Needs Assessment to Improve Data Discovery, Access, and Use of Oregon Hazard Themes

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Executive Summary

Communities often identify a 'lack of data or access to data' as an obstacle in their natural hazard mitigation planning. However, many agencies and organizations at all levels of government are creating data sets and are conducting analyses relevant to specific hazards. Despite these data and technology development efforts, statewide GIS and community hazard data needs remain unclear.

The purpose of this needs assessment is to improve the ability of the state and local communities to better facilitate the *discovery* (identifying, locating and collecting hazard related geospatial data), *access* (obtaining and using existing hazard related geospatial data), and *utilization* (incorporating, analyzing and managing hazard related geospatial data) of data in community natural hazard risk assessments.

Project Partners

The needs assessment combines interrelated efforts by the Oregon Natural Hazards Workgroup (ONHW) at the University of Oregon's Community Service Center, Oregon Geospatial Enterprise Office (GEO), United States Geological Survey (USGS), and Department of Land Conservation and Development (DLCD). The findings of this report will be used by the various project partners in the following ways: (1) assist ONHW in refining and improving community risk assessment development support; (2) assist the Oregon Geospatial Enterprise Office in developing a standardized hazard related geospatial dataset for the Oregon GIS Utility; (3) provide USGS with increased understanding of community needs regarding hazard data; and (4) provide DLCD with Flood Map Modernization Program outreach strategies.

Project Methodology

The project partners used a number of research methods to develop this needs assessment. The project partners worked together to collect information to assist in identifying the issues communities face when developing risk assessments. The project inputs included:

- An analysis of previous efforts related to natural hazard mitigation risk assessments;
- An analysis of existing hazard data;
- Statewide hazard risk assessment survey;
- Stakeholder interviews;
- Community focus groups; and
- Statewide GIS Utility survey.

Key Findings

The project inputs yielded key issues related to local community's abilities to discover, access and use geospatial data to complete natural hazard risk assessments. The following is a brief summary of those issues.

Lack of knowledge about what types of hazard data to collect and data collection programs

The analysis of existing hazard data indicated that there are a multitude of data owners at the local, regional, state and federal levels. However, awareness of such data is not well documented, making data discovery difficult for the local governments or potential data end-users. The stakeholder interviews indicated that 66% of interviewees were not familiar with digital Flood Insurance Rate Maps (FIRM), a common hazard overlay used to identify the flood hazard.

Lack of statewide hazard data standards

Various project inputs indicated that local communities are not aware of how to collect hazard related data or why it is important. Communities have indicated that they commonly experience compatibility issues integrating hazard data sets into their local GIS systems. Barriers related to data standards impede a community's ability to meet state and federal hazard mitigation planning requirements.

Missed opportunities for data collection at the local level

Focus group participants identified that in many instances, different departments within a jurisdiction may collect data without talking to other departments about their data needs. This method of operation creates missed opportunities to collect data locally that meets multiple local government objectives. Geospatial data used in natural hazard risk assessments is best at a fine scale developed at the local level so that parcel specific issues can be addressed.

Available hazard data is in an inconsistent format

The analysis of existing hazard data and the focus groups identified that existing data is often available in inconsistent and incompatible formats. Communities with limited staff resources face barriers when data is not in the projection that the community already uses as it takes additional time to re-project the data. Communities also face barriers when trying to incorporate neighboring jurisdiction's data when it is not maintained in a compatible format.

Secure or sensitive hazard data is blocked or has limited access

Focus group participants indicated that a common barrier they face is lack of access to sensitive data such as utility lines and natural gas pipelines. Another issue raised was that some sensitive data is only available to be viewed and/or used by pre-approved staff and is not readily available to the public.

Lack of local capacity to acquire datasets

Communities lack the capacity to acquire datasets due to a number of factors including cost, staff time, and political directives. Some communities are working on developing both formal data sharing and licensing agreements to ease data acquisition among neighboring jurisdictions.

Communities need methodologies to develop hazard overlays

The research indicates that in general, hazard related geospatial data is available and that communities have the technical capabilities to complete the basic level hazard identification and vulnerability assessment steps. What is missing are state accepted methodologies for using the data elements to create hazard overlays for the risk assessment. The GIS utility survey indicated that most communities have the technical capabilities to complete a risk assessment and in the past have completed GIS tasks related to planning and public works that would be similar to the tasks needed in the risk assessment process.

Communities lack capacity to complete risk assessment work locally

The stakeholder interviews indicated that there is miscommunication among GIS technicians, planners, and emergency managers about what a risk assessment entails and who should be involved. Communities also indicated that two of the biggest barriers they face are a lack of staff and lack of money to fund the development, maintenance and update of community risk assessments.

Most risk assessment data are not integrated into local GIS systems

Many communities have used consultants to develop and use risk assessment data sets in conjunction with the development of their mitigation plans. Often, this data is not integrated into the local GIS system, but is held separately.

Recommendations

Data Discovery: identifying, locating and collecting hazard related geospatial data
• Coordinate with State GIS Utility project to complete an annual analysis of existing hazard data • Increase flood map modernization outreach to local governments • Review current data standards and establish new standards where needed for data collection • Develop a statewide users guide for appropriate geographic scales for hazard related geospatial data and end products • Create a data collection guidance document aimed at assisting community's collect data that is multi-objective in nature.
Data Access: obtaining and using existing hazard related geospatial data
• Promote the Oregon Geospatial Enterprise Office's statewide standard for data projection • Establish statewide hazard protocol for sharing GIS data produced through state agency reports and studies. • Investigate legal ramifications of accessing data and using for hazard planning. • Work with State partners and USGS to develop one-stop data portal for hazard related data • Create and implement training on completing hazard risk assessments for planners, emergency managers, and GIS technicians.
Data Use:- incorporating, analyzing and managing hazard related geospatial data
• Develop new risk assessment training focused on the use of hazard related geospatial data • For the earthquake hazard, investigate the use of HAZUS and develop protocols for using it in Oregon • For the flood hazard, develop and implement an outreach strategy to make communities aware of the Flood Map Modernization program as a means to update out-of-date FIRMs. • For the wildfire hazard, finalize and disseminate the Oregon Department of Forestry Wildland Urban Interface Risk Assessment Methodology. • Explore the potential for the state to complete certain risk assessment tasks for local communities • Provide recommendations and local examples of how to integrate, maintain, and update Risk Assessment data

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Section 1
Introduction

Project Purpose and Partners

Repeatedly, communities identify a 'lack of data or access to data' as an obstacle in their natural hazard mitigation planning, however, many agencies and organizations at all levels of government are in the process of creating data sets and are conducting analyses relevant to specific hazards. Despite these data and technology development efforts, there has not been a needs assessment of statewide GIS activities and community hazard data.

The purpose of this needs assessment is to improve the ability of the state and local communities to better facilitate the *discovery (*identifying, locating and collecting hazard related geospatial data), *access* (obtaining and using existing hazard related geospatial data), and *utilization* (incorporating, analyzing and managing hazard related geospatial data of existing geospatial data) of data in community natural hazard risk assessments. Specifically, this needs assessment will:

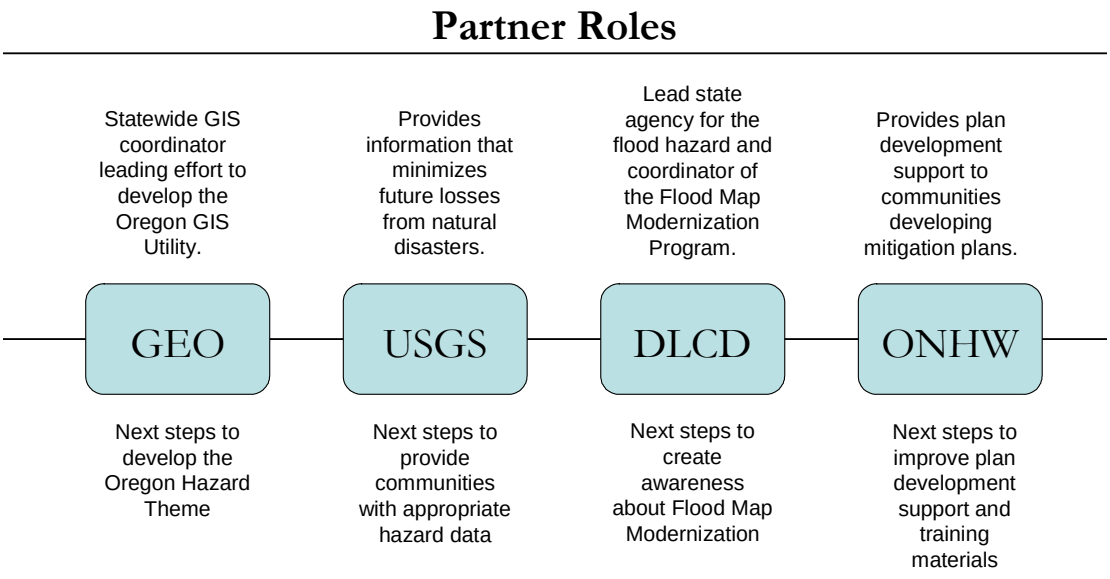
(1) Identify agencies/organizations that compile GIS data pertaining to hazards and catalogue their activities;

(2) Identify the GIS needs of local communities and the state; and

(3) Evaluate the capacity of the state and local agencies/organizations to use GIS to plan for hazards events.

The needs assessment combines overlapping efforts by the Oregon Natural Hazards Workgroup (ONHW) at the University of Oregon's Community Service Center, Oregon Geospatial Enterprise Office (GEO), United States Geological Survey (USGS), and Department of Land Conservation and Development (DLCD). The findings of this report will be used by the various project partners in the following ways: (1) assist ONHW to refine and improve community risk assessment development support, (2) assist the Oregon Geospatial Enterprise Office in developing a standardized hazard related geospatial dataset for the Oregon GIS Utility, (3) provide USGS with increased understanding of community needs regarding hazard data, and (4) provide DLCD with Flood Map Modernization Program outreach strategies. Figure 1.1 below illustrates why each partner became involved in the effort and also describes how the partners will use the conclusions and recommendations of the assessment.

Figure 1.1: Partner Roles and Outcomes



Project Context

This project was funded through grants and contracts provided by the 2004 National Spatial Data Infrastructure – Cooperative Agreement Program (NSDI-CAP), the Department of Administrative Services – Oregon Geospatial Enterprise Office, the United States Geological Survey, and Department of Land Conservation and Development.

The NSDI-CAP is a federal effort that funds projects aimed at building the infrastructure necessary to effectively discover, access, share, manage, and use digital geographic data. In Oregon, the Oregon Geospatial Enterprise Office, within the Department of Administrative Services (DAS) is taking the lead to develop such geospatial infrastructure, called the Oregon GIS Utility. The Oregon GIS Utility is an effort to develop a system and program to support consistent, efficient statewide geographic information sharing, maintenance, and GIS services supporting the business needs of the government and non-governmental community in Oregon.[i]

The Oregon GIS Utility is composed of fourteen Framework Implementation Teams, (FIT), each taking the lead to develop categorized datasets called Framework Themes. Currently, the FIT coordinates 14 framework themes, including seven themes recognized by the Federal Geographic Data Committee. The FIT and its 14

committees include over 300 participants from all levels of government, academia, and the private sector in Oregon. The Oregon Framework themes are:

- Geodetic Control
- Elevation
- Cadastral
- Administrative Boundaries
- Hydrography
- Transportation
- Orthoimagery
- Bioscience
- Geoscience
- Cultural
- Climate
- Utilities
- Landcover/Landuse
- Hazards[ii]

Each theme listed above is composed of individual data layers called data elements. The proposed Hazard Theme is different from other themes in that it is based primarily on overlays (or zones) that are derived from various data elements. For example, the wildland urban interface overlay is composed of several individual data elements including, but not limited to: slope, aspect, vegetation type, historic fire occurrence and population density. The following are the proposed hazard overlays for Oregon:

- Avalanche zone
- Coastal erosion areas
- Debris flow hazard zone
- Drought areas
- Dust Storm
- Earthquake
- Floodplain
- Landslide zones
- Tsunami Inundation Zone
- Wildland/Urban Interface boundary
- Volcano hazard overlay
- Windstorm overlay
- Winter Storm overlay

Project Methodology

The Oregon Natural Hazard Workgroup at the University of Oregon's Community Service Center, Oregon Geospatial Enterprise Office (GEO), United States Geological Survey (USGS) and Department of Land Conservation and Development (DLCD) all served as members of the project steering committee. The project steering committee guided development of the needs assessment and to ensure coordination among the partners. The steering committee held monthly meetings via teleconference to update the

partners on the project's progress. Documentation of the monthly teleconferences is in Appendix A.

We used a number of research methods to develop this needs assessment. Previous efforts related to addressing hazard mitigation and/or completing risk assessments were analyzed to identify relevant conclusions that were applicable to this research. The project partners worked together to collect information to assist in identifying the issues communities face when developing risk assessments. The project inputs included:

- An analysis of existing hazard data,
- Statewide hazard risk assessment survey,
- Stakeholder interviews;
- Risk assessment focus groups, and
- Statewide GIS Utility survey.

These efforts are described in more detail in Section 4: Project Input Summaries and in individual appendices.

Report Outline

This needs assessment is organized into the following sections.

Section 1: Introduction

The Introduction explains the purpose of the project, the project partners, and briefly describes the methods used to develop the needs assessment.

Section 2: Community Risk Assessment

This section defines the risk assessment process as it relates to natural hazard mitigation planning and also describes the connection between this effort and state and federal risk assessment requirements.

Section 3: Previous Efforts

This section describes previous efforts related to addressing hazard mitigation and/or completing risk assessments that were analyzed to identify issues related to local capacity to address risk assessment requirements.

Section 4: Project Input Summaries

This section describes the purpose, methods, and conclusions of the various project inputs used to develop the needs assessment including:

- Summary of existing hazard data,
- Summary of statewide hazard risk assessment survey,
- Summary of stakeholder interviews;
- Summary of risk assessment focus groups, and

- Summary of statewide GIS Utility survey.

Section 5: Conclusions and Recommendations

This section outlines key conclusions and recommendations for the Oregon Hazard Framework Implementation Team (FIT) to pursue as it develops the Oregon Hazards Theme. The conclusions and recommendations are categorized by data discovery, access and use.

Appendices

Appendix A – Project Coordination

This appendix includes documentation of project coordination between the various project partners.

Appendix B – Flood Map Modernization Outreach Strategy

This appendix includes an education and outreach strategy for the Department of Land Conservation and Development aimed at raising awareness of the Flood Map Modernization program among planners, emergency managers, elected officials, GIS technicians, and building officials.

Appendix C – Existing Hazard Data Summary

This appendix summarizes existing hazard data and specifically addresses data elements. The summary includes a description of the purpose, methods, findings and conclusions regarding existing hazards data.

Appendix D – Natural Hazard Survey Summary

This appendix includes the full report of the hazard risk assessment survey. The report includes a description of the purpose, methods, findings and conclusions of the survey.

Appendix E – Interview Summary

This appendix is the full report from stakeholder interviews conducted as part of this project. The report includes a description of the purpose, methods, findings and conclusions from the interviews.

Appendix F – Focus Group Summary

This appendix is the full report from focus groups conducted as part of this project. The report includes a description of the purpose, methods, findings and conclusions from the focus groups.

Appendix G – GIS Utility Survey Summary

This appendix includes the full report of the hazard GIS utility survey. The report includes a description of the purpose, methods, findings, and conclusions of the survey.

Appendix H - Oregon Department of Forestry Wildland-Urban Interface Identification Methodology

This appendix features the wildland-urban interface identification methodology developed by Oregon Department of Forestry (ODF) and is provided as an example of a hazard overlay methodology.

Section 2
Community Risk Assessment

The use of Geographic Information Systems (GIS) can greatly enhance planning for natural and human caused hazards. However, the ability to find good data about hazards and analyze it is not always easy tasks for communities. GIS data is especially useful when developing natural hazard mitigation plans to comply with regulations such as the Federal Disaster Mitigation Act of 2000(DMA2K)[1], Oregon's Land Use Planning requirement Goal 7: Natural Hazards, and Oregon's SB 360: Wildland/Urban Interface Requirements.

This needs assessment identifies conclusions and recommendations to improve data discovery, access, and use of the Oregon Hazards Theme. The Oregon Hazards Theme, a series of hazard-related geospatial datasets, will be an important data resource for communities developing natural hazard mitigation plans, specifically, the risk assessment components. The outcomes of this report will assist communities in discovering, accessing, and using hazard data more effectively to produce better and more accurate risk assessments. Better risk assessments will help communities better prioritize mitigation projects thus ensuring that limited mitigation dollars are spent effectively.

What is a Risk Assessment?

Understanding the impacts that natural hazards have on a community is essential to reducing the community's risk to that hazard. Risk assessments determine how a hazard or hazards may affect a community. Specifically they describe:

- Each hazard to which the community is susceptible;
- How these hazards affect physical, social, and economic assets;
- Identify the areas that are most vulnerable to damage from the hazards; and,
- The resulting cost of damages or costs avoided through future mitigation projects.

One way to think about the development of a risk assessment is to relate it to baking a cake. To bake a cake you need *ingredients*, a *recipe*, and an *oven*. The following paragraphs describe the risk assessment process using a cake baking analogy.

[1] DMA2K requires all communities in the United States to develop and maintain mitigation plans to be eligible for federal mitigation funding both pre- and post-disaster after November 1st 2004.

First let's examine the *ingredients*. Cake ingredients include such things as flour, sugar, baking soda, etc. Each one is vital, and the better the ingredients, the better chance your cake will taste good. In our case, for the risk assessment, the ingredients include data elements, such as soils layers, hydrology, and slope. The better the data the more accurate the risk assessment will be.

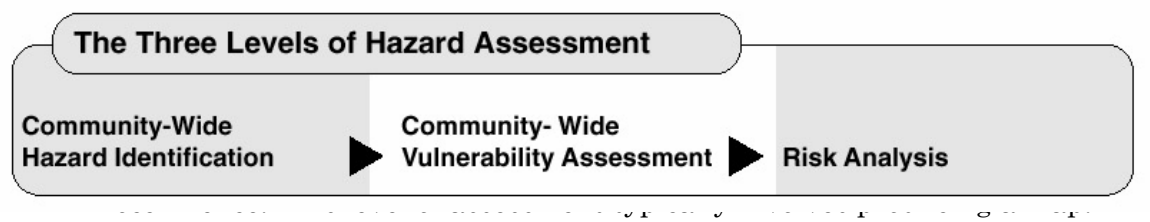
The second component we need to make our cake is a *recipe*. We need to know the quality and quantity needed for each ingredient. The recipe also defines when each ingredient is added to the mixture and if certain ingredients need to be mixed separately. The recipe for the risk assessment describes how to conduct a risk assessment (as defined on the next page), including a step-by-step process, or methodology of how to combine data elements to make hazard overlays or zones.

The third and final step in baking a cake is an *oven*. The ingredients and recipe can only go so far, without an oven, we have no cake! On the risk assessment side, we need geographic information systems (GIS) and/or technical analysis to combine the data elements (e.g., ingredients), hazard overlays (e.g., recipe) to produce a risk assessment. The risk assessment identifies the location and potential impact of natural hazards and the community assets at risk, which enables the community to develop appropriate solutions to the problems they face.

The Three Phases of a Risk Assessment

A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

Figure 2.1: The Three Phases of a Risk Assessment



The outputs from this phase can also be used for: land use planning, management, and regulation; public awareness; defining areas for further study; and identifying properties or structures appropriate for acquisition or relocation.[iii]

The second phase, vulnerability assessment, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by the hazard. This process can also assist communities to justify: changes to building codes or development regulations, property acquisition programs, policies concerning critical and public facilities, taxation strategies for mitigation risk, and informational programs for members of the public who are at risk.[iv]

The third phase, risk analysis, involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Risk has two measurable components: (1) the magnitude of the harm that may result, defined through the vulnerability assessment, and (2) the likelihood or probability of the harm occurring.

The three-phased approach to developing a risk assessment should be conducted sequentially because each phase builds upon data from prior phases. However, gathering data for a risk assessment need not occur sequentially.

Risk Assessment Requirements

At both the state and federal levels, there are requirements for communities to conduct risk assessments as part of a broader natural hazard planning process. The following describes the risk assessment requirements for the State of Oregon's Goal 7 and the Federal Disaster Mitigation Act of 2000 (DMA2K).

Oregon Statewide Planning Goal 7 – Areas Subject to Natural Disasters and Hazards

The general purpose of Goal 7 is to protect life and property from natural disasters and hazards. Goal 7 calls for the use of comprehensive planning and hazard inventories to reduce risks to people and property. This goal is related to the risk assessment process because it requires communities to: assess the frequency, severity and location of the hazard, the effects of the hazard on existing and future development, the potential for development in

the hazard area that may increase the frequency and severity of the hazard, and the types and intensities of land uses to be allowed in the hazard area.

Disaster Mitigation Act of 2000

In 2000, the Federal Government enacted the Disaster Mitigation Act of 2000, commonly known as DMA2K. Under this Act and rules[2], states, communities, and tribal governments must complete FEMA approved natural hazard mitigation plans to be eligible for certain federal assistance programs such as the Hazard Mitigation Grant Program (HMGP) and Public Assistance. DMA2K sets forth planning criteria that must be met in order to be FEMA-approved. DMA2K includes requirements for risk assessment. Specifically, DMA2K requires that communities:

- Describe the type of hazards that can affect the jurisdiction
- Describe the location and extent of all hazards that can affect the jurisdiction
- Describe any previous occurrences of hazard events
- Describe the probability of future occurrences of hazard events
- Describe the community's vulnerability to the identified hazards
- Describe the overall impact the hazard has on the community

In addition to these requirements, DMA2K also recommends that communities:

- Identify the types and numbers of buildings, infrastructure and critical facilities in hazard areas
- Estimate potential dollar losses to vulnerable structures
- Describe future land use and development trends

Conclusions

The risk assessment process is an important component of mitigation planning because it results in the identification of the hazards that can affect the community, describes how and where hazards may impact the community, and estimates the potential losses expected. The use of GIS systems and technology can greatly enhance the risk assessment process by allowing the end user to spatially visualize the risks. The risk assessment outputs ultimately assist communities to direct limited mitigation dollars to the most vulnerable areas, ensuring that mitigation dollars are being spent effectively. More accurate risk assessments can also assist communities make better decisions about where future development should take place, which is a key objective of both Goal 7 and the DMA2K.

[2] 44CFR Part 201.6

Section 3
Previous Efforts

In addition to defining what a risk assessment is and what the state and federal requirements are, this needs assessment also looks at previous studies and reports related to natural hazard mitigation. The following section outlines several efforts previously completed that assist in identifying issues related to local capacity to discover, access, and use geospatial data for natural hazard mitigation planning. These efforts include a review of Goal 7, Flood Map Moderation Business Plan, Oregon Enterprise Office's map projection standards, the Oregon HAZUS Users Group goals and standards, the Titan Survey, and research documented in *Cooperating with Nature*. The issues identified in this section serve as background documentation for Section 5: Conclusions and Recommendations. While some issues may not directly relate to the use of geospatial data to complete the risk assessment, they can provide insights on obstacles and opportunities communities may face when addressing natural hazards in general.

Goal 7

In 1996 and 1997 Oregon was hit by devastating floods and landslides caused by heavy rain and melting snow, which led to several fatalities and $280,000,000 in damage[v]. Following this series of events, Governor John Kitzhaber looked to state agencies to find ways to reduce the state's vulnerability to natural hazards. Kitzhaber specifically called on the state's Department of Land Conservation and Development (DLCD) to review the Statewide Land Use Planning Goal 7—Areas Subject to Natural Disasters and Hazards.

In 1998, the Community Planning Workshop at the University of Oregon's Community Service Center completed a study of Statewide Land Use Planning Goal 7: Areas Subject to Natural Hazards for the Department of Land Conservation and Development. The focus of the study was to evaluate how effectively local governments were implementing the requirements of Goal 7.

A number of findings from the Goal 7 report help shed light on issues related to local capacity to discovery, access and use geospatial data to complete natural hazard risk assessments. They include:

- Community hazard inventories, the predecessor to the DMA2K risk assessments, were lacking.
- The scarcity of information, money, and expertise is a significant obstacle to improved hazard planning.
- Communication between agencies and local jurisdictions could be improved.

- A hazards information "clearinghouse" would improve dissemination of data and research.

Flood Map Modernization Business Plan

As the lead state agency for the flood hazard, the Department of Land Conservation and Development created a Flood Map Modernization Business Plan in 2004. The Business Plan outlines the State's role in Flood Map Modernization and identifies the necessary financial and human resources needed to implement the plan. The plan also identifies potential partners, existing resources, documents how the state will meet the Flood Map Modernization program objectives, and identifies flood mapping priorities in the state. This plan acknowledges that a majority of the Flood Insurance Rate Maps in the state are out of date and that there is a lack of financial and staff time available locally to address the flood map problem.

Oregon Geospatial Enterprise Office Map Projections

The Oregon Geospatial Enterprise Office (GEO) has taken steps to develop a statewide map projection standard for data created by state agencies. The creation of statewide projection standards can assist local communities develop risk assessments more effectively. A project standard is important considering that state agencies use up to ten different map projections. This standard would benefit entities using state agency-developed geospatial data for risk assessment because: data publishing and transfer would be simplified; it would normalize projection errors found in different parts of the state, and would make the display and analysis of statewide data easier. Re-projecting data can be difficult for communities with limited human resources.

A representative committee evaluated the multiple projection issue and submitted a recommendation to the Oregon Geographic Information Council to use the Oregon Lambert Projection for the use and transfer of spatial data by state agencies. Creating and maintaining a statewide standard creates a number of advantages including:

- Statewide analysis is easily accomplished with base data
- Data from varied agencies will be readily usable
- Most GIS, CAD, and GPS software can project data into Oregon Lambert
- Computers can be programmed to convert data for a one time conversion
- Total area error for the entire state is 0.0045% (2,900 acres out of 64 million)
- Average length error for the entire state is 0.0176% (1.76 in 10,000).

Oregon HAZUS Users Group Standards and Goals

The Oregon HAZUS Users Group (ORHUG) is made up of local, state, regional and federal agency representatives in Oregon that use HAZUS, a loss estimation software program. ORHUG has created a set of standards and goals to achieve as a group related to data collection, training, using HAZUS, and developing a HAZUS data clearinghouse. Many of the standards and goals directly align with recommendations of this needs assessment.

Titan Survey

Conducted by Titan Geospatial Services in 2003. Respondents included 23 cities and 17 counties. The survey instrument was on paper, and the responses were handwritten. Data compilation was accomplished by the consultant, and results were entered into a series of spreadsheets, one for each major base data theme. Estimates of quality are possible based on responses for accuracy, currency, completeness, and metadata.

Cooperating with Nature

Cooperating with Nature, edited by Raymond Burby, includes two key discussions about issues pertinent to evaluating local capability to complete risk assessments. The first discussion is related to the appropriateness of geographic scale in conducting risk assessments. This discussion identifies that data at varying levels of geographic scale can be useful for a variety of reasons, but for risk assessments, and specifically analysis at the parcel level, scales from 1:2,000 to 1:200 are needed.

The authors also identify numerous constraints on the use and enhancement of local risk assessments that include:

- Uneven knowledge of the probabilities, magnitudes, and locations of some types of extreme natural events.
- Limited parcel specific data on relevant attributes of land use such as the type, design and construction of buildings.
- Lack of empirically validated damage functions that are accurate at the building or infrastructure component level for some natural hazards.
- Lack of professional expertise to incorporate sophisticated risk assessment models into land use decision making.
- Lack of understanding and confidence in those models by appointed and/or elected officials.

Small scale data (e.g., 1:120,000) covers a larger ground area in less detail than **large-scale** data (e.g., 1:20,000), which depicts a small ground area in considerable detail.

Avery, T. and G. Berlin. 1992. Fundamentals of Remote Sensing and Airphoto Interpretation. New York: Macmillian Publishing Company. Pg 71.

Conclusion

Previous efforts to analyze local and state capacity to address natural hazard risk assessments provide insights on some of the barriers communities face when developing mitigation plans. The findings and conclusions of the previous efforts help to form conclusions and recommendations to overcome the barriers identified in both previous efforts and this needs assessment. The key issues identified in these efforts include: lack of financial and human resources; access to data; and the appropriateness of geographic scale.

Section 4:
Project Inputs Summaries

The following summarizes the research efforts made in conjunction with this needs assessment. These various inputs were developed and implemented in an effort to gain insight on issues that communities face when discovering, accessing, and using geospatial data to complete risk assessments. The purpose of this section is to document the purpose, methodologies, and key conclusions from the five primary project inputs used to develop the conclusions and recommendations. The project inputs include:

- An analysis of existing hazard data,
- Statewide hazard risk assessment survey,
- Stakeholder interviews;
- Risk assessment focus groups; and
- GIS utility survey.

Full reports and findings from the inputs can be found in the appendices of this report.

Existing Natural Hazards Data Summary

Purpose

Public and private organizations at the local, regional state and federal levels have invested considerable time as well as financial and human resources into developing hazard related geospatial data and technology. Examples of data and technology development projects vary in scale from local to national. Examples range from Hood River and Wasco County's efforts to collection structural data as it relates to wildfire risk, to the USGS's efforts to build a national interactive map service called The National Map. To develop a risk assessment a community must first understand what data is available to assist them in better identifying risks natural hazard pose to there jurisdiction. This analysis aims to document the hazard data currently available, and is intended only to be a snapshot in time.

Methods

The Oregon Natural Hazards Workgroup reviewed and analyzed the Oregon Framework Implementation Team's themes geospatial data database to gain an understanding of how existing data elements may be useful in the risk assessment process. This database documents all the current data elements under construction to develop uniform data

standards through the FIT process. This database includes detailed information on the data's type, scale, ownership, and next steps to completion. Each data element in the database was assessed for its potential use in the risk assessment process. Elements were categorized into the following three categories: 1) not useful in a risk assessment, 2) useful in identifying the geographic extent of the hazard, or 3) useful in assessing vulnerability.

The full report on this existing data analysis can be found in Appendix C.

Conclusions

Upon completion of this investigation of existing hazard data, a number of conclusions became apparent.

- There is a wealth of data available; for example, there are a total of 238 existing data elements in the Oregon Framework Implementation Team's database.
- Data ownership is spread over a number of local, state, and federal entities. For example, the 238 data elements in the Oregon Framework Implementation Team's database are maintained either solely or jointly between 53 different local, state, and federal entities.
- The majority (53%) of data elements in the FIT database were applicable to the vulnerability assessment phase of the risk assessment, while 23% were useful for hazard identification and 23% were not useful to any phase of the risk assessment.
- In most cases, the scale of the data is too small to produce accurate risk assessments or to support refined mapping of hazards.

Hazard Survey Summary

Purpose

ONHW and the Department of Land Conservation and Development (DLCD) worked together to develop a hazard survey targeted to planners and GIS professionals that focused on community's efforts to develop risk assessments and community needs related to FEMA Flood Insurance Rate Maps (FIRM). Questions in the survey specifically asked about community efforts to identify hazards and to conduct vulnerability assessments. The survey questionnaire and a complete summary report are located in Appendix D.

Methods

The online survey was sent to 222 City and County planners and GIS professionals around the state in March and April 2005. A total of 38 city and county representatives responded to the survey (17% response

rate). Due to the limited number of responses, this survey was used for scoping purposes only.

The survey questions fell into the following categories:

- Natural hazards affecting the community
- Mapping and vulnerability assessment actions
- Flood Insurance Rate Maps & Flood Map Modernization Program
- FEMA HAZUS software

ONHW conducted a secondary analysis of the survey data provided by PlanGraphic, Inc.

Conclusions

The survey yielded information on the ability of local governments to develop risk assessments and local issues regarding FEMA FIRMS. The following are key conclusions.

- Most communities have made efforts to complete at least the hazard identification portion of the risk assessment.
- Different agencies within jurisdictions do not have a consistent understanding of the risks hazards pose within the community.
- Flood hazard has been addressed by most communities because of existing federal data standards and mapping methodologies.
- The majority of FEMA FIRMS in Oregon are out of date.
- Staff and funding are obstacles for community involvement in the Flood Map Modernization Program.

Stakeholder Interview Summary

Purpose

The purpose of the stakeholder interviews was to gain a better understanding of how GIS is used to support local government efforts to complete the risk assessment component of natural hazard mitigation plans and Flood Map Modernization Program. A full stakeholder interview report can be found in Appendix E.

Methods

In March and April of 2005, ONHW conducted telephone interviews with 27 communities across Oregon. ONHW identified communities across the state based on geographic dispersion, population, specific

hazard vulnerability, the status of mitigation planning in the community, and project steering committee input.

Conclusions

The stakeholder interviews provided candid information on local community's ability to complete risk assessments and their ability to participate in FEMA's Flood Map Modernization program. The following are key conclusions gleaned from the interview process.

- Communities lack accurate data, such as up-to-date Flood Insurance Rate Maps, for phase one of the risk assessment (Hazard ID) but generally have the data needed to conduct phase two (Vulnerability Assessment)
- Communities identified staff, funding, and training as obstacles to completing risk assessments and participating in FEMA's Flood Map Modernization program.

Focus Group Summary

Purpose

In July 2005, Oregon Natural Hazards Workgroup held targeted focus groups aimed at identifying the issues that local governments encounter while developing the risk assessment component of natural hazard mitigation plans. The focus groups specifically examined the obstacles and opportunities that local governments experience in discovering, accessing, and using geospatial data to develop their risk assessments. A full report of the focus groups can be found in Appendix F.

Methods

The project steering committee identified two communities for the focus groups – one urban and one rural. The first focus group was held on July 20, 2005, with the City of Beaverton and Washington County employees. The second focus group was held on July 26, 2005 with Umatilla County employees. Participants included members from the emergency management, planning, and GIS departments.

Participants completed worksheets identifying any technical, administrative, economic, and legal issues related to the discovery, access, and use of hazard geospatial data. An open discussion followed in which participants reported their top issue from each issue category to the group. Participants discussed the importance of data collection standards and hazard overlay methodologies as well.

Conclusions

The findings from the issue identification worksheet exercise and the discussion questions are summarized below.

- There is a lack of knowledge of what data is available

- Capacity issues at the local level stem from a lack of staff and funding rather than a lack of technical capacity
- Discovering, accessing, and using hazard geospatial data is complicated by the lack of standardized data formats
- There is a lack of communication between internal departments on what GIS activities are taking place and opportunities are being missed to collect and acquire multi-objective datasets.
- Both data collection standards and hazard overlay methodologies are equally important because one cannot be accomplished without the other.

GIS Utility Survey Summary

Purpose

The purpose of the GIS Utility survey was to collect information about spatial data, information technology investments, and institutional aspects of GIS use of local jurisdictions. This baseline information will serve as the essential foundation for the design and creation of a GIS utility that maximizes benefits and makes the best use of available resources across all levels of public agencies. While this survey does not specifically address natural hazards, it does provide insights on the technical capacity of local jurisdictions to deal with geospatial data. The survey questionnaire and additional analysis are available in Appendix G.

Methods

The online survey was sent to 203 City and County planners and GIS professionals around the State in March and April 2005. A total of 117 city and county representatives responded to the survey (58% response rate).

The survey questions fell into the following categories:

- Organizational information
- GIS technology infrastructure
- Geographic data development, use and maintenance
- GIS applications and users
- GIS organizational structure and staffing
- GIS program collaboration and sharing of GIS data

ONHW conducted a secondary analysis of the survey data provided by PlanGraphic, Inc.

Conclusions

While the GIS utility survey did not directly address natural hazards, it did provide insight on the technical capability of local communities to complete risk assessments. The following are key conclusions from this survey.

- Current GIS activities address land use planning, natural resources planning, and roads and highways, which all have direct connections to the risk assessment process.
- The majority of responding communities have the technical capabilities required to complete GIS based activities related to the risk assessment process.
- Without realizing it, many communities have already developed or are developing local data sets required for completing risk assessments through other department plans, programs, and policies.
- The majority of communities have data sharing agreements in place.

Section 5
Conclusions and Recommendations

Overview

This section outlines conclusions, and recommendations for the Oregon Hazard Framework Implementation Team (FIT) to consider as it develops the Oregon Hazards Theme. The creation of this theme will aid communities in the development of their risk assessments. The findings are based upon the research presented in the previous sections of this report. The conclusions and recommendations are organized into four categories.

- **Data Discovery** –relates to increasing local capacity to identify, locate, and collect hazard related geospatial data.
- **Data Access** –relates to increasing local capacity to obtain and use existing hazard related data.
- **Data Use** –relates to increasing local capacity to incorporate, analyze, and manage hazard related data.
- **General Conclusions**–includes broad conclusions that cut across all three categories above. These overarching conclusions are aimed at increasing local capacity to better address the risk assessment components of natural hazard mitigation plans in general.

The conclusions and recommendations are organized around these categories of issue statements. These broad issue statements identify key barriers related to local capacity to complete natural hazard mitigation risk assessments. For each issue statement, there is a background statement and a recommendation. The background statement documents the fact-base for the issue based on the various project inputs and research. The recommendations are action statements that describe the recommended action for addressing the issue statements. Each recommendation also includes a paragraph explaining in more detail the ideas for implementing the action.

Data Discovery

Data discovery (DD) is defined as the process of identifying, locating, and/or collecting geospatial data. Examples of data discovery include field collection and data development. The analysis of existing hazard data indicated that there are a multitude of data developers and owners at the local, regional, state, and federal levels. Current efforts seem to

lack sufficient coordination or communication, making data discovery difficult. At the core of this statement is the fact that data end-users (e.g. local, state, or federal) have a difficult time simply determining whether the data they seek already exists or needs to be developed. The results of the stakeholder interviews and focus groups highlighted several conclusions related to this issue.

The three primary issues identified are as follows.

- First, a lack of local knowledge about what data already exists. Local communities lack the human and financial resources to be able to stay current on the availability of hazard related geospatial data.
- Second, a need for data collection standards. Often communities are unaware or unsure of what data they should be collecting for risk assessment outside of the general hazard information. This issue has a direct connection to DLCD's land-use planning Goal 7 as it related to the incorporation of new data in to local policies.
- Third, missed opportunities for data collection due to insufficient inter and intra-governmental communication about what data exists and what data is being collected.

The following issue statements and recommendations focus on increasing local capacity to discovery hazard related geospatial data.

DD Issue #1. Lack of knowledge of what types of data to collect and data collection programs

Background

The analysis of existing hazard data indicated that there are a multitude of data owners at the local, regional, state and federal levels. However, awareness of such data is not well documented, making data discovery difficult for the local governments or potential data end-users. The stakeholder interviews indicated that 2/3 of interviewees were not familiar with digital Flood Insurance Rate Maps (FIRM), a common hazard overlay used to identify the flood hazard.

Recommendations

DD-Rec #1.1 Coordinate with State GIS Utility project to complete an annual analysis of existing hazard data

Because there are so many sources of state hazard related geospatial data and because locals lack the resources to seek out data, it will be important to maintain up to date records of what data exists. The Oregon Hazard Framework Implementation Team should work with the Oregon Geographic Information Council (OGIC) to complete an annual data sweep to identify new data sets that may be of use to complete natural hazards risk assessments. OGIC could partner with the Oregon Natural Hazard Workgroup at the University of Oregon's

Community Service Center to fund a graduate student to complete the annual sweep of hazards data. The outputs of this analysis should be shared with the DLCD to evaluate for the relevance for Goal 7.

DD-Rec-1.2 Increase flood map modernization outreach to local governments

The Oregon Hazard Framework Implementation Team should work with the DLCD to increase awareness about the Flood Map Modernization program. The team should use the Flood Map Modernization outreach strategies found in Appendix B to formulate a work plan to increase awareness about hazard related geospatial data sources. The Oregon Hazard Framework Implementation Team should also partner with the Oregon Natural Hazards Workgroup and the *Partners for Disaster Resistance and Resilience* to tap into outreach and awareness related resources already developed through the *Partnership*.

DD-Issue #2. Lack of statewide data standards

Background

Various project inputs indicated that local communities are not aware of how to collect hazard related data and why it is important. State and federal hazard mitigation planning requirements have placed greater emphasis on completing risk assessments using hazard geospatial data. Communities have indicated that they commonly experience compatibility issues integrating new data sets into their local GIS systems.

Recommendations

DD-Rec #2.1 Review current data standards and establish new standards where needed for data collection

The Oregon Hazard Framework Implementation Team (FIT) should take the lead in reviewing current Oregon GIS utilities data elements to assure they meet the needs of local risk assessments. Additionally, during this review the team should determine if there are any new element standards that need to be developed for hazard related geospatial data. The team can start with the conclusion and findings in appendix C of this report that list the current set of data elements. The current data elements are divided into two main categories hazard identification and vulnerability assessment. Additionally, the Oregon Hazard Framework Implementation Team should coordinate its efforts with the DLCD's Goal 7 review committee.

DD-Rec #2.2 Develop a statewide users guide for appropriate geographic scales for hazard related geospatial data and end products

The analysis of existing hazard data and the research documented in *Cooperating with Nature* both indicate that geographic scale is an extremely important factor in completing risk assessments. Different

scales are appropriate for different efforts. For instance, course scales may be appropriate for public education and awareness, while fine scales are required for parcel specific land use or policy decisions. Developing a guide for local communities will help planners, emergency managers, and GIS technicians make decisions about the appropriate geographic scales for their needs.

DD-Issue #3. Missed opportunities for data collection at the local level

Background

The participants of the focus group identified that in many instances, different departments within a jurisdiction may collect data without talking to other departments about their data needs. This method of operation creates missed opportunities to collect data locally that meets multiple local government objectives. Geospatial data used in natural hazard risk assessments is best at a fine scale developed at the local level so that parcel specific issues can be addressed.

Recommendations

DD-Rec #3.1 Create a data collection guidance document aimed at assisting community's collect data that is multi-objective in nature.

Oregon Hazard Framework Implementation Team (FIT) should create a guide for local communities that would assist in taking advantage of multi-objective data collection opportunities. The guide may include a checklist of the internal and external organizations to talk to before collecting data, a checklist of appropriate data attributes. This guide should also reference any relevant data collection standards (DD-Rec 2.1). The FIT could also partner with ONHW and the Partners for Disaster Resistance and Resilience to develop this guide as ONHW and the Partnership have developed similar resources.

Data Access

Data Access (DA) is defined as the ability to obtain and use current geospatial data. Examples of sources used to access data include federal, state, or local jurisdictions. Common data access issues and barriers identified through the project inputs included inconsistent data formats, access to sensitive data, and lack of local capacity to access data.

The three primary issues identified are as follows.

- First, data is available in inconsistent formats. Data is often available in inconsistent formats because hazard related geospatial data is held by so many different agencies at all levels of government.
- Second, communities are concerned about the use of sensitive or secure datasets. Following September 11th and the

implementation of Measure 37, communities question the potential legal liabilities of using and publishing sensitive data.

- Third, local communities lack the human and financial resources to be able manipulate data so that it can be integrated into local GIS systems.

If communities are unable to access hazard related geospatial data, the task of completing an accurate risk assessment becomes difficult. Potential methods of overcoming the data access barriers identified include developing a one stop data portal, establishing GIS format standards for state produced data, exploring the legal ramifications of using secure and sensitive datasets, and providing training to better assist local community staff to access data in a more effective and efficient manner. The following issue statements and recommendations focus on increasing local capacity to access hazard related geospatial data.

DA-Issue #1. Available data is in an inconsistent format

Background

The analysis of existing hazard data and the focus groups identified that existing data is often available in inconsistent and incompatible formats. Communities with limited staff resources face barriers when data is not in the projection that the community already uses as it takes additional time to re-project the data. Communities also face barriers when trying to incorporate neighboring jurisdiction's data when it is not maintained in a compatible format.

Recommendation

DA-Rec #1.1 Promote the Oregon Geospatial Enterprise Office's statewide standard for data projection

Focus group participants indicated that data comes in a number of different projections and that it takes considerable staff time and financial resources to re-project the data source to match their local GIS system. Despite the Oregon Geospatial Enterprise Office's development of statewide projection standards for state developed data, communities continue to indicate that data projection is a barrier to completing risk assessments. The Oregon Hazard Framework Implementation Team should work with the Geospatial Enterprise Office to better promote the projection standards to both state data producers and local community end users.

DA-Rec #1.2 Establish statewide hazard protocol for sharing GIS data produced through state agency reports and studies.

Some data produced by state agencies are not available in a format that allows communities to incorporate the data into their local GIS systems. For instance, some state-created data is only available in the form of paper maps rather than digital files that could be integrated into local systems. Creating statewide digital data format protocols would allow

communities to be able to access state created data that currently isn't available in a plug and play format such as a shapefile.

DA-Issue #2. Secure or sensitive data is blocked or has limited access

Background

Focus group participants indicated that a common barrier they face is lack of access to sensitive data such as utility lines and natural gas pipelines. Another issue raised was that some sensitive data is only available to be viewed and/or used by pre-approved staff and is not readily available to the public.

Recommendation

DA-Rec #2.1 Investigate legal ramifications of accessing data and using for hazard planning.

Communities have concerns about accessing and using certain secure data sets due to legal issues. An investigation is needed to identify the implications and legal liabilities communities may face related to private property rights, measure 37, influence over property values and insurance rates, eminent domain, and secure data post September 11th.

DA-Issue #3. Lack of local capacity to acquire dataset

Background

Communities lack the capacity to acquire datasets due to a number of factors including cost, staff time, and political directives. Some communities are working on developing both formal data sharing and licensing agreements to ease data acquisition among neighboring jurisdictions.

Recommendation

DA-Rec #3.1 Work with State partners and USGS to develop one-stop data portal for hazard related data

Because there are so many sources of federal hazard related geospatial data and because locals lack the resources to seek out data, creating a one-stop portal for hazard related data is an important task. The review of Goal 7 discussed in Section 3: Previous Effects also concluded that a one-stop data clearinghouse was needed. The Oregon Hazard Framework Implementation Team should work with the United States Geological Survey as they are the primary federal source for data. In 2004, the USGS developed a strategic plan entitled: A Science Strategy for the Geographic Research of the United States Geological Survey, 2005-2015. Goals 4 and 8 in this strategic plan support the USGS's involvement in the development of a one-stop data.

DA-Rec #3.2 Create and implement training on completing hazard risk assessments for planners, emergency managers, and GIS technicians.

It is important for both emergency managers and planners to have access to hazard related geospatial data as both play a role in hazard mitigation. Planners and emergency managers can have a direct impact on ensuring that future development occurs in a more disaster resistant manner. Providing training to community staff members beyond just GIS technicians is an important step in assisting communities better integrate mitigation into other existing programs, which is a requirement of the Disaster Mitigation Act of 2000.

Data Use

Data use is defined as the incorporation, analysis, and management of community risk assessment geospatial data into local systems. Data use issues and barriers identified through the project inputs include a lack of hazard overlay methodologies and a lack of local human and financial resources and capacity.

The two primary issues identified are as follows.

- First, is a lack of methodologies for the development of hazard overlays. The project inputs and research indicate that the data and technical capabilities to develop risk assessments are intact. But communities need detailed methodologies describing how the data elements are used together to create the hazard overlays.
- Second, lack the human and financial resources to be able to use and maintain hazard related geospatial data. Creating a hazard risk assessment and maintaining the data and end products takes dedicated staff and financial resources at the local level.

A community's ability to use hazard related geospatial data would be enhanced by the development of hazard overlay methodologies. Overcoming local funding and staff barriers is not a task that the Oregon Hazard Framework Implementation Team can directly take on; however, the state may be able to complete some portions of the risk assessment for communities that lack financial and human resources. The following issue statements and recommendations focus on increasing local capacity to use hazard related geospatial data.

DU-Issue #1. Communities need methodologies to develop hazard overlays

Background

State and federal hazard mitigation planning requirements have placed greater emphasis on completing risk assessments using hazard geospatial data. As was stated in the Introduction, the hazard theme is unique because it is made up of overlays of individual data elements.

The research indicates that in general, hazard related geospatial data is available and that communities have the technical capabilities to complete the basic level hazard identification and vulnerability assessment steps.

What is missing are state accepted methodologies for using the data elements to create hazard overlays for the risk assessment. The GIS utility survey indicated that most communities have the technical capabilities to complete a risk assessment and in the past have completed GIS tasks related to planning and public works that would be similar to the tasks needed in the risk assessment process.

Recommendation

DU-Issue #1.1 Develop new risk assessment training focused on the use of hazard related geospatial data

This training should focus on the steps necessary to integrate, manipulate, and maintain hazard related geospatial data for natural hazard risk assessments. The project inputs indicate that local GIS technicians have the skills necessary to complete the tasks associated with the risk assessment, but may lack the knowledge of how to use the hazard data. These trainings would better assist communities remain in compliance with the Disaster Mitigation Act of 2000 and the requirements of Goal 7.

DU-Rec #1.2 For the earthquake hazard, investigate the use of HAZUS and develop protocols for using it in Oregon

HAZUS is loss estimation software that can be used to complete the risk assessment for the earthquake hazard. The default data used in the program is fairly course and does not allow for very accurate or site specific results.

The use of HAZUS can be greatly enhanced with the use of local data. The Oregon Hazard Framework Implementation Team should work with the Oregon HAZUS Users Group (ORHUG) to develop an Oregon specific users guide for incorporating local data to enhance the use of HAZUS to create earthquake risk assessments. ORHUG has established a set of standards and goals. One of the goals deals with standards for the use of HAZUS and calls for the identification of how communities can use HAZUS.

DU-Rec #1.3 For the flood hazard, develop and implement an outreach strategy to make communities aware of the Flood Map Modernization program as a means to update out-of-date FIRMs.

The majority of FIRMS in Oregon are at least 15 years old and are in need of updating to accurately reflect significant growth and development, which ultimately impacts the flood hazard. This report includes an outreach strategies developed for the Department of Land Conservation and Development aimed at making planners, emergency managers, elected officials, building officials, and GIS technicians aware of the Flood Map Modernization program. DLCD should take the

lead in implementing the actions identified in the Flood Map Modernization outreach strategy, (Appendix B).

DU-Rec #1.4 For the wildfire hazard, finalize and disseminate the Oregon Department of Forestry Wildland Urban Interface Risk Assessment Methodology.

The Oregon Department of Forestry has developed a methodology for developing wildland urban interface risk assessments using best available geospatial data. The methodology has been used statewide and has also been tested by several counties as they developed Community Wildfire Protection Plans. The Oregon Hazard Framework Implementation Team should work with the Oregon Department of Forestry to finalize and disseminate the wildfire methodology. This effort could also be linked with USGS Strategic Action 3.3 in A Science Strategy for the Geographic Research of the U.S. Geological Survey, 2005-2015. Strategic Action 3.3 calls for research leading to improved capabilities to assess wildfire conditions, predict wildfire potential, prioritize treatment areas, and monitor effectiveness of fire treatment areas to support risk reduction efforts in the urban-natural landscape interface.

DU-Issue #2. Communities lack capacity to complete risk assessment work locally

Background

The stakeholder interviews indicated that there seems to be a common miscommunication among GIS technicians, planners, and emergency managers about what a risk assessment entails and who should be involved. Communities also indicated that two of the biggest barriers they face are a lack of staff and money to fund the development, maintenance and update of community risk assessments.

Recommendation

DU-Rec #2.1 Explore the potential for the state to complete certain risk assessment tasks for local communities.

Communities commonly identified that the lack of staff and funding is a barrier to completing risk assessments. Other states have taken on the task of completing portions of risk assessment for local communities in an effort to overcome the staff and funding barriers. For example, in Florida, the Department of Community Affairs provided each county with outputs from a hurricane modeling program called the Arbiter of Storms (TAOS).

DU-Issues #3. Most risk assessment data are not integrated into local GIS systems

Background

Many communities have used consultants to develop and use risk assessment data sets in conjunction with the development of their mitigation plans. Often, this data is not integrated into the local GIS

system, but is held separately. Although the various project inputs did not directly identify this issue, it has been included as an observation by the Oregon Natural Hazard Workgroup, which has been involved in the development of a number of local natural hazard mitigation plans.

Recommendation

3.1 Provide recommendations and local examples of how to integrate, maintain, and update Risk Assessment data

Risk assessments and mitigation should not be seen as additional responsibilities for communities, but should be seen as an integral part of everyday government function. Mitigation can be incorporated into planning, public works, and financial operations within a jurisdiction. Anything that is mitigated today is one less thing that needs to be responded to when the disaster occurs. The integration of mitigation into everyday operations is also true for risk assessment related geospatial data.

General Conclusions

This needs assessment identified issues local communities face when developing the components of a risk assessment for a natural hazard mitigation plan, using the categories of data discovery, access and use. Several overarching issues are applicable across all three categories and include: (1) problems with data in general, (2) lack of staff and financial resources, and (3) insufficient communication and coordination.

The first overarching issue is that there are several different types of problems communities encounter when discovering, accessing and using data. The Goal 7 report completed in 1998 concluded that a key barrier communities faced in addressing hazards was a lack of data or access to data. The inputs of this needs assessment have helped better define this previous conclusion. According to our findings, the lack of data issue is related to the hazard identification phase rather than the vulnerability assessment phase of the risk assessment. There seems to be a wealth of vulnerability assessment data available at the local level. However, both phases of the risk assessment would benefit from better data standards and hazard overlay methodologies. Developing data standards will assist communities collect more robust data that will be useful in completing a risk assessment and will also have uses in other government functions such as planning and public works. Developing hazard overlay methodologies will assist communities by providing step-by-step processes for combining the hazard identification and vulnerability assessment data to complete the risk assessment.

The second overarching issue is a lack of staff and financial resources to complete the risk assessment phases. In all the various inputs, the two issues or barriers that communities continued to bring to the forefront were a lack of staff and funding for staff. The surveys and interviews, however, indicated that most communities do have the technical

capability to complete the steps necessary to complete risk assessments. While it is highly unlikely that the FIT could provide funding to local communities to address the hazard risk assessment components, this group may be able to complete portions of the risk assessment for local communities.

The third overarching issue is an insufficient level of communication and coordination to address common issues. The inputs, especially the focus groups, indicated that there is a lack of inter and intra-governmental communication about the best available data and data collection efforts. Increased communication between the various departments that collect, use and maintain data will result in more effective use of staff time and funding because it will result in multi-objective datasets. There also seems to be a lack of intra-departmental communication and coordination related to the general understanding of the hazards that have the ability to impact the community. In the stakeholder interviews, interviewees were asked to indicate which hazards affected their communities. The results were then compared to the State Natural Hazard Mitigation Plan's Regional Risk Profiles. A majority of communities participating in the survey failed to identify one of more high-risk hazards identified in the Regional Risk Profiles. The Oregon Geographic Enterprise Office and various GIS users groups are working to increase outreach efforts to overcome the communication and coordination obstacle.

The development and implementation of the recommendations identified in this needs assessment will assist in furthering the Oregon GIS Utility which will ultimately assist local communities more easily discover, access and use hazard related geospatial data to complete the three phases of the risk assessment. As risk assessments become more accurate and detailed, communities can better define their most vulnerable community assets and potential losses, and in affect, utilize limited mitigation dollars more effectively to create more disaster resistant communities. The conclusions and recommendations in this needs assessment can also be integrated into the State Natural Hazard Mitigation Plan to be implemented through the Inter-agency Hazard Mitigation Team, when possible.

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[i] Oregon Geospatial Enterprise Office. 2005. What is the Oregon GIS Utility? http://www.plangraphics.com/projects/Oregon_GIS_Utility/gisutility.htm

[ii] Oregon Geospatial Enterprise Office. 2004. Oregon Standard Development Effort. http://www.gis.state.or.us/coord/standards/Standards_Development_Effort.pdf

[iii] Burby, R. 1998. Cooperating with Nature. Washington, DC: Joseph Henry Press. Pg 126.

[iv] Burby, R. 1998 Cooperating with Nature. Washington, DC: Joseph Henry Press. Pg 133.

[v] Interagency Hazard Mitigation Team Report, FEMA-DR-1099-OR, 1996, p. 12.

Appendix A
Project Coordination

This appendix includes minutes from core team meetings held on the following dates:

November 30, 2004

February 3, 2005

March 3, 2005

April 7, 2005

May 11, 2005

June 2, 2005

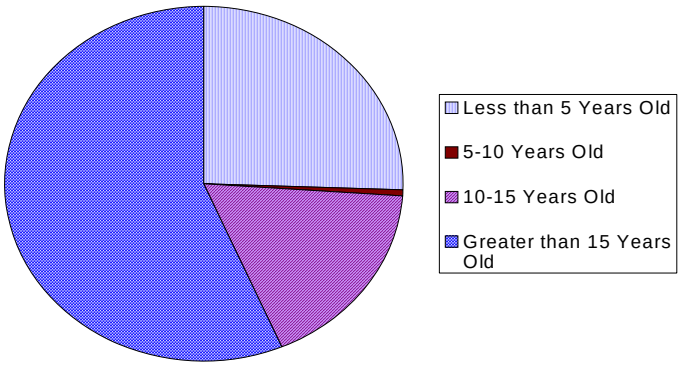
July 7, 2005

Statement of Need

The following statement of need was developed for the Flood Map Modernization Business Plan for Oregon created by the Oregon Department of Land Conservation and Development in 2004.

Flood hazard maps produced by the Federal Emergency Management Agency (FEMA) are one of the essential tools for flood hazard mitigation in Oregon, and in the United States in general. Oregon's local governments and state agencies rely on FEMA flood hazard maps to regulate floodplain development and otherwise mitigate for flood losses. The private sector also uses FEMA maps for development and insurance purposes. As shown in Figure A.1, the majority of flood hazard maps produced for Oregon's communities are more than 15 years old. Many of these maps were originally produced in the 1970s or early 1980s. Since then, Oregon's population has increased significantly, particularly in the flood-prone Willamette Valley and in some coastal communities. Flooding levels and impact areas are potentially altered by these population increases and changes in development patterns.

Figure B.1: Age of Oregon Flood Hazard Maps



Source: FEMA Region X, Oregon State Mapping Data, 2002

Additionally, the state suffered significant flood losses in 1996 and 1997 when 27 of the state's 36 counties were declared federal disaster areas. Among the lessons learned during the 1996 and 1997 floods was that flooding in Oregon communities was not always limited to areas shown on FEMA flood hazard maps. In many cases, flooding occurred in areas not mapped as having significant flood hazards. This demonstrates the problem of older FEMA maps sometimes reflecting outdated flood hazard information, thereby limiting map utility for floodplain management purposes.

Even where the flood hazard information represented on FEMA's flood hazard maps remains accurate, FEMA's traditional map format generates numerous challenges for Oregon communities charged with regulating floodplain development and state agencies working to mitigate flood hazards. We provide some examples here of these challenges for illustrative purposes.

- Most of the FEMA maps were prepared using road network information that is now outdated.
- The original maps were prepared using manual cartographic techniques, which make the maps difficult for state and local customers to use and expensive to maintain.
- Changes in political boundaries, such as annexations by cities, are not readily addressed on older maps.
- City and county maps were not produced in a seamless method making it difficult to use the maps for locations near jurisdiction boundaries.
- The base data used to develop the flood hazard maps, where still accessible, are not in an easy-to-use format by today's mapping standards.
- Local floodplain administrators must document by hand onto the paper maps all the site-by-site administrative changes made routinely by FEMA.
- The submission and acceptance process for updating flood maps can appear slow and complicated to potential participants.

The state of Oregon also has a relatively high number of stream miles subject to mapping for flood hazards. The Association of State Floodplain Managers (ASFPM) reports that Oregon has 107,039 total stream miles to address. ASFPM lists only nine states with more stream miles subject to flood hazard mapping, and only one of those states (Alaska) is located within Region X. This highlights the extent of flood hazards across Oregon and the potential scope of updates needed to modernize existing flood hazard maps.

Baseline Information

The following section outlines the information supporting the need for a Flood Map Modernization outreach strategy. This supporting information includes a summary of existing outreach materials, responses from the hazard survey, responses from stakeholder interviews, and key findings from a technical assistance and outreach needs assessment completed by the Community Planning Workshop at the University of Oregon for the Department of Land Conservation and Development. This section concludes with key findings that will build the foundation for the recommended actions located at the end of this appendix.

Existing Outreach Materials

The following is a summary of existing flood hazard planning outreach and education examples and materials available to planners and other professions involved in flood hazard planning. This is summary is not meant to be comprehensive, but is intended to illustrate the types of information currently available.

Federal Emergency Management Agency (FEMA)

Much of the information, available through FEMA, focuses on preparation and prevention, such as flood insurance, floodplain management, and flood hazard mapping.

The following materials were developed by FEMA for the Flood Map Modernization program:

Brochures

- **Multi-Hazard Flood Map Modernization:** This document describes the importance of modernizing flood maps. It describes the process and collaborative nature of the program.
- **Cooperating Technical Partners (CTP):** This brochure describes the CTP program, including the program's objectives, benefits, and available funding. It also illustrates changes in the CTP program, available tools, and training opportunities.
- **Data Capture Standards:** This brochure explains the data capture standards for flood hazards and explains how the standards are used. It also provides information about the organization of the data capture standards and where they can be obtained.
- **Want to talk to a Map Specialist about Flood Hazard Mapping?:** This document explains how to contact a map specialist and gives examples of the information available.
- **Need Information on Flood Hazard Maps?:** This brochure provides FEMA's web address for flood hazard mapping. It explains about the type of information available to the following groups: home owners, insurance professionals and lenders, engineers and surveyors, and floodplain managers and community officials.

Mini-CD

The mini-CD distributed by FEMA contains a multimedia presentation about the Flood Map Modernization program. The presentation provides an overview of the purpose of the program and how the program has improved flood mapping in several communities. It includes information on the background and history of the Flood Map Modernization program, as well as case studies about map modernization.

Multi-Year Flood Hazard Identification Plan (MHIP)

The MHIP describes FEMA's nationwide strategy for updating Flood Insurance Rate Maps used to implement the NFIP. The Plan provides FEMA's projections for sequencing DFIRM production and how federal dollars will be spent. The Plan also addresses issues such as map quality and partnering with local, state and regional organizations. The Plan can be accessed on FEMA's website and is updated at least once per year.

Map Modernization PowerPoint Presentations

The Region 10 office has worked with federal map modernization partners to develop several presentations about map modernization. The presentations explain the fundamentals of the map modernization program and the benefits of using a DFIRM. Region 10 staff have and will continue to use these presentations for trainings in Oregon.

Association of State Flood Plain Managers (ASFPM)

Information provided by the Association of State Floodplain Managers focuses on floodplain management using the No Adverse Impact (NAI) method of floodplain planning. NAI provides a framework of techniques, methods, and tools for flood planning and mitigation. These materials focus on flooding hazards, rather than Flood Map Mod.

Department of Land Conservation and Development

DLCD has also created PowerPoint presentations covering various elements of the state and local roles in the map modernization program. These presentations have and will continue to be used for presentations around Oregon. DLCD has not yet created presentations that could be used by local staff for presenting information about map modernization to local elected officials or community members.

DLCD Website

DLCD has posted the Flood Map Modernization Business Plan for Oregon (March 2004) and the predecessor Flood Map Modernization Plan for Oregon (August 2002) on its Natural Hazards website. However, the Department has not yet integrated the plans into a webpage specific to the map modernization program.

NatHazNews Listserv

DLCD uses a listserv to disseminate natural hazards related information to local, state, federal, and private sector stakeholders. The listserv was established through the Oregon State Library and is set up for one-way information dissemination from DLCD to listserv members. The Department's Natural Hazards Newsletter is also distributed through this listserv.

Oregon Natural Hazards Workgroup

The Oregon Natural Hazards Workgroup developed a resource guide entitled, *Planning for Natural Hazards: Oregon Technical Resource Guide*, which provides information for Oregon communities about flood

hazards, laws relating to flood hazards, reducing the risk from flood hazards, approaches to addressing flood hazards, and community resources.

Other State and Special District Flood Map Modernization Websites

A number of states and special districts have developed web sites that provide general information on the state and non-profit organization's efforts related to the Flood Map Modernization program. These web sites range in complexity from a simple one page description, to white papers, to web-based GIS platforms. The following links serve only as examples of the types of information available.

- Oklahoma Water Resources Board – http://www.owrb.state.ok.us – This web site provides a brief overview of the Map Modernization program and provides and list of related links.
- New Hampshire Office of Energy and Planning – http://nh.gov/oep/programs/floodplainmanagement/modernization.htm - This web site provides a brief overview of the Map Modernization program and language for model ordinances to amend Floodplain Development Ordinances for the purpose of adopting new FIRMS.
- Wisconsin Department of Natural Resources – http://www.dnr.state.wi.us/org/water/wm/dsfm/flood/documents/MapModBrief.pdf - This document describes the role of the State of Wisconsin in the Flood Map Modernization program.
- North Carolina – http://ncfloodmaps.com – This web site serves as a portal to the most current information about floodplain mapping in the State of North Carolina. The main intent of the web site is for education and outreach and includes links to digital flood maps, public documents, news, project status, and resources.

Hazard Survey

ONHW and DLCD worked together to develop a survey that focused on community's efforts to develop risk assessments and community needs related to FEMA FIRM maps. The following are the key findings from the survey that relate to this outreach strategy. For a full report on the Hazard Survey, see Appendix D.

Respondents were asked whether or not their jurisdiction would be interested in partnering with FEMA to complete a map modernization project. Eighty-seven percent of respondents are interested in participating in a map modernization project with FEMA. Of those who indicated they would be interested, more than half of respondents report that the most common obstacle to participation would be staffing (58%) and lack of funds (58%). Table B.1 shows the map modernization participation obstacles as perceived by survey respondents.

Table B.1: Obstacles to Participating in Map Modernization Project with FEMA

Obstacle	Number	Percent
Staffing	22	58%
Lack of funds	22	58%
Limits in local GIS capabilities	12	32%
Lack of GIS data	11	29%

Source: PlanGraphics, Natural Hazards Survey, 2005

Stakeholder Interviews

Stakeholder Interviews were conducted with planners, emergency managers, and GIS technicians around the state in order to gain a better understanding of local capabilities to complete natural hazard risk assessments and to gauge interest in participating in the Flood Map Modernization program. The following are key findings from the interviews that relate to this outreach strategy. For a full report on the Stakeholder Interviews, see Appendix E.

The majority of interviewees indicated that they would be interested in participating with the state and FEMA in a flood map modernization project, but that available staffing, funding and GIS capability would most likely be obstacles to completing this work. A majority of respondents indicated that they would be interested in partnering with the State or FEMA to improve flood hazard awareness and conduct outreach. The State or FEMA could best support local education and outreach efforts in the following ways:

- Update the FIRMs and digitize them for use in GIS
- Provide funding for education and outreach
- Provide content and funding for mailings, presentations, and signs
- Work closer with communities on flood hazard planning

DLCD Technical Assistance and Outreach Needs Assessment

In 2002, the Community Planning Workshop at the University of Oregon completed a needs assessment on existing technical assistance and outreach resources developed and implemented by the Department of Land Conservation and Development. The intent of the project was to determine which audiences were using the existing resources, assess the effectiveness and usefulness of the resources, and to identify gaps between the resources being provided and community needs. Although this particular needs assessment was not focused on natural hazards or the risk assessment process, it does assist in identifying potential technical assistance methods for addressing the risk assessment process. The following key findings have been taken directly from the DLCD report.[iii]

- **The preferred format of technical assistance and outreach materials is short brochures**. Survey respondents and focus group participants indicated that, in general, they would prefer written materials to be in the form of short brochures. Focus group respondents indicated that planning commissioners are less likely to read longer, technical documents than planning staff. However, with a planning program as complex as Oregon's, it may be unrealistic for DLCD to adequately cover many planning related items in a short brochure.

- **There is a high demand for local and regional workshops**. The survey data show that there is demand for local and regional workshops. The majority of focus group participants preferred workshops that were less than three hours and up to one hour commuting distance. According to the survey, there was more demand for local training workshops than the regional workshops. Focus group participants noted that regional workshops could be a potential medium to share examples of successful planning activities.

- **The majority of survey respondents receive new planning information from their peers, other planning staff or planning commissioners.** The survey shows that that most common sources of planning information that exist currently for the respondents are 1) planning staff or planning commissioners, 2) talking to colleagues, 3) COG staff, and 4) newspaper articles. This data highlights the potential of increasing partnerships with COGs, as well as the importance of the media in disseminating information.

- **Local planning staff and decision makers are not utilizing written and web-based technical assistance and outreach materials available through DLCD and other planning-related sources.** When survey respondents were given an extensive list of current DLCD technical assistance publications, the majority of planning staff and decision makers alike had never reviewed them. Although planning staff are more likely than decision makers to utilize DLCD resources, the underlying theme of most survey question responses indicates a lack of awareness that DLCD resources exist. Focus group participants confirmed this sentiment and explained they would use DLCD and other planning-related resources if they knew of their existence.

- **DLCD relies heavily on their website to disseminate technical assistance and outreach materials, yet the majority of respondents are not accessing it.** DLCD provides a wealth of useful information through their website, however over half of survey respondents had never visited the website. For planning staff, the Internet is the third most

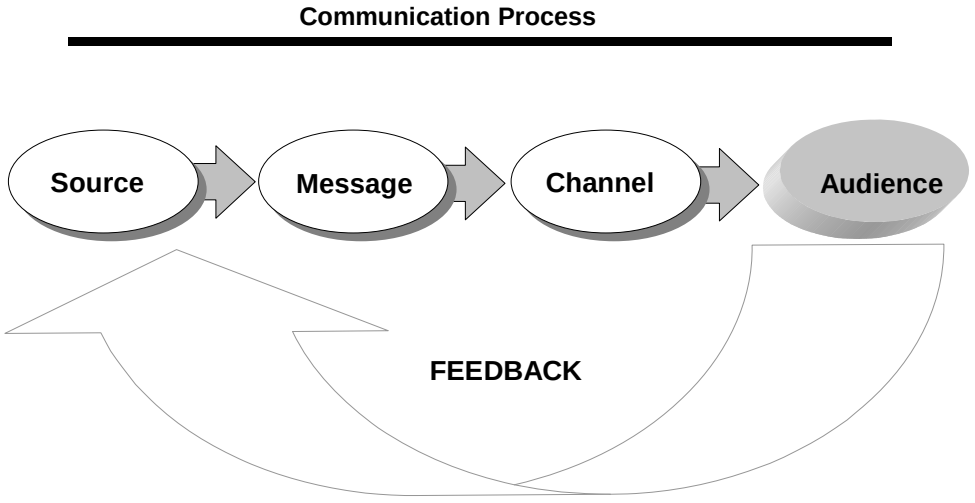
preferred format for technical assistance and outreach materials; for decision makers, the Internet is the fourth most preferred format. Focus group participants indicated that if they knew what resources where available, and resources were quick and simple to find, they would utilize Internet resources more often. Online survey respondents overwhelmingly preferred (75%) the internet as a source of technical assistance and outreach materials.

Communication Process

Having an understanding of the basics of the communication process can help in creating an outreach campaign that is effective in reaching and connecting with the target audience. There are five essential elements for communicating effectively to a target audience. These five features are shown in Figure B.2 and include the following:

- The **source** of the message must be credible,
- The **message** must be appropriately designed,
- The **channel** for communicating the message must be carefully selected,
- The **audience** must be clearly defined, and
- The recommended action to the audience must be clearly stated with a **feedback** channel established for questions, comments and suggestions.

Figure B.2: Communication Process



Source: Adapted from the U.S. Environmental Protection Agency Radon Division's outreach program

Key Findings

The following are key findings based on the supporting information reported above.

- There is a lot of information available about flood hazard mitigation and floodplain management but relatively little information is available about flood map modernization.
- FEMA materials on the Flood Map Modernization program are intended for a nationwide audience and as a result, provide little, if any local or state specificity.
- Communities indicate that they are interested in participating in Flood Map Modernization projects, but staffing, funding, and GIS capacity may be obstacles.
- Planners and other professions involved in flood hazard planning are most likely to get information from their peers and other planning professionals.
- It is insufficient to provide information about flood map modernization via the DLCD's website unless there is a way to inform planners and other professionals concerned with flood map modernization that the information is available.
- A majority of the outreach and communication efforts currently available on Flood Map Modernization are one-way communication tools. Communication models indicate that two-way communication models may be more effective in increasing awareness because of the availability of feedback loops.
- Previous research and the project inputs indicate that communities are interested in increased face-to-face interactions to address Flood Map Modernization, however, limitations of staff time and funding make increased physical presence difficult. Electronic and other virtual means of communication may be best for raising awareness given current staffing and funding levels available.
- An understanding of the components of communication models is essential for developing effective outreach strategies.
- An understanding of the intended outreach audience is essential for developing effective outreach strategies.

Outreach Strategies

Because very little information is available about flood map modernization, it is important for DLCD to establish a coordinated strategy for providing communities with related resources and outreach efforts. This strategy outlines recommendations on how DLCD can raise awareness of the Flood Map Modernization program among planners, emergency managers, public works, elected officials, GIS technicians, and building officials. The following actions are based upon the background information and research completed for this project. The actions are centered around five core Flood Map Modernization messages identified by DLCD. Because the intended audiences are so

diverse, completing the following outreach activities will require the use of a number of different communication channels and outreach material formats. An analysis of available communication channels and outreach formats catalogued by the different audiences is provided at the end of the appendix. DLCD should use these tables to identify the appropriate method of reaching their intended audiences. An example of how to use the tables to complete the communication process is provided at the end of this Appendix.

Action #1 – Create Oregon Flood Map Modernization webpage on DLCD's Natural Hazard website

Currently, there is no Flood Map Modernization information on the DLCD's natural hazard website. Creating such a site would serve as a portal for information on Flood Map Modernization and can be host to resources and materials developed to make planners, elected officials, emergency managers, public works staff, building officials, and GIS technicians aware of Flood Map Modernization. This site could also include a link to the State's Business Plan for Flood Map Modernization. Links to this site could be placed on other frequently used natural hazard websites, such as:

- Oregon Emergency Management
- Department of Geology and Mineral Industries
- Building Codes Division
- Partners for Disaster Resistance & Resilience
- FEMA Region X

Action #2 – Advertise availability of Oregon Flood Map Modernization webpage

In order for the webpage to be effective, the intended audiences need to know that it exists. DLCD should use the appropriate channels to get the word out to planners, emergency managers, elected officials, public works staff, building officials and GIS technicians. DLCD should employ the use of the specific listservs or newsletters listed in the tables at the end of this report. For example, to reach planners, an announcement could be placed in the Oregon Planner's Journal.

Action #3 – Explore potential to enhance listserv functions to allow for two-way communication between end users

Previous research and the project inputs indicate that communities are interested in increased face-to-face interactions to address Flood Map Modernization, however, limitations of staff time and funding make an increased physical presence difficult. Electronic and other virtual means of communication may be best for raising awareness given current staffing and funding levels available. The DLCD already maintains a listserv to distribute natural hazard related information, however, the current listserv only allows for one-way information

distribution and does not allow end users to share information on the list independently. The enhancement of the current listserv into a two-way means of communication will allow communities to have an open forum where local community issues and solutions can be shared.

Action #4 – Create outreach materials regarding the importance of floodplain mapping

This message is essential in moving the Flood Map Modernization program forward in Oregon. Communities must understand why floodplain mapping is important before they decide whether or not to participate in a Flood Map Modernization project. Key points to include with this message are:

- Age of current maps
- Usefulness in development and insurance decisions
- Meets federal planning requirement to identify geographic extent of flood hazard
- Meets state Goal 7 inventory requirements

This message should be broadcast to a wide audience including: planners, floodplain managers, public works, emergency managers, elected officials, and building officials. See tables below for appropriate outreach channels and formats.

Action #5 – Create outreach materials regarding the importance of updating Flood Insurance Rate Maps (FIRMs)

This message is intended to provide the foundation for the Flood Map Modernization program in the state. Communities must understand why updating FIRMs is important before they decide whether or not to participate in a Flood Map Modernization project. Key points to include with this message are:

- Older maps do not accurately reflect current development, which significantly affects the flood hazard
- FIRMS are used to make insurance premium decisions
- Accurate FIRMS can be used to ensure that future development takes place outside of flood-prone areas
- Accurate FIRMS meet state Goal 7 requirements to inventory flood hazards
- New technology is available
- Federal funding is available

This message should be broadcast to a wide audience including: planners, floodplain managers, public works, emergency managers,

elected officials, and building officials. See tables below for appropriate outreach channels and formats.

Action #6 – Create outreach materials regarding the advantages of having a digital FIRM (DFIRM)

This message is intended to inform the community of the advantages of creating and maintaining digital rather than paper FIRMs. Many communities are currently working from paper maps with hand drawn map revisions and amendments. Key points to include with this message are:

- DFIRMS can be integrated into local geographic information systems (GIS)
- The ability to integrate locally allows the community to complete a level 2 risk assessment to meet federal planning requirements by overlaying community assets such as building stock and critical facilities over the floodplain boundaries
- Future map amendments and updates are accomplished easier than predecessor paper maps

This message should be broadcast to a wide audience including: planners, floodplain managers, public works, emergency managers, elected officials, GIS technicians, and building officials. See tables below for appropriate outreach channels and formats.

Action #7 – Create outreach materials regarding the process of Flood Map Mod

This message is intended to inform the community of the steps involved in updating FIRMS and participating in the Flood Map Modernization program. Key points to include with this message are:

- Advanced engineering streamlines studies and improves results
- Capturing interim data throughout the process provides access to mapping products earlier in the mapping life cycle
- Data quality will be improved through refined standards
- Flood maps will be delivered in Geographic Information System format
- Spatial visualization makes it easy to view and analyze the information
- All stakeholders will have improved access to flood hazard data through the Web
- Flood maps and data may be accessed online via FEMA's Multihazard Information Platform (MIP), both during the study

as data becomes available and after map adoption as required to determine insurance rates

- MIP, the new technology platform, promotes data sharing with all mapping partners and improves interoperability with existing data sources[iv] (FMM Web)

This message should be broadcast to a wide audience including: planners, floodplain managers, public works, emergency managers, elected officials, GIS technicians, and building officials. See tables below for appropriate outreach channels and formats.

Action #8 – Create outreach materials regarding technical information and use of DFIRMs

This message is intended to inform those who would use the DFIRM on the technical aspects of the files. Key points should be developed from FEMA's publication, *Guidelines and Specifications for Flood Hazard Mapping Partners* (http://www.fema.gov/fhm/dl_cgs.shtm):

1. **Volume 1** explains the activities involved in the completion of Flood Map Projects and provides guidelines for performing those activities in five phases - mapping needs assessment; project scoping, topographic and flood hazard data development; map and report production, and Preliminary/Post-Preliminary processing.

2. **Volume 2** provides guidelines for conditional and final revisions and amendments to Flood Hazard Maps initiated by communities and other Mapping Partners, including conditional and final Letters of Map Amendment, conditional and final Letters of Map Revision Based on Fill, conditional and final Letters of Map Revision, and Physical Map Revisions.

3. **Volume 3** provides guidelines and specification for support activities performed for FEMA by various Mapping Partners in five general categories – program coordination, special technical and program support, public outreach activities, special correspondence support, and other program support.

4. **Appendices A through M** provide additional guidelines and specification for the processes and products associated with aerial mapping and surveying (including analyses and mapping of riverine, coastal, shallow, ice-jam, and alluvial fan flooding; evaluation and mapping of flood protection systems; scoping for Flood Map Projects; Flood Insurance Study report format guidelines and specifications; Flood Hazard Map format guidelines and specifications; Digital Flood Hazard Map database guidelines and specifications;

and technical and administrative support data preparation and processing requirements.

This message should be broadcast to GIS technicians and other planning, floodplain managers, public works, or emergency management staff that might be involved in updating the FIRMS. See tables below for appropriate outreach channels and formats.

Implementing the Actions

The section above outlined a series of eight outreach actions that can be taken to make local staff better aware of the Flood Map Modernization program and why it is important. The following section will take one of those actions (Action #8) and plug it into the communication model to show how this outreach strategy works. For all the actions identified in this strategy, DLCD should serve as the message source since they are the state agency with the lead on floodplain management. There are six basic steps to creating and implementing outreach campaigns. The steps include:

1. Select the intended **audience**;
2. Select the appropriate **channel** to reach target audience;
3. Create outreach **message** specialized for the selected audience;
4. Implement the outreach effort;
5. Provide opportunities for **feedback**; and
6. Revise and improve future messages based on feedback.

Step 1 – Select the intended audience

The first step in creating and implementing an outreach effort is to answer the following question: who do I want to reach? In the example, the intended target audience will be GIS technicians.

Step 2 – Select the appropriate channel

The channel for communicating the message must be carefully selected to reach the selected audience - local GIS technicians. The question to be asked at this step would be: through what methods and means can I best reach the intended audience? The tables located at the end of this appendix can be used for identifying potential channels based on the intended audience. The table excerpt below is an example of a potential channel that can used to reach GIS technicians.

Audience	Channel Description	Message Format	Contact Information
GIS Technicians	Oregon Geospatial Discussion Forum	Brochure Poster Presentation Training	Oregon Geospatial Enterprise Office http://www.gis.state.or.us/coord/Discuss_Forum/Discussion_Forum.html

In this example, DLCD could prepare a presentation or training for one the Oregon Geospatial Discussion Forums. The purpose of this

presentation and/or training will be to provide GIS technicians with technical information about how to work with DFIRMs in their local GIS systems. This channel might be particularly effective because DLCD would be taking the message directly to the GIS technicians through a regularly scheduled meeting that is attended by the target audience.

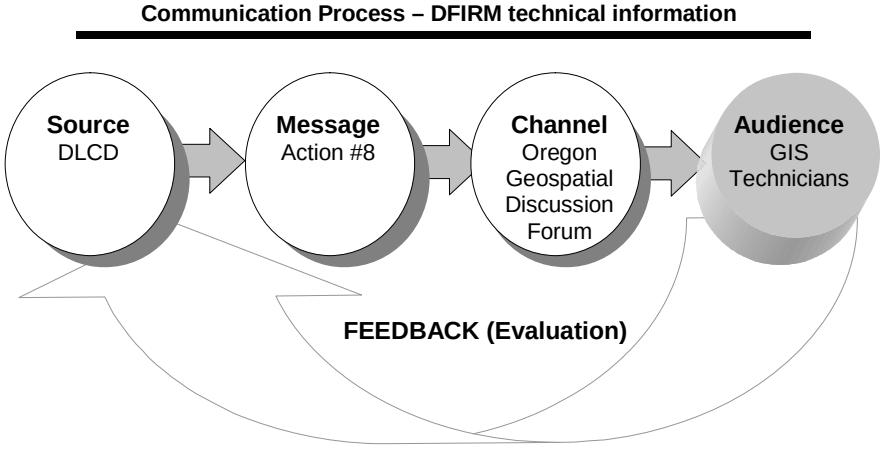
Step 3 – Create outreach message

The message must be appropriately designed for the intended audience. The main question to ask during this step is: what do I want the audience to know? Different channels may require different message formats. For example, outreach materials developed for a newsletter article may vary greatly from materials created for a training session. For the Action #8 example, DLCD would want DFIRM end users (GIS technicians) to understand how to use DFIRMS. Local GIS technicians who have worked with DFIRMS and experts at FEMA Region X could assist in developing the message. FEMA's guidance document, *Guidelines and Specifications for Flood Hazard Mapping Partners* can also be used to develop this message.

Step 4 – Implement the outreach effort

Once the audience has been selected, the message created and the channel selected, it is time to implement the outreach effort. DLCD should work with the Oregon Geospatial Enterprise Office to coordinate the implementation of the presentation or training. Figure B.3 illustrates the selected message, channel and audience for this example action.

Figure B.3: Action #8 Communication Model Example



Step 5 – Provide opportunities for feedback

The message and any associated action on the part of the audience must be clearly stated and a feedback channel must be provided for questions, comments and suggestions. DLCD could use their website as a means of feedback for GIS technicians who attend the presentation and/or training.

Step 6 – Revise and improve future messages

Providing means for feedback allows the source to revise and improve future outreach messages. DLCD should act on any feedback it may receive through the Forum presentation and/or training.

Potential Outreach Channels and Formats by Audience

The tables below document the potential audiences for Flood Map Modernization outreach efforts. In addition to identifying the potential audiences, the tables also list potential channels and message formats appropriate for each of the audiences based on the communication model presented earlier in this Appendix.

Unfortunately, there is not one single method of communication that would reach all seven of the identified potential audiences - individual channels must be used to reach each of them. The following tables display potential ways in which the messages above could reach the intended audiences. The different communication approaches range from submitting articles to existing newsletters to taking the message directly to the audience through existing organization and associations.

Audience	Channel Description	Message Format	Contact Information
Planners	Natural Hazard Planner Newsletter	Article	DLCD
	Oregon Planner's Journal – quarterly newsletter	Article	Oregon Chapter of the American Planning Association 2020 SW 8th Ave, PMB#336 West Linn, OR 97068 (T) 503-210-0860 oapa@oregonapa.org
	Oregon Planners Institute – annual conference	Brochure Poster Presentation Training	Oregon Chapter of the American Planning Association 2020 SW 8th Ave, PMB#336 West Linn, OR 97068 (T) 503-210-0860 oapa@oregonapa.org

Audience	Channel Description	Message Format	Contact Information
Floodplain Managers	Department of Land Conservation and Development Natural Hazards Newsletter	Article	Department of Land Conservation and Development 635 Capitol St, NE, Suite 150 Salem, OR 97301-2540 (T) 503-373-0050 ext 250 (F) 503-375-5518 christine.valentine@state.or.us
	Northwest Regional Floodplain Managers Association Annual Conferences	Brochure Poster Presentation Training	Northwest Regional Floodplain Managers Association PO Box 2517 Kirkland, WA 98083-2517 (T) 425-827-3243 (F) 425-827-3509 editor@norfma.org
	Northwest Regional Floodplain Managers Association Newsletter - High Water Marks	Article	Northwest Regional Floodplain Managers Association PO Box 2517 Kirkland, WA 98083-2517 (T) 425-827-3243 (F) 425-827-3509 editor@norfma.org

Audience	Channel Description	Message Format	Contact Information
Public Works	APWA News – quarterly newsletter	Article	Oregon Chapter of the American Public Works Association 1298 Elm St, SW Albany, OR 97321 (T) 541-926-0044 (F) 541-926-3478

Audience	Channel Description	Message Format	Contact Information
Emergency Managers	OEMA Quarterly Newsletter	Article	Oregon Emergency Management Association PO Box 391 Gresham, OR 97030 oema@oregonemergency.com
	Regional Emergency Management Technical Committee (REMTEC)	Poster Presentation Training	Scott Porter Office of Consolidated Emergency Management (T) 503-642-0371

Audience	Channel Description	Message Format	Contact Information
Elected Officials	Association of Oregon Counties District Meetings	Brochure Poster Presentation Training	Association of Oregon Counties PO Box 12729 Salem, OR 97309 (T) 503-585-8351 (F) 503-373-7876
	Association of Oregon Counties Annual Conference	Brochure Poster Presentation Training	Association of Oregon Counties PO Box 12729 Salem, OR 97309 (T) 503-585-8351 (F) 503-373-7876
	Local Focus – quarterly newsletter	Article	League of Oregon Cities 1201 Court St, Suite 200 Salem, OR 97301 (T) 503-452-0338 (F) 503-399-4863
	League of Oregon Cities Annual Conference	Brochure Poster Presentation Training	League of Oregon Cities 1201 Court St, Suite 200 Salem, OR 97301 (T) 503-452-0338 (F) 503-399-4863
	Oregon Futures - quarterly newsletter	Article	Community Service Center 1209 University of Oregon Eugene, OR 97403-1209 (T) 541-346-2878 (F) 541-346-2040
	Partners in Action - quarterly newsletter	Article	Oregon Natural Hazards Workgroup 1209 University of Oregon Eugene, OR 97403-1209 (T) 541-346-3588 (F) 541-346-2040

Audience	Channel Description	Message Format	Contact Information
GIS Technicians	Oregon Geospatial Discussion Forum	Brochure Poster Presentation Training	Oregon Geospatial Enterprise Office http://www.gis.state.or.us/coord/Discuss_Forum/Discussion_Forum.html
	GIS Info Listserv	Article	Oregon Geospatial Enterprise Office http://egov.oregon.gov/DAS/IRMD/GEO/GIS_INFO_listserver.shtml
	Oregon Geographic Information System Association Quarterly Meetings	Brochure Poster Presentation Training	Oregon Geographic Information System Association http://www.orurisa.org/ogisa/ogisa.htm
	Oregon and SW Washington Urban and Regional Information System Association Annual Meeting	Brochure Poster Presentation Training	Oregon and SW Washington URISA http://www.orurisa.org/`
	Northwest GIS User Group, Inc Annual Conference	Brochure Poster Presentation Training	Northwest GIS User Group, Inc http://www.nwesriusers.org/default.html
	Willamette Valley GIS User Group Quarterly Meetings	Brochure Poster Presentation Training	Willamette Valley GIS User Group http://www.orurisa.org/wgisug/index.html
	Portland Area GIS Users Group	Brochure Poster Presentation Training	Portland Area GIS Users Group http://www.orurisa.org/sigda/sigpda.htm

Audience	Channel Description	Message Format	Contact Information
Building Officials	Oregon Building Officials Association Quarterly Institutes	Brochure Poster Presentation Training	Oregon Building Officials Association PO Box 68 Silverton, OR 97381 (T) 503-873-1157 (F) 503-873-9389 aboa@teleport.com
	Oregon Building Officials Association Quarterly Business Meetings	Brochure Poster Presentation Training	Oregon Building Officials Association PO Box 68 Silverton, OR 97381 (T) 503-873-1157 (F) 503-873-9389 aboa@teleport.com

[i] Federal Emergency Management Agency. 2004. Flood Hazard Mapping. http://www.fema.gov/fhm/mm_why.shtm (28 June 2005).

[ii] Simmons, Eric. 2003. Modernizing Flood Maps in Point of Beginning. http://www.pobonline.com/CDA/ArticleInformation/Article/1,9169,97656,00.html (28 June 2005).

[iii] Community Planning Workshop. 2002. Department of Land Conservation and Development Technical Assistance and Outreach Needs Assessment.

[iv] Federal Emergency Management Agency. 2004. Flood Hazard Mapping. http://www.fema.gov/fhm`/mm_why.shtm (19 July 2005).

Appendix C:
Existing Hazard Data Summary

Purpose

Public and private organizations at the local, regional, state and federal levels have invested considerable time as well as financial and human resources into developing hazard related geospatial data and technology that can be extremely useful when planning for natural hazards and specifically developing risk assessments. Examples include Hood River and Wasco County's local efforts to collect structural data relating to wildfire risk and the USGS's efforts to build The National Map, a national interactive map service.

To develop a risk assessment a community must first understand what data is available to assist them in better identifying risks natural hazard pose to there jurisdiction. The Existing Hazard Data Analysis documents the hazard data currently available. Because of the fluid nature of data collection and production, this summary is intended only to be a snapshot in time.

Methods

The Oregon Natural Hazards Workgroup reviewed and analyzed the Oregon Framework Implementation Team's geospatial data database to gain an understanding of how existing data elements may be useful in the risk assessment process. This database documents all the current data elements under construction to develop uniform data standards through the FIT process. This database includes detailed information on the data's type, scale, ownership, and next steps to completion. Each data element in the database was assessed for its potential use in the risk assessment process. Elements were categorized into the following three categories: (1) not useful in a risk assessment; (2) useful in identifying the geographic extent of the hazard; or (3) useful in assessing vulnerability.

Findings

Data Elements

The analysis of the Oregon Framework Implementation Team's data element database categorized the existing data elements into three categories: (1) not useful in a risk assessment; (2) useful in identifying the geographic extent of the hazard; or (3) useful in assessing vulnerability. There are a total of 238 existing data elements documented in this database. Of those 238 data elements, the analysis found that 23% were not useful in a risk assessment, 23% were useful in identifying the geographic extent of the hazard, and 53% were useful in assessing vulnerability.

Appendix B
Flood Map Modernization Communication Strategy

Overview

This appendix outlines a communication strategy for the Department of Land Conservation and Development aimed at making a diverse audience aware of the Federal Emergency Management Agency's Flood Map Modernization Program. The following sections: describe the Flood Map Modernization Program, identify the need for updated flood maps, describe existing outreach efforts and other research, define the components of effective communication, describe key findings, and identify potential outreach activities.

What is Flood Map Modernization?

The Flood Map Modernization Program, also know as Flood Map Mod, is being spearheaded by the Federal Emergency Management Agency to collaboratively update community Flood Insurance Rate Maps (FIRMs). This program is related to the National Flood Insurance Program and has been assigned a relatively high priority because the majority of FIRMS are out-dated and do not accurately reflect the flood hazard. New technology has made it possible to create more accurate maps of the risk and new methods of data storage and transfer allow for the distribution of electronic maps to a wider audience[i]

The intent of the Flood Map Modernization Program is to "cost-effectively:

- Develop accurate flood hazard data for all flood prone areas nationwide to support sound floodplain management and prudent flood insurance decisions;
- Provide the maps and supporting data in digital format to improve the efficiency and precision with which mapping program customers can use this information;
- Integrate community and state partners into the mapping process to build on local knowledge and enhance community ownership of new products; and
- Improve customer services to speed processing of flood map orders and raise public awareness of flood hazards."[ii]

Data element ownership is spread out among a number of local, state, and federal entities. Analysis of the Oregon Framework Implementation Team's database indicated that the 238 data elements are maintained either solely or jointly between 53 different local, state, and federal entities.

A report pulled from the Oregon Framework Implementation Team's data element database illustrating the element's usefulness in the risk assessment process is included at the end of this Appendix.

Conclusions

Upon completion of this investigation of existing hazard data in terms of data elements, standards, and methodologies, a number of conclusions became apparent:

- There is a wealth of data available.
- Data ownership is spread out among a number of local, state, and federal entities.
- The majority (53%) of data elements in the FIT database were applicable to the vulnerability assessment phase of the risk assessment, while 23% were useful for hazard identification and 23% were not useful to any phase of the risk assessment.
- In most cases, the scale of the data is too large to produce accurate risk assessments or to support refined mapping of hazards.

Appendix C:
Existing Hazard Data Summary

Purpose

Public and private organizations at the local, regional, state and federal levels have invested considerable time as well as financial and human resources into developing hazard related geospatial data and technology that can be extremely useful when planning for natural hazards and specifically developing risk assessments. Examples include Hood River and Wasco County's local efforts to collect structural data relating to wildfire risk and the USGS's efforts to build The National Map, a national interactive map service.

To develop a risk assessment a community must first understand what data is available to assist them in better identifying risks natural hazard pose to there jurisdiction. The Existing Hazard Data Analysis documents the hazard data currently available. Because of the fluid nature of data collection and production, this summary is intended only to be a snapshot in time.

Methods

The Oregon Natural Hazards Workgroup reviewed and analyzed the Oregon Framework Implementation Team's geospatial data database to gain an understanding of how existing data elements may be useful in the risk assessment process. This database documents all the current data elements under construction to develop uniform data standards through the FIT process. This database includes detailed information on the data's type, scale, ownership, and next steps to completion. Each data element in the database was assessed for its potential use in the risk assessment process. Elements were categorized into the following three categories: (1) not useful in a risk assessment; (2) useful in identifying the geographic extent of the hazard; or (3) useful in assessing vulnerability.

Findings

Data Elements

The analysis of the Oregon Framework Implementation Team's data element database categorized the existing data elements into three categories: (1) not useful in a risk assessment; (2) useful in identifying the geographic extent of the hazard; or (3) useful in assessing vulnerability. There are a total of 238 existing data elements documented in this database. Of those 238 data elements, the analysis found that 23% were not useful in a risk assessment, 23% were useful in identifying the geographic extent of the hazard, and 53% were useful in assessing vulnerability.

Data element ownership is spread out among a number of local, state, and federal entities. Analysis of the Oregon Framework Implementation Team's database indicated that the 238 data elements are maintained either solely or jointly between 53 different local, state, and federal entities.

A report pulled from the Oregon Framework Implementation Team's data element database illustrating the element's usefulness in the risk assessment process is included at the end of this Appendix.

Conclusions

Upon completion of this investigation of existing hazard data in terms of data elements, standards, and methodologies, a number of conclusions became apparent:

- There is a wealth of data available.
- Data ownership is spread out among a number of local, state, and federal entities.
- The majority (53%) of data elements in the FIT database were applicable to the vulnerability assessment phase of the risk assessment, while 23% were useful for hazard identification and 23% were not useful to any phase of the risk assessment.
- In most cases, the scale of the data is too large to produce accurate risk assessments or to support refined mapping of hazards.

Framework Data by Hazard Risk Assessment Values 082605

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
Hazard Identification Data						
	Administrative					
		coastal zone boundary	1:24k or better	vector	area	DLCD/NOAA
		drainage districts		vector	area	local govs
		greenways	1:1200, 1:2400	vector	area	local govs
		open burning areas		vector	area	DEQ
	Bioscience					
		wetlands	1:24k (NWI); 1:7200 (LWI)	vector	area	USFWS, DSL
		seed zones		vector?	area?	ODF
		potential vegetation	1:24k; 30m	vector, raster	area, pixel	24k-NRCS, BLM; 30m-USF
		riparian areas	1:24k	vector	area	USFWS
		existing vegetation	1:24k; 1:250k; 30m	vector, raster	poly, pixel	24k-USFS, BLM; 250k-GAP;
	Climate					
		precipitation - 24-hour intens	4 km	raster	grid	OSU
		temperature - annual minim	4 km	raster	grid	OSU
		snow water equivalent	800 m	raster	grid	OSU
		length of growing season	4 km	raster	grid	OSU
		solar radiation - monthly ave	800 m	raster	grid	OSU
		fog occurrence in western O	4 km	raster	grid	OSU
		precipitation - historic monthl	4 km	raster	grid	OSU

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
		temperature ranges	4 km	raster	grid	OSU
		soil freeze depth	800 m	raster	grid	OSU
		soil temperature	800 m	raster	grid	OSU
		temperature - historic daily	4 km	raster	grid	OSU
		wind flow - monthly	800 m	raster	grid	OSU
		snowfall - monthly & annual	4 km	raster	grid	OSU
		temperature - median first/la	4 km	raster	grid	OSU
		temperature - monthly mean	800 m	raster	grid	OSU
		cloud cover - monthly avera	800 m	raster	grid	OSU
		precipitation - mean monthly	800 m	raster	grid	OSU
		precipitation - 100-year	4 km	raster	grid	OSU
		temperature - historic monthl	4 km	raster	grid	OSU
		precipitation - historic daily	4 km	raster	grid	OSU
	Elevation					
		aspect	10 meter or better	raster	pixel	
		bathymetry	10 meter or better	vector	line	
		slope	10 meter or better	raster	pixel	
		digital elevation models	10 meter or better	raster	pixel	10m USGS? 30m OTIS
		elevation contours	10 meter or better	vector	line	USGS?
	Geoscience					
		soils	1:24k	vector	area	NRCS
		geomorphology		vector	area	DOGAMI or USFS
		physiographic provinces		vector	area	
		geology	1:24k to 1:250,000	vector	area	DOGAMI

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
	Hazards					
		volcano hazard				USGS
		landslide zones				ODF/DOGAMI
		tsunami inundation zone	1:24k			DOGAMI
		coastal erosion areas	Unkn			DLCD/USGS DOGAMI? NO
		floodplains		vector	area	DLCD/FEMA
		debris flow hazard zone	1:24k			ODF/DOGAMI
		drought areas				National Drought Mitigation
		avalanche zone	1:24k or better			NWS? USFS (NW Weather
		wildland/urban interface bou	1:24k	vector	area	Local govs/ODF & OSP-Stat
		dust storm occurrence				USGS?
		windstorm hazard				USGS
		winter storm hazard		vector	area	
		earthquake hazard				DOGAMI
	Hydrography					
		water points	1:24k and better	vector	point	PNW Hydrography Framew
		watercourses	1:24k and better	vector	line, network	PNW Hydrography Framew
		water body shorelines	1:24k and better	vector	line	PNW Hydrography Framew
		hydrologic units (1st-6th field	1:24k and better	vector	area	PNW Hydrography Framew
		water bodies	1:24k and better	vector	area	PNW Hydrography Framew
Not Applicable						
	Administrative					
		cemetery maintenance distri		vector	area	Counties

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
		special road districts		vector	area	Counties
		voting precincts	1:24k or better	vector	area	local govs
		council of governments bou		vector	area	COGs
		weather modification district		vector	area	Counties
		vehicle inspection areas		vector	area	DEQ?
		shellfish management progr	1:24k or better	vector	area	ODA
		election districts - local	1:2400?	vector	area	local govs
		city & county comprehensive		vector	area	DLCD
		translator districts		vector	area	Counties
		vegetation line (coastal)		vector	line	DLCD
		library districts		vector	area	local govs
		area commissions on transp		vector	area	ODOT
		non-attainment areas (air qu		vector	area	DEQ
		county road districts		vector	area	Local govs, ODOT?
		soil water conservation distri		vector	area	ODA
		state agency administrative	1:100k or better	vector	area	OWRD, ODF, ODA, ODOT,
		election districts - state	1:100k	vector	area	SOS
		time zone boundary	1:24k or better	vector	area	
		urban renewal districts		vector	area	Local govs
		urban reserve areas		vector	area	DLCD
		urban unincorporated areas,		vector	area	Counties?
		election districts - federal	1:24k or better	vector	area	Oregon Legislature/DAS
		air quality control regions		vector	area	DEQ
		vector control districts		vector	area	local govs/DOR

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
		federal urban transportation	1:24k or better	vector	area	ODOT
		geothermal heating districts		vector	area	Counties
		air quality maintenance area		vector	area	DEQ
		development districts	1:1200; 1:2400	vector	area	local govs
		salmon trout enhancement p	1:24k	vector	area	ODFW/OWEB?
		enterprise zone boundaries		vector	area	DOE
		agricultural water quality mg	1:24k or better	vector	area	ODA
		education service districts		vector	area	ODE?
		zipcode boundaries	1:24k or better	vector	area	USPS
		wildlife management units		vector	area	ODFW
		prevention of significant dete		vector	area	DEQ
	Cadastral					
		assessor's map boundaries	1:1200; 1:2400	vector	area	counties
		Donation Land Claims		vector	area	ODOT?
		multi-account file	n/a	tabular	na	Counties
		tax code boundaries		vector	area	Counties
	Climate					
		RAWS (Remote Automated		vector	point	various-PNWCG
		commercial datasets	2 km	raster	grid	vendors
	Geodetic Cont					
		geodetic control points	centimeter or better	vector	point	NGS, county surveyors
		other survey control	subcentimeter	vector	point	county surveyors
	Public Safety					
		site address points	1:1200, 1:2400	vector	point	local govs

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
	Reference					
		GNIS points		vector	point	OGDC
		DRGs	1:250k, 1:100k, 1:24k	raster	pixel	USGS
		coordinate systems	n/a	tabular	na	GEO
		indices	n/a	vector	area	GEO
		cities	1:24k	vector	point	GNIS? Census?
	Transportation					
		road centerlines	1:24k or better	vector	line	Road authorities
		address ranges	1:24k or better	tabular	na	road authorities/OEM
		milepoints	1:24k or better	vector	point events	ODOT, road authorities
		lighthouses	1:24k or better	vector	point	
		reference points (FTRP)	1:24k or better	vector	node	ODOT
Vulnerability Assessment Data						
	Administrative					
		fire management area zones	1:100K	vector	area	ODF
		park and recreation districts		vector	area	Local govs
		federal agency organization	1:24k	vector	area	BLM, USFS, BOR, USF&W,
		transportation districts	1:24k or better	vector	area	local govs
		oil spill geographic response		vector	area	DEQ
		employment regions	1:24k or better	vector	area	OED
		state park boundaries		vector	area	OPRD
		road assessment districts		vector	area	Counties
		oxygenated gasoline control		vector	area	DEQ

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
		water improvement districts		vector	area	Local govs
		state forest boundaries		vector	area	ODF
		state boundary	1:24k	vector	area	BLM
		service districts		vector	area	locals
		Urban Growth Boundaries	1:24k	vector	area	locals, ODOT?
		school districts	1:4800	vector	area	counties
		port districts		vector	area	local govs
		water control districts		vector	area	Local govs
		people's utility districts		vector	area	local govs
		watershed council boundarie	1:24K (west); 1:100k (east)	vector	area	OWEB
		sanitary districts		vector	area	Local govs
		rural fire protection districts	1:100k	vector	area	ODF
		roadless areas	1:500k	vector	area	REO
		regulated use zones		vector	area	ODF?
		neighborhood associations	1:2400 or better	vector	area	cities
		wastesheds		vector	area	DEQ
		fish management districts		vector	area	ODFW
		county boundaries - OR	1:1200, 1:2400	vector	area	locals
		county boundaries – WA, C	1:100k or better	vector	area	respective states/ODF
		forest protection districts		vector	area	ODF
		city limits	1:24k	vector	area	counties
		American Indian Reservatio	1:1200, 1:2400	vector	area	BIA
		census 2000 geographies	1:100k	vector	area	US Census
		groundwater management a		vector	area	DEQ

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
		groundwater restricted areas	1:24k	vector	area	OWRD
		community college districts		vector	area	Community College Board
		irrigation districts		vector	area	local govs
		highway lighting districts		vector	area	Counties
		port hospital districts		vector	area	Counties
		emergency communications		vector	area	local govs
		national memorials, parks, s	1:24k	vector	area	NPS, USFS, other fed agenc
		national forest boundaries	1:24k	vector	area	USFS
		health districts		vector	area	counties/DHS
		metropolitan service districts		vector	area	local govs
		drinking water protection are	1:24k or better	vector	area	DHS
		domestic water supply distri		vector	area	Counties
		downtown districts		vector	area	local govs
		designated scenic areas (sta		vector	area	ODOT
		MPO boundaries		vector	area	Local govs
		mass transit districts		vector	area	local govs
	Bioscience					
		aquatic species & ranges	1:100k; 1:24k			ODFW
		aquatic habitat	1:100k; 1:24k			ODFW
		wildlife habitat distribution	1:24k			ODFW, OSU (INR)
		anadromous fish habitat dist	1:24k			ODFW/NOAA/OWEB
		fish stock status	n/a			ODFW/NOAA/OWEB
		hatchery release locations	n/a	vector	point	ODFW/StreamNet
		marine species habitat distri	Varies by species			ODFW (Newport)/NOAA/OS

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
		terrestrial species/distributio	30 meters	raster	pixel	OSU
		anadromous fish abundance				
		historic vegetation	1:24k; 1:100k	vector	area	24k-ORNHIC; 100K-FS/BLM
	Cadastral					
		GCDB	1:24k	vector	point, line, are	BLM
		state government properties	1:1200	vector	area	DAS - Facilities
		public lands ownership	1:24K; 1:1200; 1:2400?	vector	area	ODF/DSL
		tax lots	1:1200, 1:2400, 1:4800, 1:2	vector	area	Counties
		PLSS	1:24k	vector	area	BLM
		subdivision plat maps	1:1200; 1:2400	image	n/a	counties
	LULC					
		historic sites	1:24k	vector	point	OPRD
		archaeological sites	1:24k	vector	point	OPRD
		public land management / st	1:24k	vector	area	ORNHIC
		recreation sites	1:24k	vector	point	OPRD
		land use land cover - genera	30 m	raster	grid	NLCD
		land use - detailed	1:1200; 1:2400	vector	area	local govs
		ecoregions	1:250k	vector	area	EPA, DEQ
		zoning (nonUGB lands)	1:100k	vector	area	DLCD
		cemeteries	1:24k	vector	point	OPRD
		zoning (all lands)	1:1200; 1:2400	vector	line	local govs
	Orthoimagery					
		.5-meter DOQs	.5 meter	raster	pixel	various
		1-meter DOQs	1 meter	raster	pixel	various

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
		30-meter DOQs	30 meter	raster	pixel	USGS
	Public Safety					
		hospitals & medical facilities	1:1200; 1:2400	vector	point	Local govs
		hazardous materials sites	1:24k or better	vector	point	Various/OSP (Fire Marshal)
		public safety station location		vector	point	
		military facilities	1:24k or better	vector	area	DOD
		state police post boundaries	1:24k	vector	area	OSP
		emergency facilities	1:10k or better	vector	point	local govs
		commercial key assets	1:24k	vector	point	OED
		stadiums	1:1200; 1:2400	vector	point	Local govs
		evacuation routes		vector	line	locals
		port facilities (air, sea, river)	1:1200; 1:2400	vector	line, area	FAA, Coast Guard?, Army C
		public safety response areas	1:1200, 1:2400	vector	area	Local govs
		wildfire-related facilities		vector	point	
		public bldg footprints	1:1200, 1:2400, 1:4800	vector	area	OEM?
		schools		vector	point	OED
		emergency service zones		vector	area	OEM
		rail facilities		vector	point, area	
		monuments/icons		vector	point	
		emergency reference data st		vector	point	
		dam facilities	1:1200; 1:2400	vector	poly	Owners/operators (BOR, Ar
	Reference					
		demographic data	n/a	tabular	na	US Census
	Transportation					

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
		ports	1:24k or better	vector	point	FAA, DOA, ODOT
		VOR	1:24k or better	vector	point	Airports/Dept of Aviation/FA
		transportation structures	1:24k or better	vector	point	Road authorities
		mileposts	1:24k or better	vector	point events	ODOT/counties
		cablecars and chairlifts	1:24k or better	vector	point, line	local govs
		airports	1:24k or better	vector	point, line	county maps
		navigation hazards	1:24k or better	vector	point, line, are	Coast Guard, FAA, DOA, util
		heliports	1:24k or better	vector	point	FAA, DOA
		trails	1:24k or better	vector	line	OPRD/BLM/USFS/NPS
		culverts	1:24k or better	vector	point, line	Road authorities
		bridges	1:24k or better	vector	point	ODOT/road authorities/USD
		railroads	1:24k or better	vector	line	ODOT
	Utilities					
		sanitary sewer treatment & c	1:1200; 1:2400	vector	point, line, net	Owners/operators
		water distribution facilities	1:1200; 1:2400	vector	line, network	owners/operators
		water supply watersheds		vector	area	
		storm drainage basins		vector	area	local govs
		solid waste/transfer sites		vector	point	owners/operators/local govs
		recycling facilities		vector	point	owners/operators
		oil & gas supply and transmi	1:1200; 1:2400	vector	point, line, net	owners/operators/PUC
		municipal watersheds		vector	area	local govs
		septic systems	1:1200; 1:2400	vector	point	owners/local govs
		utility service areas	1:1200; 1:2400	vector	area	PUC
		gas distribution facilities	1:1200; 1:2400	vector	point, line, net	Owners/operators

RA Value	Theme	Element	Scale	DataType	FeatureType	Source
		utility easements	1:1200; 1:2400	vector	area	Owners/operators/counties
		storm sewer drainage & cont	1:1200; 1:2400	vector	point, line, net	Owners/operators
		telecommunication facilities	1:1200; 1:2400	vector	point	Owners/operators/FCC
		electric generation & transmi	1:1200; 1:2400	vector	point, line, net	Owners/operators/PUC
		water supply & transmission	1:1200; 1:2400	vector	point, line, net	Owners/operators/local govs
		electric distribution facilities	1:1200; 1:2400	vector	point, line, net	Owners/operators

Appendix D
Natural Hazard Survey Summary

Purpose

ONHW and the Department of Land Conservation and Development (DLCD) worked together to develop a hazard survey that focused on community's efforts to develop risk assessments and community needs related to FEMA Flood Insurance Rate Map (FIRM). Questions in the survey specifically asked about community efforts to identify hazards and to conduct vulnerability assessments. Hazard identification, involves the identification of the geographic extent of a hazard, its intensity and its probability of occurrence. A vulnerability assessment, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by the hazard. The survey built upon current survey data sets and targeted planners and GIS professionals in Oregon cities and counties. The following is a brief summary of the results of this survey.

Methodology

The survey was sent to 222 City and County planners and GIS professionals around the state in March and April 2005. The survey was conducted on-line. Respondents were notified via email with a direct link to the survey. A total of 38 city and county representatives responded to the survey (17% response rate). Due to the limited number of responses, this survey is used for scoping purposes only.

The survey questions fell into the following categories:

- Natural hazards affecting the community
- Mapping and vulnerability assessment actions
- Flood Insurance Rate Maps & Flood Map Modernization Program
- FEMA HAZUS software

ONHW conducted a secondary analysis of the survey data provided by PlanGraphic, Inc. As a result, 'n' numbers for certain responses were unavailable.

Findings

Natural Hazards Affecting the Community

Respondents were asked what natural hazards affect their jurisdiction. The natural hazards that affect jurisdictions most frequently are: flood

(50%), wildfire (24%, landslide or debris flow (13%), and tsunami (11%). In an effort to truth the responses to this question, ONHW compared individual community responses with the County Hazard Analyses found in the State Natural Hazard Plan. This analysis indicated that in this survey, 13 out of 38 respondents failed to identify one or more high risk hazards identified in the State Natural Hazard Plan Regional Risk Profiles.

Table C-1: Natural hazards that affect respondents' jurisdiction (n=38)

	Yes		No		No Answer	
	Number	Percent	Number	Percent	Number	Percent
Flood	19	50%	14	37%	5	13%
Wildfire	9	24%	15	39%	14	37%
Landslide or Debris Flow	5	13%	18	47%	15	39%
Tsunami	4	11%	6	16%	28	74%
Coastal Erosion	3	8%	7	18%	28	74%
Drought	3	8%	17	45%	18	47%
Earthquake	3	8%	21	55%	14	37%
Winter Storm	3	8%	22	58%	13	34%
Volcano	0	0%	16	42%	22	58%

Source: PlanGraphics, Natural Hazards Survey, 2005

Mapping and Vulnerability Assessment Actions

The survey asked respondents to indicate whether or not they had mapped the geographic extent of hazards known to affect communities in Oregon. The natural hazards that jurisdictions have mapped most frequently are: flood (74%), landslide or debris flow (26%), earthquake (24%), wildfire (16%), and tsunami (13%). The response to this question was consistent with current state priorities for mapping natural hazards.

Table C-2: Natural hazards that jurisdictions have mapped (n=38)

	Yes		No		No Answer	
	Number	Percent	Number	Percent	Number	Percent
Flood	28	74%	7	18%	3	8%
Landslide or Debris Flow	10	26%	13	34%	15	39%
Earthquake	9	24%	14	37%	15	39%
Wildfire	6	16%	16	42%	16	42%
Tsunami	5	13%	6	16%	27	71%
Coastal Erosion	4	11%	6	16%	28	74%
Volcano	3	8%	13	34%	22	58%
Winter Storm	1	3%	21	55%	16	42%
Drought	0	0%	18	47%	20	53%

Source: PlanGraphics, Natural Hazards Survey, 2005

Respondents were then asked to identify the hazards for which they had sufficient data to complete a vulnerability assessment. They are: flood (50%), wildfire (24%), landslide or debris flow (13%), and tsunami (11%).

Table C-3: Hazards having sufficient vulnerability assessment data

	Yes		No		No Answer	
	Number	Percent	Number	Percent	Number	Percent
Flood	19	50%	14	37%	5	13%
Wildfire	9	24%	15	39%	14	37%
Landslide or Debris Flow	5	13%	18	47%	15	39%
Tsunami	4	11%	6	16%	28	74%
Coastal Erosion	3	8%	7	18%	28	74%
Drought	3	8%	17	45%	18	47%
Earthquake	3	8%	21	55%	12	32%
Winter Storm	3	8%	22	58%	13	34%
Volcano	0	0%	16	42%	22	58%

Source: PlanGraphics, Natural Hazards Survey, 2005

Flood Insurance Rate Maps & Flood Map Modernization Program

The survey asked respondents to identify common issues, inaccuracies or data quality problems, and inadequately reflected floodplain impacts experienced with the community's FIRMs. The most common issues that respondents reported were: changes in land use since FIRM was created (45%), inaccurate flood data (39%), current flood data not reflected in map (39%), inaccurate floodplain boundaries (37%) and inaccurate jurisdiction boundary (37%). The least common data problems with FIRMS that respondents report are: coastal flooding/erosion hazards not reflected in FIRM (11%), inaccuracies in other reference features (18%), inaccuracies in waterways (21%), flood control projects not reflected in FIRM (24%), and stream stabilization projects not reflected in FIRM (24%). Table C-4 displays the issues communities commonly experience with their FIRMs.

Table C-4: Community FIRM Issues

Problems on FIRMS	Number	Percent
Inaccurate flood data	15	39%
Current flood data not reflected in map	15	39%
Floodway location	13	34%
BFE Unknown	12	32%
BFE Inaccurate	10	26%
Inaccuracies or data quality problems	**Number**	**Percent**
Floodplain boundaries	14	37%
Jurisdiction Boundary	14	37%
Street network	12	32%
Waterways	8	21%
Other Reference Features	7	18%
Impacts not adequately reflected in FIRMS	**Number**	**Percent**
Changes in land use	17	45%
New/Altered Bridges or culverts	13	34%
Increase Public ownership/open space	12	32%
Flood control projects	9	24%
Stream Stabilization Project	9	24%
Coastal flooding/erosion hazards	4	11%

Source: PlanGraphics, Natural Hazards Survey, 2005

Respondents were asked whether or not their jurisdiction would be interested in partnering with FEMA to complete a map modernization project. Eighty-seven percent of respondents are interested in participating in a map modernization project with FEMA. Of those who indicated they would be interested, more than half of respondents report that the most common obstacle to participation would be staffing (58%) and lack of funds (58%). Table C-5 shows the map modernization participation obstacles as perceived by survey respondents.

Table C-5: Obstacles to Participating in Map Modernization Project with FEMA (n=38)

Obstacle	Number	Percent
Staffing	22	58%
Lack of funds	22	58%
Limits in local GIS capabilities	12	32%
Lack of GIS data	11	29%

Source: PlanGraphics, Natural Hazards Survey, 2005

FEMA HAZUS Software

HAZUS-MH, is a nationally applicable standardized methodology and software program that contains models for estimating potential losses from earthquakes, floods, and hurricane winds. Estimating losses is essential to decision-making at all levels of government, providing a basis for developing mitigation plans and policies, emergency preparedness, and response and recovery planning.i Respondents were asked whether or not they: had HAZUS software, have staff that has been trained on HAZUS, or made use of HAZUS. Sixteen percent of

organizations report having HAZUS. Twenty percent of organizations report making use of HAZUS. More organizations report that staff has been trained on using HAZUS or that the organization has made use of HAZUS than report having HAZUS. Table C-6 illustrates the respondent's current use of HAZUS.

Table C-6: Use of HAZUS

	Number	Percent
Organization has HAZUS	6	16%
Staff been trained in HAZUS	12	32%
Organization made use of HAZUS	8	21%

Source: PlanGraphics, Natural Hazards Survey, 2005

Conclusions

The survey yielded information on the ability of local governments to develop risk assessments and local issues regarding FEMA FIRMS. The following are key conclusions:

- Most communities had made efforts to complete at least the hazard identification portion of the risk assessment.
- Different agencies within jurisdictions do not have a consistent assessment of the risks hazards pose within the community.
- The flood hazard has been addressed by most communities due to the existence of federal data standards and mapping methodologies.
- FEMA FIRMS in Oregon are out of date.
- Staff and funding are obstacles for community involvement in the Flood Map Modernization Program.

[i] Federal Emergency Management Agency. 2005. Overview of HAZUS-MH (Multi-Hazard) http://www.fema.gov/hazus/hz_overview.shtm

Appendix E:
Interview Summary

Background

In March and April of 2005, ONHW conducted telephone interviews with 28 communities across Oregon. The purpose of the interviews was to gain a better understanding of how GIS is used to support local government efforts to complete the risk assessment component of the natural hazard mitigation plans. The ability to use GIS data can greatly enhance natural hazard mitigation planning.

In addition to the need to become more disaster resistant, natural hazard planning is important because the Disaster Mitigation Act of 2000 (DMA2K) requires that communities prepare a natural hazards mitigation plan to remain eligible for certain pre- and post-disaster funding programs. A key component of DMA2K is the risk assessment requirement. The risk assessment process identifies hazards, profiles hazard events, provides an inventory of community assets, and estimates potential losses from hazards.

This report includes a summary of key issues identified in the interviews, a summary of "yes" and "no" questions, and a transcript of open-ended responses. Stakeholder input will be used to identify recommendations on how the project partners can better assist local communities in developing and improving risk assessments in the future.

Methodology

ONHW identified communities across the state based on the following criteria.

1. **Geographic Dispersion**. Stakeholders from at least one county and one city in each of the State's Natural Hazard Regions were selected to participate, with the exception of Region 6, where stakeholders from two cities were selected to participate.

2. **Population**. A region's population was taken into account in selecting the number of communities to be interviewed. Regions with higher populations had more communities interviewed than those with lower populations.

3. **Specific hazard vulnerability**. Communities with diverse hazard vulnerability were invited to participate in the interviews, ensuring that information on the use of GIS for a variety of hazards was included in the interviews. Community hazard vulnerability was determined using the State Natural Hazard Mitigation Plan's Regional Risk Profiles for Counties.

City vulnerability was generalized based on the County Risk Profiles in the State Plan.

4. **Status of mitigation plans**. Selection of communities was designed to strike a balance between interviewing communities with FEMA approved plans, those in the process of approval, and those without approved plans.

5. **Steering committee input**. The project Steering Committee also identified potential communities based on experience working in communities around the State.

ONHW sent an introductory e-mail, which explained the project and its purpose, to the person most likely to be involved in natural hazard planning in each selected community.

Some questions were modified slightly or not asked at all, depending on their relevance to the community. Each interview lasted between 30 and 45 minutes. Interviews were either transcribed by hand during the interview and entered into a computer template afterwards, or entered into the computer template during the interview. Following completion of the interviews, all of the answers were documented and then analyzed for common themes.

Participants

- Albany -- Darrel Tedisch, Retired Fire Chief and Emergency Planner
- Bandon -- Jason Locke, Community Development Director
- Burns -- David Fine, City Manger
- Corvallis -- Fred Towne, Senior Planner
- Elkton -- Linda Higgins, City Clerk
- Eugene -- Fred McVey, Engineering Data Service Manager
- Grants Pass -- Craig Clausen, City Surveyor
- Jackson County – Keith Massie, GIS Manager
- John Day -- Peggy Carey, City Manager
- Josephine County -- David Kellenbeck, Assistant Planning Director
- Klamath Falls -- Erik Nobel, Senior Planner
- Lane Council of Governments – Bill Clingman, GIS Senior Analyst
- Lincoln County -- Matt Spangler, Planning and Development Director

- Malheur County -- Craig Smith, Emergency Services Lieutenant, EMS Coordinator
- Maupin -- Dan Meader, Planning Consultant
- Pendelton -- Tim Simmons (City Engineer), Wayne Green, Associate Engineer and George Clough, Building and Planning Technician
- Portland -- Bill Freeman, Supervising Engineer
- Prairie City -- Bob Titus, Public Works Director
- Roseberg – Les Wilson, Community Planner
- Salem -- John Smith, GIS Supervisor, Salem Public Works Department and Susan Blohm, Lead GIS Analyst
- Sandy -- Tracy Brown, Planning Director
- Seaside -- Kevin Cupples, Planning Director
- Sisters -- Brian Rankin, Planner
- Tillamook -- Dave Mattison, City Planner
- Wallowa County -- Dawn Smith, GIS Coordinator and Mathew Marmoor, Emergency Manager
- Wasco County -- Dawn Baird, Associate Planner
- Washington County -- Richard Crucchiola, GIS Supervisor

Summary of Themes

Below is a summary of themes from the interviews. The themes are separated into the following five areas:

- **Geospatial data:** The interview began by asking about the availability of geospatial data for the natural hazards that the community is vulnerable to.
- **Flood map modernization:** This series of questions focused on the use and accuracy of the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRMs).
    - **Public outreach:** ONHW asked communities how they inform the public about flood hazards. These questions also assessed whether the community would be interested in federal or state help in conducting public outreach and education about flood hazards.
    - **Collaboration:** These questions focused on whether the community had interest in and the ability to collaborate

with FEMA on flood map modernization or flood hazards public awareness projects.

- **Risk assessment:** These questions assessed the community's ability to complete a natural hazards risk assessment. The risk assessment includes three components: the identification of hazards, the identification of vulnerable assets, and the estimation of potential losses. This section of the interview asked questions about the sources of data, as well as the availability of and ability to use GIS.

A summary of all interview responses can be found at the end of this chapter.

Geospatial Data

Most jurisdictions interviewed have geospatial data about floods. More than half of the jurisdictions have geospatial information about earthquakes and landslides/debris flows. Fewer than half of the jurisdictions had geospatial information about other natural hazards, such as wildland/urban interface fire, drought, windstorm, and severe winter storm. All participating costal communities had geospatial information about tsunamis and half had geospatial data about costal erosion. About half of the communities had used their geospatial data to develop a natural hazard mitigation plan.

Flood Map Modernization

Nearly all jurisdictions have identified the geographic extent of the flood hazard, often with the help of their FIRMs. Most jurisdictions, however, reported that there are inaccuracies with their FIRMs. More than half of the jurisdictions interviewed indicated that the FIRMs have a variety of inaccuracies and problems with data features. More than two-thirds indicated that the FIRMs adequately reflect floodplain impacts.

The following are problems with the FIRMs for at least half of the jurisdictions interviewed:

- Inaccurate flood data
- Current flood data is not reflected in the maps
- Base flood elevations are inaccurate or undetermined
- Floodway locations are problematic

The following data features are inaccurate or incomplete for at least half of the jurisdictions interviewed:

- The street network
- Floodplain boundaries
- Current jurisdictional boundaries.

Twenty of the 26 jurisdictions indicated that they would need State or Federal assistance to adequately map flood hazards. About half of the

jurisdictions have previously worked with FEMA to update the flood maps. Eight communities had performed updates or contracted to update hydraulic or hydrological studies for flood hazard mapping. Five of the eight communities said the new information was reflected in an updated FIRM.

While jurisdictions would like to work with the State or FEMA to update flood maps, most jurisdictions have obstacles to doing so. Obstacles include:

Funding and staff time: The most common obstacle is lack of resources, including funding and staff time. One-third of communities said they would be able to provide matching funds to participate in a mapping project and another one-third said they might be able to provide matching funds.

On the other hand, 24 of 25 jurisdictions indicated that they could provide in-kind contributions for a mapping project.

GIS capabilities: Eleven jurisdictions interviewed thought that limits in local GIS capabilities would be obstacles to participating in a mapping project.

Political Will: Nine jurisdictions interviewed thought that issues related to political will would be obstacles to participating in a mapping project.

Outreach

Most jurisdictions estimated that public awareness about flood hazards is "fair", with several reporting that it is "good", and fewer indicating that flood awareness is "poor" in their community.

The most common forms of outreach used by jurisdictions include: use of GIS or websites, presentations, and brochures. Only one jurisdiction used signs. While few jurisdictions used public service announcements or newspapers for outreach, several jurisdictions indicated that they use them in a flooding event. Some jurisdictions indicated that they discuss flood hazards during the permitting or development process. The information used in outreach was most frequently developed in-house or by Federal agencies.

Jurisdictions indicated that the following methods could be used to increase awareness of flooding:

- Use mailings to educate people about flooding dangers and the National Flood Insurance Program;
- Increase use of signs to alert people to the location of the flood plain;
- Increase public education about flood hazards; and
- Update the FIRMs so that jurisdictions are able to give precise information about the location of the flood plain.

Collaboration

Twenty of 26 jurisdictions indicated that they would be interested in partnering with the State or FEMA to improve flood hazard awareness and conduct outreach. The State or FEMA could best support local education and outreach efforts in the following ways:

- Update the FIRMs and digitize them for use in GIS
- Provide funding for education and outreach
- Provide content and funding for mailings, presentations, and signs
- Work closer with communities on flood hazard planning

Several communities indicated that they are not concerned about flood hazards because flooding is infrequent. Other communities indicated that FEMA is doing a good job of providing content about flood hazards.

Digital FIRMs

Two-thirds of jurisdictions are not familiar with the digital FIRM. But 20 of 26 communities report that they have the GIS capacity to use a digital FIRM and nearly all communities would like to have access to a digital FIRM.

The majority of jurisdictions reported that they would benefit from training specific to FEMA flood mapping and digital FIRMs. The preferred type of training was one-day onsite training. Some jurisdictions indicated a willingness to attend training if it was located within their region.

Risk Assessment

A risk assessment includes three components: identification of hazards, identification of vulnerable assets, and estimation of potential losses.

Most communities have completed some part of a risk assessment. Nearly all communities have identified hazards and more than half have identified vulnerable assets. But only two communities have estimated potential losses in their community.

The vulnerable assets most frequently identified were public buildings and infrastructure. These included schools, hospitals, fire and police stations, transportation system, and infrastructure such as power, water, and sewer lines. Of the few jurisdictions that included human populations in their vulnerable assets, elderly and special needs populations were most frequently identified.

The data sources used by more than half of communities to identify natural hazards included: FEMA, in-house generated data, Department of Geology and Mineral Industries, and U.S. Geologic Survey. Few jurisdictions reported being unable to find data for the hazards identification.

All of the fifteen jurisdictions that completed a vulnerability assessment used in-house generated data. Information from the State

and tax records were also frequently used. U.S. Census data was used by about one-third of jurisdictions. Fewer than one-third of jurisdictions were unable to find data for the vulnerability assessment.

Jurisdictions used a variety of methods for presenting the results of risk assessments. The most common methods were text and maps. Some jurisdictions also used tables and graphs. A few jurisdictions used photographs, graphics, and other types of maps.

Completing risk assessment

Most jurisdictions reported having issues in completing the risk assessment. Many jurisdictions indicate that lack of resources is the biggest hurdle to completing the risk assessment. The most common problem is administrative, such as availability of funding and staff time. Technical issues, such as availability and quality of data and maps were also identified. More than half of jurisdictions indicated that they need staff, better funding, and more training to complete the risk assessment. Nearly half of jurisdictions indicated that they need more accurate and precise data, such as updated FIRMs. Additional technology, such as hardware and software, was identified as a need by about one-third of communities. Few communities said that legal concerns are an issue.

GIS Use

About half of the jurisdictions interviewed used GIS in the completion of the risk assessment.

GIS Work: Most jurisdictions did the GIS work in-house and only one jurisdiction used a private consultant. In several cases, GIS work was done by the county or another agency such as the U.S. Forest Service, The Bureau of Land Management, or the Oregon Department of Fish and Wildlife.

GIS Users: Planning and public works departments are the most frequent users of GIS data. Nearly all jurisdictions that have GIS make GIS data freely available to other departments within their organization. Some of the participating jurisdictions are moving to cost recovery GIS programs, where individual departments within the jurisdiction pay for access to GIS services.

GIS Uses: Most jurisdictions use GIS for basic mapping, presenting results, and overlaying multiple data sources. Fewer jurisdictions use it for advanced computations.

Mapping Problems: Few jurisdictions reported problems with mapping. The problems that were most frequently reported included data availability and integrating data.

Seventeen of twenty-six jurisdictions plan to use GIS to complete future risk assessments. Most jurisdictions will perform the GIS work in-house and more than half may use private consultants. A few jurisdictions indicated that the GIS work will be performed by another

agency, such as the county or a Federal agency. Some jurisdictions indicated that GIS work is likely to be done through a combination of these methods.

Additional Comments

There were a series of related additional comments about lessons learned in the risk assessment process and the assistance that State and Federal agencies could give communities for completing risk assessments. These comments had three main focuses: need for more and better data, the need for collaboration, and need for additional funding.

Better Data: Communities expressed a need for better data to perform a risk assessment and update the FIRMs

FIRMs Lack Detail: The most common problems with the FIRMs are their lack of detail and precision. Several jurisdictions indicated that their FIRMs are too general and need more detail and better precision to determine which properties are in the flood plain.

FIRMs Are Outdated: The other common problem with the FIRMs is their age. This is especially a problem for smaller cities, many of which are using FIRMs that are more than 20 years old. Many communities have developed significantly since the FIRMs were last updated.

Need More Data About Local Hazards: Another common theme is the need for additional data about local hazards and related topics. Several communities indicated that they need additional information about local exposure to hazards, such as volcanoes or wild fires. Other communities would like more information about related topics such as vegetation type, water courses, prevailing winds, and flood plains.

Collaboration: Several communities indicated that collaboration is important in completing a risk assessment. Coordination between agencies is essential. Allowing for and encouraging public input in the process is also very important. The person leading the risk assessment should understand community concerns and have a connection to the community.

Funding: Communities frequently commented that they need help funding risk assessments. Many communities need to devote a significant amount of staff time for the risk assessment, as well as training staff to do the assessment. State or Federal agencies could help communities perform a risk assessment by providing additional funding.

Interviewee Experience

On average, the people we interviewed had worked for their jurisdiction for 10.8 years. They had about 5.4 years of GIS experience.

Conclusions

The stakeholder interviews provided candid information on local community's ability to complete risk assessments and their ability to participate in FEMA's Flood Map Modernization program. The following are key conclusions gleaned from the interview process.

- Communities lack accurate data, such as up-to-date Flood Insurance Rate Maps, for phase one of the risk assessment(Hazard ID) but generally have the data needed to conduct phase two (Vulnerability Assessment)
- Communities identified staff, funding, and training as obstacles to completing risk assessments and participating in FEMA's Flood Map Modernization program.

Results by Question

How many years have you worked for your jurisdiction?

10.8 years on average

How many years of GIS experience do you have

5.4 years on average

For the hazards that could impact your community, which do you have geospatial data for?

Hazard	Yes	Percent	Total
Flooding	20	77%	26
Earthquake	15	58%	26
Landslide/Debris Flow	13	50%	26
Wildland-Urban Interface Fire	9	35%	26
Tsunami	5	19%	26
Coastal Erosion	2	8%	26
Severe Winter Storm	2	8%	26
Drought	1	4%	26
Windstorm	1	4%	26
Volcanic Eruption	1	4%	26

Other:

- Slope hazard, used for development for geotechnical report

For those hazards that your community has geospatial data for, was this data used to develop a natural hazard mitigation plan?

13 of 26 (50%) answered yes

Have you identified the geographic extent of the flood hazard?

25 of 26 (96%) answered yes

Do any of the following issues apply to the FEMA flood hazard map(s), also known as Flood Insurance Rate Maps (FIRMs), issued for your jurisdiction?

FIRM Issues	Yes	Percent	Total
Inaccurate flood data from FEMA	18	69%	26
Street Network	18	69%	26
Current Jurisdiction Boundaries	16	62%	26
Curren flood data not reflected in map(s)	15	58%	26
Floodplain Boundaries	15	58%	26
Base Flood Elevations Inaccurate	14	54%	26
Floodway(s) location problematic	14	54%	26
Base Flood Eleveations Undetermined	13	50%	26
Other Reference Features	10	38%	26
Waterways	9	35%	26
Coastal Flooding/Erosion hazards	9	35%	26
Significant changes in land use within watershed or community	8	31%	26
New/altered bridges or culverts	8	31%	26
New/altered streambank stabilization projects	7	27%	26
New/altered flood control projects	6	23%	26
Increased public ownership/open space	6	23%	26

Other comments include:

- The scale of the map is such that the floodplain boundaries have a lot of limitations
- Have digitized FIRM flood hazard information to overlay with more accurate local data on waterways, etc.

What outreach methods do you use to inform the public where flood hazard areas are in your community? Do you use:

Public Information Methods	Yes	Percent	Total
GIS/Websites	12	46%	26
Brochures	10	38%	26
Presentations	8	31%	26
Mailings	7	27%	26
Public Service Announcements	5	19%	26
Newspaper	5	19%	26
Signs	1	4%	26

Other:

- The permit review process informs applicants of flood issues
- In the case of a storm event that caused floods - would make use of radio station and police, etc.
- Discussion with land developers as the land is developed near/on the flood plain
- In the planning/zoning process - for permitting
- A map in city hall shows floodplains

- Hazard mitigation plan
- People come in and ask about it - in relation to the planning commission
- Use the permitting process
- Permitting process
- Work with local builders, training with home builders

For each of the outreach methods you listed, could you tell me whether the material was developed by federal agencies such as FEMA, a state agency such as the Department of Land Conservation and Development, or whether the material was developed in-house.

Eleven participants indicated that the materials were developed in-house, three used federal sources, and four indicated they used a combination of several sources.

How would you generally rate public awareness in your jurisdiction about flood hazards?

Rating	Number	Percent
Fair	11	42%
Good	9	35%
Poor	6	23%

Can you provide any suggestions on how the public's level of awareness of flood hazards could be improved? Or maintained over time?

- Another flood event would remind people of the dangers. Signage of where flood extent is.
- Distribute hazard plan to residents
- Can't think of anything
- None
- Accurate mapping by FEMA. They could use that to plan industrial and commercial development. Could reduce/eliminate flood insurance premium. This would get people's attention and boost awareness about flood issues.
- More accurate FIRM and they would feel more confident in using the information. Then they would/should do more of the outreach methods in #7.
- Major problem is that the FIRM's level of accuracy - it is too general and does not provide people with an accurate portrayal of the flood hazard areas.
- No

- If there was more education about the entire Federal Flood Insurance program, including the need and the risks of not taking part in it, this would be helpful to provide information. The information should best be provided by the home insurance agent or at the time of home purchase. The fact that houses located in non-flood plains but in the tsunami inundation zone - their insurance may not cover flooding caused by tsunami. There needs to be education of homeowners and insurance company providers.
- Most effective outreach has been through direct mailings - for the properties within the flood plain. Those mailings generated a lot of response
- Education such as mailings
- Flyers sent out to people
- Field signage
- Increased public information
- Web education and GIS data available. Funding. Technical advisory committee would be helpful.
- Signs would help to inform public about floodway
- Better outreach- sending out notices about storm drains before rainy season and conditions that contribute to flooding
- Agencies need to work together, work more with feds and state. This is happening to some degree already
- Possibly with using signs.
- No
- Updated flood plain. Use public hearings to discuss findings on the map (and maybe accuracy of the map).
- Provide ongoing information about flooding but the problem is that floods happen infrequently. Providing the public with constant reminders about flooding when there is none is not going to work.
- Cost is an issue. Targeted mailings would be good. More frequent outreach and notification. Education with neighborhood groups
- Programs to educate people about hazards. FEMA should do more outreach about flooding. FEMA needs to provide the educational materials. FEMA needs to update its maps first though to ensure they are accurate/credible.
- Public service announcement on the radio

- Billboard media campaign, chamber activities for new people who move into the area

How could FEMA or the state best support local education/outreach efforts regarding local flood hazards, including efforts related to flood map updates.

Outreach content?

- Target people who live in floodplain and send them flood information including a flood map of area.
- Have current flood data
- Good succinct explanation about flood insurance - how you get it, rates, etc.
- State and FEMA are meeting needs
- Yes, there currently isn't an outreach program.
- Work with property owners to improve FIRMs
- FEMA needs to work closer with the jurisdiction to find out about local issues
- Awareness
- Training sessions FEMA has done with DLCD have been good. Community rating system.
- Improve web information. Quality of geographic map data. Registered up to more local accurate data.
- content is good but people don't really want to look at it. Council wouldn't even look at it.

Outreach format?

- Mailings / signage
- Not sure.
- Could be
- New/updated GIS layer would be useful
- They provide maps, flyers might help
- Neighborhood meetings
- Don't know
- Work through GIS dept. Digitized format to put on website
- Mailing, update website

- Training sessions FEMA has done with DLCD have been good. Community rating system.
- Television video, flood insurance

How should the state or FEMA efforts supplement/support local efforts?

- Funding- pay for outreach materials and work with local jurisdiction to develop it.
- Not sure
- Accurate mapping
- By doing regular, accurate map updates when requested by local agency.
- Remapping is most important and effective use of the money. FEMA in the LCD do a good job in making useful and user friendly materials available.
- Update the FEMA maps more frequently
- 1) Put together packaged power point presentations or a scripted performance that local planners/others could use. 2) State/fed could make presentations available to local governments for local presentation. 3) Provide funding to local governments to create and put those presentations on. 4) Paying for public service announcements. 5) Making the process simple for reimbursement/payments for public service announcements and funding for local meetings.
- The importance of having flood insurance. People are relatively ignorant about flood experience.
- Update the FIRMs. Provision of outreach content could be helpful
- Funding for mailings
- Assistance in the CRS Application process
- Funding, staff
- Work with property owners to improve FIRMs
- FEMA needs to work closer with the jurisdiction to find out about local issues. More consistent data updates. Additional funding.
- Coordinate better with communities to inform the public
- Not sure because there is not much flooding

- Not sure - because flooding is not a big issue. The Feds or State could provide flyers or public service announcements.
- Finance updates or do the updates of the FIRMs. Technical assistance would be helpful.
- Do the flood map updates. Some communities don't have a large potential for flooding, so it is less important.
- FEMA does a good job of providing content from their website. Not sure that they could do too much more, aside from reminding jurisdictions to contact the public.
- FEMA does a good job through NFIP and community rating system. Keep doing this. Provide more financial incentives. Incentivize CRS program. Community rating system
- FEMA need to make it easier to update maps, fewer forms to fill out and fewer hoops to jump through. Would like to share LIDAR data but it is just too cumbersome to do what FEMA wants. Don't have the staff to just spend time updating maps. We have the data to update the maps now. FEMA needs to get rid of the paper maps. Allow communities to use their own electronic data that is more accurate. FEMA is 30 years behind with their technology. Need to trust local communities.
- Education about hazards needs to start at grade school. Older folks can be set in there ways.
- more accurate maps, inch to 100 scale, accuracy can make or break people who need to get flood insurance.

Would your jurisdiction be interested in partnering with the State or FEMA to improve flood hazard awareness/conduct outreach?

20 of 26 (77%) said yes

Has your jurisdiction previously worked with the State or FEMA to update flood maps? (Or are you currently working with…)

13 of 26 (50%) said yes

Does your jurisdiction need State or Federal assistance to adequately map flood hazards in your community?

20 of 26 (77%) said yes

Has your jurisdiction performed or contracted for any updated hydraulic or hydrological studies for flood hazard mapping?

8 of 26 (31%) said yes

If yes, has this information been reflected in updated FEMA FIRMs?

Of the 8 who said yes to the previous question, 5 said yes to this question.

Are you familiar with FEMA's digital FIRM format?

9 of 26 (35%) said yes

Does your jurisdiction have the GIS capacity to use a digital FIRM?

20 of 26 (77%) said yes

Does your jurisdiction want to have digital FIRMs?

24 of 26 (92%) said yes

Can your jurisdiction provide matching funds, if needed to participate in a mapping project?

Answer	Number	Percent
Yes	9	35%
Maybe	8	31%
No	6	23%
Don't Know	3	12%

Can your jurisdiction provide in-kind contributions (e.g. data, staff time) if needed to participate in a mapping project?

25 of 26 (96%) said yes

Are there other, potential obstacles to your jurisdiction participating in a mapping project that we need to know about?

Obstacle	Yes	Percent	Total
Staffing	21	81%	26
Limits in Local GIS capabilities	10	38%	26
Political will/support	9	35%	26

Other

Ten participants mentioned that financial resources were an obstacle to participation.

- Difficulty in working with FEMA
- Funding, staffing, limits in local GIS capability, and political will could all be issues

- Fear over what might come out over FEMA's remapping. This fear is shared by the government, residents, and business owners.
- Most communities have developed wisely before FEMA flood mapping, so not a lot of older homes at risk. New developments are moving into floodplains. Floods are getting bigger.

Would your jurisdiction benefit from training specific to FEMA flood hazard mapping, including both technical aspects of digital FIRMs and mapping process?

Answer	Number	Percent	Total
Yes	20	77%	26
No	4	15%	26
No answer or don't know	2	8%	26

If YES – What kind of training would you prefer? (1-day, 3-day, on-site workshop, off-site, content?)

Training Preferences	Number
On-site	15
1-day	12
Regional	5
3-day	3
Content	1

Have you identified hazards in your community?

25 of 26 (96%) said yes

Have you identified vulnerable assets in your community?

15 of 26 (58%) said yes

What vulnerable assets have you addressed? E.g. Schools, hospitals, police stations, fire stations, sewer, water, power, low income populations, elderly, minorities?

Common assets identified include: schools, police stations, fire stations, sewer, transportation system, large employers, and elderly populations.

Have you estimated potential losses in your community?

2 of 26 (8%) said yes

What hazard source data did you use to complete the risk assessment?

Data Source	Yes	Percent
Federal Emergency Management Agency	17	65%
Generated in-house data	16	62%
Department of Geology and Mineral Industries	13	50%
United State Geological Survey	13	50%
State GIS Clearinghouse	7	27%
Oregon Department of Forestry	7	27%
National Oceanic and Atmospheric Administration	5	19%
Oregon Department of Fish and Wildlife	3	12%

Other (Specify)

- Five participants indicated they used local data
- Two participants indicated they used US Forest Service or Bureau of Land Management data
- Use inventories, zoning maps, tax lot maps, as built improvements, aerial photos
- Crew, NRCS, State Fire Marshall hazmat site
-

Was there any information you wanted to include but couldn't find data for?

7 of 25 (28%) said yes

Information wanted includes:

- Building footprint, ground floor elevations, current data
- Telephone switching stations, rail trestles, overpass and underpass- difficult to get accurate data.
- Potential LOMA data was not available
- Severe storm, wind, severe wind
- Volcanic impacts
- Wetlands, maps were not real accurate
- Social data

What data sources did you use to either identify vulnerable assets or estimate potential losses?

Data Source	Yes	Percent
Generated in-house data	15	58%
State	10	38%
Tax records	9	35%
U.S. Census	5	19%

Other (specify)

- Zoning maps
- Metro, private consulting firms, local utilities for water, natural gas, and power, telephone book, co dept of aging, disabilities and vet services, shelter facilities

Was there any information you wanted to include but couldn't find data for?

4 of 15 (27%) said yes

Information wanted includes:

- Do not have a database that indicates what types of subsidence or reaction the ground surface would have in certain areas based on a near shore event.
- Facilities with dense populations,
- Would have liked better utility data
- Would like to know about the type of building - nonreinforced masonry - so that they can accurately estimate the effect of the hazard event.

How did you present your findings?

Findings Presented With:	Yes	Percent
Text	16	62%
Maps	16	62%
Tables	9	35%
Graphs	5	19%

Other:

- In the zoning standards - for flood plain or steep slopes. Created specific maps and standards in zoning ordinances.
- Graphics
- Digital photos, and aerial photos of critical facilities

(IF YES on #22) Did you do use GIS to complete the risk assessment?

14 of 26 (54%) said yes

(IF YOU USED GIS) Who did the GIS work for your jurisdiction?

GIS Done By	Answers	Percent
In House	8	31%
Private Consultants	1	4%

Other:

- County
- Forest Service
- University of Oregon
- State
- Bureau of Land Management
- Oregon Department of Fish and Wildlife
- Lane Council of Governments

Which department or division in the city/county uses the community's GIS services the most?

Department	Answers	Percent
Planning	9	35%
Public works	9	35%
Assesor	3	12%

Other departments include:

- City Engineer
- Tax Assessor
- Sheriff
- Health Department
- District Attorney
- Surveyor
- Clean Water Services
- Fire Department

Is in-house data made available free of charge to any other department within the jurisdiction?

13 of 15 (87%) (who answered) said yes

What was the GIS used for?

GIS Uses	Yes	Percent
Basic Mapping	17	65%
Presentation of Results	16	62%
Overlaying multiple data sources	15	58%
Advanced computations	10	38%

Other

- Preliminary summary data
- Service boundaries
- Internet mapping services, issuing of permits, management of special service districts
- Conceptual design - laying out planning for infrastructure
- Used as a general reference for geographically indexed data for staff

Did you encounter problems while mapping components of the risk assessment?

4 of 26 (15%) said yes

What were the mapping problems you experienced?

Problem	Yes	Percent
Data availability	8	31%
Integrating data	7	27%
Analysis time	4	15%
Presenting results	2	8%

Which of the following (has been/would be) an issue in completing your jurisdiction's risk assessment?

Risk Assessment Issues	Yes	Percent
Administrative	18	69%
Technical	14	54%
Political	6	23%
Legal	3	12%

Administrative

- Eight participants indicated that funding was an issue in completing the risk assessment
- Six participants indicated that staff and human resources was an issue in completing the risk assessment

Political

- Decision makers need to be made aware of how important this data is
- Could be but less so
- No - except for FEMA's flood mapping because of their past experience
- No - probably not a problem if the resources were available
- Yes - conflicting priorities short range vs., long range priorities
- Multi-jurisdictional issues. Getting cooperation from the different agencies coordination the plans.

Technical

- Data not available
- Training
- Accuracy of data
- Have a skilled hazard management and response staff.
- Skills in the GIS realm is limited though.
- Availability and quality of data and maps is problematic, as well as technical ability to identify assets that are threatened
- Determining the best data
- Need staff, training, and GIS software

Legal

- Liability can be an issue
- Could be but less so

Other

- Getting feedback from people out in the field who have direct knowledge of hazards and know how the public can be impacted

Please identify the issue that you feel presents the biggest hurdle to completing the risk assessment in your community.

Administrative

- Five participants indicated that the biggest hurdle is financial
- Four participants indicated that the biggest hurdle is staffing
- Two participants indicated that the biggest hurdle was time

Technical

- Technical
- Technical - don't have the staff
- Training and staff time for GIS
- Accurate information

Other

- Capacity to provide an accurate assessment and the variability of on the ground situations. The variability of the natural hazard event and the impact of the event is so great that it makes the risk assessment difficult. Likewise, the variability of the situation on the day that event happens (holiday/nonholiday, tide in or out, etc.)
- Lack of a central champion, dispersed stakeholders- different agencies
- Coordination with other depts. in the city.
- Wildfire, location of new homes, fuel loads, defensible spaces, emergency plans
- I haven't been involved in the risk assessment process. Getting the county/city jurisdictions to work together. Getting departments to work together as well.

What are the resources you would need to complete a risk assessment in your community?

Resources Needed	Yes	Percent
Staff	16	62%
Finances	13	50%
Training	13	50%
Data	12	46%
Technology	8	31%

Finances

- Eleven indicated that they needed financial resources
- Two indicated that they needed additional staff resources

Staff

- Staff to keep data up to date
- More staff that is trained in GIS
- Always seem to be staffing problems, more people would be helpful.

- GIS dept needs its own manager. Have an IT dept that needs to merge with GIS dept.
- More staff would be helpful
- Need an intern, someone with some basic skills

Data

- Updated FIRM
- Yes - Access or time to improve own data. Would like more contact with people out in the field to provide local information
- Better structural data - more accurate and precise. Refining data that they have. More details - such as about the type of house construction, etc.
- Finding the right data.
- In a few areas data is incomplete or the resolution is too low.
- Better hazard data
- Just need to know where data is

Do you plan to use GIS to complete risk assessments in the future?

17 of 26 (66%) said yes

Who will do the GIS work for your jurisdiction?

GIS Work Done By	Yes	Percent
In-house	16	62%
Private consultant	13	50%
Other	6	23%

Other

- County EMS may be working on this
- Maybe Federal Agencies - USFS
- COG
- County
- Federal and state partners
- County might help as well

Do you have any additional comments related to lessons learned or issues that could improve the mitigation planning process?

- Count on it taking more time than you expect. Need to contact the right people in the community for feedback

- Pretty well hit most of the problems: data accuracy, availability, and precision
- Coordination between various agencies is the key
- They have learned that assessments need to be done with lots of public input and the public needs to help with the assessment because they provide information that is unobtainable any other way. The public helps in bringing up issues that you wouldn't think about.
- have the right champions -political leaders, building officials
- Required to create hazard map but another entity had already created it- USGS ODF. Better outreach and collaboration with Fed and State entities.
- Coordination of mapping projects with the different bureaus in the city.
- Hiring the right person to help develop the plan. They need to have a connection to the community.
- It would be much easier if there was more updated information. The last update of the FIRM was in 1982 and they have been trying to get the maps updated for the last several years.
- No - the process that Albany is involved in includes a 6 County grant organization. They are working with ONHW (and others) to figure out how to do the mitigation plan.
- Anyone who wants to start a GIS program needs to start with a good parcel base map. Good digital orthophotography. LIDAR is a very useful technology for making accurate maps. Don't just slap stuff together with data that might not be accurate.
- Time management- don't wait to start the process! Otherwise, it will take longer and you have to spend a lot of time to catch up. Having the proper software is important. Having people who are fully trained is important too.

Do you have any suggestions on assistance that state and federal agencies could provide communities that would make the risk assessment process easier?

- A flood loss form from FEMA would be useful…it might already exist.
- Better and more current data for hazard areas. More support for developing in-house data, especially financial assistance
- Not really

- Most of the smaller jurisdictions are using 20 year old maps with limited detail. Most of the small cities have the old maps that require a survey/engineer is hired to estimate the extent of the flood plain on the property, using the flood plain map to estimate the elevation. Having cross sectional information would be helpful because it would provide known bench marks. The jurisdictions that Dan works with have not done risk assessments.
- Technical information like reports or geospatial data or hard copy maps. If Fed and state agencies had a comprehensive list of potential hazards, they could do the rest of the work for the City for the assessments. Their area include state and Federal lands.
- Better explanation of the requirements for completing it
- The updating process for the FIRM should collaborative, working closely between the community and FEMA. Also, the state or feds could provide a bulleted guide to doing an assessment that is clear and concise. They could include an assistance guide that provides an explanation of each bullet or part of the process.
- Proving financial assistance
- Additional funding
- Training and funding
- State did a good job providing assistance and information. Provide a calendar for training and other informational opportunities. Better communication from the state to inform county what the FEDS and State are doing. Communication issues. "every jurisdiction for themselves" Who is doing what. Data is only made for the West side of the state. The East side is often forgotten by the rest of the state.
- Plan relied on cooperation from state ,fed and local agencies, good process
- Informational paper about risk assessment. Ideas of how much the risk assessments cost and how much matching funds would be necessary.
- More data about DTMs, vegetation type, flood plains/ways, water courses, prevailing winds, grassland fires.
- Help finance this process.
- Give more detail on the FIRM, especially with the street network. It becomes difficult to use them with the public because the maps are so vague.

- Additional and more accurate data on regional and local risks, such as volcano
- Education. GIS mapping folks need to be involved in this process. People higher up need to know more about federal programs and their consequences
- No, don't really understand what a risk assessment process entails
- Money. This can help drive the federal and state agendas.

Is there anything else you would like to share?

- It may not be able to be helped, but many of the questions seem to be redundant when going over the risk assessment questions.
- Dan works for Dufer, Antelope, Culver, Metolious, Wasco, Arlington, Condom, Fossil, Spray and other small cities that are located on a water way. They all have a 1984 flood plain map. None of them have GIS capability. Having more detailed maps would be extremely useful
- Readily available technical information in a digitized form is very useful for small jurisdictions that do not have the capabilities or budgets to develop those data sets themselves. This would be very helpful.
- They would like to collect more information locally on fire hydrant and other EMS equipment locations.
- There is a strong need to get their maps updated. They have had a lot of changes to the river since the maps were updated. Having inaccurate maps negatively affects the City's ability to develop areas that are no longer in the flood plain. This has an economic impact on the City.
- The FIRMs are not detailed enough to tell the street level detail about which properties are subject to flooding.
- Similar survey done about 3 years ago, I think it was federal… paper survey. (Maybe FEMA?)

Appendix F:
Focus Group Summary

Purpose

In July 2005, Oregon Natural Hazards Workgroup held targeted focus groups aimed at identifying the issues that local governments encounter while developing the risk assessment component of their Natural Hazard Mitigation Plan. The focus groups specifically examined the obstacles and opportunities that local governments experience in discovering, accessing, and using geospatial data to develop their risk assessments.

Data discovery is defined as the process of identifying, locating, and/or collecting geospatial data. *Data access* is defined as the ability to obtain and use current geospatial data. *Data use* is defined as the incorporation, analysis, and management of community risk assessment geospatial data into local systems.

Methods

The first focus group was held on July 20, 2005, with the City of Beaverton and Washington County, and the second focus group was held on July 26, 2005 with Umatilla County. The project's steering committee identified the participating communities. Communities were selected to represent both urban and rural interests and were invited to attend focus group meetings conducted by Oregon Natural Hazards Workgroup (ONHW).

ONHW asked the selected communities to bring individuals from the various departments that participated or would participate in developing the community's risk assessment. Focus group participants included members from emergency management, planning, and GIS staff from both city and county departments.

At the focus group meetings, ONHW gave an overview of the project and explained the purpose of the focus groups to meeting participants. ONHW asked participants to individually fill out an issue identification worksheet that asked about issues regarding technical, administrative, economic, and legal issues related to the discovery, access and use of hazard geospatial data.

An open discussion followed in which participants reported their top issue from each issue category to the group. Participants were then asked to have a group discussion regarding the importance of data collection standards and hazard overlay methodologies.

Findings

ONHW documented the responses from the group discussions and collected participants' worksheets after the meetings. The following is a summary of all participants' responses for the issue identification worksheet and the discussions regarding data collection standards and hazard overlay methodologies.

Issue Identification Worksheet

ONHW created an issue identification worksheet to gain information from focus group participants about the different aspects of discovering, accessing, and using geospatial data to develop risk assessments. Specifically, the worksheet questioned participants on the technical, administrative, economic, and legal aspects geospatial data. Please note that not all of the four issues categories listed above applied to each of the geospatial data aspects – discovery, access, and use.

Definitions of the different worksheet topics appear below, along with a summary of responses for each topic from participants' worksheets.

Data Discovery

Data discovery is defined as the process of identifying, locating, and/or collecting geospatial data. Examples of data discovery include field collection and data development. Participants were asked to identify issues that their communities experienced related to technical, administrative, and economic aspects of data discovery.

Technical

Participants were asked to identify issues related to the technical skills and equipment necessary to collect, develop, and interpret local hazard data. A summary of responses from participants' worksheets is listed below.

- Need to collaborate with border jurisdictions and agencies for data discovery.
- Some jurisdictions are inadequately staffed;
- There is an need for more staff training, cross training, and continued education for staff and end-users;
- There is an need for more technical assistance;
- There is a need for data collection standards;
- Data is in multiple formats that are not always compatible; and
- Data is often in formats that make it hard to quantify.

Administrative

Participants were asked to identify issues related to the human and financial resources required to administer various data elements for a community risk assessment. A summary of responses from participants' worksheets is listed below.

- Some jurisdictions and departments are adequately staffed.
- Some jurisdictions and departments are inadequately staffed.
- Sometimes there is a lack of communication between departments when data is collected.
- Costs of hiring more staff or outside consultants to collect, input, and integrate are prohibitive.

Economic

Participants were asked to identify issues related to the cost associated with developing, buying and/or collecting new hazard or community risk assessment. A summary of responses from participants' worksheets is listed below.

- Need to collaborate with other departments and jurisdictions to collect or purchase data.
- Cost of staff time and equipment to collect data is prohibitive;
- Cost of hiring an outside consultant or purchasing data is prohibitive;
- Ineffective use of resources when duplication of collection or purchase of data occurs; and
- Unaware of available funding sources and resources.

Data Access

Data access is defined as the ability to obtain and use current geospatial data. Examples of sources used to access data include federal, state, or local jurisdictions. Participants were asked to identify data access issues that their communities experienced related to technical/administrative and legal aspects of data discovery.

Technical/Administrative

Participants were asked to identify issues related to the necessary technical skills and/or equipment, human and financial resources needed to obtain and acquire natural hazard data. A summary of responses from participants' worksheets is listed below.

- Lack of adequate storage space for data; and

- Need to collaborate with other jurisdictions to share data.
- Unaware of what data already exists and how to access it;
- Blocked or limited access to data;
- Data is in multiple formats that are not always compatible; and
- There is a need for more staff time, money and equipment to be able to access data.

Legal

Participants were asked to identify issues related to potential legal challenges, constraints and/or opportunities involved in acquiring and using community risk assessment data. A summary of responses from participants' worksheets is listed below.

- Publishing data belonging to other agencies and/or jurisdictions;
- Publishing data that contains locations of critical facilities;
- Affect on private property owners of publishing confidential information that could influence property values or insurance rates;
- Access onto private property to collect and access data;
- Ballot Measure 37; and
- Licensing agreements.

Data Use

Data use is defined as the incorporation, analysis, and management of community risk assessment geospatial data into local systems. Examples of data use issues include data format and ease of integration. Participants were asked to identify data use issues that their communities experienced related to technical, administrative, and legal aspects of data discovery.

Technical

Participants were asked to identify issues related to the technical skills, equipment, and/or software necessary to interpret and analyze natural hazard data. A summary of responses from participants' worksheets is listed below.

- Cost of staff time and equipment needed to maintain data;
- There is a need for training on how to use and merge data; and

- Data is in multiple formats that are not always compatible, making some data unusable.

Administrative

Participants were asked to identify issues related to the human and financial resources required to analyze and maintain various data elements for a community risk assessment. A summary of responses from participants' worksheets is listed below.

- Collaboration with other departments and jurisdictions to share data.
- Cost of maintaining data to keep it current; and
- There is a need for training and funding for staff to be able to use data.

Legal

Participants were asked to identify issues related to potential legal challenges, constraints and/or opportunities involved in acquiring and using community risk assessment data. Responses from participants' worksheets are listed below.

- Ballot Measure 37;
- Internal and external sharing of data; and
- Publishing data that contains locations of critical facilities.

Data Standards and Methodology Discussion Questions

ONHW asked participants to provide input on potential next steps to better assist communities develop accurate risk assessments. Participants were asked to identify how important data collection standards and hazard overlay methodologies are to local communities.

How important are data collection standards?

Focus group participants expressed that having data standards at the time of collection would allow for multi-purpose data collection, and could save time and money in the long run. Participants expressed a desire for a template for how to collect data to meet standards. They also expressed a desire for a multi-hazard and multi-purpose GIS tool to make inputting data easier. Several participants agreed that the methodologies used later to analyze data do not matter if there are uncertainties in the accuracy of the data. The majority of participants agreed that having statewide standards for data collection could help accomplish the following:

- Ensure data users that they are receiving high quality data from other jurisdictions;
- Make sharing data and resources across jurisdictions easier; and

- Provide legitimacy when jurisdictions must collect data or ask for funds based on analysis of collected data.

How important are hazard overlay methodologies?

Focus group participants agreed that having both data collection standards and hazard overlay methodologies are important. Participants indicated that having methodologies that demonstrate how to use collected data would be helpful, providing technical support to data users. Participants also expressed that flexible methodologies could be adapted for each site and/or jurisdiction, and could be used for reviewing and updating plans and risk assessments.

Conclusions

The findings from the issue identification worksheet exercise and the discussion questions are summarized below.

- There is a lack of knowledge of what data is available.
- Capacity issues at the local level stem from a lack of staff and funding rather than a lack of technical capacity.
- Discovering, accessing and using hazard geospatial data is complicated by the lack of standardized data formats.
- There is a lack of communication between internal departments on what GIS activities are taking place, and opportunities are being missed to collect and acquire multi-objective datasets.
- Both data collection standards and hazard overlay methodologies are equally important because one cannot be accomplished without the other.

Appendix G
GIS Utility Survey Summary

Background

The Oregon GIS Utility is an effort to develop a system and program to support consistent, efficient statewide geographic information sharing, maintenance, and GIS services supporting the business needs of the government and non-governmental community in Oregon.

The purpose of the GIS Utility survey is to collect information about spatial data, information technology investments, and institutional aspects of GIS use from local jurisdictions. This baseline information will serve as the essential foundation for the design and creation of a GIS utility that maximizes benefits and makes the best use of available resources across all levels of public agencies.

While this survey does not specifically address natural hazards, it does provide insights on the technical capacity of local jurisdictions to deal with geospatial data.

Methodology

The GIS utility survey was developed by the Oregon Geographic Information Council with input from project partners. The survey was sent to 203 City and County planners and GIS professionals around the State in March and April 2005. The survey was conducted on-line. Respondents were notified via email with a direct link to the survey. A total of 117 city and county representatives responded to the survey (58% response rate).

The survey questions fell into the following categories:

- Organizational information
- GIS technology infrastructure
- Geographic data development, use and maintenance
- GIS applications and users
- GIS organizational structure and staffing
- GIS program collaboration and sharing of GIS data

ONHW conducted a secondary analysis of the survey data provided by PlanGraphic, Inc. As a result, 'n' numbers for certain responses were unavailable.

Findings

A summary of the findings from the GIS Utility Survey are organized into the following sections:

Organizational Information: This section provides information on what type of organization the respondents were representing and information about the jurisdiction's GIS program.

GIS Technology Infrastructure: This section provides information on the types of operating systems and GIS platforms and software currently being used by local governments in Oregon.

Geographic Data Development, Use, and Maintenance: This section provides information on data sets that respondents indicated were already developed, are being developed, are in the planning stages, or are not planned. This section also includes information on the source and the update frequency of the data.

GIS Applications and Users: This section provides information on the types of GIS users and applications currently available, as identified by respondents.

GIS Organizational Structure and Staffing: This section provides information on respondents' GIS program's organizational structure and the types of GIS activities that their jurisdiction typically outsources.

GIS Resources, Costs, and Benefits: This section provides information on respondents' resources for funding, what respondents' GIS programs cost, and what benefits respondents get from the GIS programs.

GIS Program Collaboration and Sharing of GIS Data: This section provides information on what certain data sharing arrangements respondents have planned, in development, currently in place, or do not have in place.

Organizational Information

Three-quarters of respondents have GIS programs that are currently operational. Only 4% of respondents had no GIS program or plans to begin one. GIS programs were most likely to support the following business areas: land use planning and management (72%), natural resources planning and management (54%), roads and highway maintenance (47%), public safety and emergency preparedness (46%), land development permitting and inspection (44%), and facility/property/asset management (43%). Data and activities supporting all of these business areas also have connections to the risk assessment phases.

GIS Technology Infrastructure

Note: Much of the information in this section is problematic because the survey instructions are to "check all that apply". In several cases, this makes it difficult to decide how useful the data is because it is difficult to determine how many respondents checked more than one item.

This section of the survey focused on the operating systems and GIS platforms and software currently being used by local governments in Oregon.

Respondents were asked to indicate whether or not they had GIS software. Twelve percent of respondents indicated that they did not use server GIS software. Respondents documented a total of 28 different types of desktop GIS software being used by communities around the state. Knowledge of what GIS software is being used by locals is an important component of understanding local capacity to complete risk assessments. This type of GIS software is required to use risk assessment modeling software such as HAZUS. The vast number of software being used also indicates that data sharing between jurisdictions may be problematic.

Respondents also identified available mobile data collection systems and software. Many respondents use a field or mobile computer. Of the respondents who use a field or mobile computer, less than half use field or mobile GIS mapping software. Many respondents use GPS collection systems. The availability of field/mobile data collection devices and software greatly enhances a community's ability to collect primary data.

Geographic Data Development, Use, and Maintenance

This section of the survey asked respondents to identify whether or not certain data themes commonly found in local GIS systems had been developed, are being developed, are in the planning stages, or are not planned. The individual data themes were categorized into the 13 state framework themes: geodetic control, cadastral, administrative boundaries, cultural features, transportation, digital orthoimagery, elevation, hydrography, utilities, geoscience features, bioscience features, landcover/land use, and climate. Respondents were also asked to indicate the source and the update frequency of the data.

Seventy-seven percent of data themes have a status of "complete", with 19% in "development" and 4% in planning. The only theme to be reported as "complete" and in "development" with equal or near equal frequency is Geodetic Control/survey monument. The themes most commonly "completed" are: census boundaries (96%), election districts (95%), railroads (89%), rain (88%), and zoning boundary (88%). Most of the data sets listed below are important in completing the vulnerability assessment. See Table G-1 below.

Most data was generated in-house (65%) or by the Federal government (12%). Data was least likely to be generated by a university or nonprofit organization (1%). The most common update frequency for

themes is "as needed" (85%), followed by "daily or as changes occur" (6%).

Table G-1: Completed GIS Data Themes by Percent of All Themes

Theme	Complete		Total
	Number	Percent of Total	All Responses
Census Boundaries	43	96%	45
Election Districts	41	95%	43
Railroads	54	89%	61
Rain	22	88%	25
Zoning Boundary	42	88%	48
Temperature Ranges	20	87%	23
Digital Orthophotography	56	86%	65
Snow	18	86%	21
Administrative Boundaries	71	85%	84
Elevation	48	81%	59
Riparian Areas	33	80%	41
Soils	37	79%	47
Land Cover	29	78%	37
Historical Sites	25	78%	32
Telecommunications	21	78%	27
Wastewater Collection	27	77%	35
Gas or Oil Transmission/Distribution	19	76%	25
Transportation	52	75%	69
Geology	26	74%	35
Wetlands	38	73%	52
Electric Transmission/Distribution	24	73%	33
Land Use	34	72%	47
Water Distribution	28	72%	39
Hydrography	43	72%	60
Fish Habitat	25	71%	35
Site Address	35	71%	49
Cultural Features	24	71%	34
Archaeological Sites	16	70%	23
Bridges and Culverts	31	67%	46
Cadastral	37	67%	55
Vegetation Species	22	65%	34
Wildlife Habitat	22	65%	34
Geodetic Control/Survey Monument	27	47%	58
Total	**1090**	**77%**	**1421**

Source: GIS Utility Survey, 2005

GIS Applications and Users

This section asked respondents to identify the types of GIS users and applications currently available.

The most commonly used GIS applications are: map production/plotting (90%), basic geographic query, map display, reporting (85%), map or database update (71%), custom thematic mapping (68%), and map-

based query and access to digital document (68%). The least commonly used GIS applications are: call center support (29%), network flow analysis (29%), and vehicle location and tracking (19%). All of these applications are important steps in completing a natural hazard risk assessment. These results indicate that communities do have the technical capacity to develop risk assessments.

GIS Organizational Structure and Staffing

Survey respondents were asked to describe the GIS program's organizational structure and identify the types of GIS activities that the jurisdiction typically outsources.

Respondents were asked to indicate the number of staff devoted to the following GIS activities: management/coordination, system/database administration, GIS database or application development, GIS analyst or technician, data compilation/update, training/user support, and other GIS staff. Most organizations indicated that they have 10 or fewer staff doing each category of GIS work listed above. Activities that were outsourced most frequently were: ortho or satellite image acquisition (17%), GIS application design/development (12%), GIS training (12%), and GIS mapping or data conversion (11%). Activities that were outsourced least frequently were: GIS needs assessment or planning (5%), technical design, specifications, vendor procurement support (4%), and GIS program management support (2%).

GIS Program Collaboration and Sharing of GIS Data

Respondents were asked to indicate whether or not they had certain data sharing arrangements planned, in development, currently in place, or not in place.

In general, collaboration and sharing of GIS data across all respondents is divided by those that have agreements currently in place and those that have no agreements in place or planned. Formal collaboration with other organizations is currently in place for 62% of respondents, in development for 13% of respondents or planned for 5% of respondents. For the remaining respondents, the status is unknown or they have none in place or planned. Due to limited local resources dedicated to hazard data development, data sharing is an important means of data access for jurisdictions. This is also important because the nature of hazards not respecting political boundaries.

License agreements for use or distribution of GIS data are currently in place for 32% of respondents and none in place or planned for 38%. Clearinghouse for GIS data is held by or for the organization is currently in place for 32% of respondents and none in place or planned for 41%. Distribution of GIS data or products is currently in place for 46% of respondents and none in place or planned for 27%. Sale of GIS data or products is not in place or planned for 59% of respondents and currently in place for 27%. Information on the provision and

distribution of hazard data is critical to understanding how easily communities can access and utilize data.

Conclusions

While the GIS utility survey did not directly address natural hazards, it did provide insight on the technical capability of local communities to complete risk assessments. The following are key conclusions from this survey.

- Current GIS activities address land use planning, natural resources planning, and roads and highways, which all have direct connections to the risk assessment process.
- The majority of responding communities do have the technical capabilities required to complete GIS based activities related to the risk assessment process.
- Without realizing it, many communities have already developed or are developing local data sets required for completing risk assessments through other department plans, programs and policies.
- Majority of communities have data sharing agreements in place.

Appendix H
Oregon Department of Forestry Wildland-Urban Interface Identification Methodology

This appendix includes the wildland-urban interface identification methodology developed by the Oregon Department of Forestry. This methodology has been used by several communities to develop the risk assessment portion of Community Wildfire Protection Plans. It is an example of the types of hazard overlay methodologies that are recommended in this needs assessment.

IDENTIFYING AND ASSESSMENT OF COMMUNITIES AT RISK IN OREGON
Draft Version 4.0

October 18, 2004

Scope: This assessment methodology provides for a "seamless" process for identification and wildfire risk assessment of Oregon's communities that is appropriate at all levels resolution – from statewide to community to parcel.

Background: Assessment of wildfire's threat to communities in Oregon is occurring at several levels.

- The state will be using the National Association of State Forester's (NASF) *Field Guide* during the next 12 months with the desired outcome to identify and assess Oregon's communities to meet the needs of the "Collaborative Fuels Treatment MOU" and Task e, Goal 4 of the *Implementation Plan for the 10-Year Comprehensive Strategy.*
- The state is also beginning implementation of Oregon's Forestland-Urban Fire Protection Act of 1997 (SB360), which will use procedures contained in Oregon Administrative Rules to identify and classify forestlands in nearly every county in the state over the next 10 years.
- Many counties and communities are beginning a wildfire assessment with the desired outcome to:
    - Meet federal FEMA requirements for a wildfire mitigation plan (Title 44 CFR Part 201 of The Disaster Mitigation Act of 2000) and
    - Prioritize Title III and National Fire Plan projects.
- Additionally, individual communities and watershed councils are completing neighborhood level assessments as part of their neighborhood/community fire plans.
- The Healthy Forests Restoration Act of 2003 (HFRA) and a new federal fire management planning process addresses community fire plans and identification of WUI lands within and adjacent to "at-risk" communities.

Purpose: Provide a tiered collaborative process that best serves the various needs at the appropriate resolutions of assessment. – from statewide to an individual neighborhood. The assessment includes all lands and ownerships and collaboratively considers the complexity of ownership patterns, resource management issues and stakeholder interests. The higher quality local assessments will be used to further refine the statewide assessment.

<u>Process Overview</u>

ODF, with cooperators through a statewide steering committee will:

- Design and conduct a coarse scale statewide risk assessment to initially prioritize fire mitigation needs.
- Set standards and provide certain data for counties and communities to conduct a fire risk assessment.
- Initiate and maintain a risk assessment map and database for the state.

Counties and communities will:

- Using statewide standards, collaboratively further identify unique communities within their jurisdiction.
- Using statewide standards, collaboratively further refine the risk assessment
- Submit results to ODF for approval to be up-dated in statewide risk assessment.

Identifying/Naming Communities to be Assessed

Background: Under agreement of the NAFS and federal agencies, states are responsible for identification of communities at risk. For management of nearby federal lands, communities, through an approved *Community Wildfire Protection Plan (CWPP)*, will identify areas (Wildland-Urban Interface) within and adjacent to these state-identified communities using criteria contained in the HFRA. In areas not covered by a CWPP, federal agencies will determine the WUI boundary.

NASF Guidance defines *community* as " a group of people living in the same locality and under the same government."

The HFRA defines an "at-risk community" as:
1) An area comprised of:
- Where humans and their development meet or intermix with wildland fuel (federal register definition, January 4, 2001, which uses a structure density of 1 per 40 acres or population of 28 person per square mile), or
- Or a group of homes and other structures with basic infrastructure and services within or adjacent to federal land;

2) in which conditions are conducive to a large scale wildland fire event; and
3) for which a significant threat to human life or property exists as a result of a wildland fire disturbance event.

For its list of communities at risk in Oregon, ODF defines *community at risk* as ***a geographic area within and surrounding permanent dwellings with basic infrastructure and services, under a common fire protection jurisdiction or government, for which there is a significant threat due to wildfire***.

Identifying communities for initial statewide assessment:
- Geographic areas where at least 1 structure per 40 acres meet or intermix with wildland fuel are identified (federal register criteria).
- Adjacent landscapes that contain vegetation creating a risk to the community, generally a sixth field watershed, and municipal watersheds.
- These geographic areas are subdivided by the boundary of the jurisdictional with primary constitutional authority for protection of life from wildfire (Cities, fire districts, and county board of commissioners for "unprotected" areas).

Identifying communities for county and community assessments:
- For the purpose of providing a better community risk assessment and fire plan (and development of community wildfire protection plans under the HFRA), the jurisdictional areas identified at the statewide level should be divided into logical community boundaries collaboratively with fire districts, cities and counties. An unincorporated *rural community* without a common government or fire district providing structural fire protection is defined as consisting primarily of permanent residential dwellings but also at least two other land uses that provide commercial, industrial, or public uses (e.g. schools, churches, grange halls, post offices) to the community, surrounding rural area or persons traveling through the area (Oregon Department of Land Conservation and Development 1994).

Assessment of Risk Factors

Related to wildfire assessment, it is clear that one-size-does-not-fit-all. However, nearly all assessment models consider **risk, hazard, protection capabilities and values protected.** In addition, an assessment of the **vulnerability of values at risk** is needed for community down to parcel level assessments. Complex assessment worksheets available through Firewise, NFPA, RAMS, Western Fire Chiefs Association, International Fire Code Institute, and various states can be boiled into these groupings. FEMA requires risk assessments to profile hazards, vulnerabilities, and impacts in terms of location, extent, previous occurrence, and potential dollar loss to vulnerable assets.

Consistent with the NASF Guidance, an adjective rating of *Low*, *Moderate*, or *High* will be used to describe each factor (an additional *Very High* rating is allowed for Hazard) for the statewide assessment. However, field-testing has shown that there is a need for finer resolution of the data to accommodate local assessments. For example, it's possible that nearly every community in a county could receive a statewide rating of High for a factor. This would do little to help a local government or community prioritize areas of concern. To maintain the integrity of the statewide rating, yet provide of local needs, a point system that provides for a wide range of points for each factor is used. However, when this assessment is rolled up to the state, the statewide score system will be used

This paper provides a process for consistently assigning these adjective values. It uses *best available data* (BAD) for various resolutions of assessment.

Weighting of Factors

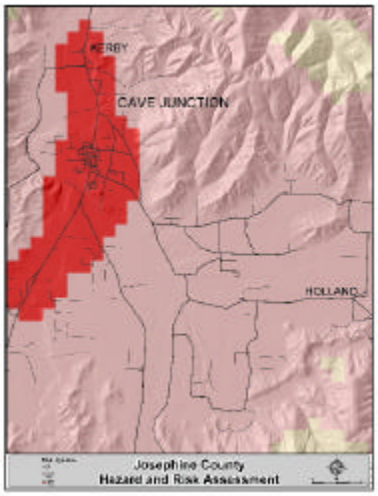
Risk: 40 Points
Hazard: 80 Points
Protection Capability: 40 points
Values at Risk: 50 Points
Structural Vulnerability: 90 Points

Risk: What is the likelihood of a fire occurring?

Statewide: Use historic wildfire occurrence provided by ODF, OSFM, and federal land management agencies and tribes.

Historic fire occurrence		**Points**
Fire occurrence - per 1000 acres per 10 years		
(Low)	0-.1	5
(Moderate)	.1-1.1	20
(High)	1.1+	40

Local: Use of historic fire occurrence alone would be adequate (see Josephine County Example). However, in addition, an assessment of **ignition risk potential** may help local communities better assess potential fire starts and design appropriate fire prevention strategies into a fire plan. The list of ignition sources in the RAMS model is a good source: *Transmission power lines, above ground distribution lines, power substations, active logging, construction, debris burning, slash burning, mining, dispersed camping, developed camping, off-road vehicle use, flammables present, fireworks, mowing dry grass, woodcutting, equipment use, target shooting, military training, arson, cultural activities, railroad, federal/state highway, county road, public access roads, camps/resorts/stables, schools, business, ranch/farm, lightning prone, dump*

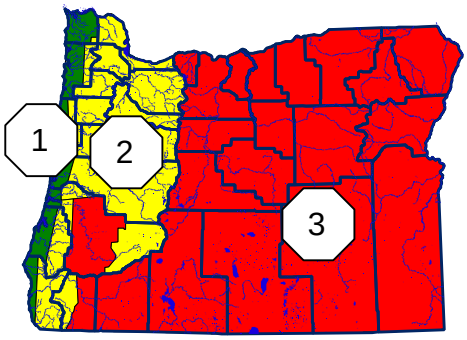


Historic fire occurrence	
Fire occurrence - per 1000 acres per 10 years	
0-0.1	5
0.1 –1.1	10
1.1+	20
Ignition Risk	
Home density (homes per 10 acres)	
0-.9 (rural)	0
1-5.0 (suburban)	5
5.1+ (urban)	10
Other risk factors present in vicinity	
< 1/3 present	0
1/3-2/3 present	5
> 2/3 present	10

Category Rating	**From**	**To**
Low	**0**	**13**
Moderate	**13**	**27**
High	**27**	**40**

Hazard: What is the resistance to control once a wildfire starts, being the weather, topography and fuel that adversely affects suppression efforts

Hazard is closely associated with fire weather, topography, and fuels (the fire behavior triangle).



Weather Hazard Factor Value: All levels: The number of days per season that forest fuels are capable of producing a significant fire event is important to consider. The reference for establishing the wildfire weather hazard factor is data provided by the Oregon Department of Forestry, which was developed following an analysis of daily wildfire danger rating indices in each regulated use area of the state and which is described in Table 1 of OAR 629-044-0230.

State/Community/Parcel	
OAR Table 1	**Points**
Non-forest in any zone (mask out)	0
1	0
2	20
3	40

Topographic Hazard Factor Value:
All levels**:** Slope and aspect affect both the intensity and rate of spread of a wildfire. Elevation affects the type of vegetation and the length of the season. The topography hazard factor is determined by considering slope, aspect, and elevation using DEM's. Each factor is added together to determine the topographic value:

Topography	**Points**
Slope	
0-25%	0
26-40%	2
>40%	3
Aspect	
N, NW, NE	0
W, E	3
S, SW, SE	5
Elevation feet above sea level	
5001+ feet	0
3501-5000 feet	1
0-3500 feet	2

Natural Vegetative Fuel Hazard Factor Value:

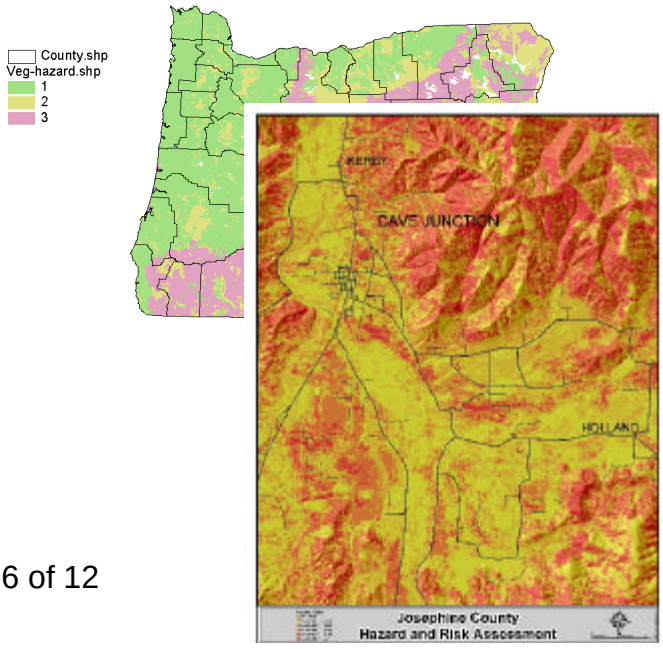
Given high-to-extreme fire danger for a geographic area, vegetation is the primary factor affecting the intensity of the fire, thus the resistance to control and the potential threat to protected resources (lives, property, and resources). It also affects the amount and travel distance of burning embers that again, significantly impact the resistance to control and the potential threat to protected resources

Determine by using fire behavior fuel models and/or potential flame length.

State/Community/Parcel*		
Fuel Hazard Factor	**Fuel Model**	**Fire Characteristics**
1	Grass (1) Low/less flammable brush (5) and short-needle timber litter (8)	Typically produces a flame length of up to 5 feet, a wildfire that exhibits very little spotting, torching, or crowning, and which results in a burned area that can normally be entered within 15 minutes.
2	Grass/Timber (2) Moderate brush, conifer reproduction, open sage and juniper (6)	Typically produces a flame length of 5 to 8 feet, a wildfire that exhibits sporadic spotting, torching, or crowning, and which results in a burned area that can normally be entered within one hour. Mixed severity.
3	Tall flammable grasses (3) Heavy/flammable brush (4), and mature timber with slash (10)	Typically produces a flame length of over 8 feet, a wildfire that exhibits frequent spotting, torching, or crowning, and which results in a burned area that normally cannot be entered for over one hour. Stand replacement severity.

Statewide: Best available data statewide will likely be a combination of grid vegetation and the GAP vegetation types with a cross-walk to hazard value (determined by an expert panel representing all areas – similar to Colorado assessment). Below is a sample of vegetation hazard value statewide using GAP data as a test (no collaboration or statewide input).

Vegetation (fuel model)	**Points**
SB360 - Natural Vegetative Fuel Hazard	
Non-forest	0
1	5
2	15
3	30

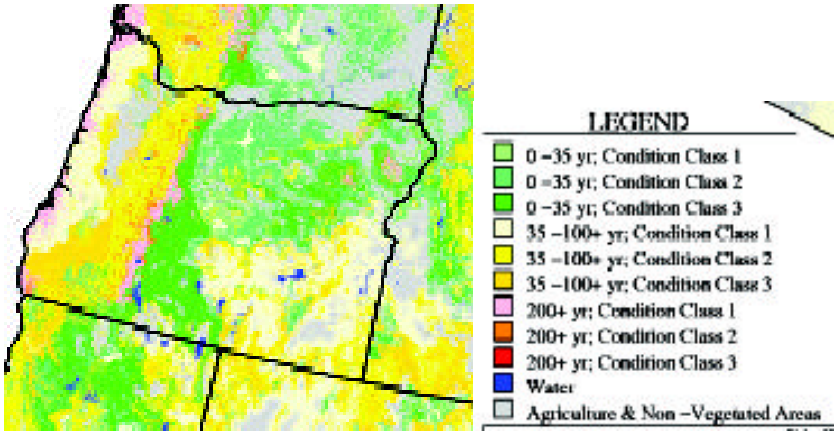


Local: The quality of fuels data varies significantly statewide. The best available data should be used to determine the expected fire behavior. Where data exists to determine crown fire potential, use the point system that follows:

Vegetation (fuel model)	**Points**
SB360 - Natural Vegetative Fuel Hazard	
Non-forest	0
1	5
2	15
3	20
Areas exposed to crown potential (including areas of insect and disease infestation, wind throw, and slash)	
Passive - Low	0
Active - Moderate	5
Independent - High	10

Category Rating	**To**
Low	**9**
Moderate	**40**
High	**60**
Extreme	**80**

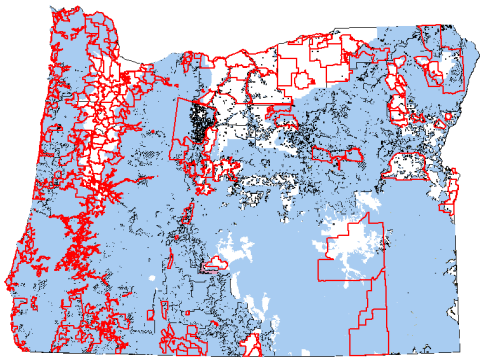
Note: Federal land management agencies are moving toward *condition class* rather than fuel model to assess hazard and prioritize projects. Discussions have begun with Region 6 staff as to how best coordinate this potential conflict. The good news is that condition class will likely be a close fit to the cross walk from vegetation to natural vegetation hazard. The clip below from a national condition class map (http://www.fs.fed.us/fire/fuelman/curcond2000/maps/frcc2000.pdf) shows similar results, except for the west slope of the Cascades (which could be resolved in development of the cross-walk).



Protection Capabilities: What are the risks associated with wildfire protection capabilities, including capacity and resources to undertake fire prevention measures?

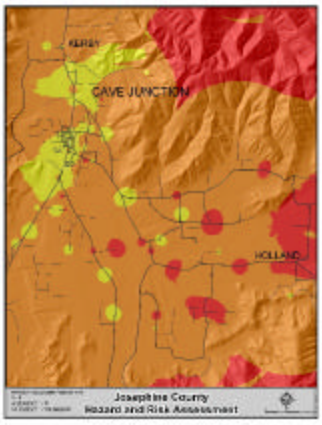
Protection capability is a combination of the capacities of the fire protection agencies, local government and community organizations. A high score represents high risk/low protection capability.

Statewide: Best available data to evaluation protection capability on a statewide basic is the absence or presence of structural and wildland protection agencies, using structural fire district boundaries and wildland protection boundaries.



Fire response	Points
Organized response	
Both structural and wildland	5
Wildland response only	15
No organized response	40

County and local: This system starts by assessing the fire response and then is increased based upon proven mitigation efforts of the community that will make the fire response effective. To assist with local assessments and planning, these factors should be identified and mapped as factors that will either increase or decrease the effectiveness of the protection system (i.e., areas with limited fire access that would lead to planning escape routes, safety zones, and/or road brushing projects). Generally, areas more than 300 feet for a road or driveway should be considered a limited response.



Fire response	Points
Organized structural response < 10 minutes	0
Inside fire district, but structural response> 10 minutes	8
No structural protection, wildland response < 20 min	15
No structural response & wildland protection > 20 minutes	36

Community preparedness	Points
Organized stakeholder group, community fire plan, phone tree, mitigation efforts	0
Primarily agency efforts (mailings, fire free, etc)	2
No effort	4

Category Rating	From	To
Low Risk	**0**	**9**
Moderate Risk	**10**	**16**
High Risk	**17**	**40**

Values Protected: What are the human and economic values associated with communities or landscapes (NASF definition)?

Statewide: Assessment of values is best accomplished at the local level. However, although protection priorities vary between agencies, protection of life is number one for all. In addition to number of lives at risk, identification of population or structure density accomplishes an assessment of associated values of community infrastructure and property.

Life/Property	Points
Population density (per square mile)	
28-111(rural)	10
112-559(suburban)	30
560+(urban)	50

County and local: Values at risk and setting protection priorities is best accomplished locally. For a general assessment of life, either population density (above) or home density (below) is a appropriate. However, identification and evaluation of additional human and economic values is needed for FEMA and community fire planning. It's important to identify **community** values at risk from wildfire

Life/Property	Points
Homes - density (homes per 10 acres)	
.1 -.9 (rural)	10
1-5.0 (suburban)	30
5.1+ (urban)	50

OR

Life/Property	Points
Homes - density (homes per 10 acres)	
.1 -.9 (rural)	2
1-5.0 (suburban)	15
5.1+ (urban)	30
Community Infrastructure	
Presence of an identified community infrastructure (examples below)	
None	0
One present	10
More than one present	20

Power substations & corridors, communication sites and facilities, transportation corridors, major manufacturing and utilities facilities, municipal watersheds, water storage and distribution, fuel storage facilities, hospitals and health care facilities, landfills and waste treatment facilities, schools, churches, community centers, and stores.

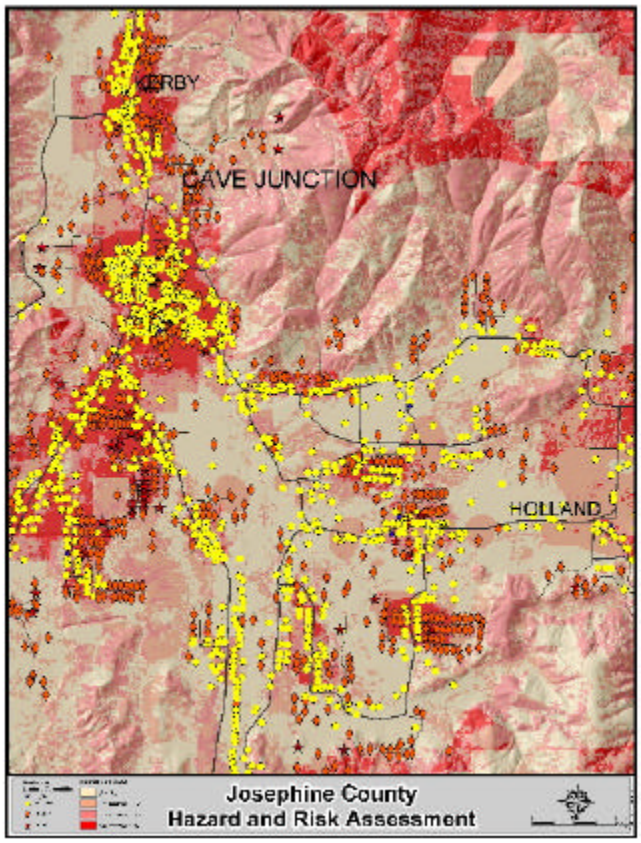
Category Rating	From	To
Low	**0**	**15**
Moderate	**16**	**30**
High	**31**	**50**

Structural Vulnerability: What is the likelihood that structures will be destroyed by wildfire?

Risk, hazard, and protection capabilities account of 90% of the likelihood of a wildfire event threatening life and property. However, factors controlled by landowners within what is now being called the home ignition zone account for 90% of the likelihood of a wildfire threatening the structures. The three primary factors are roofing assembly, defensible space, and presence of suppression action (access).

Statewide: It's not practical to evaluate structural vulnerability at the statewide level.

Local: An assessment of structural vulnerability is best accomplished by on-site visits. The results are best displayed as points over the completed risk assessment (see example to left). Areas of "red-on-red" are at highest risk of loss of structures.



Viewing factors individually will assist in determining what is causing the problem. Mapping of what is causing access issues (dead-end roads, poor bridges, heavy roadside fuel) etc) will be helpful in planning mitigation.

The table below displays two options of scoring. You can use local ordinances or the NFPA's 1144 (the portion dealing with structural vulnerability).

	Local	NFPA
Structure		
Flammable roofing		
Non-wood roofing	0	
Wood roofing	30	
Roofing assembly		
Class A roofing		0
Class B roof		5
Class C roof		10
Non-rated roof		20
Building materials		
Fire-resistant siding, eves and deck		0
Fire-resistant siding, eves and combustible deck		5
Combustible siding and deck		10
Building setback to slopes > 30%		
0 - 30 feet to slope		1
> 30 feet from slope		5
Defensible space		
Defensible space		
Meets local requirements	0	
Non-compliant with local standards	30	
> 100 feet		1
71-100 feet		3
30-70 feet		10
< 30 feet		25
Separation of adjacent homes contribute to fire spread		
> 100 feet apart		0
60-100 feet apart		3
< 60 feet apart		5
Fire access		
Roads and driveways		
Within 300 feet of access that meets local requirements	0	
Non-compliant with local standards	30	
Ingress/egress		
TWO or more roads in/out		0
ONE road in/out		7
Road width		
> 24 feet		0
24-20 feet		2
<20 feet		4
All-season road condition		
Surfaced, grade < 5%		0
Surfaced, grade > 5%		1
Non-surfaced, grade < 5%		1
Non-surfaced, grade > 5%		3
Other than all-season		4

Fire service access		
	< 300 feet with turnaround	0
	> 300 feet with turnaround	2
	< 300 feet without turnaround	4
	> 300 feet without turnaround	5
Street signs		
	Present - 4 inch and reflective	0
	Absent	5

Category Rating	From	To
Low	**0**	**30**
Moderate	**31**	**60**
High	**61**	**90**