

2016

State of Emergency Planning in Oregon Communities Under 10,000 in Population - Preparing for Cascadia



John Day, Oregon

Abstract:

Recognition of the threat presented by the Cascadia Fault off the Coast of Oregon would necessitate a paradigm shift in Emergency Management planning in the Oregon. While great strides have been made, Oregon's smallest communities, those under 10,000 in population remain vulnerable. One means of addressing vulnerabilities is through deliberate planning. This project will describe means of appropriate Emergency Response Planning, investigate the level of emergency planning present in small communities, and suggest a path toward addressing the planning demands the Cascadia Fault presents.

Dianna C. Skelly Cotter

6/10/2016

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THIS PROJECT IS DEDICATED TO THE CITIZENS AND
EMERGENCY MANAGEMENT PROFESSIONALS OF THE
STATE OF OREGON

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List of Acronyms

AAR	After Action Report
ARES	Amateur Radio Emergency Services
CIKR	Critical Infrastructure and Key Resources
COOP	Continuity of Operations
ECC	Emergency Coordination Center
ECU	Emergency Care Unit
EMO	Emergency Management Organization
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
ESF	Emergency Support Functions
FEMA	Federal Emergency Management Agency
HVA	Hazard Vulnerability Assessment
I-5	Interstate 5
IA	Incident Annex
IAP	Incident Action Plan
ICS	Incident Command System
IDA	Initial Damage Assessment
JIC	Joint Information Center
JIS	Joint Information System
MAC Group	Multi-Agency Coordination
MRC	Medical Reserve Corps
NHMP	Natural Hazard Mitigation Plan
NIMS	National Incident Management System
NRF	National Response Framework
ODOT	Oregon Department of Transportation
OEM	Oregon Emergency Management
OERS	Oregon Emergency Response System
ORS	Oregon Revised Statutes
ORVOAD	Oregon Volunteer Organizations Active in Disaster
OTFC	Oregon Terrorism Information Threat Assessment
NFC	Network Fusion Center
PDA	Preliminary Damage Assessment
PIO	Public Information Officer
SOP	Standard Operating Procedures
State	State of Oregon
USACE	United States Army Corps of Engineers

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~ Dianna
June 10, 2016

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ORGANIZATION

This original research project is organized into several chapters. Chapter 1 provides the Research Questions this paper intends to answer. Chapter 2 describes Emergency Management Planning Context in order to frame the overall discipline of Emergency Management as it is organized in practice, including the NIMS and ICS systems. Understanding these fundamental concepts and their importance to emergency management planning are essential.

Oregon State level Emergency Management planning, County and municipal planning will also be discussed in Chapter 2 in context with the Natural Hazard presented by the Cascadia Fault System, a tectonic subduction zone comprised of the interactions between the Pacific, Juan De Fuca, and North American tectonic plates.

Chapter 3, is a literature review containing the guiding themes in the research that support the salient points describing the necessity of deliberate emergency management planning, the consequences of its lack, and other concepts that influenced the direction of this paper.

Chapter 4 describes the methods utilized in the original research and discusses the results. Findings are presented in Chapter 5, and Chapter 6 contains conclusions and recommendations which tie the previous chapters together into a potentially powerful concept worthy of both future research and consideration for implementation at the State level.

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CHAPTER 1: INTRODUCTION

In July of 2012, Oregon State University Researcher Dr. Christopher Goldfinger published the findings of a 13 yearlong study describing the long term activity of the Cascadia Fault Tectonic System. His findings had a profound impact on awareness of the threat presented by one of the largest natural hazards in North America: the 600 mile long Cascadia Fault. His research using ocean floor core samples had discovered a regular pattern of activity, and when coupled with research on historical documentation of orphan tsunami's in Japan result in the conclusion that the Cascadia system is one that releases built up pressure regularly, last doing so on January 26th, 1700 (Canavan, 2005). This combined information means the fault system is within "the window" for a very large earthquake in the magnitude range of 8.0 to 9.0 depending on whether the fault experiences a southern based event, or a full 'unzipping' of the 600 mile long system. This realization would necessitate a paradigm shift in emergency management planning in the State of Oregon.

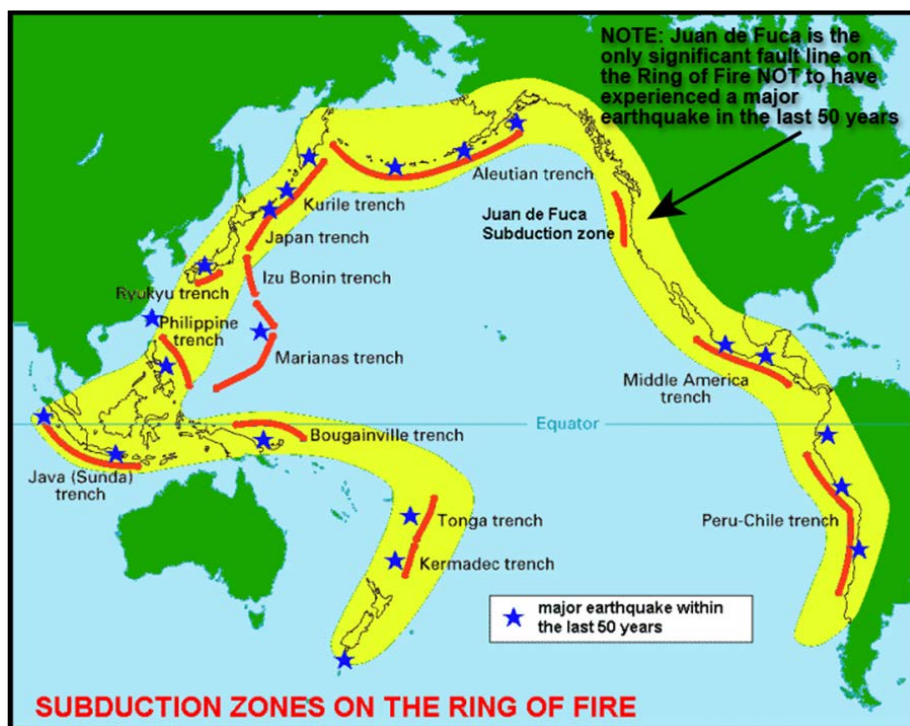


Figure 1: The Cascadia System in the Ring of Fire

The Cascadia fault system, also known as the Juan De Fuca system, is a complex interaction between the Pacific, Juan De. Fuca, and North American tectonic plates off the shores of Northern California, Oregon, Washington, and southern British Columbia, Canada. It is also the only known, significant subduction zone not to have experienced

a major earthquake in the last 50 years. Today, Dr. Goldfinger and others believe we are inside the probability window for a significant event on the Cascadia Fault system.

With this large threat in mind, how has the State of Oregon addressed this Natural Hazard? The State is naturally aware of hazards - windstorms, flooding, smaller earthquakes, and landslides among others – are events that reoccur regularly, often on a yearly basis to greater or lesser degrees. Indeed, they were taken into account long before Natural Hazard Mitigation Planning was a formalized process.

In 1973, Oregon introduced, perhaps prophetically, natural hazards into the Statewide Planning Goals with Senate Bill 100, the beginning of natural hazard mitigation in the State, known as Goal 7: Natural Hazards. This mandatory State requirement for Comprehensive Planning is an aspect of the States' larger Land Use Planning Goals, and intended to require city's to account for the natural hazards that it and its residents are subject to. This marked the beginning of natural hazard mitigation planning in the State.

While Oregon had begun some degree of planning for natural hazards in the 70's, emergency planning theory was also evolving elsewhere in the country. Following the terrible fires of southern California in the mid 1970's, the overwhelming damage in Florida from Hurricane Andrew in 1992, the man-made disaster of 9-11 in 2001, and devastating hurricanes Katrina and Rita in 2005, planning for disasters of all types became a national priority. National level planning would be firmly established by 2012 when the existential threat of Cascadia Subduction Fault system was realized. However, Oregon's natural hazard planning had begun and then largely ended with Goal 7 in the 70's.

Since Dr. Goldfinger's discovery in 2012, Oregon has responded with amazing speed and effectiveness by creating state level emergency plans, supporting and encouraging its Counties and largest metropolitan areas to follow suit. However, anecdotal reports of smaller communities lacking in resources to do the same, persist.

Research Questions

With the threat of Cascadia firmly established and reports of small communities lagging behind in planning for it, this project was originally conceived to answer two research questions: What is the planning capacity or extent of emergency management planning in communities under 10,000 in population statewide?

Secondly, if plans are not available or have not been updated, are there specific barriers to undertaking the task? Seeking answers to these questions may inform on strengths and weaknesses in statewide emergency planning that should be addressed.

Early research for this paper included a review of location-specific Comprehensive Plans for context. It soon became apparent the comprehensive plans were among the worst places to look for local natural hazard information. It should be among the first, but this was not the case. There was little to be found, and to a great degree what was found was not informative.

Goal 7: Natural Hazards states very simply that it is intended “to protect people and property from natural hazards,” (State of Oregon, 2002).

The realization that Goal 7 was not informative on local natural hazards led to a third research question: is there an opportunity through Oregon’s Land Use Planning Goal 7, which could be leveraged effectively in better preparing small communities for a large magnitude Cascadia Earthquake?

The latent potential of combining Emergency Operations Plans (EOP), Natural Hazard Mitigation Plans (NHMP), Community Wildfire Protection Plans (CWPP), and others with the power inherent in the very effective Oregon Land Use Planning Goals is a compelling one for this emergency management planner.

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CHAPTER 2: EMERGENCY MANAGEMENT PLANNING CONTEXT

A realistic discussion of Emergency Management Planning cannot effectively be undertaken without an underlying awareness of how disasters are managed in real situations. It is easy to wade into the minutiae of formal planning, to the point

HOMELAND SECURITY PRESIDENTIAL DIRECTIVE -5

“The Secretary shall develop, submit for review to the Homeland Security Council, and administer a National Incident Management System (NIMS). This system will provide a consistent nationwide approach for Federal, State, and local governments to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. To provide for interoperability and compatibility among Federal, State, and local capabilities, the NIMS will include a core set of concepts, principles, terminology, and technologies covering the Incident Command System [ICS]; multi-agency coordination systems; unified command; training; identification and management of resources (including systems for classifying types of resources); qualifications and certification; and the collection, tracking, and reporting of incident information and incident resources.” (DHS, 2003)

where response needs can be neglected or lost. Understanding how emergency agencies respond in situations according to their realistic capabilities and limitations, allows emergency planners the ability to anticipate and predict how the expected effects of a given hazard/threat combination could present themselves. In context with an understanding of how they are to be addressed in reality, first responders seek to meet the demands of the situations they seek to manage through planning and training. The understanding of all the above allows for a robust combination of situationally appropriate planning and situationally appropriate response. These exist in National level plans, and in common frameworks of response. A basic understanding of these is necessary in order to understand the need for local level planning.

National Emergency Planning

Nationwide, particularly after disasters such as 9/11 and hurricanes Katrina and Rita, it became apparent that large numbers of people and communities were vulnerable to a wide variety of natural and man-made disasters. The costs of these and other disasters in both lives and property is immense, and in some cases those losses were made worse by the lack of appropriately planned responses to them. This paper does not seek to discuss the successes or

failures of these responses. Instead these examples are meant to provide a frame of reference that while smaller than the anticipated scale of a Cascadia earthquake, do represent a reasonable approximation of the type of response that will be

required after Cascadia. With this in mind, it is clear that a Cascadia earthquake is going to require far more than a local or State response, it will demand a national one.

National level plans were introduced in 2003, through the Homeland Security Presidential Directive 5, which formally addressed the need for national level of response to domestic events through the creation of a National Incident Management System, known as NIMS (Department of Homeland Security [DHS], 2003).

NIMS

The National Incident Management System is more than a standardized response to an event or incident. It created on a national level, comprehensive concepts common today in emergency management, and provided the foundations of planning that make large scale, complex event management more successful.

The policy expressed is: in order “to prevent, prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies, the United States Government shall establish a single, comprehensive approach to domestic incident management,” (DHS, 2003).

This policy, when fully implemented would ensure that all levels of government, from very small local communities, County and State governments, to the largest Federal agencies would have the continuity needed to work efficiently and effectively in managing events from an all-hazards perspective, in the most effective manner possible. In this way, the NIMS system allows organizations at all levels the ability “to [treat] crisis management and consequence management as a single, integrated function, rather than as two separate functions,” (DHS, 2003)

NIMS achieved several important goals, and quantified a number of issues important to State emergency managers. In particular, it codified the roles and responsibilities of State and local authorities, providing them with appropriate and legal initial responsibilities for managing domestic incidents. It provides the legal path for escalating an event to a federal response level, and provides a chain of responsibility and specified roles within an expanded chain of command. This has had the effect of standardizing responses.

When events exceed the resources of local and State governments, the Federal government then assists the State upon deliberate invitation, or when Federal

NATIONAL INCIDENT MANAGEMENT SYSTEM

NIMS assists State and local governments in creating all-hazard plans, and assist in the identification of State and local capabilities through its now standardized guidelines. These formalized components consistently recognize the role of local governments in the management of their own resources. Thus State, local, and Federal plans are made compatible with one another, better enabling the process of preventing, preparing for, responding to, and recovering from a wide variety of emergencies.

interests are directly involved. In this way, the States retain control of their own resources and responses, while also having a means of requesting assistance in a formalized and predictable manner in accordance with Federal and State laws. It draws important legal distinctions that protect the States 10th Amendment rights.

Homeland Security Presidential Directive 5 requires all Federal agencies to adopt NIMS within all departments and agencies, and further directs those bodies to assist the Secretary of Homeland Security in the continuing development of NIMS into the future.

With this overview of NIMS, a discussion of how the system functionally works in a real or exercised event is appropriate. This functional framework is known as the Incident Command System.

ICS

Universally known as ICS, the Incident Command System is a deliberate and well thought out strategy of managing the smallest of local events, to the largest of National level responses that the nation has yet seen. The Deepwater Horizon Oil Spill in the Gulf of Mexico in 2010 is one such event, which covered nearly 70,000 square miles of ocean and coastal shore lands, involved five states, the United States Coast Guard, the Federal Emergency Management Agency (FEMA), the United States Navy, and more than a few Federal departments and agencies.

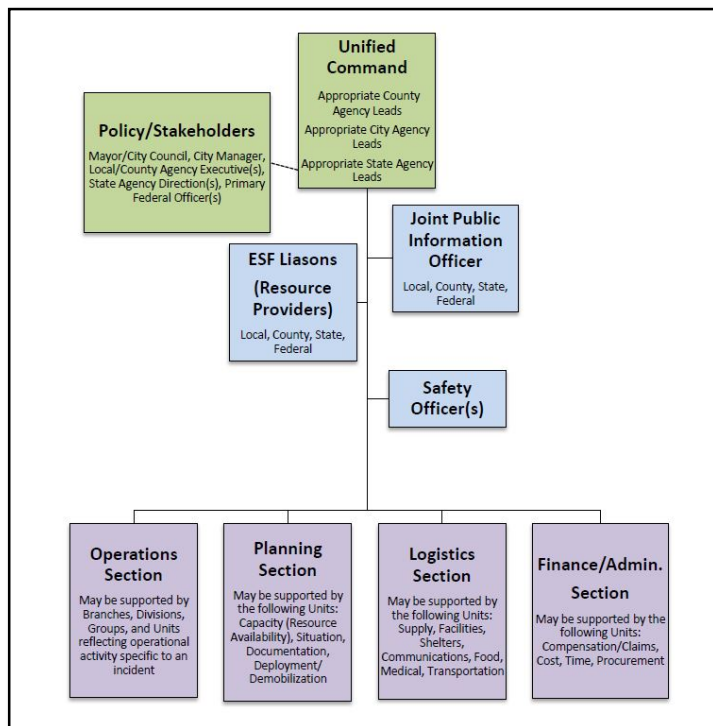


Figure 2: A Small City ICS Command Structure

Deepwater Horizon managed, at its peak of response operations, more than 47,000 personnel every day, along with the wide variety of equipment, vehicles, ships, boats, intelligence, and communications equipment the response required (Occupational Safety and Health Administration, 2011).

The ICS system was utilized to organize and manage this rapidly built and very large organization with tremendous flexibility and scalability. Furthermore, this ICS organization was capable of de-escalating and de-mobilizing according to the needs of the event and response itself.

Directed by Incident

Commander, Coast Guard Admiral Thad Allen, it was a remarkable use of the ICS system. With its built in accountability and lessons learned functionality, it refined the use of an increasingly robust and flexible system of incident management.

ICS was developed in the 1970's as a direct response to a series of tragedies that occurred in Southern California during the height of a particularly devastating fire season (EMSI, n.d.). Raging from September 22nd to October 4th, the fires began with a single match in the hills behind Oakland, California during a late summer dry spell that saw humidity levels drop below 10% down to 1 or 2% at times.

FIRESCOPE FINDINGS

The FIRESCOPE findings led to congressional funding to the National Forest Service for the development of a system that would improve the fire services ability to respond to wildfires, and coordinate a multi-agency and multi-jurisdictional response.

ICS was the eventual result, though the original intent in the FIRESCOPE project was not necessarily intended to be an on-the-ground incident management system, instead the original goal was to address field level shortcomings in organization, resource allocation, and of course the issues inherent in the differing terminologies being utilized (GMSI, n.d.).

FIRESCOPE led to discussions for a systematic approach which would allow individual jurisdictions to maintain control of their own people and equipment, while effectively operating within a larger deliberate organization.

The low humidity would be coupled with gusts reaching hurricane force winds and daily temperatures in the neighborhood of 100 degrees (Rowley, 2008). Wildfires would destroy 722 homes, burn 576,508 acres of land, and kill 16 people (Rowley, 2008). Each responding fire jurisdiction utilized its own incident management system with a variety of individualized details that made for chaos when so many jurisdictions and units responded from literally all over the country. Those differences ranged from differing radio frequencies, to different terminology for similar concepts. This led to significant communications issues, duplication of effort, misdirection, loss of personnel, equipment, and resources, property, time, and ultimately cost lives. (Rowley, 2008).

Additional issues discovered through significant after-action reporting from all the responding agencies in the California fires included confirmation of the confusion created by different terminology used across agencies, variations in organizational structures between agencies, and a variety of inconsistent operating procedures.

The mechanisms that were in place at the time to manage competing resource demands were inadequate, and inconsistent resource prioritization was also problematic (EMSI, n.d.).

Firefighting Resources of Southern California Organized for Potential Emergencies, or FIRESCOPE, developed two different but closely related systems for managing wildfires that have since been integrated into the national response (NIMS) for managing large and small events: The Incident Command System and the Multiagency Coordination System (MAC).

First known as Field Command Operations System, ICS was designed to provide uniform terminology (occasionally identified today as a continuing issue), procedures, and incident organization structures that ensure consistency in response (EMSI, n.d.) (Stambler & Barbera, 2011).

Today's nationwide emergency response system owes much of its current organizational capacities to the FIRESCOPE project and its results. To the extent that many non-governmental relief organizations have also become familiar with the use of the ICS system, utilizing it in their responses to disasters as well. These include non-profit relief agencies such as the American Red Cross, the Salvation Army, a wide variety of religious groups, and private hospitals and healthcare systems.

For example, the Non-profit Samaritan Health System based in Corvallis, Oregon utilizes a modified ICS structure known as HICS or Hospital Incident Command System. Hospitals necessarily have a unique component to their responses in disasters, particularly in disasters that affect the facilities themselves. For this reason their ICS system utilizes the flexibility of the structure to create two operational sections, a Clinical (patient-oriented) Operations section, and an Engineering Operations section that is dedicated to the facility operations that form the backbone of clinical operations. Without these two operation sections, a Hospital cannot continue to function in a disaster. Individual hospitals may name these sections slightly differently, but it illustrates inherent flexibility of ICS to meet the needs of disasters of all types.

ICS forms the basis of response in all emergency operation plans in the United States. This standard response format is the framework upon which emergency planning is built. In this way, the functionality remains the same regardless of the jurisdiction it is written for. The interoperability that is essential to effective response across multiple jurisdictions and disciplines locally and nationally, is dependent upon it. It is the common denominator present in all emergency plans.

ICS TRAINING

Training in ICS is a planned activity. It is a functional need often identified in the planning process, as training is required in order to participate in government drills and exercises.

These exercises test the written plans, and identify where they do and do not work effectively for the communities they serve.

The State of Oregon, like all other states, utilizes the ICS system and often facilitates training opportunities in its effective use in order to broaden and

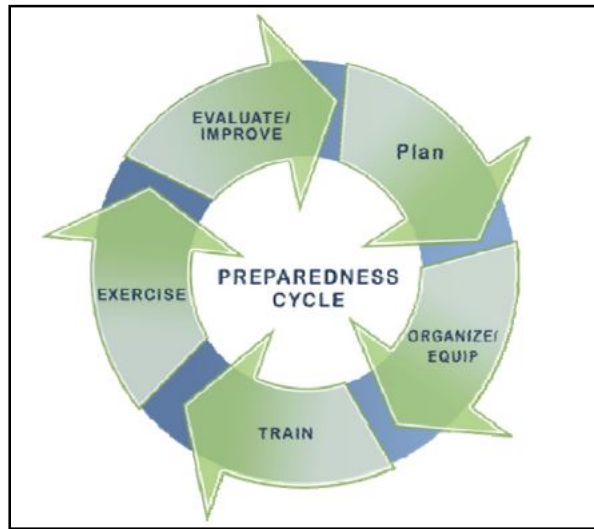


Figure 3: Planning as a Component of the Preparedness Cycle (U.S. Federal Emergency Management Administration, 2010)

standardize its use State and agency wide. With regard to the coming Cascadia earthquake, the ICS system will be a critical organizing component in the response at every level in all jurisdictions. This requires a significant number of persons and roles throughout the state be familiar with its implementation and trained in its use.

An example of such an exercise is “Cascadia Rising” which will take place in Oregon, Washington, California, Idaho and British Columbia, Canada June 7th – 10th, 2016. These exercises are meant to test emergency management response

at all levels, management expressed in the form of Emergency Operation Plans. This exemplifies why it is essential that

an Emergency Operation Plan be written by the individual community to the greatest extent possible. A community cannot test what has not been written. This process is illustrated in Figure 3.

Only an individual community, particularly a small community, can be functionally and institutionally aware to the greatest extent possible of all its own Strengths, Weaknesses, Opportunities, and Threats (SWOT). It may never have put some of this institutional knowledge down on paper, and may not have detailed out how to address or utilize them successfully. Reliance upon county level plans aside, a given community is always the best source of information about itself and its capabilities.



Figure 4: Relationship between Strategic, Operational, and Tactical Planning (U.S. Federal Emergency Management Administration, 2010)

These operational plans are essential in the tactical management of resources, equipment and personnel. It is the foundation of the Strategic, Operational and Tactical pyramid seen in Figure 4.

This brings us to the purpose of this project, the determination of the level of planning which has been accomplished in Oregon’s smallest communities in relation to the Cascadia earthquake threat. The ICS structure seen in Figure 2, is dependent upon an Emergency Operation Plan for its creation. How this structure is populated is unique and specific to each community, many will be similar, but none are exactly the same.

Oregon’s Emergency Planning

The need for fine-grained emergency planning is particularly acute in Oregon, which lacks a general culture of preparedness due to the State’s overall happy lack of reoccurring natural disasters. Many of our communities have not had the natural or man-made disasters in numbers large enough to encourage and/or facilitate the planning and updates that naturally occur through lessons learned and after-action reporting seen in other parts of the country.

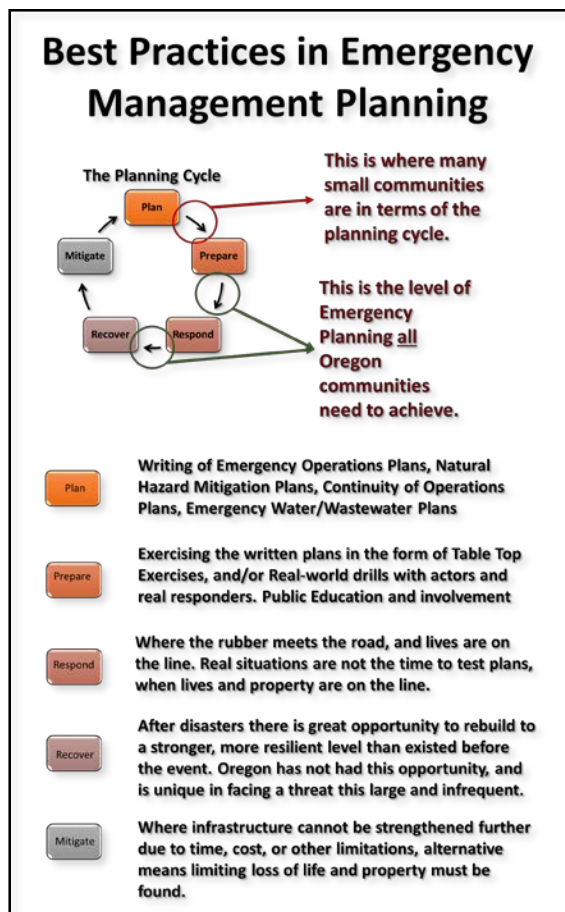


Figure 5: Best Practices in Emergency Management Planning

Figure 5 describes where in the planning cycle many small Oregon communities stand in regards to emergency planning. Most seem to have some written plans, but these are not necessarily being exercised in order to gain lessons learned and after action reports. Though hypothetical situations, these exercises are exceptionally useful to responders and planners. The concept is simple - you play the way you train. If there is no training, the best a plan can provide is a hopefully good starting point. Unexercised plans are better than no plans, but by no means are they the end goal of emergency management planning.

The lack of recurring natural disasters is a two-edged sword. While the state has not been forced to respond and then rebuild its infrastructure and economy at great cost to society, it has similarly not had the opportunity to rebuild it to stronger and more resilient levels, or revisit its written planning across communities.

Thus, Oregon is more vulnerable to the sheer power and scope of an 8.0 to 9.0 magnitude earthquake with infrastructure built largely in the 1950’s and 1960’s, than either California or Washington with their higher frequency of natural and man-made of disasters.

To make matters more challenging, the economy of Oregon in the past was supported through the timber/logging industry and the taxes and jobs it generated. This industry has been severely affected by the loss of logging on Federal lands beginning in the 1980's. In 2016, annual Federal timber payment dollars dipped below \$100 million to Oregon counties (Manning, 2016), exacerbating an already challenged fiscal situation in many rural Oregon counties and rendering them far less capable of meeting the expensive challenges Cascadia presents. These rural counties also contain the largest numbers of communities most vulnerable: those under 10,000 in population.

With a significant tax-revenue generating industry a shadow of its former self, and federal compensation dollars dwindling among other financial and economic challenges, Oregon is lacking in the funds necessary to address the overwhelming needs expressed in the Oregon Resilience Plan – developed by the Oregon Seismic Safety Policy Advisory Committee, or OSSPAC, in 2013. The money needed for infrastructure upgrades to the highway system alone is estimated to be in the hundreds of millions of dollars (OSSPAC (B), pp. 172, 2013) something the State cannot currently afford. This reality makes planning even more acutely important, as it is something communities can undertake for relatively low cost when compared to the replacement of expensive infrastructure.

THE OREGON RESILIENCE PLAN

Very large earthquakes will occur in Oregon's future, and our state's infrastructure will remain poorly prepared to meet the threat unless we take action now to start building the necessary resilience. This is the central finding of the Oregon Resilience Plan requested by Oregon's 76th Legislative Assembly. (OSSPAC (A), 2013)

Oregon Resilience Plan

July 2012: Dr. Chris Goldfinger PhD of the Oregon State University College of Earth, Ocean, and Atmospheric Sciences published "Turbidite Event History—Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone", which, for the first time, gave an accurate depiction of how often the Cascadia system had violently decompressed through the use of seafloor sediments laid down over a period of 10,000 years (Goldfinger et. al., 2012).

In plain English, the fault has ruptured 41 times in 10,000 years (See Figure 4). Of that number, 19 were full-scale events along the length of the 600 mile long fault creating earthquakes in the magnitude of 9.0 (see Figure 6). These are extremely dangerous earthquakes that also create very large tsunamis

(Goldfinger et. al., 2012). Upon discovery of the frequency and long-term activity of the Cascadia Fault system, efforts in other parts of the world and in differing disciplines would take on new meanings.

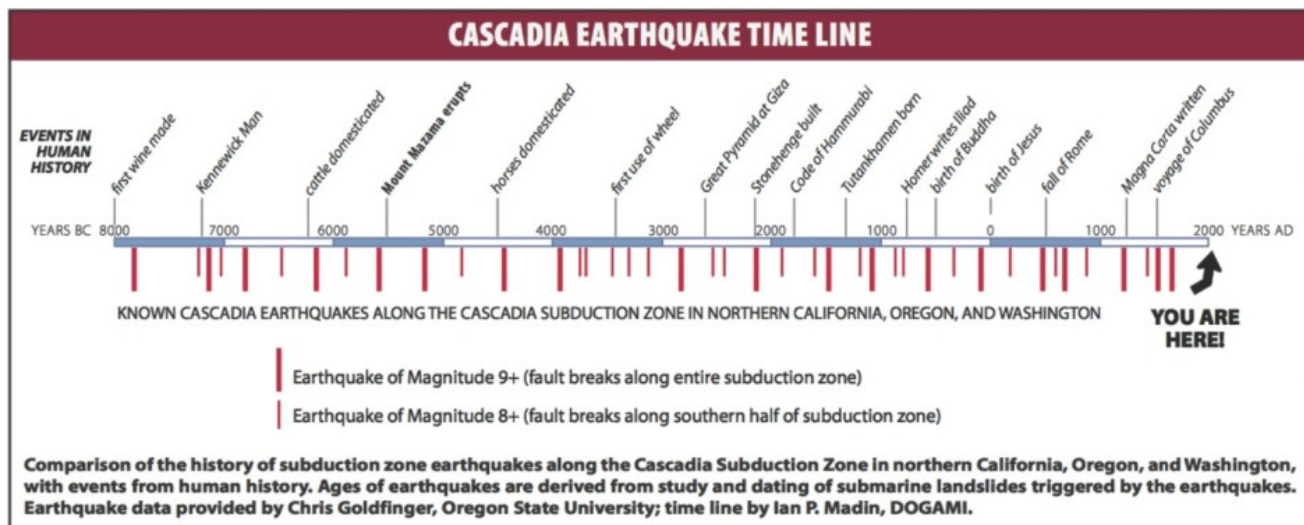


Figure 6: Cascadia Earthquake Timeline (OSSPAC (B), 2013)

In 2005, Dr. Brian Atwater PhD published what is now considered one of the single most influential studies with regard to Cascadia in America, “The Orphan Tsunami of 1700: Japanese clues to a parent earthquake in North America”. Recognition of the cause of “Ghost Forests” – stands of drowned trees on sandy beaches up and down the coasts of the Pacific Northwest –were connected for the first time to the Orphan tsunami in Japan. This discovery led directly to the dating of the most recent Cascadia event on January 26th, 1700 (Atwater, pp. 5, 2005). For reference, Russia would not discover this region of North America until 1741, which meant there were no written records of the 1700 earthquake. Native American oral histories would not be appropriately recognized until after the orphan tsunami was connected to Cascadia through Atwater’s work.

Now, with a specific date of occurrence firmly established, Goldfinger’s timeline of Cascadia events would come into terrifying clarity. Not only was Cascadia an active fault system established over a 10,000 year long period, it was also overdue for an event.

With a clear threat established, a professional group of concerned Oregonians came together through OSSPAC to take a serious and unflinching look at Oregon, and determine how large a threat Cascadia posed to the State. The group focused on describing the threat, Oregon’s infrastructure and risk, the estimated impacts, included an evaluation of the State’s business and workforce continuity, its coastal communities, critical and essential buildings, transportation (all types), energy, information and communications, and water and wastewater systems. It is perhaps one of the most sobering documents ever written. The impacts on the state will be wide-spread, systematic in affecting every sector of society, and long-term in nature. The result of their work is the 50 year Oregon Resilience Plan.

Without delving into the specific effects Cascadia will have that OSSPAC addresses, the Oregon Resilience Plan is a long-term 50 year guide providing the first realistic assessment of the threat from a very high, statewide level. What should necessarily

follow these harrowing assessments of destruction and loss of capabilities following Cascadia, are more specialized plans that are closer to home for the average Oregonian.


The Cascadia Playbook

The State began its planning with the release of the Oregon Resilience Plan, and through the State Office of Emergency Management, began its Emergency Operations Planning for Cascadia. These plans take several forms, one of the most important of which is the Cascadia Playbook. The Playbook is a numbered, version controlled, and secured document that details the State level response to Cascadia. The Playbook addresses:

- The first 14 days after the event
- Reflects content from the Oregon Cascadia Subduction Zone Plan and FEMA Region X's Cascadia Execution Checklist as source content
- Identifies decision-making structures and authorities to initiate response and ensure smooth operations and unified effort
- Focuses on action items to create a punch list of missions for each "play".
- Is organized by Emergency Support Functions (ESF's) which are 18 in number and focus on specific sectors of society
- Supports existing plans developed by local, tribal, state and federal agencies
- Presents actions in a streamlined, easy-to navigate, flip-chart style document
- Playbooks are only issued in hard copy format, assigned to one specific individual for each partnering organization, to better manage version control, as edits are made

(Oregon Office of Emergency Management, 2014)

The underlined sections above point directly toward local planning. The State response at the local level will only be as effective as those existing plans. This means that local communities need to provide as much information on their own perceived Strengths, Weaknesses, Opportunities, and Threats (SWOT) in order to create the most resilient response and recovery as possible. This requires specific, local knowledge and involvement. While County Emergency Managers are well aware of their locations general SWOT qualities, they often have tens of thousands of square miles to cover. They are reliant to a great extent on city's to provide more granular detail regarding their own communities. The saying goes, 'you play the way you train'. In this case, for city's to be able to train with County or State responders, it requires that plans be in place. Without them, there will be little if any training at the grassroots city level.



CASCADIA IS AN EVENT THAT WILL OVERWHELM THE ABILITY OF CITY'S, COUNTIES, AND THE STATE TO RESPOND TO THE DISASTER, RESULTING IN THE NEED FOR A NATIONAL LEVEL RESPONSE APPROXIMATELY 5 MINUTES AFTER CASCADIA STARTS MOVING.

The Emergency Support Functions outlined in the Cascadia Playbook and the Oregon Emergency Operation Plan include:

- | | |
|---|---|
| ESF 1 – Transportation | ESF 11 – Food and Water |
| ESF 2 – Communications | ESF 12 – Energy |
| ESF 3 – Public Works | ESF 13 – Military Support |
| ESF 4 – Firefighting | ESF 14 – Public Information |
| ESF 5 – Information and Planning | ESF 15 – Volunteers and Donations |
| ESF 6 – Mass Care | ESF 16 – Law Enforcement |
| ESF 7 – Resource Support | ESF 17 – Agriculture and Animal Protection |
| ESF 8 – Health and Medical | ESF 18 – Business and Industry |
| ESF 9 – Search and Rescue | |
| ESF 10 – Hazardous Materials | |

The above ESF's match the NIMS and ICS systems with some minor differences specific to Oregon, and contain an expectation for further planning. At this time, when discussing small communities, ESF's are generally utilized only as far down as the County level, though they are utilized in larger metropolitan areas with greater resources. Small communities, according to the information generated by this paper, face real challenges in standing up an Emergency Operation Center with ICS certified staff, so it stands to reason that small communities may not be writing the detailed, and threat-specific Emergency Support Functions for their communities. This presents an opportunity for further research, to determine if this is the case across all Oregon small communities. Research for this paper has revealed indications this may be the case.

From personal experience in writing an Emergency Operation Plan for a community of nearly 9,900 persons, with a city and emergency management staff of two, neither of whom is a full-time emergency planner, I can report that the decision was made to rely upon the County level ESF's. Though this is not ideal, it is realistic in terms of their current capabilities and resources. A significant amount of information can be quantified and then written by engaging in the process of writing ESF's. It is both a discovery opportunity as well as recording and planning opportunity. However, this particular city barely has the ICS staff for an EOC, let alone a staff that can undertake or facilitate the tasks in 18 ESF's in a disaster. The ESF's exceed their capabilities.

It stands to reason that if a community lacks the resources to write the plans needed in preparing for a disaster, they may also lack the resources to respond adequately in one.

All of the interviewed emergency professionals spoken to for this project reported limitations in either time, funding, or experience in creating plans which will work at Cascadia Playbook's expectations. The playbook cannot support plans that do not exist, or are inadequate to the task.

To provide a sense of scale, the Oregon Office of Emergency Planning expects the following results from a full Cascadia Event:

- Ground shaking for 4-6 minutes causing massive statewide critical infrastructure damage,
- Liquefaction and landslides causing disruption of transportation routes,
- Tsunami inundation to coastal areas with as little as 15 minutes warning,
- Up to 25,000 fatalities resulting from combined effects of earthquake and tsunami,
- Buildings destroyed or damaged, up to 10,000+ damaged structures,
- Households destroyed or damaged, up to 10,000+ people in need of shelter,
- \$50+ billion in economic losses, not including critical infrastructure rebuilding costs.

(Oregon Office of Emergency Management, 2014)

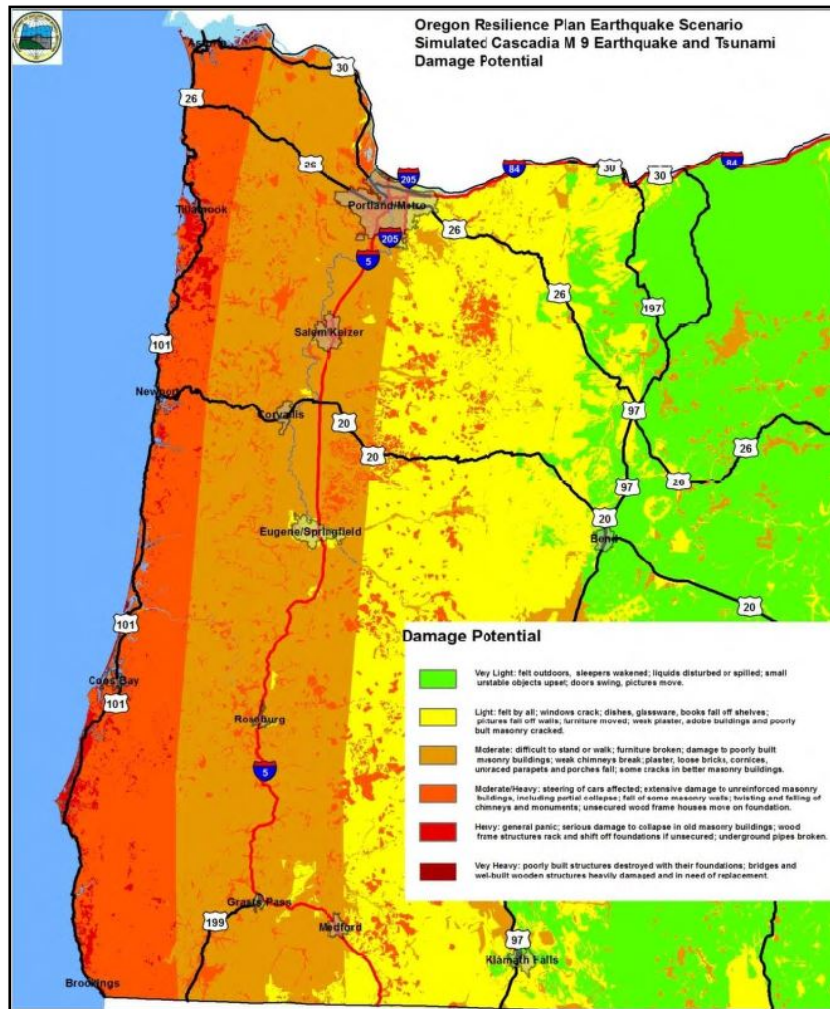


Figure 7: DOGAMI Simulated Cascadia M 9 Earthquake and Tsunami Damage Potential (OSSPAC (B), pp. 8, 2013)

County Level Emergency Planning

County level planning is a crucial component of Oregon's larger strategy in response to Cascadia. Emergency Management in the state follows a specific path: A city level emergency is bumped up to the county level once the city's resources and ability to respond have been exceeded. The County utilizes its resources until those too are exceeded by the needs of the disaster. At this point, the County looks to the State for a legal Disaster Declaration and State level resources are then deployed. Once the State's ability to respond has been exceeded, a Presidential Disaster Declaration is sought for National level resources

and assistance from the Department of Homeland Security (DHS) and the Federal Emergency Management Administration (FEMA).

All of Oregon's Counties have responded to disasters through formal planning. In particular Emergency Operation Plans (EOP), Continuity of Operation Plans (COOP),

Natural Hazard Mitigation Plans (NHMP), Community Wildfire Protection Plans (CWPP) and others have been written.

Grant funding is available to finance these efforts in the form of Emergency Management Performance (EMPG), Natural Hazard Mitigation Planning (NHMPG), Homeland Security (HSG), and Seismic Rehabilitation Grants (SRG) to assist applicants in affording the costs of writing these plans. In general, most counties have the personnel, expertise, time, and budgets to write these grants, and emergency plans. Indeed, all counties have done so.

Where the system appears to show weakness is in Oregon's smallest communities, those under 10,000 in population, who do not have the budgets to hire the personnel with the experience to write either the grants or the plans. This leaves Oregon's smallest and most resource poor communities particularly dependent upon their parent counties for their emergency planning.

Municipal Level Planning

The municipal level of planning is where research for this paper has deliberately focused. Much attention has been paid to Oregon's largest communities in keeping with the emergency management philosophy: do the greatest good for the greatest numbers of people in the shortest time possible. This requires a large focus at a strategic level capable of taking into account the needs of an entire state, those of entire counties, and the largest metropolitan centers. The Portland Metro area, Salem, Eugene, Bend, Redmond, Roseburg, and Ashland are all examples of city's with the means to hire emergency managers and other planning specialists capable of accomplishing the task.

Yet there remains a significant group that does not have the benefit of a large enough tax base to provide the money, time, or expertise the writing of emergency plans require. Approximately 36,000 people live in Oregon communities with fewer than 10,000 in population according to Social Explorer, in 2010 U.S. Census data (Social Explorer, 2010). This is nearly 10% of Oregon's overall population of 3.8 million (Social Explorer, 2010). Almost 1 in every 10 Oregonians live in a community smaller than 10,000 people. This includes every coastal and coast range community in the state, the two geographic areas that can expect the worst damage from a Cascadia earthquake and tsunami.

Small communities have equally limited budgets where city employees often fill more than one role for their community. The City Recorder may also be the City Planner. The wearing of more than one duty-hat is more common in smaller communities who do not have the budget to hire specialists. Therefore, this paper anticipated finding communities that lacked formal, location specific, up-to-date plans including (but not limited to) Emergency Operations Plans (EOP), Natural Hazard Mitigations Plans (NHMP), Continuity of Operations Plans (COOP), and possibly lacking in basic location specific hazard, vulnerability, and risk assessments. Correspondingly, it expected to find an inability to create these plans.

Instead, communities were discovered to be relying predominately upon county-level plans that may not be specific enough to provide the best advantage before, during, and after a Cascadia event. This is a positive finding as any amount of planning is better than none at all.

However, this led to an important observation, because Oregon has not faced a disaster remotely close to the level that Cascadia presents, it does not have experiential knowledge in responding to or recovering from one to draw upon. Indeed, the state has not faced any massive statewide event beyond the level of recurring winter storms and flooding since the days the state was first populated with westward pioneers in the late 1700 and 1800's, so there is no modern history of disasters in the state from which to draw. This means the state and its communities are entirely dependent on exercises to test their planning, which subsequently requires that the plans be written before they can be exercised. Furthermore, these plans need to be specific enough for each community to test, regardless of size or population, in order to provide accurate assessments on effectiveness and provide opportunity for refinement.

Just as important is the relatively low level of public awareness of the sheer magnitude of destruction Cascadia will bring. Correspondingly, there is little public political pressure being put towards addressing these issues and funding the needed planning, training, and exercising that preparedness requires. Without the political will to change Oregon's current state of resilience, little is likely to change in the near future.

CHAPTER 3: LITERATURE REVIEW

There is no previous literature or previous research upon which to draw that details the amount of existing emergency planning in relation to a Cascadia megathrust earthquake, specific to Oregon. A point in fact, the last large event on the fault occurred before the State or the Territory was occupied by westerner settlers, and it has only been recently that oral histories of Native peoples was recognized with the appropriate level of seriousness they deserve. Some amount of original research was required.

Review of existing literature provided several topical themes, some already discussed, which are important to the formulation of this paper.

- Scientific research on the frequency of events on the Cascadia Fault;
- Investigative research on specific events internationally demonstrating the consequences inherent to a lack of planning and training;
- A real-world example where lack of emergency management led to poor results;
- Benefits of Federal standardization of emergency planning; and
- Building upon existing means to encourage increased planning;

This existing literature created the foundational premise leading to the research questions this paper asks. These particular pieces of literature helped guide the formulation of questions that made their way into the survey and interviews, and informed the realization there is a potential missed opportunity in Oregon State Land Use Planning Goal 7.

Methods and Limitations

This paper relied upon several themes found in existing literature. They are scientific, investigative, experiential, and informative and innovative themes leading to solid conclusions.

Scientific

A review of the scientific research on the Cascadia Fault leads directly to Dr. Christopher Goldfinger of Oregon State University with “Turbidite Event History—Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone” published by the United States Geologic Survey in 2012. This is a thorough scientific investigation into the repeated ruptures of the tectonic subduction zone fault system providing the first realistic ability to assess the threat the system presents to Northern California, Oregon, Washington, and southern British Columbia Canada.

It was accomplished through the drilling of hundreds of core samples off the coastal shores of Oregon into sedimentary layers in the sea floor created by past Cascadia earthquakes and tsunamis. By carbon dating the layers in the drill cores, Dr. Goldfinger was able to conclusively prove over a wide area that Cascadia ruptures regularly, and with a very high level of energy released (Goldfinger et. al., 2012). This detailed seismic research clearly established the potential laying off the coast, but was limited in that it could not provide exact dates of occurrence, though it broadly informed that the events had occurred 41 times over 10,000 years, within a few hundred years of one another, the last of which had been 300 to 500 years ago. Even noting this limitation, it was clear there was a large threat lurking in the waters of the eastern Pacific Ocean.

As with so many other scientific endeavors, it is not one piece of research or perhaps even two or three that clarify a new concept. Goldfinger's research was certainly groundbreaking, but needed better context in time. This context was found through investigative research done a few years before Goldfinger would release his Turbidite research.

Investigative

Dr. Brian Atwater in 2005 published investigative research on a Japanese orphan tsunami in Otsuchi Japan, one tsunami not accompanied by a local earthquake. The Otsuchi tsunami was recorded on January 26th, 1700 having destroyed rice warehouses on Japan's eastern coastline, a relatively large event (Atwater, 2005). After July, 2012, it would not be long before news of Goldfinger's research would be coupled with that of Atwater's and the threat of Cascadia would come into crystal clarity: Cascadia was a regular event with an average of occurrence of 255 years, and it was currently within the window of probability, if not overdue, for another. This realization, as of the date of this paper, not yet four years old.

With a massive threat firmly established and a built environment clearly at risk, research on the justifications for emergency management planning take on a new level of importance. This type of research tends to take two different forms: the first being experiential studies on the consequences of inadequate emergency planning and response, and the second focusing on informative research on best practices in emergency management planning in a policy context. Changing a culture of non-preparedness into one of preparedness takes more than mere awareness of the threat if society is to mitigate it to the greatest extent possible. It requires additional motivation in the form of appropriate context, namely the realistic consequences of doing little or nothing in the face of that threat.

Numerous studies worldwide describe responses to man-made and natural disasters, and are studied by many researchers for their causes, lessons learned, and identification of where those responses and mitigations failed to meet expectations. One such event with particular relevance to Oregon that illustrates the terrible cost potential inherent in the built environment when the potential for disaster isn't planned for or mitigated. It occurred in Bhopal, India in 1994.

Experiential

The effectiveness of any response to a disaster begins with the plans that are society's method of addressing them. Often known as Risk Management, there is a wealth of incidents and research on what happens when methods of dealing with disasters are not in place. One such study is "Learning from Disaster: Risk Management after Bhopal", edited by Sheila Jasanoff. It discusses the changes that occurred internationally in risk management following that disaster.

In 1984, one of the world's largest industrial accidents occurred in the city of Bhopal, India. The leak methyl isocyanate (MIC) and numerous other toxic gasses lead to the deaths of thousands of people (estimates run from 8,000 to 25,000 dead depending on the source), and injured upwards of 500,000 at and near the Union Carbide Pesticide Plant.

Not only were there no plans to realistically deal with a failure that large, or to get people out from under a deadly plume, there weren't any plans for preventing the accident either. Inspection practices were either lacking or missing, and measures which should have been taken by the company were shortcut in the name of decreasing cost and maximizing profits (Jasanoff, 1994).

Jasanoff looks at risk management from a perspective of the consequences. Something which must be done in considering Cascadia. Because Cascadia is going to affect a major portion of State of Oregon, it goes without saying that the event will also cause one of the largest combined chemical accidents ever seen in the United States. Thousands of businesses State and region-wide utilize hazardous chemicals on a daily basis. Hundreds of millions of tons of chemicals are transported and stored Statewide and all will be subject to damage of their storage containers. This will negatively impact both people and the environment when those containment measures fail in a 9.0 magnitude earthquake, and begin interacting with other chemicals, people, and the environment. Quite literally the resulting damage will be massive. Bhopal provides the opportunity to put uncontrolled hazardous chemical spills into a human context. Naturally this leads to the reasoning behind developing plans for dealing with this man-made hazard. It is entirely realistic to view Oregon and Cascadia through this lens.

"Learning from Disaster: Risk Management after Bhopal" is a cautionary tale, one that illustrates the need for current laws and regulations that realistically consider the potential consequences (Jasanoff, 1994). This is an exercise that Oregon must engage in over a large area, and in context with a Cascadia earthquake. This may mean reengineering existing laws and regulations, and creating plans that will take into account the entirety of this and other hazards. Chemical spills will not be the only problem the State will face after Cascadia. The best means of addressing the existential threat is through local planning, where local residents, emergency managers, and first responders are specifically aware of their own resources and how they might deal with the threats in their own areas. This requires more than planning, it also necessitates training.

Also replete with discussions of equity and ethical concerns, "Learning from Disaster: Risk Management after Bhopal" describes how the poor of Bhopal were badly and disproportionately affected, though also noting how those better off suffered greatly as well (Jasanoff, 1994). This disaster affected everyone in the area, but those with the least resources and mitigations (such as leaving the area or getting to medical care) were by far the worst affected. This can be applied directly to Oregon when discussing the relative wealth and resources in larger city's and richer Counties, versus poorer Counties and smaller Oregon city's with fewer resources.

Bhopal also illustrates the necessity of training in how to address disaster when the worst does happen. In the case of Oregon this problem is spread over tens of thousands of square miles and compounded with additional expanses of northern California and the entire western half of Washington State. On a large scale, these must similarly be planned for by the States, and by the Federal government as this will instantly become a National response due to the sheer size and numbers involved. The accident in India and the horrible cost of it demonstrate what happens without planning and the resulting less-than-effective response. When Cascadia was recognized accurately for what it is, it was also apparent that Oregon had no answer to it in the form of appropriate planning.

Applying the disastrous results in Bhopal in a comparative analysis does have limitations when applied in this paper. The population center of Bhopal is a single location with an extremely dense population, and is directly instructive when considering a large metropolitan area such as Portland, Or., more than the State. Examples of a very large scale disaster where few if any mitigations had been undertaken was sought. However, none was found that could be compared apples to apples, with the situation facing Oregon, Washington, northern California and southern B.C. Canada. So this example was chosen to illustrate the human consequences of a specific hazard (an industrial chemical accident) that would also be seen in a Cascadia event, which can be multiplied by the number of Oregon communities with hazardous chemicals, and industrial concerns.

Multiply the consequences of Bhopal by the massive geographic area Cascadia will cover (in the neighborhood of 150,000 to 200,000 square miles without beginning to consider the debris in the Pacific Ocean caused by a massive tsunami) tens of millions of people, and the scale becomes a little clearer. There is no modern disaster that is comparable to a future Cascadia event and the damage that emergency planners expect to see from it.

Oregon can expect effects across a 72,000 square mile area which includes the entire south to north coastline inland 120 miles to the Cascade Mountains. Every human settlement in Oregon has its chemical hazards, even if they only contain underground fuel containers. It is the summation of all of these over a very large area that puts the magnitude potential for a chemical disaster on a different level than that which occurred in Bhopal. Another limitation of this work beyond the demographics, includes the fact that Bhopal occurred before the terrorist attacks of 9/11 drastically altered how the United States plans for and responds to disasters of all types. Much has changed in emergency and risk management since 1994.

Informative

The informative research aspect undertaken here involves understanding the context provided by the Federal Emergency Management Administration (FEMA) and the frameworks it utilizes upon which the responses to an event are structurally organized and managed. Based upon a cumulative body of knowledge gathered from the federal level down to individual first responders, FEMA and OEM now recognizes that the effectiveness of response is directly tied to our plans for dealing with disasters.

FEMA, however, does not speak for the broader planning profession, professional associations, researchers, emergency managers, or the private sector (Perry & Lindell, pg. 442, 2007). FEMA provides the framework of response in order to standardize it, establishing the need for nationwide pre-planning, which is led in Oregon through Office of Emergency Management (OEM). These frameworks of response are central to local, State and National efforts to create large scale, effective responses. It remains up to individual states and communities to determine the means by which the plans that contain the standardized frameworks, are created, updated, exercised, and refined. Equally important, it is largely up to the individual States to determine how to do so in a manner appropriate to the individual communities within it, and of course how to finance it. Bhopal is an existential reminder why it is necessary to accomplish these tasks well in advance of a disaster.

To provide another perspective on the need for effectiveness in response, Jordan Ferraro and Jane Henderson describe two different aspects of emergency management in "Identifying Features of Effective Emergency Response Plans" useful in the overall discussion. The first of these, Threat Response, often adopts a form of an Emergency Operation Plan (EOP) or its equivalent. Threat response plans allow departments and jurisdictions to storyboard responses, actions, and map inter-relationships through exercises in advance, and then close the identified gaps before a real event occurs (Ferraro & Henderson, 2011).

This is a particularly important function of emergency management planning, as it requires active participation, cooperation, and information from a variety of agencies and departments often at many levels of government. A Threat Response, Ferraro and Henderson conclude, is action oriented and guided by plans written in advance during the planning phase. Where these plans do not exist, Threat Response becomes an ad hoc, unplanned activity, and is profoundly not ideal.

The second concept Ferraro and Henderson discuss is the Management Response or planning phase, a necessary component in understanding the intent of emergency planning. This advance, written work is done long before an event occurs in a deliberate attempt to reduce risk, and is risk-mitigation oriented (Ferraro, 2011). Examples of these types of plans are Natural Hazard Mitigation Plans (NHMP), Emergency Operations Plans (EOP), Community Wildfire Protection Plans (CWPP), and Continuity of Operations Plans (COOP). Management Response plans focus on activities meant to reduce risk. These require advance work be done on hazard identification, vulnerability and risk analysis, and deliberate mitigations that

address the weakness(s) identified. These are often identified and addressed through the process of writing emergency plans. These two distinct phases are important when discussing emergency planning policies at the local or State levels, as Management Response often informs the Threat Response, just as the Threat Response informs the Management Response (Ferraro, 2011).

There is an existential need at all levels of government to be informed by the information contained in plans such as these. An example put forth by Ronald Perry Ph.D and Michael Lindell Ph.D., in "Emergency Planning" informs that "...the creation and implementation of specific response protocols is a local function. By contrast, writing building codes with seismic provisions is a state function, but making sure these codes are adopted is the task of local government," (Perry & Lindell, pg. 11, 2007). Where these plans do not exist or are not updated and maintained, a weakness is exposed. Therein lay the reasoning behind the concern that small communities may be lagging behind in planning and training.

"...the creation and implementation of specific response protocols is a local function. By contrast, writing building codes with seismic provisions is a state function, but making sure these codes are adopted is the task of local government," (Perry & Lindell, pg. 11, 2007)

Perry and Lindell's research and conceptualizations coupled with those of Ferraro and Henderson, are fundamental informative realizations made by emergency planning analysts, and by the emergency profession as a whole. These are today, existential components of planning that when implemented and exercised are very effective in creating more successful emergency responses to disasters.

Emergency management requires a consistent and rational policy in order to create the most effective response possible. This can be achieved only when all levels of government are working together (Perry & Lindell, pg. 11, 2007). These rational policies are made real through the creation of specific and detailed plans at the level of individual responsibilities, inform at these levels, and are intended to function in a rational manner with plans written for different jurisdictions and communities in a relatively seamless manner. All communities carry their own individual responsibilities for specific tasks in emergency planning.

The applicability and informative nature of Perry and Lindell's research along with that of Ferraro and Henderson have no real limitations. Their suggestions on best practices and the justifications for them are utilized every day in emergency management planning and analysis. They are in many ways descriptive of the foundation of modern emergency management.

Innovative

The foundations of emergency management have been widely accepted, and Oregon is in the midst of implementing them, writing and testing the plans that have resulted. However, a weakness remains in the fact that individual

communities still need to find a means of affording to follow suit. A new and innovative method of developing cost effective means of planning lay in a paper written by Sarah Allison in "Keeping Local Economies Safe" in 2015. Community Resilience is the wider concept she discusses, and her research proposes combining two different disciplines of planning in order to create an overall result that has potential to create a more resilient society, which will have a positive effect in planning for Cascadia, financing it, and ultimately in responding to it.

Allison combines the concepts of economic resilience and natural hazard resilience, recognizing that business and commerce have a significant role to play in a community's comprehensive resilience and ability to recover. Allison is looking at the larger picture and investigates how these two previously unrelated forms of planning can synergistically add to each other in a more deliberate fashion than has previously been undertaken in Oregon (Allison, 2015). It is due in part to Allison's combining of sectors in seeking funding that led to the investigation of Oregon Planning Goal 7: Natural Hazards, as a means of leveraging better local planning for emergencies from a legislative perspective.

Allison's work is structured around two central questions: (1) how well do economic development plans currently address economic resilience to natural hazards? And (2) how could economic development plans address economic resilience to hazards in the future? While limited to economic and natural hazard resilience, the idea of combining previously unconnected sectors of society under a single umbrella-like concept was and continues to be an intriguing one.

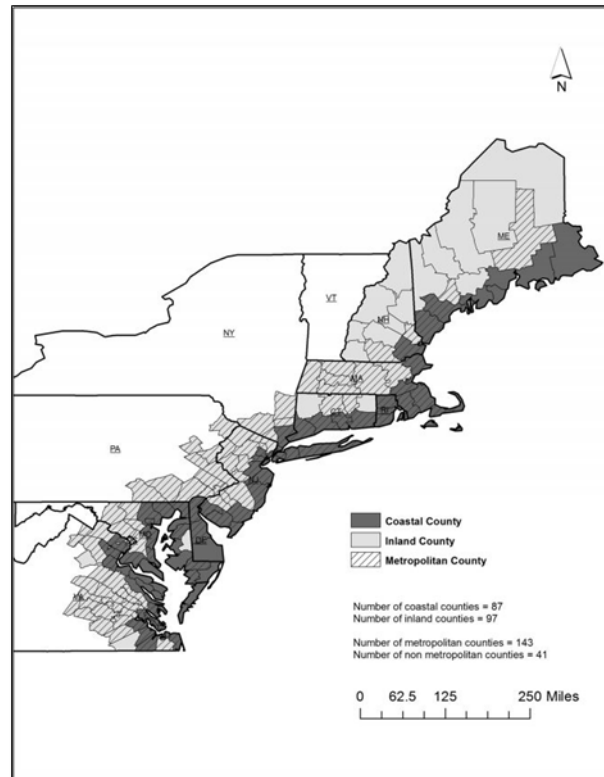
Allison's innovative concept in part inspired this research project to ask the question, could Goal 7 be leveraged to increase local Natural Hazard planning, increasing our ability to effectively respond to Cascadia?

As noted by Amy Donohue and Philip Joyce, "emergency management is a complex policy subsystem that involves an intergovernmental, multi-phased effort to mitigate, prepare for, respond to, and recover from disasters." They analyzed the fiscal as well as functional components of federal policies and noted that, at the time, government was perhaps overemphasizing the response and recovery phases of a disaster, while underestimating the planning and mitigation phases (Donohue & Joyce, 2001).

In light of this and other research along similar lines, an approach similar to the one Allison presents becomes a potential means of creatively overcoming the fiscal reality that responding to disasters is very expensive. It can leave communities without enough funding for planning and mitigation. This has the added effect of making response and recovery yet more expensive and less effective.

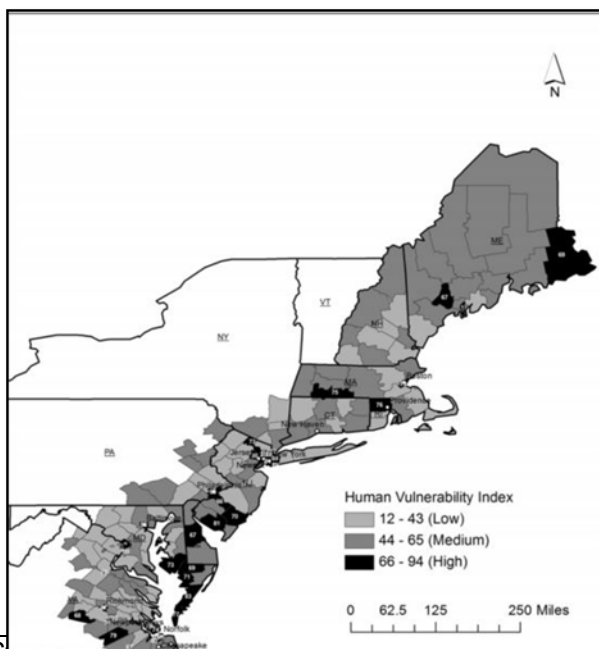
To bring the point home, where thinking outside the box is necessary, Oregon must consider other means of determining vulnerability. The standard Vulnerability assessment being roughly equal to Hazard x Risk x Consequence does not necessarily take into account all the factors in Oregon society. The work "An Assessment of Human Vulnerability to Hazards in the US Coastal Northeast and Mid-Atlantic", by Shivangi Prasad of the University of Miami in 2012, investigated human vulnerability based on a different means of calculating vulnerability. "[His] approach assesses the vulnerability of a place by incorporating elements of physical exposure and societal vulnerability to compute overall vulnerability." (Prasad, 2012) The threat he was assessing was primarily that of hurricane like storms on coastal areas. His research is relevant due to its focus on coastal communities and the relevance of policy decisions on small communities and their success or failure in the face of a disasters.

Figure 8: Study Area (Prasad, 2012)



Perhaps it goes without saying that land use policy not accounting for Natural Hazards can lead to poor decisions regarding where and what to build in a given area. It becomes an acute discussion once the realization hits that a small coastal community has built entirely within a tsunami inundation zone, there is no good place to relocate

the community to because of geologic limitations... and there is no good place to run to once the shaking stops and a 40 to 60 foot high tsunami is on the way. As has been noted by professors within the Master's program in Planning, Public Policy, and Management at the University of Oregon, we must stop building in stupid places. However, in many cases, building in other places is impossible for many reasons outside a community's control.



This duly noted, Prasad's conclusion is by looking at the composition of counties versus the numeric size of

Figure 9: Distribution of Human Vulnerability to Hazards in the mid-Atlantic. (Prasad, 2012)

them, we might be able to provide a better means of determining vulnerability that would allow for better comparisons across counties with differing demographics. This might provide a better means of realistically assessing how to allocate resources on more individualized terms based on a better assessment of vulnerability than by simply comparing statistics. Many Oregon communities have low populations, and from the standpoint of Vulnerability being roughly equal to Hazard x Risk x Consequence (a more traditional means of determining vulnerability), would result in an assessment that a low population county is less vulnerable to disasters – less in need of assistance... on paper at least. Under that sort of consideration, smaller communities should be the last to receive aid, when by other more realistic measures they have the greatest need for outside assistance.

Prasad was able to demonstrate that vulnerability is also tied to demographics, and not just to the geographic immediacy of the threat. This should inform in Oregon that our poorer and smaller communities are indeed going to be more vulnerable to a large, widespread hazard like Cascadia.

This realization is one of the inspirations for this this research paper. Smaller communities do not have a lower vulnerability to Cascadia due to lower numeric consequences or lower risks on paper. Instead they have higher vulnerability do to their poorer demographics.

Summary

These five research themes provide the context for what the State of Oregon is facing, and the scale of the problem at hand in its most vulnerable communities. Quite literally the threat is larger than the current combined resources of the State, let alone its smallest communities. Dr. Goldfinger provides the sheer magnitude of the natural hazard, and the certainty that it will occur again as it has 41 times in the last 10,000 years. Another Cascadia earthquake is a “when”, not an “if”. Dr Atwater in connecting the dots, providing an unprecedented accuracy on the date of the last Cascadia event, bringing Dr. Goldfinger’s research on the earth’s natural recording of giant tsunamis in the sediments of the ocean floor into absolute clarity: We are within the window of probability for another Cascadia event.

Bhopal, on a small scale relatively speaking, provides us with a glimpse of what a single event, an industrial accident, looks like when it is completely uncontrolled and unmitigated. Bhopal provides the opportunity to apply the consequences hundreds of times over in different industrial locations spread across the state, and multiplied yet again by those chemicals being transported via roadway and train. Multiplied yet again by the simultaneous nature of these multiple, individual, and simultaneous disasters.

All this will be greatly exacerbated by the fact that all 16 sectors of society as identified by the Department of Homeland Security will be negatively affected by this catastrophic earthquake (Department of Homeland Security, 2015). From power to transportation, financial to food and agriculture, healthcare to emergency services... all will face overwhelming challenges in continuing to function on any

level. This means there will be little that can be done about any chemical or industrial accident immediately after Cascadia. The realistic scope starts becoming overwhelming to contemplate, indeed it demands society do as much as possible before the event occurs. After Cascadia, it will be too late.

This brings us to the monumental question... what can we do about it? Among the least expensive mitigations that can be taken with the greatest possible return on investment lay in planning. Information on successful emergency management planning comes to us via many sources. Among the best are Perry and Lindell who wrote one of the best compilations of these best practices in "Emergency Planning", a required text in many emergency and disaster management university programs across the country. Backed by Ferraro and Henderson's "Identifying Features of Effective Emergency Response Plans", and there is a clear path in planning for the worst natural or man-made disasters. The existing literature is clear both on the need for planning as a form of mitigation, and the means of applying it effectively. The State of Oregon is taking this threat seriously, demonstrated by the very rapid creation of the Oregon Resilience Plan and the Cascadia Playbook, both of which rely on the concepts shared by Perry, Lindell, Ferraro, and Henderson. The scale of the threat demands this cannot be the endpoint of our collective thought processes. Instead, testing, exercising and then refining the plans that result are necessary.

Innovation in planning and emergency management is going to be necessary over the long term. Allison, by seeking innovative means of funding what will be a very expensive endeavor spanning decades, has provided an excellent concept: by combining funding from different resources which might not normally be considered, expands our fiscal considerations and opportunities. As a society, we will need to seek innovative means of funding the mitigations that will save lives and reduce the damages to society that Cascadia is going to cause.

Prasad provides us with an example of reconsidering how we define vulnerable communities, by more accurately assessing our weaknesses we can more effectively address them. Cascadia is an unstoppable event we can neither predict nor avoid. What we can do is prepare ourselves in the most efficient ways possible. This requires accurate assessments of all our strengths, weakness, opportunities and threats. Accurate Hazard Vulnerability Assessments (HVA) are essential in this necessary endeavor. Given that HVA's are an integral aspect of successful emergency planning, it is equally essential that we consider how we are determining those vulnerabilities if we are going to find success in mitigating them, and Prasad offers us a different means of doing so.

Oregon will not get a second shot at responding to Cascadia. The State will have to do it right the first time if we, as a society, are serious about reducing the otherwise catastrophic results it is going to bring. This paper brought together the scientific, investigative, experiential, informative, and innovative means of considering Cascadia in relation to small communities for a purpose: to draw deliberate attention to the 36,000 people statewide who live in them. These are unique and beautiful communities who at this time, may possess less in the way of resources in staff, planning, training, time, and expertise to undertake planning based mitigations to the same degree that Oregon's largest cities, higher population

counties, and the State can marshal. Research into the realistic capabilities of these communities is a necessary component in accurately assessing the impacts Cascadia will have on them, and is a requirement in providing the best that emergency management planning can provide to them.

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CHAPTER 4: METHODS

Original Research

With the need to determine a realistic assessment of the capabilities of small communities established, the question becomes one of how to go about making these assessments. There is no available research in Oregon upon which to draw that answers this and the other research questions this paper poses:

- What is the planning capacity or extent of emergency management planning in communities under 10,000 in population statewide?
- If plans are not available or have not been updated, are there specific barriers to undertaking the task?
- Is there an opportunity in Oregon's Land Use Planning Goal 7, which could be leveraged effectively in better preparing small communities for a large magnitude Cascadia Earthquake?

As an equally important adjunct to the creation of original data, what can already implemented, State mandated and legally required Natural Hazard planning tell us about the level of planning capacity in small communities? Oregon Land Use Planning Goal 7 has been legally required since 1973, and is specifically intended to require all communities assess how natural hazards might impact their residents. As noted in the literature review, this is a necessary first step in emergency planning. Research and analysis on Goal 7 implementation will inform on whether or not communities have leveraged the State's already required planning effectively as seen through the lens of Cascadia. Additionally, this analysis may inform on the opportunity for increasing planning capacity through already existing means.

This project utilized interview and survey formats to create original data, coupled with a deliberate analysis of 25 Comprehensive Plans randomly selected from different communities statewide as a means of answering the questions this paper asks.

The survey questions come directly from the Interview Guide in order to reach as many of those responsible for emergency management planning as possible while also providing consistency in the results from the interviews. Interviews were intended to provide more detail in an in-depth format where participants could provide a finer granularity of detail than possible in a survey format. These tools are intended to answer this projects first two research questions: 1) What is the planning capacity or extent of Emergency Management Planning in communities under 10,000 in population statewide; and 2) if no plans are available or have not been updated, are there specific barriers to undertaking the task? As an informative back up to this main second question, logically one must also ask what those

barriers are, and how do the results inform on strengths and weaknesses in statewide emergency planning?

Analysis of Comprehensive Plans are also intended to answer two of the three questions this paper proposes: What is the planning capacity or extent of Emergency Management Planning in communities under 10,000 in population statewide?; and is there an opportunity in Oregon's Land Use Planning Goals that could be leveraged effectively in better preparing small communities for a large magnitude Cascadia Earthquake? 25 communities were randomly selected for Goal 7 analysis from across the State.

The process of advertising and distributing both the survey and interview opportunities included contacting the Oregon League of City's who were unable to assist directly but did provide publically available contact information on 195 cities in Oregon under 10,000 in population; the University of Oregon School of Architecture and Allied Arts who were very helpful in posting a Facebook advertisement and posting the links onto Twitter under University of Oregon accounts; the Federal Emergency Management Administration (FEMA) Region X which was limited to re-tweeting other sources, and did re-tweet the University of Oregon's posting of the Qualtrics survey; and the Oregon Emergency Management Association (OEMA) who emailed the invitation to participate to its entire Statewide membership. Their assistance in this project is gratefully acknowledged.

Surveys

The 10 question survey was designed to reach as many potential emergency planners as possible. It was designed utilizing Qualtrics survey software provided through the University of Oregon. From personal experience, having received many emergency management surveys in the past, the decision was made to keep the length to 10 questions in order to increase the completion rate of the survey. 15 surveys were begun, 14 were completed. The questions asked in the survey are 10 of the 18 questions asked in the interviews.

The Qualtrics Survey was completed and successfully published in late March 2016, when the survey link was sent to the Oregon Emergency Management Association (a professional organization) who published the link via email to its 300+ membership. The University of Oregon Architecture and Allied Arts Department published the survey link via Facebook and Twitter accounts. In the same time period, FEMA Region X re-Tweeted the U of O posting to its 14,600 followers.

A total of 14 completed surveys were completed. When compared to the number of small communities in Oregon (195 in number) this is not a statistically relevant population. For future researchers, the use of Social Media to publicize survey opportunities did not prove to be an effective means of creating statistically significant results, despite the large exposure rate of over 14 thousand accounts. While a useful adjunct, other more direct means of advertising or encouraging participation will likely prove more effective for future researchers. This significant limitation duly noted, the results of the Survey did produce some interesting direct

results worthy of further investigation and research, and some interesting indirect results also worthy of sincere consideration.

The survey questions were designed thematically to support the overall goals of this paper, and to allow for deeper informed interpretation. These themes are as follows:

- General: Geographic region, population of the community, and whether or not the community had experienced a declared natural disaster within a given time frame.
- Staffing: Ability to stand up a full ICS organization for longer than 7 days,
- Location Specific Planning: City specific plans separate from county or State plans, level of perceived adequacy of existing plans, and consideration of evacuees in existing plans.
- Training: Staff ICS certifications for training exercise participation, participation in emergency management drills, and what resources would be beneficial to furthering local emergency planning.

The intent of the survey was to determine the overall level of planning present, and provide insight into the staffing, funding, specificity of planning and training these communities were able to undertake.

The full Survey Guide can be found in Appendix A.

Interviews

As previously mentioned, the original intent of this project was to interview as many persons responsible for emergency planning as possible. With 195 potential communities to seek out, the goal seemed a reasonable one. The process of seeking those interviews was revealing on its own: It was discovered that many small communities work partial days, work weeks, and in many cases a combination of both. This made contacting the appropriate persons very challenging.

This indirect result is interesting in and of itself, it indicates the limited time and resources that small communities are already facing. Contacting individuals in positions of responsibility required determining when someone was going to be in the office to answer the phone, and then learning who in particular would be able to answer the research questions. This did not correspond to a 5 day or 40 hour work week schedule, and many of these communities have little more than a one page website to introduce their communities, making the gathering of information difficult. Before considering the planning demands of Cascadia, at the very least it must be noted that some number of small communities cannot afford staff for a 40 hour work week, or an informative web presence. This provides some indication for whether or not these communities will have the capacity to undertake needed emergency management planning.

There is something to be concluded from these challenges, small communities are perhaps even more limited in time and resources than is perhaps currently assumed.

As a result, out of 28 attempted phone contacts 13 did not respond to voicemails or messages, eight were unsuccessful in scheduling attempts, and four declined to participate. Ultimately, three personal interviews were conducted and transcribed with individuals from three different geographic regions: The Oregon Coast, the Willamette Valley, and Eastern Oregon.

One of the main limitations of this research project encountered lay in the difficulty of determining who in a small or very small community is responsible for emergency planning. Again, an indirect result, this observation is also of real concern. In a Cascadia event, there will be no time to sift through vague records, less time to investigate who to talk to or to attempt to find community plans in a disaster situation. There will be no electronic records to access without power which will be unavailable region wide without generators and fuel, which also impacts the ability to communicate via electricity and infrastructure dependent phone lines. The size of the community should not matter, the fact that it is a community of some number of people means there should be accurate and up-to-date emergency contact information as well as a means of making that contact separate from landlines and electricity dependent communications. Local staff should be well aware of who that emergency contact person(s) is and they should have a power grid independent means of communication (e.g.: HAM Radio or Satellite phone communications). These are natural products of planning, maintaining, and exercising emergency plans when the impacts of their lack become apparent.

The Interview Guide created and utilized specifically for this study was designed to provide results on a thematic basis matching the survey, with greater opportunities for open ended questions, allowing for deeper informed interpretation.

- General: Geographic region, population of the community, and whether or not the community had experienced a declared natural disaster within a given time frame.
- Staffing: Ability to stand up a full ICS organization for longer than 7 days, number of FTE hours the community allocates to emergency planning.
- Funding: Dollar budget reserved for emergency management, and extent of grant funding applied for.
- Location Specific Planning: City specific plans separate from County or State planning, which emergency plans have been written, level of perceived adequacy of existing plans, and consideration of evacuees in existing plans.
- Identified areas of weakness: Perceived weaknesses in location, and perceived barriers to planning
- Training: Staff ICS qualifications for training exercise participation, participation in emergency management drills, and what resources would be beneficial to furthering local emergency planning.

The intent of the Interviews is similar to that of the survey, but additionally intended to inform on funding challenges, and other perceived areas of weakness and potential barriers.

The full Interview Guide can be found in Appendix B.

Challenges with Surveys and Interviews

The process of researching this project presented several challenges resulting in limitations of the project. First, finding the correct individuals to interview proved to be very time consuming. Many hours were spent in attempting to locate the appropriate persons to contact, and yet more spent in attempting to successfully schedule interviews.

Many of the individuals contacted had schedules other than that of a 40 hour workweek. Additionally research time was limited by personal work schedule that reduced the days available to undertake those interviews to two days a week. This ultimately proved to be by and large, unworkable. Only three interviews were successfully completed, certainly a limited range of perspective that may or may not be representative across the State. The results, both direct and indirect, are informative none-the-less, and worthy of further investigation and research.

Oregon Land Use Planning Goal 7: Natural Hazards

Established in 1973, Oregon's Land Use Planning Goals have proven effective in guiding land use and planning in the State. Of particular interest to this research paper is Goal 7: Areas Subject to Natural Hazards: "To protect people and property from natural hazards." (Oregon Department of Land Conservation and Development, n.d.). The research question: is there an opportunity within the 19 Oregon Planning Goals that is being missed, which could be leveraged effectively in better preparing small communities for a large magnitude Cascadia Earthquake?

To answer this research question, five communities were randomly selected from each of the five geographic regions identified by DOGAMI, differentiated based on levels of expected shaking damage due to a Cascadia event (see Figure 7 on pg. 18): the Oregon Coast, the Coast Range mountains, the Willamette Valley, the Cascade Mountains, and Eastern Oregon.

The Comprehensive Plans for these 25 communities were downloaded and analyzed for usage of Goal 7, the dates they were either written or last updated, and incorporation of Natural Hazards in enough detail to be useful in the writing of emergency plans such as a Natural Hazard Mitigation Plan.

In many cases a given city did not have its comprehensive plan available on its own website online. The University of Oregon Scholars Bank (scholarsbank.uoregon.edu), a source repository for local and regional documents across the state generated by the University as a searchable database, was a frequent resource for these plans.

Inquiry with the Oregon Department of Land Conservation and Development regarding the ability to obtain a compiled source of Land Use Plans resulted in the information that individual plans could be requested, but would require an individual request for each city, and a waiting period while each was obtained and then mailed via U.S. Postal Service. This would have resulted in a delay of several weeks.

Through the use of a Microsoft Excel spreadsheet, information on population, geographic location, County, Comprehensive Plan date, mention of Goal 7, elaboration on Goal 7 if any, Earthquake specificity, and the download location of each plan was collated and charted.

The results of this research paper are limited by lack of statistically relevant results, generated by a low survey return rate, and low number of interviews conducted. At best, these can be considered preliminary results indicative of the need for further research. Though limited, these results do generate enough in the way of concern to justify future research.

The importance of emergency planning cannot be underestimated in the effort to save lives and property. Cascadia will be a region-wide disaster the likes of which the United States has never experienced, and small communities lacking in time, expertise, money and resources are the most exposed and vulnerable without appropriate planning and the training which follows them. The lives and livelihoods of 36,000 Oregonians will depend upon emergency planning after Cascadia. This preliminary research demonstrates that some degree of planning is lacking, the question remains: how much, and to what effect?

In the future, direct support - if not participation from Oregon Emergency Management and the State - would greatly increase the depth and usefulness of results. This strategy is highly recommended to future researchers with the caveat that developing a relationship of this depth will require a significant period of time and may necessitate assistance from University officials.

CHAPTER 5: FINDINGS

Survey and Interview Findings

This chapter is intended to present the combined results of the surveys and interviews conducted for this professional project. All identifying information has been removed from the results in a deliberate effort to maintain the anonymity of the participants. The emergency management community is relatively small in Oregon, and most of those who are or have been engaged in the profession are familiar with one another. At the same time, there are many new individuals practicing the discipline in the state, whose insights are also valuable with their fresh perspectives. In all cases, the feedback they provided was sought under the liberating environment of anonymity in order to allow for free expression without consequence.

Designed with Qualtrics, the 10 question survey was intended to give a basic snapshot of measureable components of emergency management planning. It was distributed by the Oregon Emergency Management Association, and the University of Oregon Architecture and Allied Arts Department. 14 surveys were completed.

Interviews were conducted by phone, and transcribed verbatim. The raw results, less identifying information, of the survey and interviews can be found in Appendices A and B.

40% of survey respondents hailed from the Willamette Valley, 20% each from the Oregon Coast, and Eastern Oregon. 13% and 7% originated from the Oregon Coast Range Mountains and the Cascade Mountains, respectively (n=14).

50% of respondents represent population centers in the 7,000 to 10,000 range, perhaps indicating an increased likelihood of this demographic being able to afford a professional to undertake the tasks of emergency planning.

“Warning in a small City, the two obstacles are time and resources (employees). We do not have the time nor the resources to get the key players together and plan or conduct an exercise. We do what we can, when we can. It would benefit our small City if the State or County Emergency Planner would conduct annual training that requires all key players to attend.” -Survey Participant

Interestingly, the next highest percentage of 29% came from the 1000 – 3,999 range, followed by 4,000 – 6,999 at 14% which may either indicate an increased likelihood of funding availability for the 1,000 to 3,999 range, or perhaps more likely, a need for a larger survey sample. 7% of respondents hailed from communities with a population of 1-299 and none from the 300 to

999 level (n=14). Understanding which communities are the most likely to have funding, or receive funding from outside sources would be helpful in determining both need and the appropriate distribution of funds to communities with the least resources and the corresponding greatest need. This too, is an opportunity for future research.

86% of those surveyed reported their jurisdiction had formalized and customized plans, leaving 14% either without them, or did not know. While 86% is a heartening number, the 14% who indicated they did not have them or did not know. This indicates the continuing need to assist small communities in their creation (n=14).

Written, historical information is a component of most emergency plans out of necessity, these past events are utilized in Hazard Vulnerability Assessments, which are integral in determining risk of future similar events, and their potential consequences.

50% of communities had experienced a declared disaster in the last 5 years, and all had experienced one in the last 15 years (n=17). Of the three personal interviews conducted for this research, two did not know if their jurisdictions had experienced declared disasters. This indicates some degree of loss of historical knowledge of the area, which can either be indicative of new personnel in their roles perhaps unfamiliar with historical events, a lack of written data on past events upon which to rely, or both. This may be indicative of a community in need of either new or updated emergency plans. Further research into the depth of local knowledge would be informative.

Nearly 93% of those surveyed reported some city staff obtaining ICS Certifications in their communities, enabling participation in county and State level exercises, though only 73% reported actual participation in those exercises (n=17). It must be stressed, unexercised plans are also untested plans, and their effectiveness in a real disaster is questionable. Increasing exercise participation is crucial in increasing the effectiveness of a statewide response to Cascadia.

One of the most revealing results of this study is reflected in the perceived effectiveness of local planning in the face of a Cascadia event. No community reported their plans as being exceptionally adequate – thoroughly prepared for a Cascadia event. 21% reported being moderately adequate. Most importantly, 57% reported being slightly adequate to extremely inadequate. With lives on the line, and billions of dollars of property at risk, anything less than “moderately adequate”

“Assistance with the framework for planning [is needed]. Many smaller communities are using firefighters, police officers as our planners and our stakeholders (from the whole community), rarely include anyone with professional planning experience.”
-Interview Participant

should not be considered sufficient to a Cascadia event.

Moderate adequacy is, at best, a good starting place. This finding indicates the need for better planning from those who know these plans the most intimately.

50% of those surveyed reported that they “definitely” or “probably” could stand up an ICS organization for longer than 7 days, however an equal number reported they might or might not, probably could not, or definitely could not stand one up for at least 7 days (n=14). Once again, this demonstrates the potential difficulty small communities will face in a Cascadia event, they may not have the physical number of staff needed, or they may not have the number of trained staff who are capable of filling the roles an ICS organization. Interviewees all reported they might or might not be able to stand up an organization for this long. It is worth reiterating that the State’s initial response – the Cascadia Playbook – describes the first two weeks of the State’s response. The magnitude of Cascadia is so large, it is

“The equivalent of ICS management classes held on site and customized to our situation [would be beneficial]. Purpose[d] to enable broader group[s] to participate AND get experience working together.” – Survey Participant

reasonable to conclude that the response phase will last longer than two weeks. The Oso Landslide in Snohomish County Washington for example, lasted for several weeks, yet was a single landslide - where Cascadia will cause thousands of landslides across the entire coastal Pacific Northwest (Rubin, 2014). It seems clear many small communities are not going to be able to match the two week time frame of the Cascadia Playbook, let alone the realistic expectation of an extended response phase beyond the Playbook’s current timeframe.

It is not known if the extent of small community needs in terms of emergency response ICS staff is recognized by the state. This is one of the known unknowns from the small community perspective.

There is no information on whether the State will be able to provide personnel for basic ICS staffing needs along with immediate response support from agencies such as the Oregon National Guard through the Cascadia Playbook perspective, the assumption is that it will not.

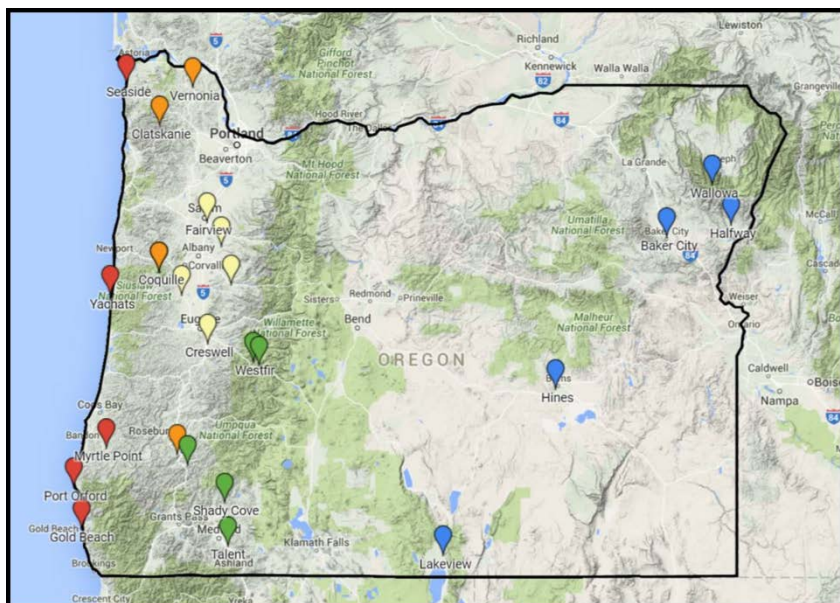
At its very smallest, 4 to 5 people per operational period are needed to man an ICS command staff organization, which in response to a disaster is generally 12 hours long assuming there are personnel available to relieve them. Otherwise they are on duty for the duration, which is not something any organization can realistically do for more than a few days. Right now, it is up to the city or organization to see that their personnel are ICS trained and certified. Many small communities face budgetary and travel/location limitations in doing this, which could be mitigated if recognized.

When asked what their area’s top three weaknesses were, the most common answers pointed to staffing, experience, and planning issues.

On a related point, Cascadia is going to result in a flood of evacuees, either those moving east from the Coast or Coast Range, and the Willamette Valley to areas east of the Cascade Mountains. It will be east of the Cascades where basic services in the form of food, shelter, water, and healthcare will be more accessible in the short and possibly long-term after the earthquake. Recognition of this eventuality demands planning, yet roughly one-third of communities in this study did not have plans for evacuees coming into or through their areas. With thousands of people on the move to the east out of the immediate disaster zones, this is going to create real burdens on the communities they are moving through. Examples of this can be seen in the aftermath of Hurricane Katrina, and in the 2015-2016 mass migration of people out of Syria and the Middle East into Europe.

Oregon State Planning Goal 7 Analysis

Oregon’s Land Use laws, regulations and policies have been a very effective tool for the state, counties, and city’s in Oregon. Since its creation and implementation in



1973, Oregon’s land use policies have had decades to develop, and the results are clearly visible in the clear demarcations in Urban Growth Boundaries, and in Oregon’s standout levels of public participation, among numerous other benefits. While Oregon has effectively made use of many of its land use goals, it may not have leveraged its potential with all of them, specifically Goal

Figure 10: Distribution of Analyzed Comprehensive Plans

7: Areas Subject to Natural Hazards is intended “to protect people and property from natural hazards” (State of Oregon, 2002), is rarely mentioned as a potential tool by emergency managers.

The research question this paper proposed: is there an opportunity within the 19 Oregon Planning Goals that is being missed, which could be leveraged effectively in better preparing small communities for a large magnitude Cascadia Earthquake, can be answered with an unequivocal “yes”.

25 Comprehensive Plans in total were selected for analysis. These were separated into geographic regions demarcated by the Oregon Department of Geology and Mineral Industries (DOGAMI) into expected damage regions. DOGAMI’s prediction of expected damages by geographic region can be found in Figure 7.

Similar to the demarcations utilized in the Surveys and Interviews, Comprehensive

City Name	Population 2010 Census	Geographic Location	County
Yachats	690	Coast	Lincoln County
Seaside	6,457	Coast	Clatsop County
Port Orford	1,133	Coast	Curry County
Gold Beach	2,253	Coast	Curry County
Myrtle Point	2,514	Coast	Coos County
Coquille	3,866	Coast Range	Coos County
Vernonia	2,151	Coast Range	Columbia County
Clatskanie	1,737	Coast Range	Columbia County
Willamina	2,025	Coast Range	Yamhill County
Myrtle Creek	3,439	Coast Range	Douglas County
Creswell	5,031	Willamette Valley	Lane County
Fairview	8,920	Willamette Valley	Multnomah County
Sweet Home	8,925	Willamette Valley	Linn County
Monroe city	617	Willamette Valley	Benton County
Scio	838	Willamette Valley	Linn County
Westfir	253	Cascade Range	Lane County
Oakridge	3,205	Cascade Range	Lane County
Shady Cove	2,904	Cascade Range	Jackson County
Talent	6,066	Cascade Range	Jackson County
Canyonville	1,884	Cascade Range	Douglas County
Lakeview	2,294	Eastern Oregon	Lake County
Baker City	9,828	Eastern Oregon	Baker County
Halfway	288	Eastern Oregon	Baker County
Wallowa	808	Eastern Oregon	Willowa County
Hines	1,563	Eastern Oregon	Harney County

Table 1: Distribution of Analyzed Comprehensive Plans

Plans were divided into “Coast”, “Coast Range”, “Willamette Valley”, “Cascade Range”, and “Eastern Oregon”. The full table containing the analysis of Goal 7 can be found in Appendix C.

There was a large range in the depth of natural hazard detail to be found in the Comprehensive Plans this project analyzed. The newest Comp Plan was written in 2016 from Scio, Linn County, Oregon in the Willamette Valley, with a population of 838 people. This Comp Plan contains an entire section on Natural and Geologic Hazards, including Earthquake, Landslide, Flooding, and Volcanic Hazards. This is a

Year Comprehensive Plans Written	
1970's	8
1980's	5
1990's	4
2000's	5
2010's	3

Table 2: Year Comprehensive Plans Were Written

a robustly built-out Goal 7. The City of Scio is a great example of a Comp Plan that could be utilized in the creation of a Natural Hazard Mitigation Plan, and it contains much of the same information. Scio is the best example found of a Comp Plan actually leveraging the potential inherent in Goal 7. It could serve as an example for the re-envisioning of what Goal 7 should look like statewide.

In contrast the oldest plan discovered was written in 1973 from Canyonville, Douglas County, Oregon in the Cascade Mountain Range, with a population of 1,884 people. It contains no mention of Goal 7 specifically or in general, and makes no mention of natural hazards. As can be seen in Table 1, 17 of the 25 plans were written before 2000. Only one, Scio, was written after the threat of Cascadia was quantified in 2012.

The Geographic use of Goal 7 (Table 2) was perhaps the most surprising result in analysis, as all 5 of the Eastern Oregon Comp Plans contained information that could reasonably be expected to be found in the State mandated goal. In hindsight, this result is not so unexpected when one considers the numbers of wildfires this region faces on a yearly basis. It makes sense to incorporate natural hazard information into these plans

Geographic Use of Goal 7	
Coast	3
Coast Range	2
Willamette Valley	4
Cascade Range	3
Eastern Oregon	5

Table 3: Geographic Use of Goal 7

as a matter of course.

Earthquake Hazard Specificity	
Yes	7
No	18

Table 4: Earthquake Specificity

With these points noted, none of the Eastern Oregon Comp. Plans matched the most ideal plan found in Scio. Given the lack of recent updates to all but one of the analyzed plans, it is not surprising that less than one third of plans had any earthquake specificity to them (Table 3).

The results of this research are clear, there is opportunity for the State of Oregon to better leverage Goal 7 for realistic natural hazard assessments including realistic

assessments of Cascadia created hazards risks, and vulnerabilities. By fulfilling the unused or under-utilized promise inherent in Goal 7: Natural Hazards, the State can proactively better prepare every city that is required to prepare a Comprehensive Plan for a Cascadia event we know is coming.

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CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

There are several conclusions to be drawn from this project. The most important of which is that small communities are in need of greater attention in terms of writing their own, location specific emergency plans and testing them through realistic live or table top exercises. The best practices in emergency management insist on granular plans that meet the on the ground conditions they are written for. Emergency planning is not meant to be a cookie cutter – one size fits all – endeavor. While templates are very useful, and now relatively commonplace in the State, there can be no substitution for consulting face-to-face with a city engineer, or determining the relative usefulness of city equipment available for use in a disaster. These and many other details live with the local populace. When Cascadia lets go, it is these details that become crucial in a response and the subsequent recovery. There will be no state officials, no county emergency manager available. There will only be the people who live and work in that city, and nothing else for some length of time. There is no substitute for this level of planning.

What is the planning capacity or extent of emergency management planning in communities under 10,000 in population statewide is the first question this project asked. The short answer is 86% of survey responders reported their areas do have plans, the caveat to this response is that many of those same respondents did not consider their current plans to more than slightly adequate to the threat of Cascadia.

Consider a large scale Cascadia Fault event: Do you consider your jurisdictions level of planning to be adequate in addressing the needs of your community during the response and recovery from such an event?	Response	%
Extremely adequate	0	0%
Moderately adequate	3	18%
Slightly adequate	8	47%
Neither adequate nor inadequate	1	6%
Slightly inadequate	1	6%
Moderately inadequate	3	18%
Extremely inadequate	1	6%

As reported in both surveys and interviews, most communities had plans in place that are at least specific to County-level plans. All communities rely upon these County plans to a greater or lesser degree, and all naturally have access to them as they are published online. Reports of their usefulness to a given community varied, as did the level of perceived helpfulness of both County and State-level resources.

Table 5: Perceived Adequacy of Emergency Planning, Combined Results

The combined results to the question “Consider a large scale Cascadia Fault event: Do you consider your jurisdictions level of planning to be adequate in addressing the needs of your community during the response and recovery from such an event?” are significant. 82% of respondents reported their level of planning to be “slightly adequate, to extremely inadequate”. Only 18% reported their planning to be moderately adequate, and none of them believed their planning to be extremely adequate to a Cascadia Earthquake.

Cascadia will be a regional event that communities must have at least moderately adequate planning for in order to expect to save lives and property. The state is facing a stark reality:

- Deaths in an estimated range of 5,000 to 25,000 from the earthquake and resulting tsunami.
 - 24,000 buildings completely destroyed, and another 85,000 with extensive damage requiring months to years of repair.
 - Approximately \$32 billion in economic losses. 27,600 displaced households.
 - Almost 10 million tons of debris (1 million dump truck loads) and few usable roads to transport it.
- (OSSPAC (B), pp. 14, 2013)(Oregon Office of Emergency Management, 2014)

Plans moderately adequate or less to OSSPAC’s estimate (considered by many emergency management professionals in Oregon, including myself, to be significantly underestimated) are plans likely to fail their communities. At this time, with many communities reliant upon county level plans which may or may not take into account the existential SWOT qualities of a given city, a barrier exists in the form of creating fine grained planning either due to a lack of funds, time, expertise or a combination of all three, which are required to write the plans to the point where they are moderately adequate or better.

Illustrative of the overall scale of the challenge is whether or not a community is capable of standing up and staffing an Emergency Operations Center for longer than 7 days in order to cope with the disaster Cascadia will create. The table to the left speaks for itself, even though more research and a statistically significant sample is needed.

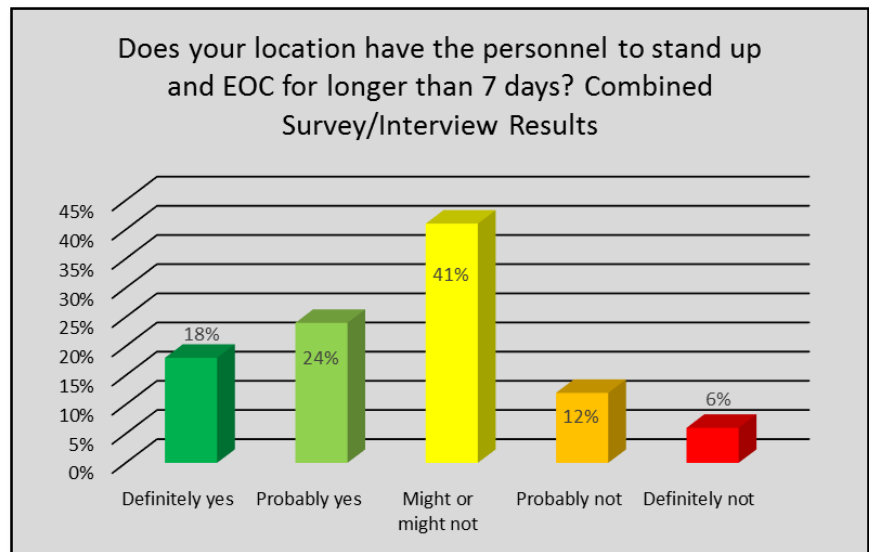


Figure 11: Can Your Location Stand-up an EOC for longer than 7 days? (Combined Results, (n=17))

59% (n=17) of respondents reported that they might or might not, to definitely could not, stand up a functioning EOC for longer than 7 days. This can only lead to the uncomfortable conclusion (if accurate across all 195 communities in Oregon with populations under 10,000, which admittedly is in need of further investigation and a statistically significant sample), many of Oregon's smallest communities are unprepared to staff an emergency response to Cascadia for this relatively short length of time. Recall, this is an event the State Office of Emergency Management is planning a two week immediate Emergency Response to in the form of the Cascadia Playbook.

At a minimum, the Oregon Resilience Plan expects that many communities are going to be on their own for longer than one week. Realistically, some services will not return for months if not years in some cases (OSSPAC (B), 2013). Clearly Oregon's smallest and most vulnerable communities, representing approximately 36,000 people, and are in need of more training, support, planning, and resources than they currently possess.

A barrier to the creation of adequate plans may well lay in a subtle perception or belief that the community isn't capable of standing up an EOC, leading to the question becoming somewhat defeatist: 'why write plans with appropriate Emergency Support Functions (ESF), when we cannot staff an EOC at a basic level, let alone actually activate any of these ESF's?' It seems a pointless exercise from this perspective, particularly when professional emergency planning is unavailable to help in deliberately mitigating this reality, and few resources to fund changing it.

The lack of ability to write detailed grassroots plans leads to two separate but related conclusions. First, if a community cannot afford to write the plans or hire professionals with the experience to do so, it may be likely they also do not have the ability to write the grants which might fund the writing of such plans. An avenue ripe for further research would ask the question, how many Oregon communities have utilized grant funding to write emergency plans? How many more could benefit from them?

The second conclusion is age old: 'Which came first? The chicken or the egg?' If communities cannot get the funding to hire the expertise, it stands to reason they likely do not have the ability to write the plans such as Natural Hazard Mitigation Plans required to apply for grant funding. Additionally, without the expertise, they may not have the knowledge needed to apply for Emergency Management Program Grants and others. For small communities with small budgets and part time staff lacking in emergency planning expertise, this is a difficult barrier to overcome. This without beginning to account for the limited grant dollars available, or the already very stiff competition for those same dollars.

Participants were asked what they perceived the specific barriers to planning were in an open-ended format. The answers included: training needs (several mentions), cross jurisdictional training, assistance in planning, communications interoperability issues, lack of time and resources, encouraging participation, inclusion in larger

jurisdiction exercises, organizing volunteers, full exercise observation, and assistance in creating plan updates.

Most of these are resource based concerns. This is a relatively predictable set of responses given the limited resources of smaller communities. Interestingly, there were two responses from Oregon's Native American Tribes, which pose an additional layer of complexity. The Tribes are sovereign nations, yet they too are dependent on State and Federal resources and in need of fully implementing a Preparedness Cycle (see Figure 3) just as all other communities are.

It therefore behooves the State to seek means that leverage every potential tool. In Oregon's case, an under-utilized tool exists in the Oregon State Land Use Planning Goals, in particular, Goal 7: Natural Hazards. The law creating this tool is Senate Bill 100, written decades before the realistic periodicity of Cascadia was known. Utilization of Goal 7 has the potential to incorporate realistic emergency management planning at an appropriate level for every community already statutorily required to write a Comprehensive Plan. The State will need to update this law to include these specific requirements and provide funding or other direct assistance to small communities to achieve this. This is no small task, however, this opportunity is one ripe for further research and legislative consideration.

Incorporation and utilization of realistic natural hazard mitigation planning into Goal 7, and mandated as a required update utilizing a pre-existing process developed decades ago and leveraging the resources of the Department of Land Conservation and Development (DLCD) which manages the Oregon Land Use Planning Goals program, will further the process of increasing the detail and granularity of emergency planning for even the smallest of Oregon communities on a threat realistic basis developed by those communities themselves. Admittedly, this concept requires further research, which is beyond the scope of this paper, and significant legislative support.

This recommendation would accomplish several worthy goals: First, it will help communities to prepare. Second it will provide to the State realistic and detailed information at an appropriate grass roots level, which is where every disaster lives regardless of the scale. Third, the process gathers the information needed to generate the plans that lead to or are necessary for applying for grand funding.

All disasters are local, which means for Oregon approximately 98,500 square miles of local disaster in a Cascadia event that we know is coming, it is a when, not an if. Taking the initiative to incorporate legal requirements for emergency planning is a logical, if not necessary, action for the state to take. Cascadia will be a devastating event, affecting Oregonians for decades. With realistic awareness of the scope and greater meaning for the nation as it simultaneously deals with related disasters in Washington and northern California, it behooves the state, its legislators and its emergency professionals to advocate for the most serious possible planning policies and actions before this disaster occurs. Once Cascadia hits, it will be too late.

An aspect of this paper considered research done by Sarah Allison regarding innovative funding for economic resilience and natural hazard projects. Given the

reality that there will be no windfall in State budget resources, how can the state tackle the costs of realistically and effectively planning for Cascadia? Intelligently combining the needs of different sectors of society, as Allison suggests, is one means of addressing funding. Another is to utilize already existing State departments such as the Department of Land Conservation and Development and enhance their capabilities without either recreating them or going to the expense of creating all new departments. Instead, leveraging existing resources and enabling existing State agencies with an additional mission, seems a reasonable alternative to consider.

Emergency planning is a relatively straightforward process, some of which can be automated as has been demonstrated by the creation of templates already in use across the state. If a small community had access to a web-based program that allowed them to save their progress until completion, provides them with the needed guidance, the ability to seek answers to specific informed questions, and results in the generation of customized emergency plans, it becomes possible they could be created on a large scale across the state at a relatively low cost. Importantly, this could be achieved with the human resources small communities already have, on a timeline that doesn't overwhelm their limited resources.

There are examples of small communities that have leveraged Goal 7 in a very effective manner. Investigating how they did it, and what resources it required of them may enable similar small communities in emulating the excellent example set by the City of Scio. Emulating the example of Scio Statewide would have a marked impact in increasing planning, readiness, and resilience for all communities.

There is no question that Oregon has been forced to face a huge, impending, natural disaster, and must respond with something other than unlimited resources. These issues appropriately acknowledged, Oregon also has underutilized potential in the form of existing state agencies, and a significant opportunity through fuller implementation of Goal 7 to positively impact State resilience and readiness for Cascadia in all communities regardless of size or location. The State also has a wealth of human resources in the form of emergency management professionals, and civil servants who are motivated to add to the State's resilience as much as to their own communities. While much of the information presented in this paper is cause for concern, it also presents a hopeful means of leveraging existing resources to a far more positive result.

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APPENDIX A: SURVEY

The link to the Qualtrics Survey was broadcast through the Oregon Emergency Management Association, the University of Oregon Architecture and Allied Arts Department. The questions and raw results follow:

Question 1: Choose one of the following that best describes your geographic location:

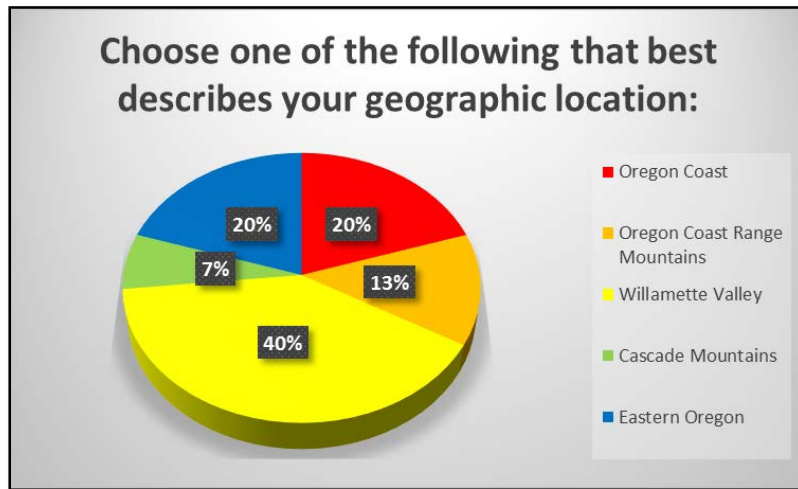


Figure 12: Question 1

Geographic Region	Response	%
Oregon Coast	3	20%
Oregon Coast Range Mountains	2	13%
Willamette Valley	6	40%
Cascade Mountains	1	7%
Eastern Oregon	3	20%
Total	15	100%

Table 6: Question 1

Question 2: Choose one of the following that best describes the population range of your community:

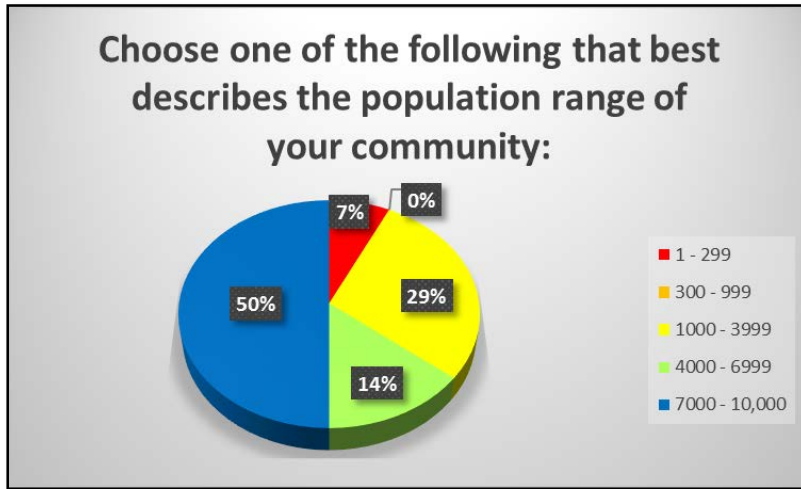


Figure 13: Question 2

Population Range	Response	%
1 - 299	1	7%
300 - 999	0	0%
1000 - 3999	4	29%
4000 - 6999	2	14%
7000 - 10,000	7	50%
Total	14	100%

Table 7: Question 2

Question 3: Does your location have written formally adopted and customized Emergency Management plans, in printed or digital format, separate from County or State level plans?



Figure 14: Question 3

Answer	%
Yes	86%
No	7%
Do not know	7%

Table 8: Question 3

Question 4: Has your community had a State or County declared disaster in the last:

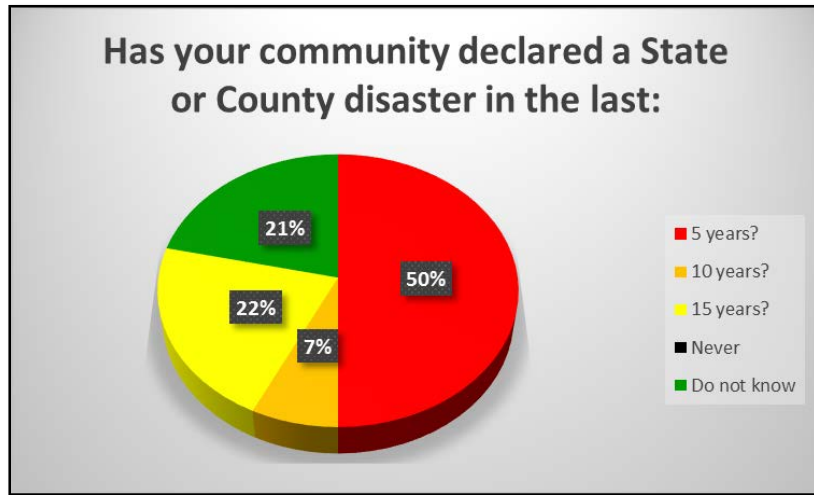


Figure 15: Question 4

Has your community had a State or County declared disaster in the last:	Response	%
5 years?	7	50%
10 years?	1	7%
15 years?	3	21%
Never	0	0%
Do not know	3	21%

Table 9: Question 4

Question 5: Have any city/town/area staff members in positions of responsibility obtained ICS certifications enabling participation in county or state level exercises?

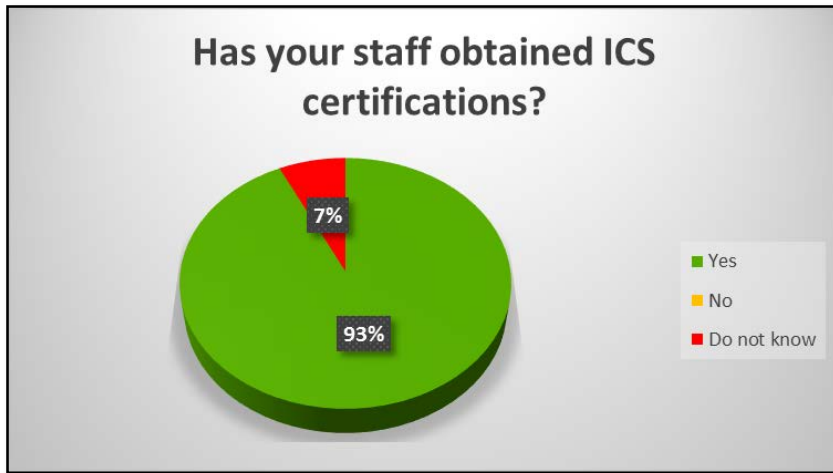


Figure 16: Question 5

Have any city/town/area staff members in positions of responsibility obtained ICS certifications enabling participation in county or state level exercises?	Response	%
Yes	13	93%
No	0	0%
Do not know	1	7%

Table 10: Question 5

Question 6: Has your community participated in Emergency Management drills, table top, or other exercises at the county or state level?

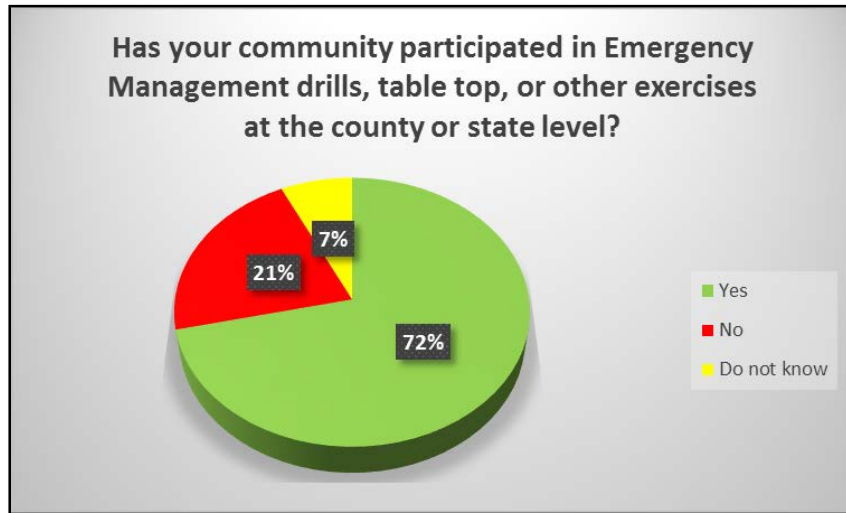


Figure 17: Question 6

Has your community participated in Emergency Management drills, table top, or other exercises at the county or state level?	Percentage	Response
Yes	71%	10.00
No	21%	3.00
Do not know	7%	1.00
Total		14

Table 11: Question 6

Question 7: Consider a large scale Cascadia Fault event: Do you consider your jurisdictions level of planning to be adequate in addressing the needs of your community during the response and recovery from such an event?

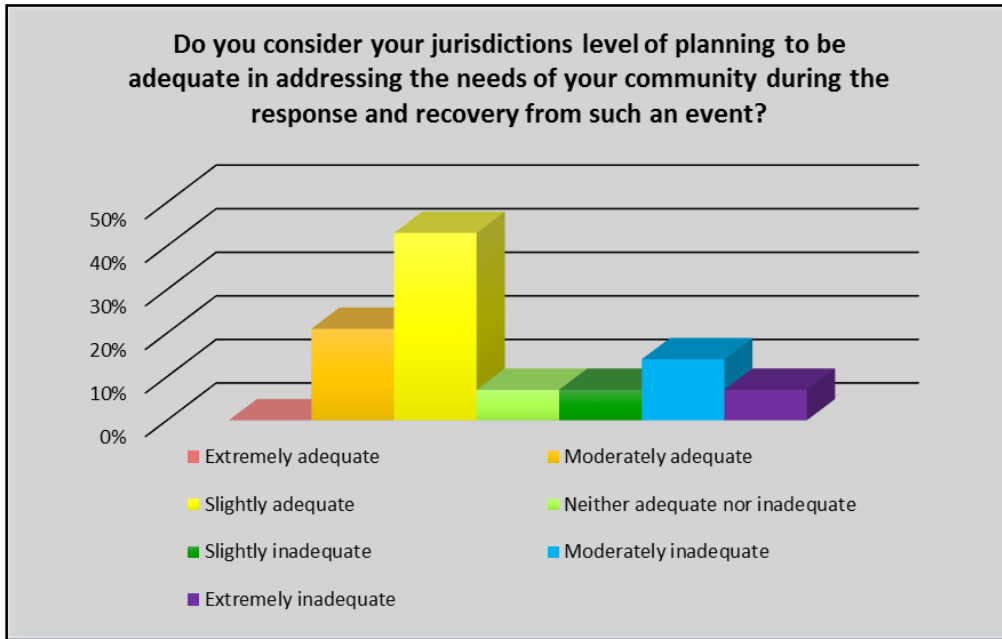


Figure 18: Question 7

Consider a large scale Cascadia Fault event: Do you consider your jurisdictions level of planning to be adequate in addressing the needs of your community during the response and recovery from such an event?	Response	%
Extremely adequate	0	0%
Moderately adequate	3	21%
Slightly adequate	6	43%
Neither adequate nor inadequate	1	7%
Slightly inadequate	1	7%
Moderately inadequate	2	14%
Extremely inadequate	1	7%

Table 12: Question 7

Question 8: Has your jurisdiction considered the impacts of large numbers of evacuees on your community through formal and customized planning efforts specific to your location, regardless of whether the community anticipates direct effects from Cascadia Earthquake shaking?

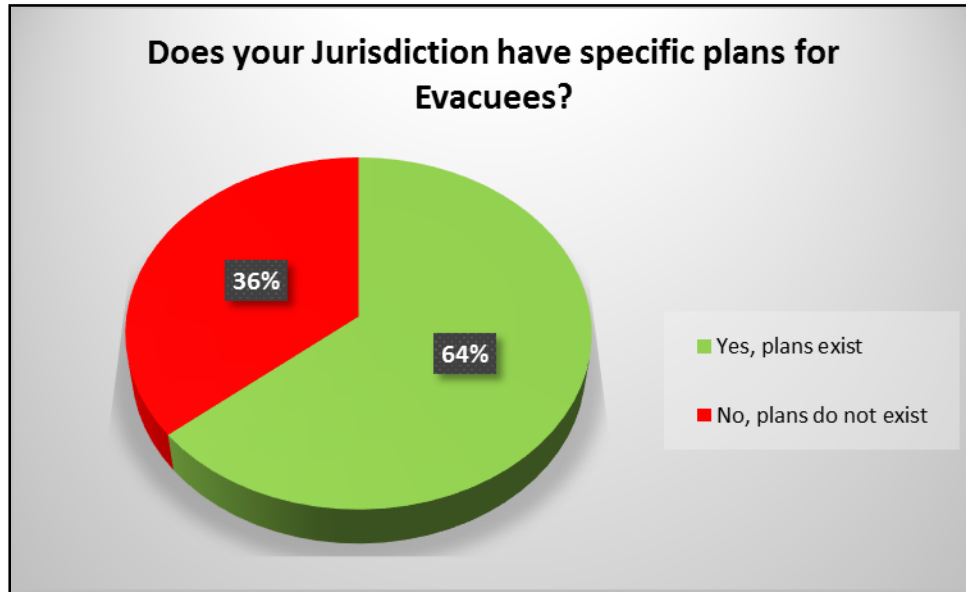


Figure 19: Question 8

Has your jurisdiction considered the impacts of large numbers of evacuees on your community through formal and customized planning efforts specific to your location, regardless of whether the community anticipates direct effects from Cascadia Earthquake shaking?	Response	%
Yes, plans exist	9	64%
No, plans do not exist	5	36%
Do not know	0	0%

Table 13: Question 8

Question 9: Does your location have enough personnel to stand up and activate an Incident Command System (ICS) structure in an Emergency Operation Center (EOC) for an extended period of time? (Longer than 7 days)

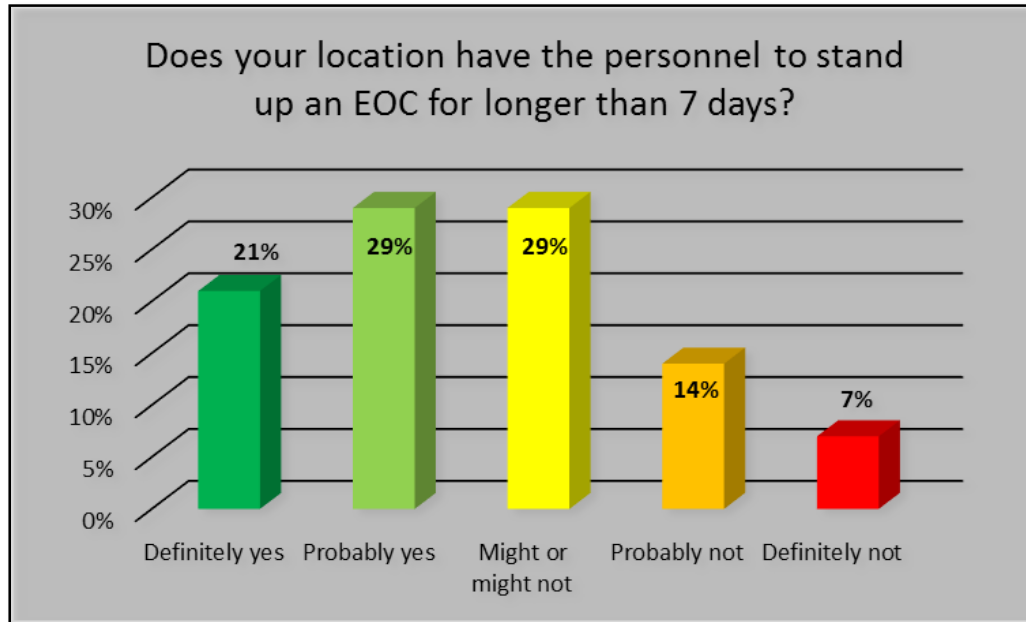


Figure 20: Question 9

Does your location have enough personnel to stand up and activate an Incident Command System (ICS) structure in an Emergency Operation Center (EOC) for an extended period of time? (Longer than 7 days)	Response	%
Definitely yes	3	21%
Probably yes	4	29%
Might or might not	4	29%
Probably not	2	14%
Definitely not	1	7%

Table 14: Question 9

Question 10: In considering county and state and federal level resources, separate from funding or funding availability, what planning activities would benefit your community the most? (In 500 words or less, this is your opportunity to present options, ideas, solutions that you believe would be effective for your jurisdiction with no constraints such as limited availability of funding etc.)

Additional training addressing Command and General staff positions.
The equivalent of ICS management classes held on site and customized to our situation. Purpose to enable broader group to participate AND get experience working together.
Assistance with the framework for planning. Many smaller communities are using firefighters, police officers as our planners and our stakeholders (from the whole community) rarely include anyone with professional planning experience.
we are a Treaty Tribes that require Government to government with BIA and IHS and FEMA we are also a NONPUBLIC LAW 280 tribes that doesn't allow deference Jurisdiction from our State, County, FEDERAL agencies we are a Close reservations one of the remaining few in the Nation
Creating direct emergency communication links with county which we do not have in place since we have no city fire department and no city police department. Joint planning with school district.
Warning in a small City, the two obstacles are time and resources (employees). We do not have the time nor the resources to get the key players together and plan or conduct an exercise. We do what we can, when we can. It would benefit our small City if the State or County Emergency Planner would conduct annual training that requires all key players to attend. Some City departments (Police) train their personnel and participate in joint training exercises when they can, but other key departments and key personnel choose not to participate and therefore are not as prepared as they should be.
To be included in local city (Redacted) tabletop or full scale exercises.
Debris Management Plan update, Fuel distribution plans, disaster caches in more communities.
The (Redacted) Tribe is very active with the 9 Tribes Coalition of Emergency Managers within Oregon. We will be participating in the Oregon Tribal Nations Exercise Plan that is inconjunction with Oregon Cascadia Rising Exercise. The Tribal Emergency Preparedness Program works closely with (Redacted) County Emergency Management in regards to sharing of information, personnel, other resources, and assisting with tabletop exercised such as active shooter in the high school, tabletop exercise for wildland fires, tabletop exercise for Burns and Hines Water capacity during an power outage. The (Redacted) Tribal Council is very active in providing support, and processing policy and procedures for emergency management. Our next step is to conduct tabletop exercises for Tribal Disaster Declaration, and mobilization of our emergency operations center. A strong effort is maintained to keep the Tribal Community appraised of activities for community emergency management.

Table 15: Question 10

APPENDIX B: INTERVIEWS

The interview responses are separated via coding utilized in DOGAMI’s breakdown on expected damages by geographic region to provide additional context. This breakdown can be seen in Figure 9.

General

1. Of the following, what is your geographic Location?

Oregon Coast; Oregon Coast Range Mountains; Willamette Valley; Cascade Mountains; Eastern Oregon (Positive responses are noted with an “I”.)

Coast I

Coast Range

Valley I

Cascades

Eastern Oregon I

2. What is the population of your community?(Must be under 10,000 persons)

Coast 195

Coast Range

Valley 4800

Cascades

Eastern Oregon 6200

3. Has your community had a State or County declared disaster...

- 1) In the last 5 years?
- 2) In the last 10 years?
- 3) In the last 15 years?
- 4) Never
- 5) Do not know

Coast Do not know

Coast Range

Valley Do not know
Cascades
Eastern Oregon 15 years ago

Staffing

4. Does your location have enough personnel to stand up and activate an Incident Command System (ICS) structure in an Emergency Operation Center (EOC) for an extended period of time? (Longer than 7 days)
(Definitely yes * probably yes * might or might not * probably not * definitely not)

Coast Might or might not
Coast Range
Valley Might or might not
Cascades
Eastern Oregon Might or might not

5. How many Full Time Employment (FTE) hours does your community spend on emergency management planning or activities?
(Number of Hours)

Coast 1
Coast Range
Valley 40
Cascades
Eastern Oregon 1

Funding

6. What is the approximate dollar budget reserved for Emergency Management in your area of responsibility?
(Dollar amount (Approximate))

Coast There's no dedicated funding
Coast Range

Valley \$22,500 AmeriCorps position

Cascades

Eastern Oregon \$80,000 for the whole county. None for a specific city.

7. Has your community received grant funding in the past for planning or training exercises? If yes, how long ago?

a. (Yes or no?)

Coast No

Coast Range

Valley AmeriCorps, yes

Cascades

Eastern Oregon Yes

b. (If Yes, How long ago)

Coast NA

Coast Range

Valley Last 6 months

Cascades

Eastern Oregon 18 months ago

Level of Administrative Support

8. How supportive has County level Emergency Management been of your location's planning efforts?

LIKERT SCALE 1) not at all helpful 2) somewhat helpful 3) neutral 4) helpful 5) exceptionally helpful

Coast I'd probably put them at a 4 anyway, if not a 5. Cause actually the county is doing most of the work on our NHMP.

Coast Range

Valley 4 – They are pretty helpful.

Cascades

Eastern Oregon 4 - They are supportive, but they're not jumping up and clapping.

9. How supportive has State level Emergency Management been supportive of your location's planning efforts?

LIKERT SCALE 1) not at all helpful 2) somewhat helpful 3) neutral 4) helpful 5) exceptionally helpful.

Coast 3 - I would put them at a 3, we haven't necessarily reached out to them, so...

Coast Range

Valley 3 - I don't really know who to talk to, or where to look.

Cascades

Eastern Oregon 5 - The State's been very helpful. I reached out to them for information.

Location Specific Planning

10. Does your location have written formally adopted and customized Emergency Management plans, in printed or digital format, separate from County or State level plans?

Coast Yes

Coast Range

Valley No

Cascades

Eastern Oregon Yes - I have county wide plans, both in paper and in a digital format. [So, not specific to (County name redacted)?] It does address [County name redacted], matter of fact that was one of our questions that we had when we recently went through the full adoption. And our county council [attorney?] told me that I did not have to do that, and that's to have each one of the individual city's adopt the document as a separate piece. So, it's a blanket plan that covers the whole county and each one of the city's is addressed within that plan.

11. Which emergency plans does your community currently have? (E.g. EOP, NHMP, COOP, etc.)

Coast Ok, EOP, NHMP, COOP, we do have emergency response plans with our water and wastewater system. I am not sure if that is covered in your other [definitions].

Coast Range

Valley I would say the city itself has none of those.

Cascades

Eastern Oregon EOP, NHMP, and Community Wildfire Protection Plan (CWPP) we are just finishing up the re-write for that that's done every 5 years. A lot of that is directed under SB 360. Which deals with preparing communities for wildfires. Which is of course huge for us every year over here. So those are the three that we currently have. And we are looking at some COOP planning in the next couple of months with some of the new tools that are coming out from the state.

12. Consider a large scale Cascadia Fault event: Do you consider your jurisdictions level of planning to be adequate in addressing the needs of your community during the response and recovery from such an event?

*7 point Likert Scale 1) Extremely adequate * 2) Moderately adequate * 3) Slightly adequate * 4) Neither adequate nor inadequate * 5) Slightly inadequate * 6) Moderately inadequate * 7) Extremely inadequate*

Coast 3 with an explanation. Because I don't think anyone really knows what is going to happen with all of this. So, I think we are as prepared as we can be.

Coast Range

Valley I will say 6, because there are people out there that, you know, there are smart people out there like the fire chief and stuff like that.

Cascades

Eastern Oregon We've done a lot of work in the last 3 to 6 months, so, um, we are a 3.

13. Has your jurisdiction considered the impacts of large numbers of evacuees on your community through formal and customized planning efforts specific to your location, regardless of whether the community anticipates direct effects from Cascadia Earthquake shaking?

Yes, plans exist * No, plans do not exist * Do not know

Coast Not really no.

Coast Range

Valley Not currently but we will be. We are aware there will be an onslaught from the coast. We're in the direct line on the transportation, with the highway.

Cascades

Eastern Oregon Uh, we have not addressed people leaving, we have addressed people coming in. Because we feel that we are going to see a large influx of people.

[that seems like a pretty common sense thing to do.]

Oh yeah, yeah, we just don't know the number. Our area has already been designated as relief, you know, by FEMA, along with Redmond.

Identified areas of weakness

14. What do you perceive to be the top three weaknesses of your area of responsibility? (This can be in planning, a specific natural hazard, funding, or others. This is an open ended question.)

Coast 1- Probably going to be staffing, cause we are going to have to rely a whole lot on outside help. Just because we don't have the manpower. Whether that's volunteer local help or getting help from uh the county or the state. Um other agencies.

2- It's always going to be funding. There's always going to be money issues because our budget are so tight. Um, and um the fact there's a lot of these we don't um we don't have the budget to, and I think this is kind of related in a number of different ways, we don't have the budget to keep ourselves completely prepared. As far as if we have to replace a major section of water line we're going to look for outside funding, in addition to replacement parts and things like that, keeping those on hand, we just don't have the ability to do that, we don't have the capacity to do that.

3- Not that I can think of off the top of my head. The big problem with this is I don't think anybody really knows what's coming.

Coast Range

Valley 1 lack of education, lack of training for civic employees

2 I would say lack of planning.

3 Lack of level of uh level of readiness on the civic level, because even though, because it's a rural area, people tend to be a little more self-sufficient than people living in you know a downtown apartment I think. So rural areas might have well water, etc but um, they tend to be more self-sufficient than people living in town.

Cascades

Eastern Oregon 1- The level of experience of the administration or the people that will be representing the specific agencies, that's simply being based on attrition, people leaving or retirement things like that.

2- two uh...to Allow enough flexibility to be able to work within the plan parameters.

[of the Emergency Operation Plan?]

Uh, yea the EOP.

3- last would be to sustain for long duration of time.

15. Are there barriers to emergency planning in your community? If so, what are they?

Coast Probably the biggest barrier is the amount of time that it takes to do the planning and it takes away from other duties and actually budgeting the time. This probably is a pointed topic right now because this is what I've been working on pretty hard in the last couple of months. It takes a long time to get this stuff done. It takes away from other jobs because we are so limited in our resources here.

Coast Range

Valley Um... barriers. No not really. This city council has made this a priority.

Cascades

Eastern Oregon Uh... we have a large transient population, we are huge in... our area is a 100 million dollar agricultural [area], so we support a lot of seasonal folks and we're a huge recreation mecca in the summer time. So that could present some issues for us. [Are those language/translation issues?] Yeah, translation issues.

Training

16. Have any city/town/area staff members in positions of responsibility obtained ICS certifications enabling participation in county or state level exercises?

Coast Well since I don't know what that is for sure, I am guessing not. [Explanation of ICS provided to interviewee] No, we haven't. Actually I'm not sure if we have someone on the fire department that has. I can't answer that for sure, I haven't. But we could have somebody on our volunteer fire department that has.

Coast Range

Valley Just me.

Cascades

Eastern Oregon I am glad you asked the question! (laughs) Uh, I will share a little story with you, I retired from the fire department, I did a 28 year career with the fire department, so, the fire service within (redacted) County has played with ICS for several years. And we are real good at it. And the appropriate levels of training have been met by the different uh, classes within the organization. Uh, we are starting to see and we have seen over the last couple of years a change in leadership with retirement, and a lot of that uh, impacts me 'cause I have to go out and try to educate people you know, to the importance to maintaining the baseline level of ICS. So we are getting better. Uh, we are getting our law enforcement to be more engaged. Just recently we are getting the Public Works people to take the necessary level of ICS classes. So, it's a work in progress.

[would you say on a civic level, other civil employees other than public works, I am thinking of in some ways elected officials]

The elected officials, no, a lot of that is just uh, just their tenure, and their role. But we are striving towards that. We probably 50% with Law Enforcement, and probably about 30% with public works. And... we are probably I am going to say 50+% with the public health folks that we work closely with.

17. Has your community participated in Emergency Management drills, table top, or other exercises at the county or state level?

a. Yes * No * Do not know

Coast No. Not at the county or state level. Well the Fire department maybe. 'Cause I know that they have been pretty active with the county.

Coast Range

Valley No

Cascades

Eastern Oregon Yes we have. We've conducted two full scale exercises in the last 3 years. And we have more planned.

b. If "yes", how long ago?

Coast NA

Coast Range

Valley NA

Cascades

Eastern Oregon October 2014.

18. In considering county and state and federal level resources, separate from funding or funding availability, what planning activities would benefit your community the most?

Coast I don't really know how to answer that one, like I said, we've got a ton of plans. Um I don't know if, putting more work into planning if that would help us or not. We... I have been working pretty hard lately on making sure I've these plans up to date. So if you are looking for what I think would give more help or I don't know if I have an answer for that. Potentially training, assist us in training with our fire department and coordinating with them. Maybe organizing volunteer staff, cause obviously we are going to have to rely a whole lot on volunteer staff, getting that organized.

Coast Range

Valley I hope to have us Participate, if only as an observer, in the upcoming DR 16 Exercise [**coming in June correct?(Referring to Cascadia Rising)**] then we tentatively have, we will be doing two Table top exercises in the next year. [**so observation of real world and table top exercises**] Yes.

Cascades

Eastern Oregon Oh... I'm gonna say right now uh... some COOP planning. I got excited listening to the short session at the conference about COOP planning. That's actually on our radar screen, but I haven't tried to get implemented this year. Right off the bat, recognizing where we are, myself and my counterparts in the tri-county area which includes Crook and Deschutes county, we recognize that we are going to be on our own for a while. We're not expecting to see any immediate state and federal services come and help us, bail us out.

[Right. It will largely trying to get people out of the immediate impact zones]

Right, it will be the I-5 corridor.

[Discussion on intersecting highways, OR26, OR97, and how this may be a key area in the response]

95% of the liquid fuel we get comes out of Portland, and without that, source, there isn't any fuel. We won't be using the highways after a certain point, until fuel reserves arrive. Then the roadways may be too damaged. We don't know.

APPENDIX C: GOAL 7 ANALYSIS

In order to provide the most readable document, the full excel table is attached in the following pages.

City Name	Population 2010 Census	Geographic Location	County	Comprehensive Plan Date	Goal 7 Mentioned ?	Goal 7 elaborated on, and how	Goal 7 Earthquake Specific? (How)	Comprehensive Plan Location
Yachats	690	Coast	Lincoln County	2008	No	No Statewide Planning Goals directly mentioned. This is a customized document.	Tsunami Specific Not Earthquake Specific, wildfire, landslide, flooding	http://www.yachatsdocuments.info/library/Download.aspx?docid=263
Seaside	6,457	Coast	Clatsop County	1983	No	No	No	http://www.cityofseaside.us/sites/default/files/docs/ComprehensivePlan_0.pdf
Port Orford	1,133	Coast	Curry County	1975	Yes	GOAL 7: AREAS SUBJECT TO NATURAL DISASTERS AND HAZARDS GOAL To protect life and property from natural disasters and hazards in the City of Port Orford and its urban growth area. POLICIES 1. Port Orford will provide protection from flooding by limiting further development in flood prone areas and implementing its flood damage prevention ordinance. 2. Port Orford will encourage reasonable protection from the occurrence of landslides by encouraging the retention of protective vegetation cover on steeply sloping areas which are subject to erosion. 3. Port Orford will develop ordinances which encourage safe land use and construction techniques in hazard areas. 4. Port Orford will encourage development of emergency evacuation routes for disaster preparedness and mitigation.	Earthquakes There are no documented epicenters in the immediate Port Orford area. However, the question of local seismicity is not totally resolved. Historically Port Orford felt an Intensity VIII quake in 1873 and an Intensity III quake in 1932. The earthquake potential can probably be regarded as moderate, although it is regarded as severe by many sources on the basis of the 1873 quake.	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/9283/HT168_P67P67_1975_OCB.pdf?sequence=1&isAllowed=y
Gold Beach	2,253	Coast	Curry County	1998	Yes	6. Natural Hazards Statewide Planning Goal 7 requires the comprehensive plan to identify and protect life and property from natural disasters and hazards known to exist in the area. The natural hazards of the Gold Beach area include flooding, mass movement of earth, wave erosion and deposition, and possible earthquake damage. These hazards are related to the presence of the Rogue River and Pacific Ocean, the varied topography, and the geologic units and structure of the area. The geologic units of the area include beach and dune sand, marine terrace deposits, Quaternary fluvial terrace deposits, sandstone and siltstone of the Otter Point Formation, and serpentinite. These units are described in detail.	Mention of EQ, flooding specific.	https://scholarsbank.uoregon.edu/xmlui/handle/1794/1271
Myrtle Point	2,514	Coast	Coos County	1997	Yes	GOAL 7 Areas Subject to Natural Disasters and Hazards Goal: The protection of life and property from natural disasters and hazards. Policies: 1. The City shall participate in the National Flood Insurance Program. 2. All new development shall conform to the minimum City Code and Flood Insurance Program requirements in flood-prone areas. 3. The City shall limit, or provide appropriate safeguards for development which may occur in known areas of natural hazards. 4. Areas designated as having extreme slopes or ill-suited for development shall be retained as open space to provide soil stabilization, wildlife habitat and general aesthetic.	No	http://www.ci.myrtlepoint.or.us/sites/default/files/fileattachments/general/page/1942/1997_mp_comprehensive_plan.pdf
Coquille	3,866	Coast Range	Coos County	1989	No	Discusses some natural hazards like floods	No	http://www.cityofcoquille.org/document/docs/Complan_and_attrices_map_and_overlay.pdf

Vernonia	2,151	Coast Range	Columbia County	1995	No	Discusses issues with flooding	No	http://www.vernonia-or.gov/tsp/Appendix-B-Goals-Plans-Policies/AppAGoalsPoliciesPlans.pdf
Clatskanie	1,737	Coast Range		1978	No	Refers to Natural Environmental Hazards - Flooding and Flood insurance, and Landslides in particular.	No	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/9275/HT168_CS3554_1978_OCR.pdf?sequence=1
Willamina	2,025	Coast Range	Yamhill County	1979	Yes	Conclusion: The City of Willamina does not comply with Goal 7. The City has inventoried hazards found in the planning area. A plan policy discusses avoiding hazards in residential areas, but no general policies dealing with the hazards in the planning area are provided. The flood hazard ordinance protects development on the floodplain. In order to comply with this Goal, the City must: 1. Adopt policies to assure that adequate safeguards are applied in identified hazard areas; and 2. Adopt additional implementing measures if appropriate.	No	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/9300/HT168_WS44W5_1979_OCR.pdf?sequence=1&isAllowed=y
Myrtle Creek	3,439	Coast Range	Douglas County	2005	Yes	No	No	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/1374/Myrtle_Creek_Compplan.pdf?sequence=1
Creswell	5,031	Willamette Valley	Lane County	1977	No	No	No	https://scholarsbank.uoregon.edu/xmlui/handle/1794/9089
Fairview	8,920	Willamette Valley (Columbia River)	Multnomah County	2004	Yes	Specific Policy information on: Floodplain, Storm Drainage, Impervious surfaces, Wet Soils development, Current Seismic Construction Standard adherence, New Development Wind Load Standards	Earthquakes Fairview and all of Oregon are prone to earthquakes. Land use planning and development should incorporate principles of earthquake preparedness and up-to-date seismic construction standards. Comprehensive Plan - City of Fairview Revised June 2004 Since 1993 new buildings in Oregon have been required to meet more stringent seismic construction standards. Last updated: see website.	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/1889/Fairview_Compplan.pdf?sequence=1&isAllowed=y
Sweet Home	8,925	Willamette Valley	Linn County	2010	Yes	Policy 1 The City's Goal 5 and Goal 7 inventories, as mapped (also available in the City's GIS computer software), shall be used for general identification of areas that have natural features where the protection and enhancement of the resource are encouraged.	No	http://www.ci.sweet-home.or.us/documentcenter/view/2472
Monroe city	617	Willamette Valley	Benton County	2010	Yes	No	No mention	http://www.ci.monroe.or.us/docs/Monroe%20Comprehensive%20Plan.pdf
Scio	838	Willamette Valley	Linn County	2016	Yes	Goal 7 - AREAS SUBJECT TO NATURAL HAZARDS: To protect people and property from natural hazards.	Entire Section on Natural and Geologic Hazards. Includes Earthquake, Landslide, Flooding and Volcanic Hazards. Very robustly built out, GREAT example.	http://ci.scio.or.us/LinkClick.aspx?fileticket=roBR23Hfyy0%3d&tabid=6848&mid=17091&language=en-US
Westfir	253	Cascade Range	Lane County	1980	Yes	No	No	http://www.lanecounty.org/departments/pw/lmd/landuse/documents/cities%20igas%20and%20comp%20plans/westfir%20comprehensive%20plan.pdf
Oakridge	3,205	Cascade Range	Lane County	1993	No	NA	No	http://www.ci.oakridge.or.us/sites/default/files/fileattachments/general/page/831/city_of_oakridge_comp_plan.pdf

Shady Cove	2,904	Cascade Range	Jackson County	2004	Yes	Discussion of Flood Plain Insurance, and fold control measures (Lost Creek Dam)	No	http://www.shadycove.net/Comprehensive%20Plan%202004.pdf
Talent	6,066	Cascade Range	Jackson County	2007	Yes	Specifically addresses Natural Hazards: Floods, and critical facilities and their vulnerability to them. Also discusses Hazard Mitigation, Emergency Response, and Recovery. Contains 2 specific goals, several Policies, and numerous implementation strategies. This is one of the best so far found, THIS IS A GREAT EXAMPLE.	Yes	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/5848/Talent_Compplan.pdf?sequence=1&isAllowed=y
Canyonville	1,884	Cascade Range	Douglas County	1973	No	NA	No	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/9176/HT168_C37U45_1973_OCR.pdf?sequence=1&isAllowed=y
Lakeview	2294	Eastern Oregon	Lake County	1988	Yes	C. Recommendations 1. That known levels of flooding be documented. 2. That provisions be made to insure that road and utility construction and run-off from development east of Town will not increase landslide or flood hazards downhill. 3. That units of local government work jointly in solving floodplain problems that are inclusive of more than one jurisdiction. 4. That ordinances be developed preventing encroachment into or filling of natural drainways or waterways. 5. That detailed information showing the extent and degree of landslide, flood, or other hazards be provided by developers when potentially hazardous areas are proposed for development.	Yes. Geologic Report. Flooding, landslide	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/4885/Lakeview_Compplan.pdf?sequence=3&isAllowed=y
Baker City	9828	Eastern Oregon	Baker County	1978	Yes	To protect life and property from natural disasters and hazards. Refer to Existing Natural Features and Land Use.	No	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/9273/HT168_B345B35_1978_OCR.pdf?sequence=1&isAllowed=y
Halfway	288	Eastern Oregon	Baker County	1979	Yes	vi. Other Areas Subject To Natural Disasters and Hazards: To protect life and property from natural disasters and Hazards. A. Policies 1. New developments of land will not increase flood hazards nor restrict or divert flood waters into areas not previously subject to flooding, and flood plains will be regulated to meet requirements of the National Flood Insurance Program when flood elevation data becomes available. 2. Existing irrigation ditches will be maintained so as to minimize flood danger. B. Recommendations 1. New land development should meet adequate levels of fire safety requirements. 2. High groundwater areas should be napped and development limitations recognized.	No	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/8944/HT168_H345H35_1979_OCR.pdf?sequence=1&isAllowed=y
Wallowa	808	Eastern Oregon	Willowa County	1982	Yes	Contains a summary, findings, and recommendations all related to flooding.	No	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/9140/HT168_W256W352_1982_OCR.pdf?sequence=1&isAllowed=y
Hines	1563	Eastern Oregon	Harney County	1979	Yes	Contains information on Floodplain, Steep slopes, and Earthquake hazards - noting in particular that lack of long term earthquake history information. Even included some epicenter information as it existed in 1979. Also has a Seismic Risk Zone map...Including generally accurate risk zones!	Yes	https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/9281/HT168_H56M67_1979_OCR.pdf?sequence=1&isAllowed=y