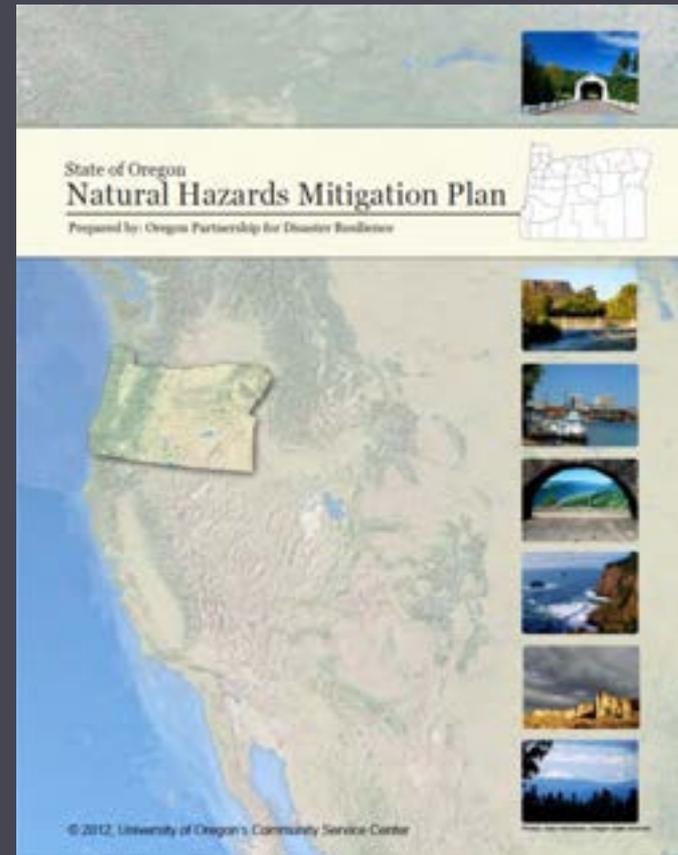
Prepare and Be Aware



*Our agencies collaborate best when working to mitigate **RISK**.*

State Hazard Mitigation Plan

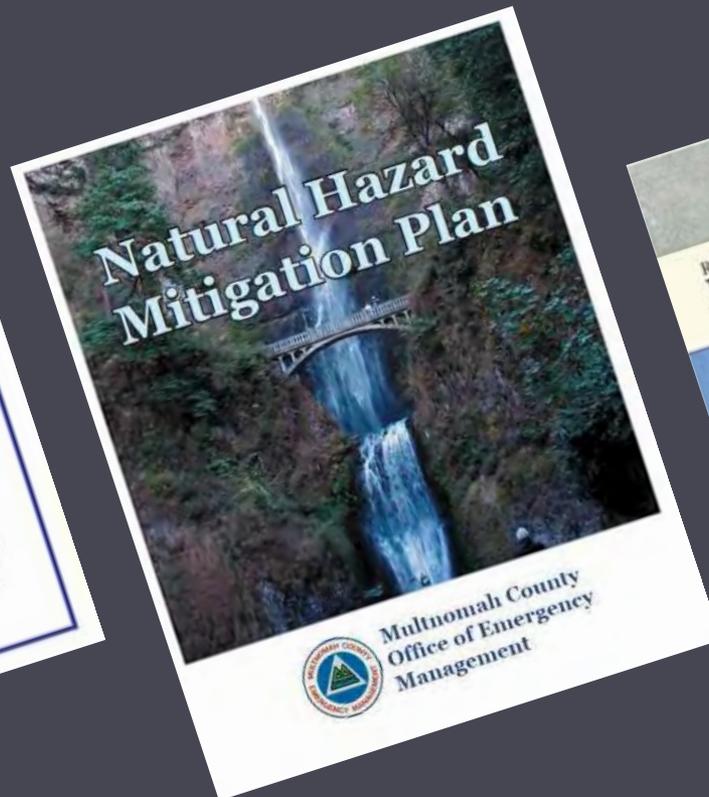
1. *Coastal Erosion*
2. Drought
3. Dust Storms
4. *Earthquakes*
5. Fire
6. *Flood*
7. *Landslide and Debris Flows*
8. *Tsunamis*
9. *Volcanic Eruptions*
10. Windstorms
11. Winter Storms



Why do we have State & Local Natural Hazard Mitigation Plans?



City



County



Region

No State Plan

NO FUNDING!

State & Local Plans

Public Infrastructure
and Private Mitigation



SHMP & LHMP Comparison

State Plan	Local Plans
First Plan 1992	All 36 counties have plans
<i>3-Year</i> Update Cycle	<i>5-Year</i> Update Cycle
Current Deadline: <i>March 2, 2015</i>	<i>75% of Counties Current</i>
Risk Assessment	Risk Assessment
Mitigation Actions	Mitigation Actions
Repetitive Loss Optional	<i>NFIP & Repetitive Loss Required</i>
Coordination with LHMPs	<i>Integration w/Local Plans</i>

SHMP, LHMPs, and Goal 7

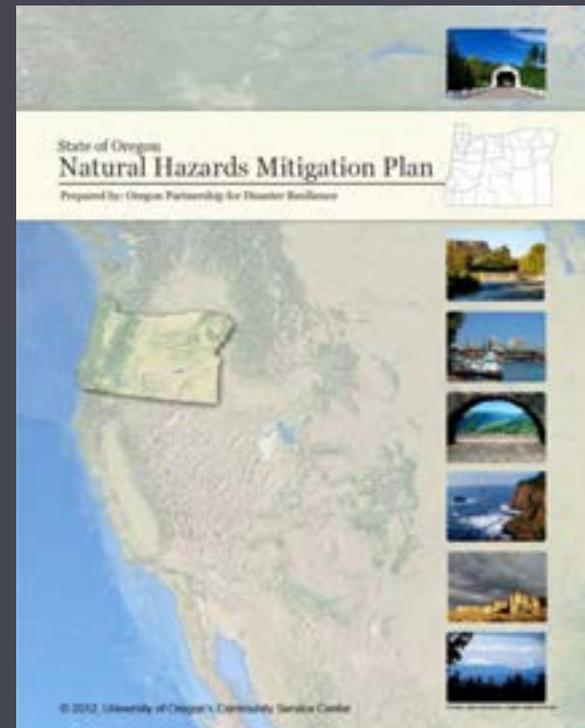
SHMP Requirements	Goal 7 Requirements
	Local: Adopt Comp Plans to reduce risk from natural hazards.
Process for reviewing, coordinating , and linking LHMPs to the SHMP	State: Coordinate SHMP and programs with local governments
Support development of LHMPs through technical assistance	State: Provide local governments with hazard inventory information
Support development of LHMPs through technical assistance	State: Provide local governments with model codes and risk evaluation methodologies
Support development of LHMPs through funding and assistance with federal grant applications	

Goal 7 Process Challenges

STEP	CHALLENGE
New hazard information created	No system for information notification or obtaining and sharing the data
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SHMP Collaboration

- Risk assessment
- Hazard characterization
- Mitigation successes
- Mitigation actions and strategies
- New risk assessment methodology**



LHMP & Goal 7 Collaboration

- Technical Assistance to Local Governments
- Goal 7 Implementation



Internal Collaboration

- Regular coordination meetings
- Consulting relationship
- Long-term coordinated work program
- Long-term risk assessment platform
- Public outreach and education



Collaboration Challenges



Summary

Strategize to ensure early and effective collaboration with quality products and performance!

- Risk Reduction
- Collaboration
- Funding



Questions?



Thank you!