

Appendix A

2002 Flood Map Modernization Plan for Oregon

Flood Map Modernization Plan for Oregon

FEMA Flood Map Modernization

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Mapping Plan for Oregon

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Executive Summary

Updates of the Federal Emergency Management Agency's (FEMA's) floodplain maps are proposed in the President's Fiscal Year (FY) 2003 budget. FEMA is calling on individual states to identify how they would implement flood map updates. This plan addresses the state of Oregon's role in updating maps, the need for updates based on current flood map information and how states propose to produce these maps. This plan outlines the State of Oregon's strategy for flood map modernization.

The State of Oregon would like to take a "mid-level participation" role in the flood map modernization. The state is capable of coordinating the majority of the needs assessments and assisting with outreach and community coordination on mapping projects. The University of Oregon's InfoGraphics Lab and Natural Hazards Workgroup may play a role in this. If additional resources are provided for state, Oregon may have the capacity to manage some flood mapping projects however, the state will not conduct flood studies or produce the new flood maps. These activities will continue to be conducted by FEMA's mapping contractors and others with experience in conducting flood studies and producing digital map products.

According to the initial needs assessment conducted by the State of Oregon Department of Land Conservation (DLCD), the State's lead agency on map modernization, a few counties stood out as having a particularly high priority needs for map updates. Clackamas County is identified as having the greatest need according to a variety of analyzed categories surrounding relating to the status of existing maps, community size and development as well as flood issues and past flood history. The level of map upgrade in Clackamas County is suggested as a mix of Level 1 and 2 (less detailed and more detailed studies). Other counties proposed for immediate map updates include Gilliam, Sherman and Yamhill for countywide Level 1 updates, and Douglas, Jackson, Morrow, Multnomah, Umatilla and Union for combined Level 1 and Level 2 updates. Level 1 studies will also be done in a number of Counties where new base map information is available. In addition to these priorities, the state has identified flood-related hazards that are specific to Oregon and the Pacific Northwest that should be considered as part of the mapping effort.

In terms of map production, the state of Oregon proposes that FEMA spearhead the efforts to produce the flood maps. The state would however be willing to help coordinate and scope the work to be done for map production.

Oregon will meet help FEMA meet the GPRA goals by:

- reducing the average age of the state's flood maps from 14.6 years to 11.0 in the first year of the project;
- digitizing maps for eight (8) counties in the first year; and
- mapping one of the state's two remaining unmapped floodprone communities.

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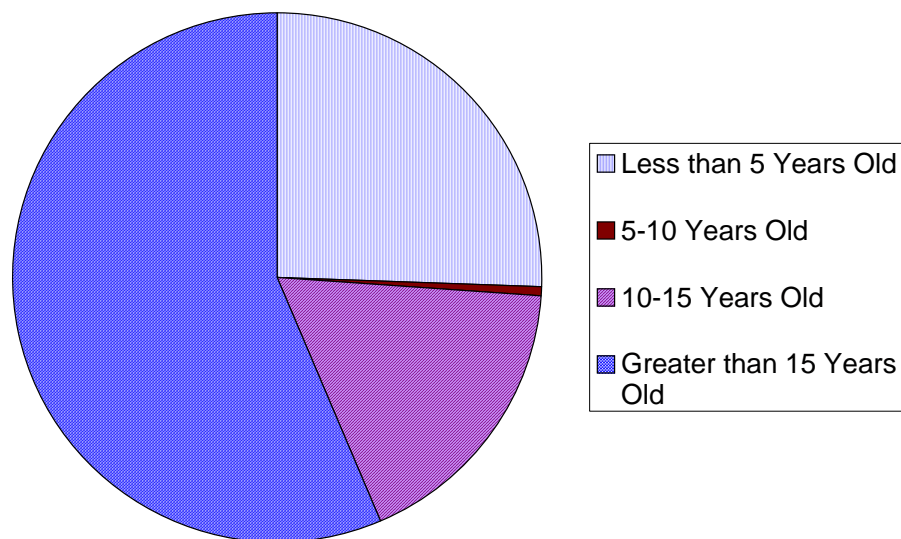
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Background and Purpose of Oregon's Mapping Plan

The Federal Emergency Management Agency's (FEMA's) flood hazard maps are one of the essential tools for flood hazard mitigation in Oregon and in the United State in general.

Figure 1 - Age of Oregon's Flood Map Panels

Age of Effective Map Panels in Oregon



Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002

In many cases, the older maps reflect outdated flood hazard information that limits their utility for insurance and floodplain management purposes. Additionally, most of the maps were prepared using now outdated road network information and manual cartographic techniques, which make the maps difficult for State and local customers to use and expensive for FEMA and the state of Oregon to maintain. In addition, FEMA has not produced flood maps for three of Oregon's floodprone communities.

The State of Oregon is committed to working with FEMA to update flood maps. As seen in Figure 1, the majority of Oregon's maps are more than 15 years old. Many maps were originally produced in the early 1980s. Since then, Oregon's population has increased significantly, particularly in the floodprone Willamette Valley and in some coastal communities. The state suffered significant flood losses in 1996 and 1997 when 27 of the state's 36 counties were declared federal disaster areas. In many cases, flooding occurred in areas with no mapped flood hazards.

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To address these and other map problems, the President's budget for Fiscal Year (FY) 2003 (which starts on October 1, 2002) includes \$351 million for initiating FEMA's national Map Modernization Program. Similar funding amounts are proposed for subsequent years.

This plan was prepared to assist in the development of regional and national plans for implementing the FEMA's Map Modernization Program. This Plan summarizes the role that Oregon will play in completing the required mapping activities and how these activities will be managed and performed. This Plan identifies mapping priorities, explains how mapping priorities were established for each county in Oregon and outlines an approach for addressing these mapping priorities.

In accordance with Government Performance Results Act (GPRA) performance measures suggested by the Office of Management and Budget (OMB), the details of this plan have been developed to assist FEMA in accomplishing the following:

- Reducing the average age of flood maps nationwide from 13.6 years to 6 years or less (in Oregon, the average age of flood maps is 14.6 years);
- Producing digital flood hazard maps with up-to-date flood hazard data for the 15% highest priority areas in the state; and
- Developing flood hazard maps for half of the unmapped, floodprone communities in Oregon.

In addition, Oregon hopes to implement a plan that includes a 20% cost-share provided by State and local partners to support the mapping effort.

The remainder of this plan outlines the role the State will play in future flood hazard mapping efforts, and how such efforts will be managed and performed.

The Role of the State in the Flood Hazard Mapping Program

The State of Oregon's role in updating flood hazard maps will initially be at the mid-level of participation. The state will manage some mapping activities and will work with FEMA to develop a partnership agreement that will clearly identify the respective roles of the state and FEMA's regional office. This plan proposes a role in which the state assumes the lead in project coordination, mapping needs assessment including more detailed project scoping, data collection, and *some* aspects of map production but leaves long-term data/database management and flood studies to FEMA and flood mapping contractors. The state will work with local governments to perform outreach efforts.

Lead Agency

The Oregon Department of Land Conservation and Development (DLCD) will take the lead for the State of Oregon in the Statewide Flood Hazard Mapping Program as part of its ongoing floodplain management responsibilities. The agency's role will be project coordination. DLCD will coordinate with local governments in the project scoping phase and will assist local governments in developing Cooperating Technical Partnership agreements with FEMA. A key part of the lead agency's coordination role will be to facilitate the acquisition and preparation of statewide GIS and base mapping data. The lead agency will focus primarily on acquiring base mapping data that is in the public domain and free from proprietary licensing agreements and making this information available to FEMA's mapping partners.

Coordination / Managing with Partners

The Department of Land Conservation and Development (DLCD) will work closely with partnering state agencies, local governments and the University of Oregon InfoGraphics Lab, to coordinate and facilitate the Statewide Flood Hazard Mapping Program.

The State of Oregon currently has an organizational structure for creating, collecting and distributing geographic information. The lead agency will work with the Oregon Geographic Information Council (OGIC) and the Oregon Geographic Data Clearinghouse (OGDC) in its role to collect data. OGIC members include agency directors, deputy directors, and policy level alternates from local governments, federal agencies and state agencies. The lead agency will work in particular with the Geoscience Framework Implementation Teams (FIT) to identify and collect existing datasets.

FIT currently coordinates efforts on the 7 framework layers identified by the Federal Geographic Data Committee (FGDC): elevation, hydrography, geodetic control, tax lots (cadastral), transportation, administrative boundaries, and digital aerial photography (orthoimagery). The FIT group has also defined several additional framework layers specific for Oregon; bioscience, climate, cultural, geoscience, land cover/land use, and utilities.

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The GeoScience FIT group has identified flood hazard boundaries as a framework development priority. This will serve in an advisory role for the State Flood Mapping Plan.

Members of the FIT group are:

Andrew Rorick, US Forest Service
Courtney Cloyd, US Forest Service
Ron Geitgey, OR Geology & Mineral Ind.
Paul Stueb, OR Geology & Mineral Ind.
Doug Terra, OR Watershed Enhancement Bd
Sharon Clarke, OSU - Forest Science
Ian Reid, USDA – Nat Resource Conserv. Ser.
Jim Meacham, Univ. of Oregon

Teresa Gaffney, Tillamook County
Daryl Gusey, US Forest Service
Nancy Tubbs, US Geologic Service
Fred Lissner, OR Water Resources
Cy Smith, OR Administrative Services
Susan Nelson, US Bur. Of Land Mgt.
Paul Pedone, USDA-NRCS
Fred Gullixson, OR Dept. of Transport.

Major tasks for both lead and partner agencies will be the scoping of the individual map update project as well as collecting and assembling data.

Scoping

The state will also assume a lead role in coordinating and managing the “scoping” portion of the flood mapping program. The scoping process will entail: researching and inventorying available elevation, flood hazard, and digital base map data, assessing adequacy of existing flood hazard data, outreach to, and input from, counties and communities, identifying data to be developed or acquired, determining proposed scales, paneling scheme, and format for DFIRM production. To assist the state in the areas of Geographic Information Systems (GIS) mapping and hazards planning potential sources of expertise include the University of Oregon’s InfoGraphics Lab and Oregon Natural Hazards Workgroup. The State will also work closely with the Oregon Geographic Information Council (OGIC) and Oregon Geographic Data Clearinghouse (OGDC) during the scoping process.

Collecting and Assembling Data

The state will gather and provide existing statewide topographic/elevation, orthophotography, and base mapping data, focusing on data that can be obtained in a timely manner and can be freely distributed. The state will prioritize the collection of statewide and countywide datasets that enables the creation of the greatest number of countywide DFIRMs. When data is available at the local level, as determined through the scoping process, that data will be evaluated and, if it exceeds the accuracy of state base data, it will be integrated into the DFIRM.

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Map Upgrade Plan

FEMA has identified two categories for those communities that are currently mapped but are in need of upgrades; flood map upgrade Level 1, and flood map upgrade Level 2.

Level 1 Upgrades

Level 1 map upgrades are improvements to existing flood maps that are not based on the development of new detailed flood hazard information. These improvements consist of:

- a) converting manually produced paper maps to new DFIRM specifications or upgrading existing digitally produced maps to the new DFIRM specifications,
- b) utilizing current base maps that meet current FEMA specifications,
- c) when feasible, enhancing the flood theme by using all existing and readily available data that meets or exceeds National Flood Insurance Program (NFIP) mapping standards,
- d) incorporating Letters of Map Change (LOMCs), and
- e) fixing mismatched flood hazard boundaries across corporate limits.

Level 2 map upgrades include all of the elements of a Level 1 upgrade, as well as establishing or revising Base Flood Elevations through an engineering study or restudy or other existing data sources. In addition, there is a Flood Map Creation category for those communities that are unmapped and floodprone.

The state will prioritize the creation of countywide flood hazard maps and databases, focusing on "Level 1" upgrades that will create 979 maps in DFIRM format. With almost 1,000 maps in need of updating, Level 1 upgrades are much less expensive per panel update than both the more comprehensive Level 2 map upgrades and new map creation. These maps are particularly well suited for areas with limited development potential and areas that have not experienced significant flooding. Focusing predominately on Level 1 Flood Map Upgrades will have the greatest impact on reducing the average age of flood maps in Oregon. Upgrades at this level will increase base map currency, provide a building block for the next phase of map modernization, and will reflect flood hazard data in a format that is easily accessed and less difficult to manage and distribute.

Q3 to DFIRM and Base data to DFIRM

Within Level 1 upgrades, the state will focus on converting those counties with existing flood hazard data in Q3 format to DFIRM specifications and collecting current base data in DFIRM format. Focusing on these two elements of the Level 1 upgrade process provides the most appropriate opportunity to use the state's GIS mapping resources to effectively reduce the age of flood hazard maps.

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Level 2 Upgrades

Level 2 map updates involve the development of new detailed flood hazard information. These upgrades typically require updated topographic data, structure and cross-section surveys, hydrologic and hydraulic engineering analysis, and floodway and floodplain boundary delineation or redelineation.

The state will identify those communities most in need of level 2 upgrades, based on an initial screen of communities and further needs assessment and discussion with Oregon communities. The state will play a lead role in gathering and compiling the data necessary for creating the upgraded base maps for producing DFIRMs. The state may serve as a contracting agent but conducting engineering and flood studies, and providing oversight and quality control, will be left to FEMA and its National Mapping Partners.

New Maps for Unmapped / Floodprone Communities

The state will also identify those communities that are candidates for new mapping. Oregon is fortunate to have a low number of unmapped communities in the state. Of those unmapped communities, most are not floodprone. Of the two communities that are unmapped and have flood hazards, one is under the jurisdiction of its respective counties for floodplain management (Damascus in Clackamas County) but still may need detailed mapping done. The other, Banks in Washington County is in need community level flood maps. The state will play a lead role in gathering and compiling the data necessary for creating base maps necessary for producing DFIRMs for half of the unmapped, floodprone communities and may manage contracts to have the flood studies performed. However, the state will leave the technical oversight and production of flood studies to FEMA and its National Mapping Partners.

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Mapping Needs Assessment

To evaluate the State's mapping needs, Oregon's Department of Land Conservation and Development (DLCD) initiated a mapping needs assessment in June 2002. This mapping needs assessment included the following tasks:

- Reviewing information in FEMA's Mapping Needs Update Support System (MNUSS);
- Revising available community-specific data;
- Assigning preliminary map upgrade methods and priorities to each county; and
- Assessing whether the proposed map update options would achieve the GPRA performance measures.

The State has begun discussions with individual jurisdictions to evaluate the identified state mapping priorities and to get feedback on the accuracy of the map update methods (e.g., Number of Level 1 or Level 2 updates) recommended for each jurisdiction.

The mapping needs assessment was undertaken in cooperation with, and with the support of FEMA and the region's Flood Map Production Contractor (Michael Baker). The following data was collected and assessed on a county-by-county basis:

- Age of the existing Flood Insurance Rate Maps (FIRMs);
- Known mapping needs according to the Mapping Needs Update Support System (MNUSS);
- Status of existing maps (digital, manual, none);
- Existing or potential local mapping partners;
- Number of unmapped, floodprone communities;
- Availability of existing base map, topographic data and or flood hazard data;
- Numbers of letters of map change (LOMC's);
- Population and population growth;
- Flood insurance claims and/or repetitive losses;
- Availability of State and/or local funding;
- Format of existing maps (countywide or community-based);
- Ongoing map updates; and
- State specific mapping priorities associated with flood related hazards.

Methodology

Region X provided an extensive set of data on Oregon's flood maps and community characteristics. The data comes from the Mapping Needs Update Support System (MNUSS) and other existing databases and reflects information available as of May 2002. This data was analyzed to identify Oregon's highest priority areas for flood map updates.

In addition, to supplement the MNUSS data, other data provided by FEMA, and data available from various State agency offices, the Oregon Department of Land Conservation and Development, in collaboration with the University of Oregon's InfoGraphics Lab undertook

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additional data collection and outreach activities. Specific data collection and outreach activities are described in the following discussion of Oregon's needs assessment.

Because Oregon plans to conduct map updates in a countywide format, the characteristics of communities and existing maps were analyzed at the county level. An initial screen to identify high priority counties was done by ranking all 36 counties based on the mapping needs assessment factors listed above. The highest priority counties are those that ranked high in several of the assessment factors. More detail is provided in the discussion of each of the assessment factors.

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Age of the Existing FIRMs

Nearly 2,000 Flood Insurance Rate Map (FIRM) panels cover the State of Oregon. Each of these panels was sorted according to their age, oldest to youngest. The data set dated May 10, 2002 from Michael Baker showed that the age of the maps ranged from 26.4 years (City of Eastside in Coos County) to the most recently produced map in May of 2002 (City of Gresham, Multnomah County). Table 1 summarizes the oldest FIRM panels in the State. According to this information it appears that Coos, Clackamas, Tillamook, and Clatsop counties have the most immediate need for map updates due to the fact that they each have multiple map panels of the top ten oldest maps in the state. Appendix Figure 1 and Appendix Table 1 show the average map age for each county.

Table 1 – Oldest Federal Insurance Rate Map Panels (FIRMs) in the State of Oregon

County Name	City / County Name	Date of Last Map Produced	Years Since Production
COOS	EASTSIDE, CITY OF	12/19/75	26.4
COOS	POWERS, CITY OF	6/30/76	25.9
JACKSON	BUTTE FALLS, TOWN OF	6/30/76	25.9
CLACKAMAS	GLADSTONE, CITY OF	3/15/77	25.2
CLACKAMAS	WEST LINN, CITY OF	3/15/77	25.2
TILLAMOOK	WHEELER, CITY OF	11/16/77	24.5
CLATSOP	HAMMOND, CITY OF	4/17/78	24.1
TILLAMOOK	GARIBALDI, CITY OF	4/17/78	24.1
CLATSOP	WARRENTON, CITY OF	5/15/78	24.0
CLATSOP	CLATSOP COUNTY*	7/3/78	23.9
CLATSOP	ASTORIA, CITY OF	8/1/78	23.8
TILLAMOOK	BAY CITY, CITY OF	8/1/78	23.8
TILLAMOOK	TILLAMOOK COUNTY *	8/1/78	23.8
CLATSOP	CANNON BEACH, CITY OF	9/1/78	23.7
UMATILLA	MILTON-FREEWATER, CITY OF	9/12/78	23.7
UNION	NORTH POWDER, CITY OF	9/29/78	23.6
DOUGLAS	CANYONVILLE, CITY OF	11/1/78	23.5
UNION	ELGIN, CITY OF	11/15/78	23.5
DOUGLAS	DOUGLAS COUNTY *	12/15/78	23.4
UNION	UNION, CITY OF	12/15/78	23.4

* Maps in unincorporate aspects of the respective Counties

Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002 (Michael Baker)

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Known Mapping Needs

The Oregon Department of Land Conservation and Development evaluated the twenty-five communities with the highest mapping needs as identified in the Mapping Needs Update Support Service (MNUSS) database. The MNUSS data has not been updated in several years and this table reflects more current information. Communities are separated into three categories: already completed, Level 1 and Level 2 studies. It is possible that some of the Level 1 communities may also require level 2 analysis (Table 2).

Most of the communities identified through MNUSS are located in county's that have been identified as high priorities for flood map updates.

Table 2 - Mapping Needs from MNUSS

<i>Community (City unless otherwise noted)</i>	<i>CID</i>	<i>County</i>	<i>Cost (\$)</i>	<i>Benefit/Co st(\$)</i>	<i>Notes/Recommendations</i>
STUDIES COMPLETED					
Forest Grove	410241	Washington	79,000	218.22	Updated as part of Clean Water Services work in Washington County
Sherwood	410273	Washington	41,250	42.19	Updated as part of Clean Water Services work in Washington County
Seaside	410032	Clatsop	86,816	9.03	Draft maps done - digitize as part of Clatsop Cty. Update
Albany	410137	Linn	210,690	8.75	Updated in 1999
Independence	410189	Polk	179,780	26.60	Work underway
Beaverton	410240	Washington	228,270	3.03	Updated as part of Clean Water Services work in Washington County
LEVEL 1 AS PART OF COUNTY UPDATE					
Winston	415593	Douglas	488,970	34.42	Do as part of Douglas Cty. Update - Level 1
Cascade Locks	410087	Hood River	115,000	76.12	Minimal flood losses; minimal flood hazard
Medford	410096	Jackson	74,500	58.90	Crooked Creek study underway?
Scio	410144	Linn	36,700	24.35	Some losses; limited new development
Central Point	410092	Jackson	84,040	21.01	LOMR done recently; flood studies underway
Newport	410131	Lincoln	57,850	18.77	Wait for coastal erosion methodology
Portland	410183	Multnomah	390,000	17.21	Johnson Creek completed;
Talent	410100	Jackson	45,345	14.98	Wagner Creek remapping done in 1999
Manzanita	410199	Tillamook	36,700	11.99	Check V zones
Fairview	410180	Multnomah	39,339	10.29	Assess need for Level 2
Happy Valley	410026	Clackamas	42,160	6.39	
La Grande	410260	Union	133,650	6.06	Assess need for Level 2 work
Toledo	410033	Lincoln	79,490	5.91	
Warrenton	410033	Clatsop	54,900	5.33	Assess need for Level 2 work
Gresham	410181	Multnomah	54,460	5.02	Johnson Creek done;
Ashland	410090	Jackson	53,340	3.93	Assess need for Level 2 work
Dayton	410252	Yamhill	34,880	3.72	
Lakeside	410278	Coos	58,540	2.59	Assess need for Level 2 work - City proposes floodway re-evaluation
Level 2 studies					
Springfield	415592	Lane	289,610	10.43	On schedule for FY 2003 - Level 2

(Source: MNUSS Database)

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In addition the communities listed in the MNUSS database, Madras (Jefferson County), and Heppner (Morrow County) and Stanfield (Umatilla County) have approached the DLCD to determine the feasibility of new flood studies to make adjustments to their floodways. For example, in Stanfield, the city has removed a number of houses from the existing floodway, thus reducing the city's flood hazards.

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Status of Existing Maps

Table 3 outlines the formats of the existing flood maps for Oregon counties. The only county in a completely digital format is Lane County, however this format is based on FEMA's old standards for digital maps. Most of the maps in Lane County are based on the original flood study data generated in the 1980s. FEMA recently provided copies of flood maps statewide that have been scanned into a digital format. In some counties, such as Washington County, several communities have been digitally modernized up to new standards, and the rest of the county remains in the old digital format. Thirteen of Oregon's thirty-six counties have flood maps that are still only available in a paper format.

Table 3 –Status / Format of Existing Oregon Flood Maps

<i>All</i>	<i>Some</i>	<i>Manual</i>
LANE	BENTON CLACKAMAS CLATSOP GRANT HOOD RIVER DESCHUTES DOUGLAS GRANT HARNEY JACKSON JEFFERSON LINCOLN LINN MARION MULTNOMAH POLK TILLAMOOK UMATILLA WASCO WASHINGTON	COOS* CROOK GILLIAM* JOSEPHINE* KLAMATH LAKE MALHEUR MORROW* SHERMAN* UNION* WALLOWA* WHEELER YAMHILL*

* Counties listed by Baker as having manual maps but still Q3 Data.

Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002 (Michael Baker)

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Existing or Potential Local Mapping Partners

DLCD has just finished identifying the initial state mapping priorities. The agency is beginning to approach local governments to identify their interest in acting as mapping partners in updating flood maps. Clackamas County, the state's highest priority for flood map updates, is in the process of developing a partnership agreement. Many local governments are likely to have data that will support the remapping effort and will be able to provide staff support for project oversight and public outreach efforts. However, it is unlikely that many rural Oregon counties will be able to participate as full cooperating technical partners (CTPs).

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Number of Unmapped / Floodprone Communities

In addition to the communities listed in Table 4, Oregon has several Tribal governments that manage large areas of land. The Warm Springs and the Burns Paiute tribes already participate in the National Flood Insurance Policy (NFIP). The Umatilla tribe is working with the Army Corps of Engineers to map flood hazards in lands under their jurisdiction. The state will work with the remaining tribes in Oregon that have lands with flood hazards to assess their mapping needs and interest in participating in the National Flood Insurance Program. These discussions will occur in FY 2003.

From the information in the Mapping Needs Update Support System (MNUSS) database, two (2) of the 21 listed communities are unmapped *and floodprone*. These are the communities of Banks in Washington County, and Damascus in Clackamas county. Mapping efforts of Damascus will be covered by the countywide update conducted in Clackamas County as the number one priority county to map.

Some cities/communities listed in MNUSS as being unmapped have had maps recently completed . Both the City of Spray and the Warm Springs Reservation have just finished establishing flood maps for their communities. Some of these maps were finalized in early 2002.

A large number of the unmapped communities listed in MNUSS do not have flood hazards associated with them according to initial surveys conducted by DLCDC. Of those communities the city of Imbler in Union County has had some drainage issues caused by heavy precipitation and frozen ground that has prevented ground filtration. This flooding is not associated with any local waterway. The remaining communities (Richland, Unity, Adair Village, Granite, Metolius, Malin, Donald, Maywood Park, Moro, Antelope, and Shaniko) all are quite small (under 1,000 people) and have no flood hazards associated with them according to initial research. The only larger community, Redmond (population 14,950) has no flood hazard associated with it.

In order to meet an aspect of GPRA performance goals, mapping half of the unmapped floodprone communities, the state of Oregon proposes that one (1) of the two (2) communities be mapped in the first year of map modernization. The map the state has nominated for initial update in year one is Damascus. Banks will be mapped in the second year of map modernization.

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Table 4 - Unmapped Oregon Communities

City/Community	County	Population 2000	Hazard Source	Notes
Floodprone communities				
Banks	Washington	1286	West Dairy Creek	Small flood concerns, a part of larger recently updated flood region
Lonerock	Gilliam	24	Robinette and Brown Creek	Very Small Community, study would not be cost effective, No local land use plan; development subject to County jurisdiction
Sodaville	Linn	290	Oak Creek	Small community; No local land use plan; development subject to County jurisdiction
Damascus	Clackamas	-	-	Rock / Richardson Creek Study will address this
Unmapped communities without flood hazards				
Richland	Baker	150	None	
Unity	Baker	130	None	
Adair Village	Benton	600	None	
Redmond	Deschutes	14,960	None	
Granite	Grant	20	None	
Metolius	Jefferson	660	None	
Malin	Klamath	640	None	
Donald	Marion	610	None	
Imbler	Union	280	None	Some drainage issues
Merrill	Klamath	900	None	
Maywood Park	Multnomah	780		
Moro	Sherman	340		
Antelope	Wasco	60	None	
Shaniko	Wasco	30	None	
Communities that have maps				
Warm Springs Tribe	Jefferson			Map finalized in 2002
Spray	Wheeler	140	John Day	Map already completed

Source: Mapping Needs Update Support System (MNUSS)

Mapping Plan for Oregon

Number of Communities

For each of the high priority counties identified in this plan, the number of communities within each county is provided.

Existing Flood Hazard Data

Data Collected / Provided by the State

The state can provide a wide range of existing GIS and base mapping data to FEMA and its mapping partners that can greatly reduce the time and cost of the flood mapping projects. Through the collaborative efforts of many state agencies and the Oregon Geospatial Data Clearinghouse a great deal of spatial data is being organized in a manner that facilitates easier project collaboration. The data can also be provided in a common geographic projection, which will also greatly reduce the time and cost involved in processing the data to be used for flood mapping and DFIRM creation (See Appendix B for detailed section summarizing data provided by the state).

Mapping Plan for Oregon

Flood-Related Disaster Declarations

Table 5 summarizes the number of flood-related disasters declared in each county during the period from 1978 to May 2002. Counties with fewer than five (5) declarations since 1978 are not included in this table. The number of disaster declarations provides an indication of flood risk for a particular county.

Table 5 – Oregon Counties with 5 or More Flood Related Disaster Declarations as of 5/02

<i>County</i>	<i>Flood-Related Disaster Declarations</i>
DOUGLAS COUNTY	7
LANE COUNTY	7
TILLAMOOK COUNTY	7
CLATSOP COUNTY	6
COOS COUNTY	6
WASHINGTON COUNTY	6
CLACKAMAS COUNTY	5
GILLIAM COUNTY	5
JOSEPHINE COUNTY	5
LINCOLN COUNTY	5
WALLOWA COUNTY	5
WASCO COUNTY	5
YAMHILL COUNTY	5

Source: Oregon State Mapping Data from FEMA Region X – May 10, 200 (Michael Baker)

According to Oregon Emergency Management, there are currently no open flood disasters in the state.

Mapping Plan for Oregon

Number of Letters of Map Change (LOMC)

Letter of Map Revision (LOMR)

The greater the number of LOMRs in any county may indicate a higher need for updating flood maps. Table 6 shows the top ten counties of reported LOMR cases. According to the data provided by FEMA, Clackamas County exhibits a high need for map updates because it has the highest number of reported LOMR cases at 13. Twenty-two counties reported no LOMR cases.

Table 6 – Top Ten Oregon Counties with Highest Number of LOMR Cases

County	LOMR
CLACKAMAS	13
MULTNOMAH	11
LANE	10
MARION	10
WASHINGTON	10
JACKSON	7
POLK	7
LINCOLN	4
COOS	2
BENTON	1

Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002 (Michael Baker)

Mapping Plan for Oregon

Letter of Map Revision Based on Fill (LOMR-F)

Another category that indicates a level of need for map modernization is the number of Letters of Map Revision Based on Fill (LOMR-F). Table 7 notes the counties with the highest number of LOMR-F cases. Lane County leads the list of counties with the most at 41. Twenty-two Oregon counties reported zero LOMR-F cases. The cumulative effects of fill on flood storage may not be reflected in current maps so a high number of LOMR-F cases may suggest a need for map updates.

Table 7 – Top Ten Oregon Counties with Highest Number of LOMR-F Cases

County	LOMR-F
LANE	41
WASHINGTON	25
CLACKAMAS	23
MULTNOMAH	17
MARION	15
BENTON	9
POLK	8
COOS	5
DOUGLAS	5
LINN	5

Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002 (Michael Baker)

Mapping Plan for Oregon

Letter of Map Amendments (LOMA)

Letters of Map Amendments (LOMAs) are also examined as a category in which communities with higher LOMAs may have a more significant need for map modernization due to potential map inaccuracies. Table 8 indicates that Lane County as clearly having the most LOMAs. There were five counties (Gilliam, Lake, Sherman, Wasco and Wheeler) with no LOMA requests.

Table 8 – Top Ten Oregon Counties with Highest Number of LOMA Cases

County	LOMA
LANE	359
WASHINGTON	119
MARION	101
CLACKAMAS	86
BENTON	85
JACKSON	77
DOUGLAS	71
MULTNOMAH	59
LINCOLN	57
LINN	51

Source: Oregon State Mapping Data from FEMA Region X - May 10, 2002 (Michael Baker)

Mapping Plan for Oregon

Population Growth

Population Change - 1980-1990

Population growth from 1980-1990 was most dramatic for Washington County (21.10%). The largest loss in population in the state for the same period occurred in Gilliam County (-19.80%). A total of 13 of the 36 Oregon counties had decreases in population from 1980 to 1990. Each of the listed counties in Table 9 experienced the highest population growth rates in Oregon from 1980-1990 (Table 9).

Table 9 – Oregon Counties with the Greatest Population Change (1980-1990)

County	Population, 1980	Population, 1990	Population Change (1980-1990) % change
WASHINGTON	245,808	311,554	21.10%
DESCHUTES	62,142	74,958	17.10%
YAMHILL	55,332	65,551	15.59%
JEFFERSON	11,599	13,676	15.19%
CLACKAMAS	241,919	278,850	13.24%
CURRY	16,992	19,327	12.08%
MARION	204,692	228,483	10.41%
JACKSON	132,456	146,389	9.52%
LINCOLN	35,264	38,889	9.32%
POLK	45,203	49,541	8.76%

Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002 (Michael Baker)

Mapping Plan for Oregon

Population Change - 1990-2000

Table 10 highlights those Oregon counties with the highest population growth from 1990 - 2002. Oregon experienced unprecedented growth during this decade with Deschutes County leading the way (53.88% increase). Only 3 of the 36 total counties experienced declines in population during this decade. Sherman County experienced the greatest loss of population at (-7.56%).

Table 10 – Oregon Counties with the Greatest Population Change (1990-2000)

<i>County</i>	<i>Population, 1990</i>	<i>Population, 2000</i>	<i>Population Change (1990-2000) % change</i>
DESCHUTES	74,958	115,342	53.88%
MORROW	7,625	10,987	44.09%
WASHINGTON	311,554	418,377	34.29%
YAMHILL	65,551	85,150	29.90%
POLK	49,541	63,684	28.55%
CROOK	14,111	18,047	27.89%
JEFFERSON	13,676	17,064	24.77%
GILLIAM	1,717	2,118	23.35%
COLUMBIA	37,557	46,248	23.14%
CLACKAMAS	278,850	342,786	22.93%

Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002 (Michael Baker)

Mapping Plan for Oregon

Flood Insurance Claims and / or Repetitive Losses

Repetitive Losses – Zone A – 100-Year Floodplain

Table 11 highlights the Oregon counties with the most repetitive losses /claims that were in zones designated as being within the 100-Year Floodplain. Tillamook County had the largest number of reported repetitive loss / claims at 122 for the measured period. Curry, Harney and Union counties reported zero repetitive losses in Zone A. Additionally, the data set included 13 counties that did not have any information that stated their reported losses.

Table 11 – Oregon Counties with Highest Number of Repetitive Losses in Zone A

County	Repetitive Loss / Claims, A Zones
TILLAMOOK	122
LINCOLN	103
CLACKAMAS	77
WASHINGTON	73
LANE	55
MULTNOMAH	25
MARION	20
DOUGLAS	19
LINN	10
CLATSOP	8

Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002 (Michael Baker)

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Repetitive Losses – Zone B, C and X - Areas Outside the 100-Year Floodplain

For the hazard Zones B, C, and X, areas outside the 100-year floodplain, the top ten counties with the greatest reported repetitive losses or claims are listed in Table 12. Clackamas County (47) has more than twice the number of repetitive losses / claims as Washington County (22), the second highest county. Clatsop, Douglas, Grant, Harney, Josephine, Lake and Umatilla counties all reported zero repetitive losses in Zones B, C, and / or X. No losses in any of these zones were reported in 13 of the 36 Oregon counties.

Table 12 - Oregon Counties with Highest Number of Repetitive Losses in Zone B, C, or X

<i>County</i>	<i>Repetitive Loss / Claims, B,C,X Zones</i>
CLACKAMAS	47
WASHINGTON	22
MULTNOMAH	21
LINCOLN	15
TILLAMOOK	13
BENTON	6
COLUMBIA	4
JACKSON	4
LANE	4
LINN	4

Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002 (Michael Baker).

Availability of State and / or Local Funding

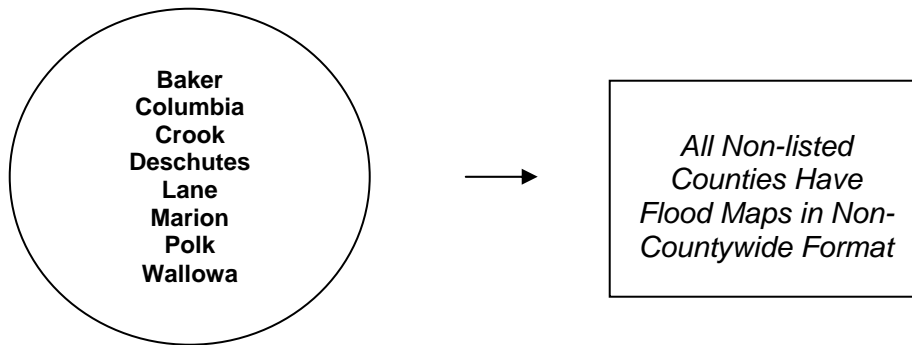
Most of the contributions to the map update effort in Oregon will be based on provision of in-kind services and data. Contribution of hard match will be assessed on a project by project basis. This information will be collected in the scoping process in working with individual jurisdictions.

Mapping Plan for Oregon

Format of Existing Maps

Figure 2 shows only eight (8) counties with maps in a countywide format.

Figure 2 - Oregon Counties with Existing Flood Maps in Countywide Format



Source: Oregon State Mapping Data from FEMA Region X – May 10, 2002 (Michael Baker)

Mapping Plan for Oregon

Ongoing Map Updates

Table 13 summarizes ongoing map updates in Oregon. The State will work with FEMA to determine the number of panels for each community.

Table 13 - State of Oregon Ongoing Map Updates

<i>Community</i>	<i>Estimated Panels</i>	<i>Date</i>	<i>Notes</i>
Central Point	*	Fall 2002	
Washington County	8	Oct 2002	Fanno Creek
	20*		
Portland	13		Crystal Springs and Johnson Creek
Seaside/Clatsop Cty	*		Necanicum, Neawanna, Circle and Beerman Creeks
Talent	*	Done 5/2002	Wagner Creek
Salem/Marion County	*		Mill Creek
Gresham	*		Johnson Creek
Eugene	3		Amazon Creek
Keizer	2		
Umatilla Tribe	15		Flood study work completed but maps have not been provided to FEMA
Independence/Monmouth	3	Sept. 2002	

* Information not yet readily available
(Source: FEMA and State of Oregon Flood Map Data)

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Other Oregon Flood Mapping Priorities

Oregon and the other coastal Pacific Northwest states have several unique flood related hazards including coastal erosion, winter storm surges, tsunamis and landslides. The state proposes addressing these hazards as part of the flood study updates.

Coastal Erosion

Oregon's coastal maps are among the oldest in the state. Many flood map panels for coastal counties can be updated at "Level 1." Those panels along the coast will need additional work to accurately reflect the "V zone" and areas of coastal erosion. The state would like to work with Region X and the other coastal states (Alaska and Washington) to make sure that a methodology is available to incorporate coastal erosion factors into "V zone" development. Thus, updates of those panels will coastal flooding hazards will be postponed until year 2 or 3 of the Map Modernization project or until such time as the methodology has been approved by FEMA Region X.

Tsunamis

Oregon's Department of Geology and Mineral Industries (DOGAMI) has done significant work on assessing the tsunami hazard for Oregon's coastal communities. DOGAMI proposes an effort to assess the inclusion of tsunami run-up information on flood insurance maps that would include a pilot project.

Storm Surge

DOGAMI would also like to assess data that shows that wave heights now are greater than they have been in priory decades due to long-term weather patterns in the Pacific. They are proposing a project to assess the impacts of the higher waves on coastal flooding patterns. The project would include a review of existing literature as it relates to flood hazards and a possible pilot study.

Mudslides

The National Flood Insurance Program (NFIP) recognizes mudslides as a flood-related hazard. However, no protocol for mapping mudslides has been developed and damages related to this hazard have not been reimbursed by the NFIP. DOGMAI has mapped the distribution of mudslides in western Oregon. According to DOGAMI, these maps need further refinement to address the need for probabilistic treatment in order to be relevant to the actuarial applications of the NFIP.

The Oregon Department of Land Conservation and Development (DLCD) will continue to work with Region X, Alaska and Washington to make sure that coastal erosion is considered in

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remapping coastal "V zone" areas. DOGAMI has proposed work on Tsunami hazards, storm surge and mudslides. These proposals are discussed in more detail in Appendix C and cost estimates for this work are included there as well.

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Needs Assessment Summary

Mapping priorities for Oregon were established based on the age of FIRMs, the known mapping needs, a list of potential mapping partners, the number of LOMCs for each county, the population growth for each county, the number of flood insurance repetitive losses and the format of existing maps. The results were examined and are all illustrated in Figure 1 and Tables 1-11. Once a more complete assessment of this data is complete, it will be used to evaluate the mapping needs of each county and to determine which of the following five mapping options are most appropriate for each analyzed county.

Various scenarios will be evaluated to determine the best combination of the above activities that achieve the GPRA performance measures. It is anticipated that it will take approximately 6 to 9 months to complete the data collection and assessment. Based upon a preliminary analysis, it is anticipated that the performance measures could be met by conducting the following:

- FIRM creation for approximately 2 panels;
- Restudies of approximately 73 panels;
- Digital conversions of approximately 2315 panels; and
- Upgrades of approximately 2388 panels.

Because Oregon hopes to update flood maps on a countywide basis, DLCD has analyzed mapping priorities for the state's 36 counties based on the map assessment factors described above. Oregon counties were evaluated based on the frequency with which they appeared in the "top ten" for each assessment factor. This somewhat simplistic method for analysis weighted each category equally and counted each time a county appeared in a category.

Level of Highest Priority – Clackamas County

Based on the examined assessment factors, Clackamas County is identified as being the highest potential priority area because it appears most frequently in the examined areas. Clackamas County was the fifth fastest growing county, in terms of population, from 1980-1990 and tenth fastest from 1990-2000. Continued population growth and development pressure is likely.

Clackamas County was also third in terms of Repetitive Loss / Claims in Zone A and first in terms of Repetitive Loss / Claims in Zone B, C, or X. For policies in force, it ranked second among all measured counties. It is first in the number of LOMRs, third in LOMR-F cases, and fourth in LOMAs. Clackamas County also contains two of the oldest flood map panels in the State: the Cities of Gladstone and West Linn each have maps that are 25.2 years old. Most maps in the county range from 13 to 25 years old. Several (2) panels were updated in 2001 for Johnson Creek including the section that lies in Clackamas County. These results make Clackamas County a strong candidate for map modernization

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Due to the significant needs previously outlined for this county, a variety of flood map modernization and updates are proposed. More detailed investigation of the data and meetings with Clackamas county staff indicated that a mix of both Level 1 and Level 2 updates for the entire county were needed. Waterways that have created the greatest number of problems are the Sandy River, the Clackamas River, and the Salmon River. More detailed level 2 studies are suggested for these rivers within the 8 selected panels 415588 0040, 415588 0045, 415588 0090, 415588 0180, 415588 0202, 415588 0206, 415588 0208, and 415588 0209. These panels are the first map panels that should be modernized in the state of Oregon. Less detailed Level 1 studies are called for in the remaining map panels in the county. DLCD will continue working with Clackamas County by communicating with individual cities to assess their mapping needs.

Other High Priority Areas

Jackson County is also identified as being a high priority for map modernization. Some of the county's map panels are among the oldest in the state, its population is among one of the fastest growing for the period of 1980-1990, plus it has a particularly high level of LOMCs. Jackson County is additionally a good choice for FY 2003 map modernization because information in this county is available in a format (Q3) that is more convenient to update to DFIRM status. Jackson County has other panels necessary for Level 2 updates as well. Additionally, Yamhill, Sherman, Gilliam, Josephine, and Wallowa have similar status requiring predominately Level 1 upgrades and can do so easier because the information they currently have is in a Q3 format.

Other Communities with Need for Map Modernization

Despite recently converting flood maps countywide to an all-digital format, Lane County still experiences an extremely high number of flood map inaccuracies. LOMCs for the county rank far and above the levels of the rest of the state. More detailed investigations have determined that there are several map panels that continuously show up as having a significant number of LOMAs associated with them. These panels are predominately connected with the greater Eugene-Springfield metro area. An update of the county's flood map data would be beneficial, but is not held with as much regard as the counties ranked before it due its recently completed digitizing work. The City of Springfield has also identified a need to conduct new detailed study work on the McKenzie River.

Both Lane and Marion County flood maps are also currently available in countywide format and have been digitized. However, most panels are still based on flood maps that are 20 years old. Both of these communities have had a significant number of LOMAs / LOMRs in recent years and both have had fairly significant population growth. Communities within these counties are likely to continue to experience growth. An update each county's flood map data would be beneficial, but is not held with as much regard as the counties ranked before it due its recently completed digitizing. Updates for both Lane and Marion Counties are slated for the FY 04, the second year of map modernization.

Washington County is the second most frequently appearing county in the examined categories. However, most of Washington County's maps have been updated through a Cooperating Technical Partnership agreement with Washington County Clean Water Services. These maps

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are slated to be available soon. The state will work with Washington County and FEMA to map the unmapped community of Banks and other unmapped areas of the county during the second year of map updates.

Multnomah County as well is suggested as a priority region in the FY 03 update, predominately because of its dramatically developing region

Clatsop, Tillamook, Lincoln, Curry, and Coos each contain coastal flooding hazards. These counties and incorporated cities within them, are high priorities for remapping efforts. The state proposes working with these counties to update base maps in non-coastal areas of the county and to issue new maps for those areas where flood studies are not necessary. However, the remapping of coastal flood hazards will be contingent on completion and testing of a methodology to assess coastal flood hazards for Pacific Northwest states. Only level 1 updates are proposed at this time so that money and efforts would not have to be replicated by after these new methodologies have been established. We will also continue to work with the Oregon Department of Geology and Mineral Industries to assess flood related hazards associated with tsunamis and storm surges and determine whether or not to include information on flood maps.

There are a number of Oregon Counties that have not experienced much population growth and have had limited flood losses. Increased development in these counties is unlikely in the next 10 to 20 years. The base maps for these communities are 15-20 years old. The state proposes working with these communities to provide level 1 flood maps, identify areas where additional flood hazard data is available or where there is a need for additional flood studies due to local conditions (e.g., major culvert work, stream relocations...). Oregon will work to finalize this list of Level 1 map updates by October 1, 2002.

A more detailed needs assessment will provide the information necessary to refine these findings and overall estimates.

Flood Study Production

The State of Oregon will take the lead role in coordinating the flood mapping program, by playing an active lead role in; identifying and collecting flood and base mapping data, managing Level 1 map upgrades, and leading the scoping process. The state is however proposing to leave the direct management of flood studies to FEMA, unless project management funds are made available by FEMA through the CAP-SSSE program or map modernization project. The state will assist FEMA in identifying regional flood study contractors and coordinating initial meetings between state and local agencies with regional flood study contractors. The state will work with local agencies to assist in the identification of potential cost-share sources. At this time, the lead agency and state does not have the resources or experience necessary to directly manage flood studies.

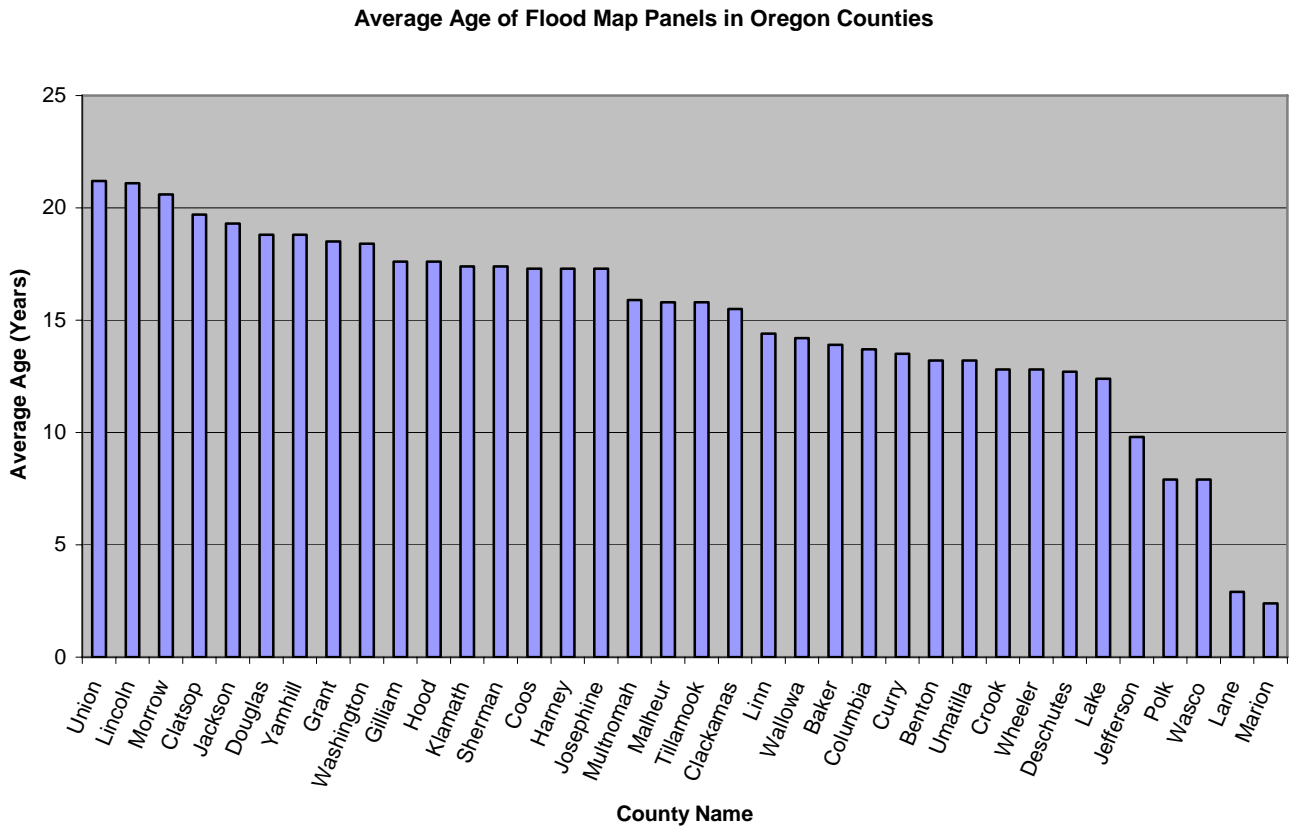
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Attachments

Appendix A

Figure and Table Showing Average Age of Maps for Each County

Appendix Figure 1 – Average Age of Flood Map Panels in Oregon Counties



(Source: State Flood Insurance Rate Maps and Baker Data (2002))

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Appendix Table 1 – Counties with the Oldest Average Flood Map Panels

<i>County Name</i>	<i>Average Age of Map Panel</i>
Union	21.2
Lincoln	21.1
Morrow	20.6
Clatsop	19.7
Jackson	19.3
Douglas	18.8
Yamhill	18.8
Grant	18.5
Washington	18.4
Gilliam	17.6
Hood	17.6
Klamath	17.4
Sherman	17.4
Coos	17.3
Harney	17.3
Josephine	17.3
Multnomah	15.9
Malheur	15.8
Tillamook	15.8
Clackamas	15.5
Linn	14.4
Wallowa	14.2
Baker	13.9
Columbia	13.7
Curry	13.5
Benton	13.2
Umatilla	13.2
Crook	12.8
Wheeler	12.8
Deschutes	12.7
Lake	12.4
Jefferson	9.8
Polk	7.9
Wasco	7.9
Lane	2.9
Marion	2.4

(Source: State Flood Insurance Rate Maps and Baker Data (2002))

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Appendix B

Detailed Information of Data Provided by the State

The State of Oregon uses a Lambert Projection for the transfer of data between state agencies. The state had determined that agencies commonly used up to ten major different map projections, all having varied error in different parts of the state. Because Oregon includes two UTM zones as well as two state plane projections a single projection was needed for display and analysis of statewide data. This custom projection has a total area error for the entire state is 0.0045% (2,900 acres out of 64 million) and an average length error for the entire state is 0.0176% (1.76 in 10,000). The data sources listed below can all be collected and provided in this projection.

Oregon Lambert Projection:

```
PROJECTION LAMBERT /* Lambert Conformal Conic
DATUM NAD83 /* North American Datum 1983
SPHEROID GRS1980 /* Required spheroid with NAD83
UNITS 3.28084 /* International Feet, (.3048 meters)
PARAMETERS
43 00 00.000 /* 1st standard parallel
45 30 00.000 /* 2nd standard parallel
-120 30 0.000 /* central meridian
41 45 0.000 /* latitude of projection's origin
400000.00000 /* false easting (meters), (1,312,335.958 feet)
0.00000 /* false northing (meters)
```

Topographic Data

The state can provide to FEMA USGS 10 meter DEMs that have been converted and processed in a manner to accommodate easier countywide mapping. The 10 meter DEMs have been projected to the Oregon Lambert projection, edge-matched, mosaiced/merged into one continuous DEM, also divided up into 9 individual sections covering Oregon to better manage their large file size. While the use of LIDAR for generating elevation / topographic data have many advantages it remains prohibitive both for cost and data management. Small projects have been flown for specific projects around the state but LIDARs availability is still limited. Where available, as determined through the scoping process, the state will work to make the data available to FEMA.

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Orthophotography

The state can provide to FEMA and its mapping partners digital orthophotography derived from USGS and USFS DOQs (1 & 2 meter source resolution). The Oregon Departments of Forestry, Water Resources and Oregon Geospatial Data Clearinghouse have processed in a manner to accommodate easier countywide mapping. The DOQs have been reprojected, edgematched, merged, clipped to USGS 15 minute quad boundaries and converted to both MrSID and TIFF format. Coverage is complete for the entire state.

Base Map Data

The following are the datasets that can be made available.

Roads

The state can provide to FEMA and its mapping partners a copy of the BLM General Transportation (GTRN). The GTRN is a statewide base originally derived from USGS 1:24K digital line graphs (DLGs); however, it substitutes USFS data coverage for DLGs in Mt. Hood National Forest.

The state can provide copies of the ODOT County and City CAD (dgn) Transportation Planning Maps to FEMA and its mapping partners. These maps are compiled at 1:24K within cities and at 1:100K scale countywide. These maps are an excellent source of base mapping information including; government jurisdictional boundaries, lat/lon ticks, township and range, etc.

The state can provide to FEMA and its mapping partners a copy of the ODOT State Highway Network. This file (CAD or GIS) is a network of all state-owned/maintained roadways, recently updated to 1:24K accuracy via orthophoto; linear referenced attribution linked to ODOT Integrated Transportation Information System (ITIS).

The state can provide to FEMA and its mapping partners a copy of the National Bridge Inventory point coverage that has been dynamically segmented onto ODOT highway network via ITIS.

Hydrology

The State can provide to FEMA and its mapping partners a copy of the Northwest River Reach files. The Intergovernmental Resource Information Coordinating Council (IRICC) has specified the Northwest River Reach files as its official source for hydrography. The files are based on 1:100K-scale DLGs, but with several additions and improvements. Currently the State is working on a 1:24K Hydro Framework layer. The data set is still under construction but may be available for use during the 2003 – 2005 FEMA flood mapping project timeline (see <http://hydro.reo.gov/> for more details).

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Watershed Boundaries

The State can provide to FEMA and its mapping partners access to 5th and 6th Level watersheds that have been compiled based on all available state and federal agency watersheds for Oregon and Washington and Northern California. Hydrologists from these agencies have agreed on these boundaries and reviewed the draft map for accuracy. This coverage includes all 5th and 6th level watersheds in a 'regioned' coverage. These are fully attributed to the Pacific Northwest and national data standards.

Digital Raster Graphics (DRGs)

The State can provide to FEMA and its mapping partners with copies of the USGS DRGs that have been reprojected into the Oregon Lambert Projection. DRGs are digitally rectified versions of the USGS 7.5minute quad maps.

Populated Place Names

The State can provide to FEMA and its mapping partners a copy of the point theme representing populated place names. This point theme shows the location of populated places in the state of Oregon as derived from the 1:24,000 GNIS theme.

City Limits

The State can provide to FEMA and its mapping partners with copy of a city limit coverage. The coverage, created by ODOT, locates city limit boundaries in Oregon at a scale of 1:24K.

Urban Growth Boundaries (UGBs)

The State can provide to FEMA and its mapping partners with copy of urban growth boundary coverage. The coverage, created by ODOT and DLCD, locates urban growth boundaries in Oregon at a scale of 1:24K. Because the majority of new development in Oregon occurs within UGBs, this coverage will be helpful in assessing the need for detailed flood studies or updates to current flood studies.

Dams

The State can provide a copy of a dams coverage produced by the department of Water Resources to FEMA and its mapping partners. The coverage is at a scale of 1:24K and identifies the approximate location of dams in the state of Oregon that the State has statutory authority over. These are dams that are greater than or equal to 10-feet in height and store greater than or equal to 9.2-acre-feet of water behind them.

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Railroads

The State can provide a copy of a railroad coverage to FEMA and its mapping partners. The coverage, created by ODOT and ODF, locates railroads in Oregon at a scale of 1:24K.

Willamette Valley Natural Wetlands

The State can provide FEMA and its mapping partners with a copy of a wetlands coverage. The coverage, created by the Oregon National Heritage Program, locates wetlands in Oregon's Willamette Valley at a scale of 1:24K.

Soils

The State can provide FEMA and its mapping partners with a copy of NRCS SSURGO 1:24K soil surveys in shapefile format. The coverage is not complete for the entire state, however, nearly all of the unmapped areas are on federally owned land.

Quad Boundaries and Tick Marks

The State can provide a copy of a quad boundary and tick mark coverages. The coverages, created by the Oregon Geospatial Data Clearinghouse (formerly State Service Center), locate USGS quad boundaries and tick marks in Oregon at a scale of 1:24K.

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Appendix C

Oregon's Unique Flood Hazards - Department of Geology and Mineral Industries

The following is documentation from the Oregon Department of Geology and Mineral Industries (DOGAMI) regarding the importance of flood map updates incorporating Oregon's unique geologic issues.

July 31, 2002

Ann Beier

Department of Land Conservation and Development

636 Capitol Street NE, Suite 15

Salem, Oregon 97310

Dear Ms. Beier:

Thank you for your July 28, 2002 request for general ideas regarding the expenditure of enhanced funding for the National Flood Program as it relates to responsibilities of the Oregon Department of Geology and Mineral Industries.

As you are aware mudslides have been part of the Act for over 30 years and are the cause of much damage in Oregon. Tsunamis have been linked to the Flood Maps in technical/policy discussions for a number of years. Storm surge is a part of coastal flooding. As it changes the maps may also need to change.

As lead technical agency on these phenomena in Oregon, a state where "things look different" partly because floods are different, we see the need to evaluate the merits of integrating these Oregon phenomena into the national Flood Program at least as it is implemented in Oregon.

We appreciate your efforts and the interest of the Delegation and the Governor's Office. As you request we are here providing general ideas regarding the furtherance of the effort. Thank you for your interest.

Sincerely,

John Beaulieu, State Geologist

Mapping Plan for Oregon

DRAFT

YEAR ONE

Scope of the Effort

0.5 FTE

Service and Supplies

Indirect Costs

\$60,000

Public Education, Workshops, Outreach

\$40,000

TSUNAMI: The hazards would be described and appropriate references of the distribution and frequency would be cited. Included would be DOGAMI tsunami maps. The citations would be strategic and not exhaustive. Losses historically would be stated including general narrative for the 1700 event. The nature of the various lines for tsunamis on the DOGAMI products would be generally evaluated in terms of possible application to probabilistic treatment within the context of the Flood Act.

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Areas in need of more mapping would be listed. The V zone would be addressed conceptually in terms of the results of current modeling and the capabilities of present modeling. Other areas of inundation greater than that shown on 100-year flood maps would also be addressed in general terms. The effort would be aimed at gaining a perspective on the relevance and possible

treatment of tsunamis on flood maps. Options would be pursued in Year Two. A pilot area for further study will be identified.

SURGE: Pacific data shows that wave heights are greater now than in prior decades and that this pattern is the product of long term cyclonic cell activity in the Pacific. These higher waves must be accommodated properly in the update of coastal flood maps. The core literature would be reviewed and restated to match the context provided by the National Flood Insurance Program. Data sources will be listed and references cited.

The probabilistic aspects of the latest trends will be addressed in general terms. Perspectives will be developed regarding whether or not this dimension of coastal flooding needs further treatment, and if so, which kinds of treatments might be most feasible. A possible pilot area for possible further study will be identified.

MUDSLIDES: The hazard will be described in general terms and the relevance of the recent SB 12 maps will be reviewed. Basically the maps demonstrate the distribution of further study areas and show that the distribution of mudslides generally does not correspond to (lie within) the distribution of 100-year floods, even though this is an assertion of FEMA in their 2000 Response to Issues. We will note the extent of damages in the 1996-1997 events including the loss of life. Douglas County will be asked to restate an earlier statement that persons were not reimbursed by the National Flood Program. Specific cases of relevance, if any, will be reviewed for identification of information of general applicability. A list of key references on mudslides in Oregon will be developed.

The current mudslide maps and model lend themselves to further refinement to address the need for probabilistic treatment to be relevant to the actuarial applications of the National Flood Insurance Program. Concepts for evolving the maps to the probabilistic treatment needed will be evaluated. Pilot areas will be identified for further study.

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YEAR TWO

Pilot Studies

FTE

Service and Supplies

Contracts

Indirect Costs

\$250,000

Public Education, Publications, Outreach

\$50,000

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TSUNAMI: Digital files will be submitted to FEMA for evaluation in terms of the National Flood Insurance Program. Included will be general lines and models for the coast and detailed lines for one or more study areas that have already been completed. Input will be solicited regarding application to V zone and the probabilistic needs of the FEMA Program. Data will be compared to the pre-existing 100-year flood maps. Attempts will be made to specifically relate some data for the 1964 tsunami to the flood maps.

One area will be studied extensively and will be carried to completion with conclusions drawn as to how the tsunami data relates to pre-existing flood maps in terms of total extent, probability of occurrence, and V zone distribution. The results will suggest the relative merits of pursuing various ways of portraying the tsunami data on flood maps. One pathway is to integrate the tsunamis into the 100-year flood; a second is to contemplate a subset of coverage; a third is to overlay the data for general public education purposes.

SURGE: Digital files for a pilot area will be submitted to FEMA for evaluation in terms of the National Flood Insurance Program. Included will be general lines and models for the coast and detailed lines for one or more study areas that have already been completed. Input will be solicited regarding application to V zone and the probabilistic needs of the FEMA Program. Data will be compared to the pre-existing 100-year flood maps.

One area will be studied extensively and will be carried to completion with conclusions drawn as to how the surge data relates to pre-existing flood maps in terms of total extent and probability of occurrence. The results will suggest the relative merits of pursuing various ways of portraying the surge data on flood maps. One pathway is to integrate the surges into the 100-year flood; a second is to overlay the data for general public education purposes.

MUDSLIDES: A pilot study area will be investigated to refine the existing model maps to better address the probabilistic aspects of the Flood Program. Avenues of investigation will include a mix of climatic patterns, land use patterns, and rigorous field investigation to discern evidence of frequency for existing mudslides. The task is difficult, but it is noted that flood maps are generally logarithmic rather than arithmetic. Reference durations are 10 years, 100 years, and 500 years in a general sense. This renders this effort doable. Results in the study area will be compared rigorously with the existing 100 year maps and conclusions will be drawn about disparities in general distribution and frequency.

Impact and mitigation are also a concern and general conclusions will be drawn there as well, since it is not desirable to have to formulate entire new mitigation schemes for the mudslide aspect of flooding unless it is necessary and warranted. This area of discussion needs realistic treatment and is difficult; these facts, however, do not negate the reality that mudslides are part of the National Flood Insurance Act. FEMA staff will be expected to provide practical and candid input.

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YEAR THREE PLUS EXTENSION

6 FTE (one year, or fewer persons for more years)

Service and Supplies

Selected Contracts

Indirect Costs

\$1,400,000

Public Education, Workshops, Publications, Web Site Development

\$200,000

TSUNAMI: Tsunami Data probably will be accommodated on the National Flood Insurance Maps in one form or another. The events are obviously flooding and they obviously have a probabilistic dimension to them that has been documented. It is unclear whether the

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representation will fall within the bounds of insurance coverage. It might be that the lines will be presented as a public education function. Requirements of Oregon law might also be referenced.

Depending on the outcome of the initial scoping of year one and the pilot work of year two the final decisions will be made and a decision for the entire coast will be implemented. The effort may or may not include completion of modeling for the few remaining bays of risk interest. V-zones will be of particular interest in any scenario, but the frequency of the V zone behavior will largely dictate the most appropriate manner in which the issue should be treated. We anticipate considerable policy discussion by the state and FEMA in year Three Plus Extension efforts.

Outreach will include explanation of the new data to the public, response to inquiries, workshops, web site development, development and release of digital files, cooperation with DLCDC and Building Codes, and technology transfer.

SURGE: We anticipate that storm surge will be integrated into updated models of coastal flooding or will otherwise be accommodated. These efforts are so much a part of the basic flood modeling that the DOGAMI efforts would be minimal on the technical side, except for oversight and review.

Outreach will include explanation of the new data to the public, response to inquiries, workshops, web site development, development and release of digital files, cooperation with DLCDC and Building Codes, and technology transfer.

MUDSLIDES: The Senate Bill 12 maps for western Oregon will be refined based on climatic data, field observations, site-specific data from field work and site specific data from available site reports in agency and county files. Existing data will be utilized in GIS systems for extrapolation and interpolation of general frequency determinations for all polygons suitable for the loose probabilistic requirements of the National Flood Program.

Outreach will include publications, web site development, workshops in cooperation with other agencies, technology transfer and advice to counties as they link the opportunities of the Flood Program with any pre-existing protocols relative to the requirements of SB 12 (1999). In the simplest of terms the structure, acceptance, and benefits of the National Flood Insurance program are a desirable supplement to the regulatory framework of SB 12. Counties may opt for the federal program and may combine it with aspects of the SB 12 effort to provide an innovative and effective approach to mudslides in Oregon. Such an evolution may provide a proto-type for consideration in analogous parts of the rest of the nation at a time when climate and demographics might otherwise further increase the risk of mudslides to society.

The existing national approach to mudslides in the National Flood Program is possibly becoming less and less viable as it becomes clear that losses are increasing, demographics will make them continue to increase, and distribution of the mudslide polygons lies largely outside the confines of the 100-year flood distributions as presently mapped.

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