Oregon Seismic Safety Policy Advisory Commission

OSSPAC

Mass Care and Mass Displacement
after a Cascadia Subduction Zone Earthquake

OSSPAC Publication 18-02
September 25, 2018

For: THE STATE OF OREGON
Mike Harryman, State Resilience Officer

Oregon Seismic Safety Policy Advisory Commission

After the Loma Prieta earthquake in 1989, Oregon residents wanted the State of Oregon to better address earthquake hazards throughout the state, so the State Legislature established the Oregon Seismic Safety Policy Advisory Commission (OSSPAC) in 1991 through Senate Bill 96. The Commission is a group of eighteen individuals appointed by the Governor representing a variety of interests regarding public policy and earthquakes and includes representatives of many state agencies, a member each from the Oregon House and Senate, representatives of important stakeholder groups, and members of the public. OSSPAC's mission is to positively influence decisions and policies regarding pre-disaster mitigation of earthquake and tsunami hazards, increase public understanding of hazard, risk, exposure, and vulnerability through education, and be responsive to new studies or issues raised around earthquakes and tsunamis.

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preface

In June of 2017, Senate Bill 850 was adopted by Oregon Legislature and signed by the Governor. It directed the Oregon Seismic Safety Policy Advisory Commission (OSSPAC) to form committees to review policy options, review existing reports and studies by state agencies, and prepare recommendations for policy measures to protect lives and preserve residential housing following a major earthquake or tsunami event and to protect lives during and after a major earthquake or tsunami event, including but not limited to policy measures to address mass care and mass displacement strategies.

This report focuses on mass care and mass displacement. General findings and recommendations are presented first, followed by findings and recommendations for the following topic areas, which were explored per the Legislature's request.

1. The provision of temporary shelters, semi-permanent, and permanent housing;
2. Supplying adequate food and water;
3. Supplying emergency health services; and
4. Providing transition services and recovery assistance.

Throughout this report, the term "Cascadia event" is used to represent the Cascadia Subduction Zone earthquake and resulting tsunami.

In gathering input for this report, the Mass Care/Mass Displacement Group of OSSPAC consulted with the State Resilience Officer and engaged other state, local, and tribal government officials. A small task force designed and held stakeholder workshops dedicated to each topic area at various locations throughout the state. Testimony was gathered from representatives of non-governmental organizations, private industry, insurance companies, and members of the public.

OSSPAC received organizational support from the Department of Human Services, Oregon Health Authority, Oregon Emergency Management, the Regional Disaster Preparedness Organization, American Red Cross, and Mercy Corps.

Jay Raskin
OSSPAC Chair

Jeffrey R. Soulages
OSSPAC Vice-Chair

executive summary

Through Senate Bill 850 in 2017, the Legislature tasked the Oregon Seismic Safety Policy Advisory Commission (OSSPAC) with forming a committee to review policy options, existing reports, and studies by state agencies and to prepare recommendations for policy measures regarding mass care and mass displacement to protect lives during and following a major earthquake or tsunami event. Through stakeholder meetings and testimony, OSSPAC in partnership with Department of Human Services and Oregon Health Authority, investigated existing mass care and mass displacement efforts to identify best practices and effective means for state, local, and tribal governments to improve upon them. The commission's major finding and recommendations are as follows:

Summary of Major Findings

A. **Oregon is currently not prepared to provide mass care and mass displacement services for its residents and visitors following a Cascadia earthquake and tsunami.** The magnitude of the damage will overwhelm capacities in all levels of government and requires more focused and collaborative planning efforts, as well as more resources. Oregon has begun the process of remedying this situation by creating the Oregon Emergency Management Plan and the Oregon Disaster Recovery Plan.

B. **Planning and implementation of mass care and mass displacement measures are hindered by gaps, lack of coordination, and funding at all levels.** As explained in the Secretary of State's recent report "The State Must Do More to Prepare Oregon for a Catastrophic Disaster," the state lacks key elements needed for an effective emergency management program, and Oregon Emergency Management does not have sufficient capacity to fulfill its role in coordinating the state's response. In addition, other agencies with responsibilities in the State's emergency response and recovery functions do not have sufficient staffing and funding to implement their responsibilities. Similar situations exist within city, county, and tribal governments.

C. **Making Oregon more resilient is the best solution for solving mass care and mass displacement issues.** Improving seismic performance of the housing stock will reduce the need to provide shelter and recreate lost housing. Seismic improvements and resilience measures for hospitals and healthcare facilities will ensure that they can provide needed medical services. Improvements to the state's transportation system will improve logistical support so that needed food and supplies can reach affected populations. Resilient water and wastewater systems will ensure that water is available and that sanitation needs are met. Resilience measures will reduce the needed emergency response capabilities to manageable levels.

Summary of Major Recommendations

A. **Implement the Secretary of State's recommendations for Oregon Emergency Management and the Governor's Office.** These recommendations will improve mass care and mass displacement response by improving the emergency response structure and continuity of operations planning, meeting minimum emergency management program standards, reporting on efforts to improve state resilience, defining roles and responsibilities, and assessing and filling resource gaps. (Recommendation 1, p. 8)

B. **Provide transparent and consistent funding mechanisms for all mass care and mass displacement coordination and resilience planning.** State agencies with mass care roles need to have stable funding for specific programs to ensure their emergency and recovery functions are adequately executed. (Recommendation 2, p. 9)

C. **Strengthen logistics planning between local, state, tribal, and federal agencies to support mass care and mass displacement efforts.** Logistical support for the coast is especially important. (Recommendation 9, p. 18)

D. **Implement a robust post-disaster building assessment program.** Currently there is no program to identify and assess damaged buildings. This is a critical issue during the response phase when it becomes necessary to open shelters and confirm the safety of healthcare facilities and other essential facilities. Building assessment is one of the first steps of the recovery phase. The assessment program should include the use of design professionals and a system for building owners to pre-certify private post-earthquake inspectors. (Recommendations 11-13, p. 20)

E. **Define the roles that schools should play in preparedness and emergency response.** The Department of Education and the Department of Human Services should clarify the expectation that schools will be used as shelters, define the responsibilities of school staff, require preparedness messaging in schools, and encourage supply storage on or near school grounds. (Recommendation 14, p. 24)

F. **Provide Oregon Health Authority with resources to improve the preparedness and resilience of healthcare facilities.** This would include improving the seismic safety of the facilities, refining oversight programs, assisting hospitals in meeting construction deadlines, creating standards for continuity of operations planning, developing Cascadia Resilience Action Plans, and creating a coastal hospital resilience network, among others. (Recommendation 23, p. 39)

G. **Encourage the nonprofit and philanthropic communities to plan for a Cascadia earthquake and tsunami.** Nonprofits often play a critical role in providing services and housing to vulnerable populations. Few of these organizations have continuity of operations (COOP) plans that address providing services post event. State and local governments can encourage nonprofits with whom they contract to have COOPs in place. The current funding structure makes it difficult for these organizations to fund additional capacity or to increase the resilience of their facilities. Nonprofits and philanthropic organizations are beginning to address these concerns, but further progress is needed. (Recommendation 4, p. 11)

chapter one

Oregon's Planning Dilemma

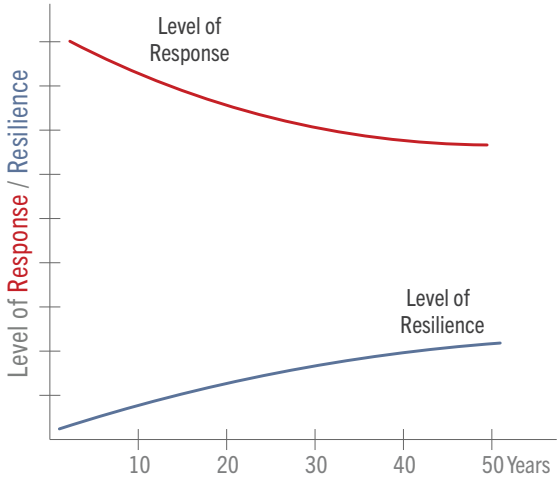
A full 9.0 megathrust Cascadia earthquake and resulting tsunami will create an unprecedented magnitude of emergency need. Federal and international response will be slow to arrive. In many cases, individuals will need to take care of themselves and their households for at least two weeks or more. The State, counties, local communities, nonprofits, and the healthcare system will be expected to assist those who are without shelter, water, food, sanitation services, critical supplies, and medical services.

Reaching impacted populations, many of whom will be isolated, will present a level of operational complexity our state and country have never seen before. The Oregon Coast will experience the most severe damage due to extreme earth movement and a tsunami. It faces exceptional challenges for providing mass care and displacement services due to its constantly fluctuating population and fragile transportation system.

We currently have low resilience and low capacity to provide for the enormous emergency response that will be needed to support those most highly-impacted by a Cascadia event. Our basic infrastructure and critical buildings were built before we knew our earthquake and tsunami risks, and it will take time to bring them up to appropriate standards. At the same time, our current State and local emergency response planning is geared toward routine hazard events and is only now beginning to address a catastrophic event.

We are not prepared if a Cascadia event happens in the near future. As resilience improves, emergency response needs will become more manageable, but given that a Cascadia event could happen at any time, there is an immediate need to quickly improve emergency response to prepare for it. The following graphs illustrate this dilemma. The ascending line shows increasing levels of resilience. The descending line shows the need for emergency response, which decreases as we increase resilience. If Oregon is successful in increasing resilience, these two lines will cross in the future (Graph 1). If Oregon continues upon its current path, emergency response needs will continue to be unmanageable (Graph 2).

Graph 1. Aggressively Working Toward Resilience



Graph 2. Continuing on Current Path

chapter two

Background

Oregon Resilience Plan

In 2013, OSSPAC delivered the Oregon Resilience Plan (ORP) to Legislature. The ORP lays out a 50-year plan for Oregon to prepare for a Cascadia Subduction Zone event. It divides the state into four zones, which reflect various levels of impact: tsunami inundation, the Coast (earthquake only), the Valley, and Central/ Eastern Oregon. The report examines the unique challenges of coastal communities, which will experience the strongest shaking and a tsunami. It assumes complete destruction in the tsunami inundation zone and a need to care for the displaced residents and visitors in the coastal zone.

The focus of the ORP is primarily on Oregon's infrastructure and critical and essential facilities. While the ORP does not directly focus on social resilience, its recommendations about individual and community preparedness are relevant to social resilience. Likewise, the ORP's recommendations regarding improvement to critical infrastructure are fundamental to ensuring that response and recovery are possible. Infrastructure goals provide targets for estimated recovery time for each zone (tsunami inundation, Coastal, Valley, Eastern). In general, the goal is to provide water supplies within 0-24 hours, to support emergency services within 1-3 days, and to control threats to public health and safety within 2-4 weeks.

The restoration time goals for critical facilities relevant to mass displacement are:

- Healthcare Facilities: Immediate
- Emergency Shelters: 72 hours
- Residential Housing: 72 hours

SB 850 further extends the scope of the ORP into social resilience areas.

Response and Recovery Roles

Oregon's emergency response and recovery structure begins locally and expands as needed. Local and tribal governments (supported by community partners) are responsible for providing emergency services and receive support from the county, tribal, state, and federal government depending on the extent of the disaster. Following federal guidelines, the State and some counties and tribal governments have created plans for emergency and recovery response operations.

Oregon revised Statute 401.054, Emergency Management and Services, requires state agencies to designate a liaison to the Office of Emergency Management. Of those, some agencies assume primary responsibilities for certain aspects of response and recovery operations that are identified in the Oregon Emergency Operations Plan (2017) and the Oregon Disaster Recovery Plan (2018), while others play a less operational role. The "lead agency" responsibilities are identified as Emergency Support Functions (ESF) during a response operation and State Recovery Function (SRF) during recovery operations. The intention is a coordinated, multi-agency effort which relies on agencies understanding their roles and how they fit into the overall effort.

During a state-declared emergency, Oregon Emergency Management (OEM) is the lead state agency identified for coordinating and facilitating private sector and governmental efforts. Other state agencies are assigned to an ESF and SRF, which allows them to work together with OEM to effectively manage statewide disaster relief efforts. The Oregon Emergency Operations Plan and the Oregon Disaster Recovery Plan define these roles. Figure 1.1 outlines roles specific to mass care and displacement.

Emergency Support Function (ESF)	Coordinating Agency
ESF 6 Mass Care	Department of Human Services
ESF 8 Health & Medical	Oregon Health Authority
ESF 11 Food & Water	Department of Human Services
State Recovery Function (SRF)	**Coordinating Agency**
SRF 3 Health Services	Oregon Health Authority
SRF 4 Social Services	Department of Human Services
SRF 5 Disaster Housing	Oregon Housing & Community Services

Figure 1.1 Response and Recovery Roles

In general, cities and counties are responsible for providing local response and recovery strategies. Nonprofit organizations are also regarded as a critical part of emergency response and recovery since they provide a range of social services that are essential to the livelihood of some of our most vulnerable community members.

Equity

Demographic and socioeconomic characteristics make some members of our society disproportionately more vulnerable than others. They have less capacity to anticipate, cope with, and recover from the impacts of disasters. This report seeks to represent all Oregonians - the whole community, with a special focus on individuals with access and functional needs, as well as communities that have historically been underserved or underrepresented.

Developing equitable mass displacement plans, processes, and policies aligns with our state values. It is the right thing to do, and it is our legal mandate. It also aligns with FEMA's "whole community" approach to emergency management, which enables a wider range of players to participate. Private and nonprofit sectors, including the general public, are included in preparedness activities in order to foster better coordination and working relationships with federal, state, tribal, and local government partners.

Definitions of Mass Care and Displacement

"Mass displacement" refers to a situation in which a significant number of people are forced to leave their homes due to sudden shocks or stresses, including armed conflict, civil unrest, or natural or man-made disasters. A Cascadia event is expected to cause the largest episode of mass displacement the United States has ever seen due to natural disaster. Those displaced by the event will need all aspects of their well-being to be addressed.

Those who are displaced by a Cascadia event, and even many who are not, will need "mass care." This report uses the National Mass Care Council's definition of mass care, which seeks to incorporate the whole community, including underserved and vulnerable populations, focusing on:

- Sheltering (including household pets)
- Feeding
- Distribution of emergency supplies
- Family reunification services
- Immediate health, emotional, and spiritual health services
- Access to information

Several issues related to mass care and displacement have not been addressed in this report due to limited time and scope of research. The Committee prioritized the issues which were raised most prominently during the public workshops. These are discussed in both the general findings section and in the body of the report. More research is needed to provide recommendations around reunification services, psychosocial support, protection, access to information, long-term housing, and income generation, which are all important aspects of mass care and displacement.

Although progress has been and is being made, Oregon is currently not prepared to deal effectively with mass care and mass displacement needs following a Cascadia event. This stems from a general lack of preparedness in all sectors, insufficient data and planning, limited logistical capacity, the absence of a damage assessment system, and inadequate leveraging of community assets. These major issues require the state's attention and investment.

chapter three

Lack of Preparedness in All Sectors

Government

The Oregon Secretary of State's January 2018 report "The State Must Do More to Prepare Oregon for a Catastrophic Disaster" revealed that Oregon Emergency Management (OEM) does not meet key emergency management standards. It found that planning across all levels of Oregon's emergency management system is lacking, critical continuity of operations plans are missing or incomplete, and statewide staffing is inadequate to reduce Oregon's vulnerability to disasters. The report included 11 recommendations directed to OEM and the Governor's office.

Oregon Emergency Management and key state agencies responsible for leading or supporting Emergency Support Functions (ESFs) and State Recovery Functions (SRFs) are not adequately staffed or funded to complete their assigned tasks. Key agencies such as OEM and the Oregon Health Authority (OHA) fund their programs through federal grant programs that have goals which may not align with state planning needs. Many agencies do not identify ESF and SRF operations as a primary responsibility and thus do not budget for them. Local governments experience similar challenges and need state support and leadership to address them. Providing general fund dollars for core programs would ensure more efficient planning that is focused on Oregon's challenge of preparing for a Cascadia event.

Oregon's overall lack of preparedness holds true for its ability to provide mass care and mass displacement services. It is the responsibility of local government to provide services for displaced people. Due to a lack of resources, few local jurisdictions have mass care and mass displacement plans, and even fewer have plans that are adequate for a Cascadia-level event. The lack of planning is particularly evident in rural areas, which have little capacity to deal with planning or implementing mass care and mass displacement plans.

The impacts of a Cascadia event will last for years. With the adoption of the State Recovery Plan in 2018, Oregon can now start addressing the relocation, land development, infrastructure, and market problems associated with widespread long-term displacement. It is within this poorly understood transition period that issues of displacement, temporary housing, long-term housing, and land development issues rise to prominence. Among the embedded concerns are social vulnerability, displacement of large populations, resettlement and housing provisions, return decisions, and short-term thinking about land development. Recovery planning allows the opportunity to apply a resilience "lens" with which pre-disaster mitigation is considered alongside post-disaster mitigation. This will reduce vulnerabilities and enhance emergency response efforts.

Recommendation 1: Oregon Emergency Management (OEM) and the Governor's Office should adopt the recommendations outlined in the Secretary of State's January 2018 report, "The State Must Do More to Prepare Oregon for a Catastrophic Disaster."

In receiving additional support, OEM should take the following actions:

- Continue to advocate for resources through the state budget process so that it can fulfill its role as the state's emergency management coordinator.
- Clearly define expectations for each Emergency Support Function and State Recovery Function partner, as designated in ORS 401.054. Specifically define roles and responsibilities with respect

to all four phases of the emergency management cycle: preparedness, mitigation, response, and recovery. Provide written guidance and expectations, such as position descriptions and orientation materials, to prepare agency staff identified to serve as liaisons to OEM.

- Ensure the plan clearly identifies gaps in existing programs and identifies the resources needed to fill those gaps. Share the plan and clearly communicate the revisions to staff and others in the emergency management system.

Recommendation 2: The State should provide a transparent and consistent statewide funding mechanism for Emergency Support Functions (ESFs) and State Recovery Functions (SRFs) so they can carry out their responsibilities within mass care and mass displacement coordination and resilience planning.

- State agencies with mass care and mass displacement roles (Department of Human Services, Oregon Health Authority, Oregon Housing and Community Services, etc.) need specific programs for their ESF and SRF responsibilities to ensure that funding can be provided.
- Stable funding is needed for the core emergency preparedness and resilience efforts. Federal grant money should be used for special projects.
- In order to ensure a smooth transition between recovery and reconstruction efforts, the agencies should plan and coordinate between local emergency managers, nonprofit organizations, community-based organizations, land-use planners, engineers, public works officials, and others involved in rebuilding efforts.

Chetco Bar Fire

During the Chetco Bar Fire in late 2017, state officials assisted the local community by providing contingency planning for the evacuation of residents from Brookings, Oregon to areas in California. These efforts were led primarily by the Department of Human Services and the Oregon Health Authority. A lack of resources for pre-disaster planning and a shortage of trained personnel during emergency operations inhibited the ability to establish and execute operational goals effectively.

Recommendation 3: State Recovery Plans should include pre-disaster mitigation, especially those things that reduce social vulnerabilities.

- The state should resource a designated agency to lead mass displacement planning.
- Emergency response planning (ESF 6, 8, and 11) needs to be coordinated with hazard mitigation planning.
- Planning should bridge the gap between immediate shelter and semi-permanent housing, and it should address concerns about social vulnerability, land use planning and housing availability.

Nonprofit Organizations

Both the State and local communities rely on nonprofit organizations to provide a range of social services that are essential to the livelihood of our most vulnerable community members. In some cases, they are contracted by the State to do so. The roles that nonprofits play will be just as critical, if not more so, during emergency response and recovery.

A 2018 survey of 140 Oregon nonprofits showed that most of them expect to play a role in disaster response, including providing food, water, shelter, and behavioral healthcare services. They also expect to play a role in post-disaster recovery by providing grants for temporary housing and repairing multi-family housing structures, providing furnishings to those in need, mobilizing volunteers to assist with debris cleanup, and more.

In general, these organizations recognize that they are currently ill-prepared to provide services following a Cascadia earthquake. According to the survey, some have never engaged in disaster resilience practices. Few have business continuity plans, and of those, even fewer have plans that include a catastrophic component. Most have limited staff/volunteer time and lack financial resources to devote to disaster planning. The grant funding model on which most of these organizations rely does not allow cash reserves or stockpiling of supplies, which tend to be viewed as an inefficient use of grant dollars. For capital projects, grants will only cover seismic standards that meet life safety code requirements but do not include the seismic performance levels that will assure post-earthquake habitability or operations.

There is a need for nonprofits to work with the philanthropic community to develop a resilience planning model that ensures they will be able to continue their core missions following a Cascadia event. Where the State, local, or tribal governments are contracting for social services from nonprofits, these jurisdictions should provide clear and reasonable expectations for post-event continuation of these services.

Recommendation 4: State, local, and tribal governments should encourage nonprofits providing critical social services to have continuity of operations plans that extend their ability to provide these services following a Cascadia event.

- Continuity of operations plans should be comprehensive and include basic training for staff on the risks of a Cascadia event, as well as how to prepare at home and work.
- The philanthropic sector should be encouraged to aid in building local capacity of nonprofits to continue their core missions following a Cascadia event.

Voluntary Organizations

Volunteer organizations, such as Oregon Volunteers Active in Disasters (ORVOAD), Community Emergency Response Teams (CERTs), and the Medical Reserve Corps help provide basic disaster response. Since a Cascadia event will seriously limit the capacity of professional responders, the role of these volunteer groups will become a critical component of effective response and recovery. Active CERT programs exist throughout Oregon, but there are rural and remote areas where the program is struggling or does not yet exist due to lack of capacity to support the program.

Professionals active in the Medical Reserve Corps are part of the State Emergency Registry of Volunteers (SERV-OR) system and are covered by Oregon Health Authority for worker's compensation for injuries incurred while performing emergency service activities under the direction of a public body. Unlike in Washington state, Oregon CERT volunteers are not currently eligible for this protection. This is a huge issue for these volunteers throughout the state. Having OEM certify eligible CERT members and add CERT volunteers to the SERV-OR system would alleviate these concerns and aid in increasing statewide participation in these volunteer programs.

FEMA provides CERT programs with minimal funding that provides volunteers with a fairly narrow scope of disaster response training. CERT participation and utility could be furthered enhanced by providing training that falls outside the scope of FEMA's curriculum. For example, CERTs could be trained to identity initial damage following the earthquake. This has been identified as a huge need by local emergency managers following the Cascadia Rising exercise of 2016. CERT usefulness could also be expanded by offering training to non-English speaking communities.

Recommendation 5: Oregon Emergency Management should support the statewide registration and certification of CERT volunteers as part of the SERV-OR system so that CERT volunteers will be covered by worker's compensation and can be part of an integrated deployment procedure.

- Citizen Corps Council should be funded so that it can provide training that falls outside the scope of FEMA's curriculum, such as damage surveys, etc.
- CERT training should be offered in multiple languages to expand the program's usefulness to non-English speaking communities.

The Public

Considering Oregon's anticipated infrastructure damage and its low level of government and institutional preparedness, it is absolutely vital that the public is as prepared as possible to live without services for some time. There is consensus that individuals and communities are vastly underprepared, although there is no clear way of measuring their preparedness.

Some progress has been made in public preparedness education thanks to hard work and increased media coverage. State and local jurisdictions have increased food and water storage recommendations from 72 hours to two weeks. Many jurisdictions have seen a drastic increase in volunteerism for programs such as CERTs, as well as increased demand for earthquake-related information and presentations. In some areas, there has also been increased prioritization of outreach to groups that have not historically received preparedness messaging.

Effectively increasing community preparedness and resilience requires understanding the capacity, concerns, and needs of all community members. It involves helping community members empower themselves with confidence, knowledge, and skills that are useful in their everyday lives and during and after a disaster. However, since Oregon does not experience regular disasters, it is difficult to inspire a culture of hazard awareness, mitigation, and preparedness. Jurisdictions need support gathering data, accessing information about best practices, and coordinating clear, consistent messaging that inspires people to act.

Recommendation 6: Oregon Emergency Management should improve and expand the state public preparedness campaign and provide recommendations and support for local jurisdictions.

- Messaging efforts should follow best practices and reflect the needs and capacities of different communities. Materials should be provided in multiple languages and formats. Self-sufficiency recommendations for coastal residents and those in remote areas should be increased to one month. These public service announcements should be disseminated via radio, television, social media, billboards, etc.
- State, local, and tribal government employees should be targeted to ensure continuity of operations post event.

Private and Institutional Sectors

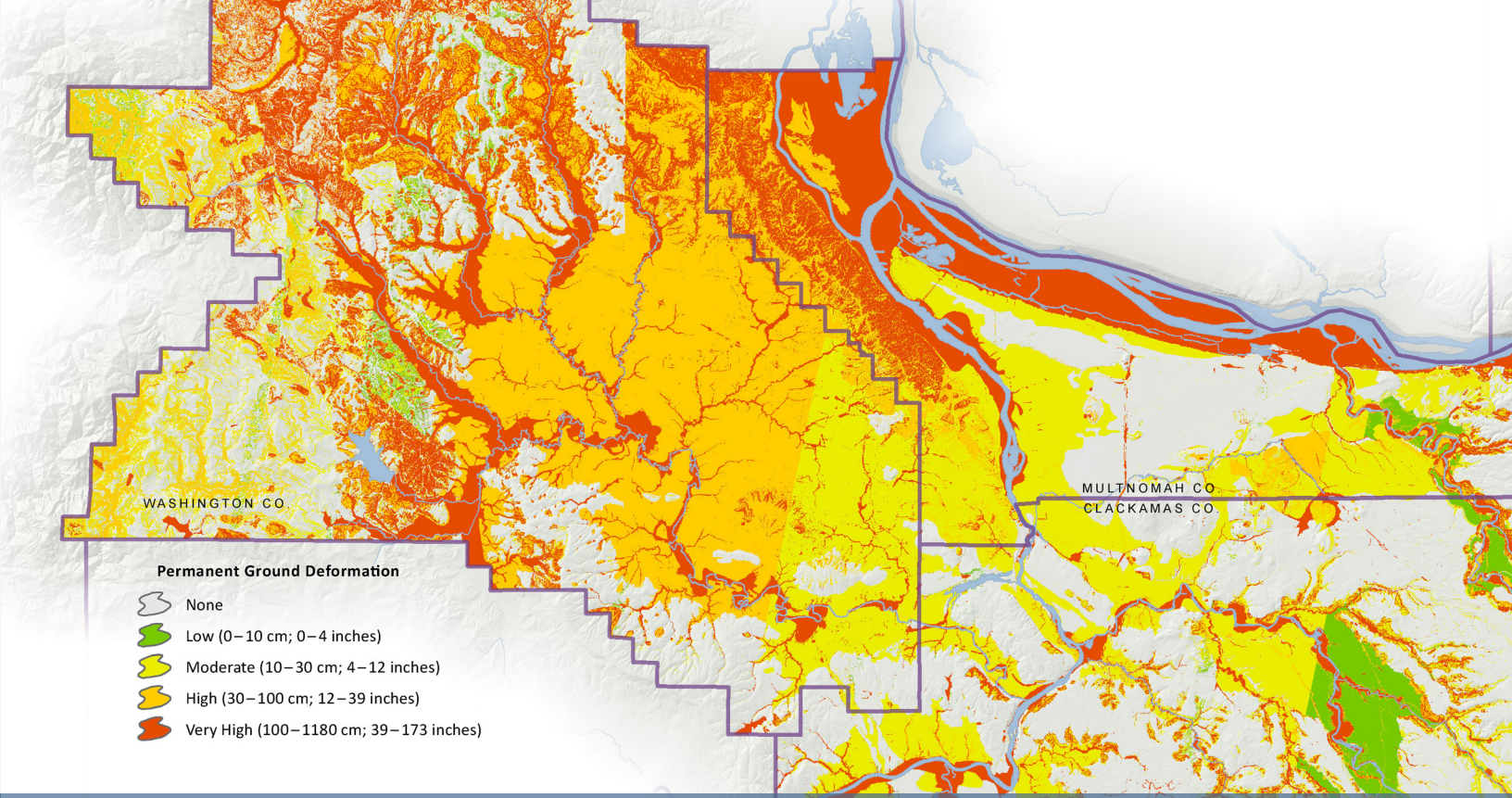
It is unclear how prepared Oregon's employers are for a Cascadia event, both in terms of emergency preparedness and resilience planning. This includes the private sector, healthcare, and K-16 schools. These sectors have many resources that could support emergency response and recovery. They can help preparedness efforts by ensuring their employees are prepared and by supporting preparedness efforts in the wider community. They can model good practices by ensuring strong continuity of operations plans and working with response agencies to ensure life-saving food, water, medicine, and shelter materials are available for a Cascadia event.

Portland BEECN Program

Portland's Basic Earthquake Emergency Communication Node (BEECN) program is a model for post-disaster public communication planning. 24-48 hours after a major disaster, volunteers will arrive at pre-identified sites across the city to operate two-way radios and interface with the community. They will report severe damage and casualties to the City's Emergency Coordination Center and communicate information to the public about the location of shelters, evacuation routes, food and water distribution, etc.

Recommendation 7: Oregon Emergency Management should fund a Public-Private Sector Partnership staff position and further develop the scope of the position.

- Develop a well-defined position that can create a robust public-private partnership program which provides additional resources for preparedness outreach and mass care efforts.
- Direct this position to identify and work with roles in other agencies with ESF/SRF functions that could strengthen public-private partnerships, particularly in ESF 18 - Business and Industry.



chapter four

Increasing Knowledge and Capacity

Insufficient Data and Planning

Planning for mass care and mass displacement is currently hampered by a lack of good information and proper understanding regarding the extent of impacts to people and buildings following a Cascadia event. On average, 10% of a given population seek disaster relief following a smaller, more localized disaster. After a Cascadia event, the number will be much higher, especially in tsunami inundation zones. In addition, the percentage of the population needing shelter will change over time. For example, it will decrease as people are reunified with loved ones and increase as people move around the state looking for refuge and services.

Improved planning requires clear estimates of the location and extent of impacts, considering geological variations, building stock, and timing of the earthquake and tsunami. The more information local jurisdictions have, the stronger their planning will be.

In February 2018, the Regional Disaster Preparedness Organization (RDPO) and the Oregon Department of Geology and Mineral Industries (DOGAMI) released a report of expected Cascadia impacts for three counties within the Portland Metropolitan Region. By using updated data, current subduction zone science, and the latest mapping and modeling techniques, the study greatly improves understanding of potential earthquake impacts for the three counties studied.

The RDPO/DOGAMI study considers the effects of shaking, liquefaction, and landslides at the neighborhood level, and it provides estimates of injuries and fatalities, the number of displaced people, building damages, and other impacts based on the time of day and time of year. It provides enough data to significantly improve mass care and displacement planning. For example, preparedness outreach can be increased in the most impacted communities, and safer sites can be pre-selected for response and recovery (shelter sites, staging areas, points of distribution, etc.).

DOGAMI is in the process of completing similar studies for coastal counties, but it needs to be continued in other areas of the state. Additionally, more information is needed to understand impacts not included in the RDPO/DOGAMI report, including impacts from aftershocks, fire following earthquake, collapsed bridges, and secondary health problems. The report also does not include data regarding fluctuating populations (i.e. homeless, temporary/seasonal workers, tourists, students, day visitors, etc.) or other short-term shelter needs. It does not consider social vulnerability and how people are impacted differently based on their circumstances before the disaster. Statewide estimates of these impacts would prove extremely valuable to federal, state, local, and tribal government's Cascadia response and recovery planning.

The RDPO is currently undergoing a study of the economic impacts of a Cascadia event on the Portland Metropolitan Area. The study will yield important data on key business sectors, including how they plan to respond post-Cascadia, how long they can withstand disruption, and what they will need for recovery. This important study will help set a baseline for building economic resilience, and it needs to be replicated statewide.

Recommendation 8: The Legislature should continue to provide funding to the Oregon Department of Geology and Mineral Industries to replicate earthquake and economic impact studies throughout the state, focusing on Oregon's economically critical counties.

- Future funding should be provided for the study of impacts to culturally specific and vulnerable groups.

Uncertain Logistical Capacity

Given the status of Oregon's transportation and fuel system, major concerns exist about logistical capacity for distribution of materials, supplies, and services following a Cascadia event. Much of these vulnerabilities have already been highlighted in the Oregon Resilience Plan, such as Oregon's many unreinforced bridges and its dependency on the Critical Energy Hub for fuel storage and distribution.

The needs and capacities of Oregon's four zones vary, and logistics planning must take these variations into account. The Coast faces extreme mass care and mass displacement challenges due to its current preparedness levels, fluctuating population, and geographic circumstances. Coastal transportation systems are highly vulnerable and will hamper logistics. The tsunami inundation zone will experience total destruction, and a large number of people will need evacuation, care, and shelter. Visitors are typically concentrated in or near the inundation zone, and they comprise a significant portion of the population at any time of the year, easily outnumbering the permanent population during the summer and special weekend events.

Communities east of the Cascades are expected to experience limited damage, but their typical supply chain includes portions of the Valley, which will be disrupted. Additionally, they will be expected to support responders arriving from other states and displaced populations from areas of Oregon with greater impact. Much of the state planning efforts have focused on the coastal and I-5 corridor counties. Future planning efforts must recognize the importance of ensuring that Eastern Oregon communities are resilient and capable of supporting response and recovery efforts.

Both coastal and eastern regions lack the capacity to support the complex levels of planning needed to support them, and therefore they are often not well integrated into state planning efforts. Many of their needs and priorities have already been identified by the Oregon Department of Transportation and the Oregon Resilience Plan, but they require prioritization at the policy level.

The State has received federal support through the Regional Resilience Assessment Program (RRAP) for a three-year study of its transportation system. This multi-modal study will include road, rail, air, and marine sectors, and it will outline what is needed to provide adequate logistical support following a Cascadia event.

The Oregon Emergency Management Emergency Coordination Center (ECC) is an essential facility that provides a location for decision makers to communicate, stay organized, and coordinate response and recovery activities. It is an essential resource for supporting mass care and mass displacement efforts of communities throughout Oregon, especially logistics support. However, the ECC is not structurally or operationally designed for a Cascadia event. Coupled with staffing issues, it is clear that it will not be operationally usable. Many county and municipal Emergency Operation Centers (EOCs) and state Agency Operation Centers (AOCs) have similar issues.

Recommendation 9: The State should strengthen logistics planning between local, state, tribal, and federal agencies to support mass care and mass displacement efforts.

- Logistical support for coastal communities is especially important due to the impact of the tsunami and the fragility of its infrastructure system due to strong shaking and landslide potential.
- Encourage more stakeholder engagement with logistics planning for mass care and mass displacement issues. For example, hospitality organizations should be encouraged to take responsibility of caring for visitors.

Recommendation 10: The state should upgrade or replace and fully staff the Oregon Emergency Management Emergency Coordination Center to ensure it is functional following a Cascadia event.

- Local Emergency Operations Centers and state Agency Operation Centers should be directed to meet the same seismic and staffing standards.

Absence of a Damage Assessment System

The State does not currently have an adequate plan or system for inspecting buildings for damage following earthquakes and aftershocks. Building inspections (using ATC-20 Procedures for Post-Earthquake Safety Evaluation of Buildings) are needed as quickly as possible after earthquakes and aftershocks so that:

- Shelters and healthcare facilities can be assessed for safety to allow their use.
- People can determine whether it's safe to enter homes and workplaces.
- Building owners receive an initial damage assessment and begin planning for repair and replacement, which marks the beginning of the recovery stage.

California's Safety Assessment Program (SAP) is considered the gold-standard for such programs and is being adopted by other states, including Washington. Oregon is one of the few states without a specific building damage assessment program.

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California also allows local building departments to create Building Operations Resumption programs (BORPs). These programs allow building owners to hire engineers familiar with their facilities to perform post-earthquake damage assessments. Annually, building owners are required to certify that identified engineers have proper training and that there is an approved inspection plan in place. Such programs can speed up the assessment process, thus permitting local building departments to make more effective use of their inspectors and volunteers.

In 2006, the Department of Consumer and Business Services (DCBS) created a list of design professionals who had been certified to provide post-earthquake inspections, but the list did not vet qualifications, is no longer supported, and is now out of date. Provisions for how the list would be implemented and coordinated between the local jurisdictions and design professionals were never developed. Some jurisdictions are developing such lists locally, but implementation issues remain. This function is delegated to the Building Codes Division, which is entirely fee funded; therefore, they have no budget for this type of work.

After Superstorm Sandy, efforts were made to keep people in their existing residences as much as possible, even if residences were lightly damaged. This approach will be needed after a Cascadia event, given the large number of people who will be displaced, but Oregon has no consistent standards for keeping people in their lightly damaged homes. The current standard for assessing post-earthquake building damage relies on training provided by the Applied Technology Council, but it does not adequately address the issue.

Recommendation 11: The State should give authority and support to the Department of Consumer and Business Services to institute a statewide post-earthquake building safety assessment program (ATC-20/45) to allow for timely inspections of shelters, healthcare facilities, points of distribution, and residential buildings.

- Develop Oregon's program considering the California Safety Assessment program, as outlined in OSSPAC's 2016 recommendation to create the Oregon Safety Assessment Program.
- Include state agencies and local government in program implementation and coordination.
- Provide oversight of trainers, evaluators, and local program coordinators.
- Collaborate with professional organizations of architects, engineers, building officials, etc.
- Include plans for prompt inspections following aftershocks.
- Formalize mutual aid agreements with other states and recognize their certification programs.

Recommendation 12: The State should give authority and support to the Department of Consumer and Business Services to establish rules enabling local building departments to create Building Operations Resumption Programs to allow building owners to pre-certify private post-earthquake inspectors.

Recommendation 13: The State should require the Department of Consumer and Business Services and Oregon Emergency Management to develop consistent criteria for local emergency managers and building officials to use when determining if residents should be allowed to remain in their lightly-damaged buildings following an earthquake.

A Need to Better Leverage Community Assets

Oregon has many community assets that will be natural gathering areas for displaced populations, including community centers, parks, colleges, and schools, among others. Schools are highlighted as an example below to show how an existing community asset could be strengthened to reduce community vulnerability to a catastrophic event, as well as contribute to response and recovery. Some of these ideas apply to other institutions such as homeless shelters and correctional facilities, which also need to protect their residents.

The Example of Schools

Few facilities receive more oversight than public schools. Building inspectors, fire marshals, and liability experts regularly monitor their facilities. They are natural candidates to provide gathering places for people to shelter and seek aid in emergencies. Acknowledging this aspiration in remarks about Oregon's commitment to seismic retrofits, Governor Kate Brown said, "Ensuring every community in the state, particularly in rural regions, has safe community gathering places and emergency response infrastructure will be key to Oregon's recovery from a significant seismic event."

This expectation about post-disaster function is widely held. Unfortunately, few schools can assure that the expectation will be fulfilled. The facilities are only as strong as their engineering and construction. Oregon's aging schools were not designed to withstand seismic events. As FEMA has noted, "Existing school buildings are often designated as emergency shelters without proper assessment of whether the buildings were designed to resist natural hazard events and if they will be in adequate condition to shelter people during or after an emergency." Few Oregon school buildings are engineered to life safety standards, and even fewer are engineered for immediate

Beaverton School Resilience Planning

Following the recommendations of the Oregon Resilience Plan, the Beaverton School District committed to ensuring that their new high school and middle school could be used for shelter following a Cascadia earthquake and be integrated into the county shelter planning. They increased structural performance to immediate occupancy standards, improved seismic bracing for nonstructural components, addressed water and waste concerns, and planned for use of open areas to support community relief efforts. The additional cost of construction to include these was estimated to be 1-2%.

occupancy. The State's Seismic Retrofit Grant Program has awarded over $225 million dollars to bring the seismic safety of schools to current code standards. While this standard is higher than standards for commercial and residential buildings, it does not ensure these schools will be usable following the earthquake.

Schools may be ideal for shelter use since they often have a variety of spaces to allow for different shelter needs and ample outdoor space that can be utilized for shelter and distribution of supplies. They are closely tied to their communities and are often gathering places for people seeking aid following disasters. The use of school grounds for temporary or long-term shelter and distribution could continue without unduly disrupting school functions. However, preparing a school to serve the mass care needs of a community takes planning well outside the scope of the typical responsibilities of educators. Because there is no state mandate requiring it, to date, there has been little or no planning by school districts for schools to be used as shelters following a Cascadia event.

If a Cascadia event occurs during a school day, many families will rely on schools to care for their children while they try to reunite. In some cases, this could take days due to geological barriers, infrastructure challenges, and lack of public preparedness and planning. Most Oregon schools have never practiced parent/child reunification drills, leaving school and parents unprepared to handle the complexities of reunification.

Seaside School District Relocation

Seaside School District has four schools located within the tsunami inundation zone and at elevations lower than 15 feet. In 2016, the District passed a $99.7 million bond to relocate all schools onto one campus well outside the tsunami inundation zone. Approximately 80% of the new school facility is being built to structurally perform at an operational standard (Risk Category IV). The remaining 20% will function at Risk Category III standards. Because of its design, the campus will be able serve as an important shelter on the North Coast following a Cascadia event. It scheduled to open Fall 2020.

Schools are legally responsible to provide for students until they are picked up by their parents following a disaster, but there are no clear guidelines about what this actually entails and the extent of staff responsibility. Some teachers and staff don't even know that Oregon is expecting a major earthquake, and most don't know how to prepare or respond. While basic drop/cover/hold drills are required, many don't know how to mitigate non-structural hazards in the classroom, shut off utilities, care for physically and psychologically wounded children, etc.

School administrators and staff will need to plan options to provide drinking water, food, electricity, communications, prescription medications, and other medical needs. Schools will need to coordinate with emergency managers, medical providers, and even hospitals and other care facilities to accommodate community needs after a seismic event. In California, government employees complete disaster service training as a condition of employment and thus become a key "human resource" in immediate response, as well as mass care and sheltering in the days that follow a disaster. Unfortunately, in Oregon there are presently few instances of such coordination.

After a Cascadia event, all schools will need inspection before they are safe to reenter. Students and staff will need to be prepared to shelter outside school buildings, and most schools do not have the supplies needed to do this. Those that do tend to be in economically and socially privileged areas. Oregon's schools are woefully unprepared to care for children given these circumstances.

Lincoln County Supply Caches

Lincoln County School District has created a community partnership that has placed shipping containers at all schools in the county. The caches are community assets, and a Memorandum of Understanding outlines shared ownership and maintenance of the caches by police, fire, schools, cities, and the county. Schools will take possession of the caches if a disaster happens during school hours; otherwise they are accessed by fire and other emergency services.

Recommendation 14: The Department of Education and the Department of Human Services should define the roles that schools should play in preparedness and emergency response, require preparedness messaging in schools, and encourage supply storage on or near school grounds.

- Clarify the expectation that schools will be used as shelters, considering the ORP goal of reopening schools after 30 days and ORS 455.400, which requires that any Oregon schools with seismic deficiencies to be upgraded before 2032. Encourage schools to apply for the Seismic Rehabilitation Grant Program grants to seismically upgrade gyms and public spaces to Risk Category 4 structural standards to allow for shelter use.
- Amend the Oregon Structural Specialty Code per OSSPAC's code amendment proposal to provide the ability that schools can be used as shelters following an earthquake.
- Define the responsibilities of teachers, staff, and administrators, and provide appropriate training.
- Provide students with age-appropriate information about Cascadia-level earthquake preparedness. This must go beyond education about the geology of earthquakes.
- Provide parents information about the risks of a Cascadia event, basic preparedness, and how to create an effective family reunification plan.
- Provide teachers and staff information about keeping children safe during and after an earthquake. Prioritize non-structural hazard mitigation to make school interiors safer and reduce injuries, as well as training to care for the physical and emotional needs of students after a disaster.
- Encourage private/public partnerships around school supplies and non-structural mitigation in schools.

chapter five

Shelter

Vulnerable Building Stock

The ability to shelter people affected by a Cascadia event depends on the survivability of Oregon's building stock. Many of Oregon's single- and multi-family homes were built before 1976, which is the year that building codes began requiring homes to be strapped to their foundations. In 1994, the codes were updated again to include seismic risk of a Cascadia earthquake. However, the 1994 codes are based solely on life safety standards, which aim to prevent loss of life and reduce injuries. They are not concerned with usability following the earthquake.

Buildings built to current code will perform better than older building stock, yet they are still vulnerable, particularly in areas of severe and strong shaking. In areas with less severe shaking and stable soils, wood-framed homes are generally expected to fare well due to their light weight.

Of greater concern is the stock of earthquake-prone buildings (EPB), such as unreinforced masonry (URM) and under-reinforced concrete. Many of Oregon's affordable housing units in urban areas were built this way. Upgrading this more fragile building stock to meet current code standards is expensive, and owners are not required to seismically upgrade the buildings to current code. For residential buildings, the seismic code focuses on life safety and does not ensure the building will be usable post-earthquake. Currently, when seismic upgrades are performed, a "collapse prevention" standard is often used, which is below current code and means there is little chance of usability. Oregon Housing and Community Services uses this approach.

Existing building stock that could be used for mass sheltering and withstand strong ground shaking is extremely limited. Schools and churches have historically been used as shelters, but they have significant issues that need to be addressed in order to serve following a Cascadia event. Many were built before 1994 and are earthquake-prone buildings. There are state and local funding sources available to seismically upgrade schools, but there is no equivalent funding source for churches.

Additionally, many facilities that house vulnerable populations do not meet current building codes because of their age, e.g. assisted living facilities, retirement homes, schools, prisons, homeless shelters, etc. Members of vulnerable populations face the most significant risk during a disaster and are more likely to become critically injured, contract disease, or die. Ensuring that facilities housing vulnerable populations are resilient will allow emergency response and relief efforts to focus on the whole community, which, in turn, will lead to a quicker geographical and economic recovery.

As seen in other disasters, loss of shelter sites and facilities housing vulnerable people has a huge impact on relief efforts and recovery costs. As a result of the September 2017 earthquake in Mexico City, Mexico is proposing to raise the seismic performance level of its residential buildings to reduce both costs and trauma.

OSSPAC has submitted a code amendment proposal to the Building Codes Division for the current revision of Oregon Structural Specialty code to require that new school gymnasiums, cafeterias and large multi-purpose rooms that can be utilized as shelters be built to Risk Category IV structural standards to ensure that these spaces can be used for shelter purposes following an earthquake.

Recommendation 15: The State should direct the Department of Consumer and Business Services to study and implement changes to the state building code to improve the seismic performance of Oregon's multi-family housing stock, resident care facilities, homeless shelters, correctional institutions, etc. to ensure these buildings can be occupied following a Cascadia event.

Recommendation 16: The State should improve the seismic safety of existing single-family housing to help reduce the need for mass shelter.

- Adopt Recommendations 4, 5, 6 and 7 of OSSPAC Publication 18-01 Encouraging Homeowner Resilience through Earthquake Insurance and Seismic Retrofit, which call for the adoption of a consistent statewide design standard for seismic retrofit of single-family homes, conducting research to improve retrofit guidelines, better code enforcement and incentives for retrofits.
- Expand seller's disclosure requirements to include information of seismic safety of the residences, including seismic retrofits completed and the standard or certificate achieved.

Insufficient Shelter Planning

There are three shelter models being utilized across the state: Red Cross-managed shelters, government-managed shelters, and community-managed shelters (run by churches, community centers, etc.). The most common model used in Oregon is the Red Cross-managed shelter, though city and county partners are often involved.

Typically, county emergency management is responsible for local mass care strategies, which includes temporary shelter planning. Since Oregon does not frequently experience large-scale disasters, many counties have not been called upon to develop large-scale mass shelter plans. Local capacity to develop and implement such plans is typically very limited, especially in rural areas. As a result, there are only a few localized catastrophic mass shelter plans scaled to a Cascadia event. A statewide shelter plan for managing a Cascadia event has not been completed due to a lack of funding and resources.

Shelters are typically identified following hazard events based on an ad-hoc list of potential sites. This system has worked adequately for routine hazard events such as fire, but it is inadequate for a Cascadia event since selection criteria has not included seismic performance of buildings. In order to be adequately prepared for a Cascadia event, counties need to pre-identify potential shelter sites, consider codes and operational concerns that could limit their use, and develop memorandums of understanding with facility owners.

Importance of MOUs

As best practice, pre-identification of shelter sites should include Memorandums of Understanding (MOUs) between emergency managers and the facilities. This clarifies roles, expectations, and the scope of activity, and it can impact reimbursement. FEMA looks more favorably on organizations when a written agreement exists outlining shelter roles and responsibilities. FEMA's Public Assistance (PA) program provides funding to state, territorial, tribal, and local governments for costs related to emergency sheltering. Private nonprofits (PNPs) are not eligible for sheltering reimbursement, as they do not have a legal responsibility to provide the service. However, FEMA will provide PA funding for work performed by PNPs when the government applicant verifies in writing that the PNP performed those operations on its behalf under written agreement.

Because people have different needs and capacities before a disaster, their needs and capacities differ during and after a disaster. Those who are most vulnerable will experience the greatest and most long-lasting impacts. Vulnerable groups include racial and ethnic minorities, religious minorities, low-income populations, children, the elderly, persons with disabilities, and members of the LGBTQ community.

Mass sheltering constitutes one of the most delicate operations in emergency response and recovery, and there is no one-size-fits-all approach. Each county's plan needs to address the unique impacts, needs, and capacities projected for their communities. Effective planning considers the whole community, including vulnerable populations, those with access and functional needs, and those who are underserved and underrepresented. It also requires input and support from the whole community, including those from incorporated and unincorporated areas in the county, special districts, community organizations, the business community, residents, and others.

The Sphere Handbook is widely accepted as a guide for universal minimum standards in international humanitarian response. It recognizes the right of disaster-affected populations to life with dignity, and it promotes the active participation of affected populations. It also acknowledges that protection is critical to the wellbeing of affected populations. Protection ensures safety, dignity, and a reduction of further harm as a result of the assistance provided by aid workers. Shelters must strike a difficult balance of providing safe environments within harsh realities while addressing the unique needs of the community.
Some mass shelter planning best practices and tools do exist within Oregon and beyond. We can and should learn from this work, though no one model will work for all communities.

The Commission reviewed elements of shelter plans for Nehalem Bay, Marion County, Multnomah County, and Clatsop County. Each plan addresses the unique resources and needs of its area. For example, Nehalem Bay's plan accommodates both residents and visitors, which are often more numerous than residents.

Several jurisdictions have engaged the help of other organizations. Nehalem Bay contracted with Catholic Relief Services, and Clatsop and Lincoln Counties have contracted with a private firm that specializes in catastrophic management services. This type of contract is not unusual in other parts of the country. The process of working with organizations that specialize in mass care has raised many questions and provided tremendous benefit to local planning. Jurisdictions with limited staff may want to consider this approach.

Recommendation 17: The Legislature should require local jurisdictions to create catastrophic shelter plans and provide planning assistance grants to support this work. Plans should integrate all other areas of mass care, including food, water, sanitation, and health care.

- Shelter planning should start with an estimation of the population who will need to be served. Refer to Recommendation 9 above, which addresses the need for further research.
- Plans should be based on best practices, including considerations of the whole community, including those with access and functional needs and vulnerable populations. There are a number of laws and policies that define our responsibility to seek equitable outcomes for everyone.
- To ensure maximum reimbursement, MOUs should be created between local jurisdictions, building owners, and

Varying Needs During Sheltering

Many types of people will seek shelter and other services after a disaster. They may need different supports to ensure life safety and other basic needs are met. These considerations need to be included throughout shelter decision making. Some examples include:

- Children and people with children need shelters to have safe spaces to accommodate their physical and emotional needs. Nursing mothers need additional food and water.
- People who don't speak the local language (including immigrants, refugees, and tourists) need adequate signage and interpretation.
- People using oxygen and durable medical goods need priority access to electricity.
- People with pets need to be able to bring them to a shelter. Many pet owners will stay in unsafe places rather than be separated from their pets.

Loss of Low-Income Housing in Hawaii

The volcanic lava flows in Hawaii (2018) have identified a secondary crisis. Development was allowed in many areas that are prone to lava flows. Low income communities have not only been displaced, but their property has become inhabitable. With Hawaii's existing challenges providing affordable housing, low income communities are being disproportionately impacted and shelter operations and costs are exacerbated.

nonprofits (as appropriate) for use of buildings not under the control of local government.

- Exercise and training of shelter plans should include all stakeholders (key nonprofits, CERTs, business community, community advocates, etc.).

Lack of Semi-Permanent and Long-Term Housing

There is currently no adequate planning for the transition from emergency shelters to either semi-permanent or long-term housing. There is a lack of data about size and characteristics of the population needing these types of housing, which can vary widely depending on the levels of damage. There are few or no provisions in the regulatory structure for providing semi-permanent housing. In addition, comprehensive plans and zoning ordinances often do not take into sufficient account potential land use changes following a major natural disaster. Of particular concern is rebuilding in the tsunami inundation zone, landslide areas, and areas of liquefaction.

The Oregon Housing and Community Services (OHCS) is the Lead agency for SRF 5, Disaster Housing, and is responsible for the state's Disaster Housing Strategy. Funding for SRF 5 has been unavailable to OHCS for several years, and the current plan does not reflect today's challenges or housing needs. Affordable housing after a Cascadia event will be a critical component of Oregon's ability to reestablish communities and achieve economic stability. In some coastal areas, households will lose both their housing and property, requiring permanent relocation. As with many other State Lead Agencies, there is no direct funding to support disaster housing planning and operations efforts.

Recommendation 18: The State should require Oregon Housing and Community Services (OHCS) to create semi-permanent and permanent housing plans.

- Fund personnel and resources for OHCS to update and maintain Oregon's Disaster Housing Strategy and lead an Oregon Disaster Housing Task Force.
- Provide funding to OHCS for personnel and resources to operationalize an Oregon Disaster Housing Strategy.

chapter six

Food, Water, and Sanitation

S.B. 850 directed OSSPAC to explore the supply of adequate food and water. Sanitation has been included here, as it is related to basic human needs.

Water Supply and Distribution

Water distribution is provided by private and public water districts. The Oregon Resilience Plan resulted in changes to the state's requirements for water district master plans, which now must include response to a Cascadia earthquake. Major water districts have realized their vulnerabilities to a Cascadia earthquake, which has resulted in efforts to improve their systems. Their prioritization is based on criteria for typical distribution. It doesn't consider where the water needs to be in an emergency. Water distribution from the emergency planning perspective is focused on mobile trucks, distribution bags, bottled water, and water filters. There has been

little coordination between the water districts, emergency management agencies, and planners on coordination of water distribution. Again, there is a need for data to determine expected water needs to inform planning and funding (for emergency equipment for example).

Recommendation 19: The Oregon Health Authority should encourage water districts to improve plans for supplying emergency potable water to their constituents.

- Plans should be coordinated with emergency managers, fire departments, government agencies and the private and nonprofit sectors.
- State and local planning efforts should include the coordination of critical lifeline routes from state emergency operations areas to points of distribution.
- Continuity of operations plan should be in place for water providers.
- Information should be disseminated on how existing water can be filtered.
- Distribution of water vessels and/or filters should be provided for the public, possibly through public/private partnerships.

Food Supply and Distribution

Food distribution is complex in normal times. For most people, food is distributed by just-in-time private sector supply chains. Large distribution centers with limited warehouse space deliver food and supplies to retail outlets, which also have limited storage capacity. Nonprofits such as the Oregon Food Bank distribute food from local sources to vulnerable populations, but they estimate having only two days' worth of food at any given time.

Oregon does produce a significant amount food, which can be drawn upon in an emergency if there is sufficient planning and coordination. Other major natural disasters in the U.S. have shown that local food sources are often not used effectively.

A Cascadia event will create an "island effect" throughout Oregon. Roads and bridges will be destroyed, rivers will flood, and ground transportation will come to a standstill. Some counties and municipalities have begun to map the islands that will be created post-earthquake due to infrastructure failures and determine what resources may or may not be accessible. There has been measured success in counties that have been able to dedicate resources to this planning, but there is no statewide effort that combines localized efforts with statewide planning.

Salem Water Crisis

In the spring and early summer of 2018, Salem posted a water advisory due to blue-green algae in the drinking water system. For several weeks, vulnerable populations, pets, and the elderly relied on potable water shipped in from other areas. Emergency management operations provided approximately 20,000 gallons per day to meet these needs. This operation required the use of nine of the ten mobile water delivery systems in the state. Had the advisory included the entire population, the Salem area would have required nearly 300,000 gallons of water per day just to service the residential community.

Federal partners are confident in their ability to mobilize bulk quantities of necessary supplies to large staging areas in Oregon. The challenge is creating an effective distribution system that moves supplies from large staging areas to smaller staging area and then to Points of distribution. Bulk distribution operations must also ensure that the right type of supplies get to the right places. Like trying to funnel water from a firehose into a straw, bulk distribution will be a critical challenge to ensure that survivors receive life-supporting sustenance in a timely manner.

The State is in the process of finalizing the Oregon Multi-Agency Feeding Support Plan for ESF 11 - Food & Water. It is intended to develop a framework to enhance coordination of multiple agencies and jurisdictions in creating an effective feeding strategy. This effort is being led by the Department of Human Services (DHS). The plan focuses on three key components:

- A mass care feeding plan
- A household feeding plan
- Development of an Oregon Feeding Task Force to coordinate and implement the plan

Counties are required to have food, water, and sanitation annexes to their emergency operations plans. However, most have not completed these annexes.

Recommendation 20: The State should provide sufficient funding and expertise to the Department of Human Services and local counties and tribes to ensure that the counties and tribes have adequate food, water, and sanitation plans that are coordinated with shelter planning. Public, nonprofit, and private cooperation should be encouraged in all plans.

- The Department of Human Services should coordinate with the Red Cross, Mercy Corps, Oregon Food Bank, Oregon Emergency Management, Oregon Military Department, and FEMA to identify Ready-Mission Packages that predesignate mission assignments in response to a Cascadia event.
- DHS should budget and provide adequate resources for their emergency management operations to develop, implement, and facilitate statewide disaster feeding operations.
- Private-public partnerships should be developed with large retail outlets and augment local distribution capabilities with local organizations (i.e. food banks, Meals on Wheels, farmer's markets, etc.).

Sanitation

After a Cascadia event, water and wastewater systems will be rendered inoperable for prolonged periods. It is estimated that Oregon will produce an estimated 1,000+ tons of feces per day after a Cascadia event. If it is not disposed of properly, disease will begin to spread, and Oregon's rivers and watersheds will be impacted. There are currently no large-scale disaster sanitation plans in place anywhere in Oregon or elsewhere in the United States. FEMA's sanitation plans are based on hurricanes and other disasters in which nearby systems are functioning and waste can be transported relatively easily.

The RDPO's Regional Disaster Sanitation Task Force has produced Emergency Toilet outreach materials, which include instructions for using the Twin Bucket System. The system was designed after the 2011 earthquake in Christchurch, New Zealand to provide a simple, cheap, and effective method for protecting public health by limiting exposure to human waste. The Emergency Toilet program also provides information about latrines and septic systems, and it answers common questions about sanitation in order to prevent actions that put public health at risk. The task force recommendations are intended to be used in the first 30-days after a major earthquake, while local jurisdictions determine disposal plans.

The RDPO Task Force is currently developing post-30 days sanitation management recommendations that will address the question of what to do with thousands of tons of bagged feces. It will provide a range of options for jurisdictions to consider depending on local systems, geography, and earthquake damage. The multi-jurisdictional Task Force is composed of experts in waste management, environmental science, public health, and emergency management.

Recommendation 21: The Oregon Department of Environmental Quality should set catastrophic incident standards which include the temporary modification of existing regulations dealing with human waste and support wastewater agency efforts to partner with emergency planners in response to a Cascadia event.

Recommendation 22: Oregon Emergency Management and Oregon Health Authority should include disaster sanitation messaging in their community education and outreach programs and ensure that communities and individuals have viable disaster sanitation plans.

chapter seven

Emergency Health Services

Healthcare delivery and support is complex. Broadly speaking, there are hospitals that provide acute care, and there are other non-hospital healthcare services that provide non-acute and long-term care, including but not limited to ambulatory surgery centers, birthing centers, community mental health centers, home health agencies, hospice agencies, in-home care agencies, rural health clinics, and special inpatient care facilities. Certification and licensing for all types is overseen by the Oregon Health Authority (OHA). All types of health care need to be included in planning, and unique approaches are required for different types of providers. The OHA's Health Security, Preparedness and Response Division (HSPR) is responsible for responding to hazards impacting Oregon.

Facilities

Healthcare facilities have different seismic standards depending on what type of service they provide and Healthcare facilities have different seismic standards depending on what type of service they provide and their occupant load. Only healthcare facilities with surgery or emergency treatment facilities are required to meet immediate occupancy standards. Buildings that house critical support functions for these facilities do not need to meet immediate occupancy standards. All other healthcare facilities with an occupant load over 50 must meet the seismic standard of Risk Category III in the building code, which is similar to schools. Healthcare facilities with an occupant load less than 50 are held to a lower Category II life/safety standard. For resilience, facilities which house patients should ideally meet immediate occupancy standards (Category IV) to better ensure they can continue to provide services after a seismic event.

There is also a need for better healthcare sector data, because there is not a clear understanding of rural and urban healthcare capabilities, nor is there good data on the impact of a Cascadia event on the public health system and vulnerable populations. The 2007 DOGAMI Statewide Structural Needs Assessment, which was based on FEMA 154 (Rapid Visual Screening of Buildings for Potential Seismic Hazards), provided some data and is available to the public. Hospitals can refer to this information to determine if they want to conduct ASCE-41 seismic performance analysis. Hospitals are eligible for funding from the State Seismic Rehabilitation Grant Program for seismic upgrades, but few have applied.

Based on the findings in the 2013 Oregon Resilience Plan, OHA and DOGAMI partnered to evaluate Cascadia preparedness levels of selected hospitals. Their studies concluded that the current hospital seismic preparedness requirements, including in Oregon Revised Statute 455.400, are unclear to healthcare partners, are not being met, and are too limited in scope to provide the needed resilience for a Cascadia earthquake.

Oregon's coastal and rural hospitals are particularly vulnerable. Coastal hospitals will have to contend with higher levels of shaking and a tsunami. Rural and coastal hospitals will be more isolated and for longer stretches of time. There is concern that affected populations will all gather at hospitals after a Cascadia type event, straining resources to deal with the most critical patients. Hospitals need to include security and communications plans into their continuity of operations plans. Furthermore, there are private coastal hospitals spread across three-state Regional Health Districts that have little cross communication. Through a grant program, OHA has conducted a review of coastal hospital resilience (DOGAMI report O-18-3) and begun efforts to create a coastal learning network where coastal hospitals can share best practices and improve inter-hospital communication.

Recommendation 23: The State should provide Oregon Health Authority with the resources they need to ensure that healthcare providers can carry out the follow critical preparedness tasks.

- Conduct seismic evaluations and develop resilience plans that address deficiencies in structural and non-structural building elements, emergency power planning, and water planning. These evaluations should be used to inform emergency healthcare continuity of operations planning and restart normal healthcare services during the recovery phase.
- Work with Oregon Association of Hospitals and Health Systems, the Department of Justice, the Department of Consumer and Business Services: Building Code Division, and hospital partners on clarifications and improvements to ORS 455.400. Develop an oversight program to track progress and assist hospitals with meeting deadlines. This should start with establishing a baseline rating and include a method to track progress on the state of preparedness.
- Create standards for healthcare continuity of operations planning. The Continuity Guidance Circular 1 can be used as a reference.
- Require all healthcare providers to have Cascadia Resilience Action Plans, which should include the following:
    - A plan to ensure that staff are "2 Weeks Ready."
    - A continuity of operations plan that addresses security and data retrieval. Security and communications plans are especially critical for hospitals, which will need to deal with a mass influx of patients and provide information to the public.
    - A "resilience plan" that considers seismic strengthening of facilities. These should be based on seismic engineering evaluations (using ASCE 41); emergency power system evaluations (using FEMA P1018) and planning for emergency power for 2-3 weeks; and emergency water planning for 2-3 weeks (using CDC guidelines).
- Work with the Oregon Association of Hospitals and Health Systems to establish and provide resources for a coastal hospital resilience network with specific focus on preparing for a Cascadia event. This would include periodic training sessions to disseminate best practices and emerging technologies among hospitals and healthcare systems. Although this network is designed to improve the resilience of coastal hospitals, certain aspects would also benefit non-coastal hospitals and improve the state's resilience.
- Work with Citizens Corps to develop and train pre-certified healthcare professionals to help prepare community members in alternative health facilities to be more resilient.
- Prepare for the behavioral health issues that will arise after an emergency and the needs of chronic care patients.

People

At-risk populations (e.g. those with medically complex conditions, functional needs, and/or economically disadvantaged) will likely be woefully unprepared for a Cascadia-type event. They are particularly vulnerable because they have special needs such as critical medications or supplemental oxygen and are less likely to have the capacity to store preparedness supplies. Additionally, they are likely to be more isolated than the average population. Most will not be under direct medical supervision at the time of a Cascadia event.

Recent disasters such as Hurricane Sandy have taught us that a community's response and recovery success is largely determined by the cohesiveness of the community before the disaster. Since all disasters are local at first, neighbors will be taking care of one another, especially those at risk. Experts recommend putting resources into enhancing social networks and involving both community members and community-based organizations in the process. It is critical to develop and promote programs that recognize the vital role citizens can and must play as "first responders" to help their own families and neighbors in the first hours to days of a major disaster.

State- and locally-supported volunteer organizations such as the Medical Reserve Corps, the State Managed Volunteer Pool, and Citizen Corps are groups who can act as "first response" resources for community-based organizations, neighborhood associations, and individual community members. They could also be utilized before an emergency to strengthen social networks of vulnerable groups and increase resilience.

Recommendation 24: Support the Oregon Health Authority to work with local partners to increase the number of Medical Reserve Corps Units and include volunteer training to meet the needs of chronic care patients that will arise after a Cascadia event.

Prescription Drugs and Distribution Systems

Healthcare and pharmaceutical systems generally use just-in-time supply chains that have centralized distribution centers. Neither the distribution centers, pharmacies, or hospitals have much warehousing capacity to store supplies. Similar to food distribution, these distribution centers are regional in nature.

At the federal level, the US Department of Health and Human Services has a large capacity to provide emergency healthcare logistical support. However, the logistics of providing emergency medical supplies to isolated areas will be a major concern. There is a need for medical supply chain planning that includes government, healthcare organizations, and the private sector.

Many vulnerable groups, particularly with the elderly and those with extreme medical and behavioral conditions, will experience severe secondary trauma after the earthquake if they cannot get access to necessary medications and consumable medical supplies. Most prescription-dependent people are on common maintenance medications, but they cannot keep extra medications in their emergency kits because of current regulations. To reduce their vulnerability, they should be allowed to establish a 30-day supply, which only needs to be filled once and then rotated every 1-2 years. This is more realistic than expecting pharmacies to promptly dispense medications and expecting vulnerable populations to get to medical distribution sites.

Recommendation 25: Oregon should improve pharmacy laws and procedures to ensure the availability of prescriptions and the ability of prescription-dependent people to maintain a thirty-day emergency supply of critical medications for use following a Cascadia earthquake or other catastrophic event.

chapter eight

Transition Services and Recovery Assistance

Mass care and mass displacement are covered in Oregon's Emergency Operations Plan. As the threat from the earthquake and related impacts subsides, the State will transition to Oregon's Disaster Recovery Plan (ODRP). The ODRP addresses short-term recovery (up to one month), intermediate recovery (up to 18 months), and long-term recovery (up to 18 months or more).

The ODRP provides for the Governor to create a State Disaster Recovery Coordinator to oversee recovery efforts, and it shifts the responsibilities of state agencies. While Oregon Health Authority will remain in charge of Health Services (SRF 3), the Department of Human Services will begin to transition from mass care and food and water to focus on social services (SRF 4). Oregon Housing and Community Services will step in to start dealing with disaster housing and will be responsible for the transition from shelter to temporary and permanent housing (SRF 5). It is important to plan for this

transition since the State will be continuing to provide mass care and displacement services, even as it starts to provide transition services and recovery assistance.
It is important to note that nationally, work on recovery planning is a recent development. The National Disaster Recovery Framework is only a few years old, and the ODRP was only finalized in March of 2018. There are very few counties in Oregon that have or are beginning to create recovery plans.

The State is currently updating the Disaster Resources Assistance Guidebook, which helps local government and tribes learn what resources are available to them. Extending the scope of the Guidebook to include recovery resources, especially for transition services and recovery assistance resources, would help facilitate the transition.

RDPO Regional Recovery Framework

The five counties that make up the Portland Metropolitan Region are working together to develop a framework to guide rebuilding, redevelopment, and recovery efforts following a disaster. It seeks to outline roles of governmental and non-governmental agencies, create a structure to organize and coordinate recovery, and identify opportunities to build back stronger and become more resilient.

Recommendation 26: The Legislature should ensure that there is funding and support for recovery planning by the state agencies leading the shift from mass care and displacement efforts to transition services and recovery assistance.

Planning should involve the Governor's Disaster Cabinet and the Economic Recovery Council, and it should include:

- Restoration of health and medical systems.
- Surge capacity for social service workers so they can evaluate and care for an increased volume of patients.
- Coordination with Oregon Voluntary Organizations Active in Disaster and nonprofits to organize post-disaster cash assistance/market access for individuals.
- Integration with the Disaster Supplemental Nutrition Assistance Program (D-SNAP) and Temporary Assistance for Needy Families strategies.
- A disaster unemployment strategy, including supplemental income to keep people working as the economy comes back online, as opposed to collecting unemployment while waiting for jobs in previous professions to return.
- A focus on keeping Oregon's market alive by ensuring local businesses can participate in relief and recovery efforts. In order to operate, many businesses will need flexibility on requirements in a time of disaster.
- Preparation for the reintegration of evacuees and a permanent relocation strategy for those in the tsunami inundation zone.
- Support pre-disaster planning for transitional and permanent housing for displaced populations in anticipation of even tighter housing supply, coupled with rising costs during the recovery period. Planning should include anticipated land use and zoning changes in response to hazard risks.

appendix a

List of Stakeholders

Attendees of the Workshop on Earthquake Insurance held on September 12th, 2017

Dean Alby	Oregon Volunteers Active in Disaster
Denise Barrett	Regional Disaster Preparedness Organization
Emily Berndt	211Info
Pete Boone	
David Cardona	Oregon Health Authority
Lisa Corbly	Oregon Emergency Management
Matt Crall	OSSPAC, DLCD
Tracy DePew	Cow Creek Band of Umpqua Tribe of Indians
Greg Ek-Collins	OSSPAC, ODOT
Laura Hall	Portland Parents for Preparedness
Dwayne Hatcher	Oregon Health Authority
Sharon Hofer	Public
Anna Feigum	Department of Human Services
Jim Frisbie	Oregon Methodist Church
Sarah Kofman	
Linda Kozlowski	EM Volunteer Corps of Nehalem Bay
Karen Layng	Oregon Emergency Management
Trent Nagele	OSSPAC
Ariel Nelson	Oregon Housing and Community Services
Peter Nunn	EM Volunteer Corps of Nehalem Bay
David Peters	City of Portland Water Bureau
Adam Puskas	OSSPAC

(List of Stakeholders, continued)

Jay Raskin	OSSPAC, Chair
Kathryn Richer	NW Oregon Health Preparedness Organization
Bonnie Robbins	Department of Administrative Services
Steve Robinson	Cascadia Prepared
Susan Romanski	OSSPAC
Jeff Rubin	Tualatin Valley Fire & Rescue
Margarete Steel	
Stan Thomas	Department of Human Services
Eric Timmons	Oregon Parks & Recreation Department
Akiko Saito	Oregon Health Authority
Ryan Schulze	Department of Human Services
Cara Sloman	OSSPAC, American Red Cross
Jeff Subas	
John Wilson	Department of Aviation
Penny Wolf-McCormick	Oregon OSHA

Attendees of at least one Workgroup Meeting between October 2017 and August 2018

Dean Alby	Oregon Food Bank
Denise Bartlett	RDPO
Emily Bernoll	211
Dianna Bijon	OSHU Ed. PrepLO
Dave Cardona	OEI, OHA
Candy Cates	OHA
Jan Castle	PropLO in Lake Oswego
Grace Chikito-Schultz	PSU
Lisa Corbly	MCEM
Gabriel Court	Transition Projects Inc.
Beth Crane	211
Glen C. Devitt	Friends of Portland NET
Kristen Darmody	OHA
Doug Dougherty	OSSPAC
John Edwards	American Council for the Blind
Molly Emmons	Portland Public Schools
Maria Escobar-Sinn	OHA-HSPR
Greg Ek-Collins	OSSPAC
Dave Evanuk	Portland Water Bureau
Anna Feigum	Department of Human Services
Ed Flick	Marion County Emergency Management
Em Gabbe	OHS
Laura Hall	Parents for Preparedness
Kris Hansen	OHS
Kattie Harris	OAHHS
Amy Hase	MCEM
Mike Harryman	State Resilience Officer
Dwayne Hatcher	Oregon Health Authority
Sharon Hofer	Public
Neil Kennedy	Tualatin Valley Water District
Michael Kubler	Providence
Karen Layng	Oregon Emergency Management
John McKesson	Public
Dan Moseler	Oregon-Idaho Conference of the United Methodist Church
Michael Mumaw	OSSPAC
Trente Nagele	OSSPAC
Peter Nunn	EM Volunteer Corps of Nehalem Bay
Michelle Patton	DHS
Curtis Peetz	American Red Cross
Steve Pegram	Columbia County Emergency Management
Michelle Patton	DHS
Jay Raskin	OSSPAC
Bonnie Robbins	DAS Risk Management
Steve Robinson	
Susan Romanski	OSSPAC
Jeff Rubin	TVF&R
Gary Russell	ODOC
Andrew Russo	PSU
Mike Saling	Portland Water Bureau
Akiko Saito	OHA
Michael Schilmoeller	Friends of Portland NET
Ryan Schulze	DHS
John Scmiedl	Marion County Emergency Management
Stephen Sirkin	Jewish Federation of Greater Portland
Zack Schick	Willamette University
Cara Sloman	OSSPAC, American Red Cross
Jill Snyder	OHA - HSPR
Sue Staley	Public member
Emma Stocker	PSU
Stan Thomas	DHS
Eric Timmons	Oregon Parks & Recreation Department
Dorothy Wettlaufer	ODOC
John Wilson	Department of Aviation

The Working Group on Mass Care and Mass Displacement also acknowledges the participants at the Eastern Region Workgroup held on April 2, 2018.

appendix b

Resources

Oregon

- Senate Bill 850
- The Oregon Resilience Plan
- State of Oregon Emergency Operations Plan
- State of Oregon Disaster Recovery Plan
- Cascadia Rising 2016 Exercise: Statewide After Action Report
- Secretary of State: The State Must Do More to Prepare Oregon for a Catastrophic Disaster
- DOGAMI: Statewide Seismic Needs Assessment Using Rapid Visual Screening
- State of Oregon Disaster Recovery Assistance Guidebook (under revision)

Equity Framework

Multnomah County Mass Shelter Equity Lens and Guidance
FEMA: A Whole Community Approach to Emergency Management
Multnomah County Equity and Empowerment Lens

Mass Care & Mass Displacement

ODI: Mass Displacement and the Challenge for Urban Resilience
FEMA's National Mass Care Strategy
The Sphere Project
FEMA: Continuity Guidance Circular 1
Clatsop County Enters Agreement for Disaster Shelters
Clatsop Commission Approves Emergency Response Agreements

Schools

Grants Announced for Seismic Upgrades of Schools, Emergency Services Buildings
FEMA P-1000, Safer, Stronger, Smarter: A Guide to Improving School Natural Hazard Safety

Other

Oregon Nonprofits and Disaster Preparedness: Survey Results
DOGAMI Earthquake Regional Impact Analysis
The Emergency Toilet Project
NIST Special Report 1224: Research Needs to Support Immediate Occupancy Objective Following Natural Hazard Events

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