

# Executive Summary

## Introduction

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) was signed into law on November 23, 1988 and provides the legal authority for most federal disaster response activities, particularly Federal Emergency Management Agency (FEMA) activities and programs. The Disaster Mitigation Act of 2000 (DMA 2000) amended the Stafford Act, emphasizing the need for state, local, and Indian Tribal entities to coordinate hazard mitigation efforts. It made the existing requirement for states to have natural hazard mitigation plans a prerequisite for disaster assistance and provided an incentive in the form of additional funding for states that enhance coordination and integration of mitigation planning and activities. The State of Oregon's Natural Hazard Mitigation Plan (NHMP) was such an "enhanced plan." While Oregon has received and made good use of funding following past disasters and continues to advance coordination and integration of natural hazard mitigation planning with other state plans and programs, the 2020 Oregon NHMP is not an "enhanced plan." The State intends to regain "enhanced plan" status during the effective period of the 2020 Oregon NHMP.

The Code of Federal Regulations Title 44, Part 201 (44 CFR Part 201) implements DMA2K by establishing requirements for developing and updating state, local, and Indian Tribal natural hazard mitigation plans (NHMPs). An amendment to 44 CFR Part 201 effective May 27, 2014, extended the state and Indian Tribal NHMP planning cycle from 3 to 5 years. The first Oregon NHMP was completed in 1992; it was updated in 2000, 2004, 2006, 2009, 2012, 2015, and now 2020.

The stated mission of this Plan is to *Create a disaster-resilient state of Oregon*, which is elucidated by its vision that ultimately *Natural hazard events result in no loss of life, minimal property damage, and limited long-term impacts to the economy*. From this guidance and the Plan's risk assessment flow 14 goals and well over one hundred specific actions calibrated to advance disaster resilience through natural hazard mitigation in the State of Oregon.

Disasters occur as a predictable interaction among three broad systems: natural systems, the built environment, and social systems. What is not predictable is exactly when natural hazards will occur or the extent to which they will affect communities within the state.

Hazard mitigation is defined at 44 CFR 201.2 as *any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards*. Benefits of hazard mitigation activities include fewer injuries and deaths; less damage to buildings, critical facilities, and infrastructure; diminished interruption in essential services; reduced economic hardship; minimized environmental harm; and quicker, lower-cost recovery.

The Oregon NHMP contains the most complete and up-to-date description of Oregon's natural hazards and their probability, the state's vulnerabilities, its mitigation strategies and implementation capability. Oregon's counties and cities can rely upon this information when preparing local natural hazard mitigation plans.

The Oregon NHMP is one component of the first volume of the Oregon Emergency Management Plan, administered by the Oregon Military Department's Office of Emergency Management.

# Risk Assessment

## Introduction

The purpose of the Oregon NHMP Risk Assessment is to identify and characterize Oregon’s natural hazards, determine which jurisdictions are most vulnerable to each hazard and estimate potential losses to vulnerable structures and infrastructure and to state facilities from those hazards.

Assessing the state’s level of risk involves three components: characterizing natural hazards, assessing vulnerabilities, and analyzing risk. Characterization involves determining cause and characteristics, documenting historic events, and evaluating future probability of occurrence while accounting for the potential shifts in probability and presentation that may manifest as Oregon’s climate changes.

A vulnerability assessment combines information from the hazard characterization with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by each hazard.

A risk analysis involves estimating the damages, injuries, and costs likely to be incurred in a geographic area over a period of time. Risk has two measurable components: (a) the magnitude of the harm that may result, defined through vulnerability assessments; and (b) the likelihood or probability of the harm occurring. For the 2020 Oregon NHMP update, the state risk assessment has been reorganized to flow from the discussion of hazards directly into the discussion of vulnerability, and then for the first time for the two to culminate in a brief discussion of risk.

Regional risk assessments begin with a description of the region’s natural environment, demographics, economy, infrastructure, and built environment followed by a region-specific hazard characterization, vulnerability assessment, and risk analysis.

## Oregon Hazards Overview

Oregon is subject to 11 natural hazards:

- Coastal Hazards
- Droughts
- Earthquakes
- Extreme Heat
- Floods
- Landslides
- Tsunamis
- Volcanoes
- Wildfires
- Windstorms
- Winter Storms

For the 2020 Oregon NHMP, dust storms were determined to have been adequately mitigated and is therefore not addressed. Extreme heat was determined to be increasing and expected to continue to increase, and therefore added as one of the state’s natural hazards for the first time in 2020. Each hazard is analyzed statewide and at a regional level. The regions used for this analysis are shown in [Figure ES-1](#) and are physiographic regions delineated specifically for the purposes of the Oregon NHMP risk assessment. The hazards impacting each region are identified in [Table ES-1](#). All of the hazards except coastal hazards and tsunamis impact all of the regions; however, the degree of impact of each hazard varies from region to region.

Figure ES-1. Oregon NHMP Natural Hazard Regions

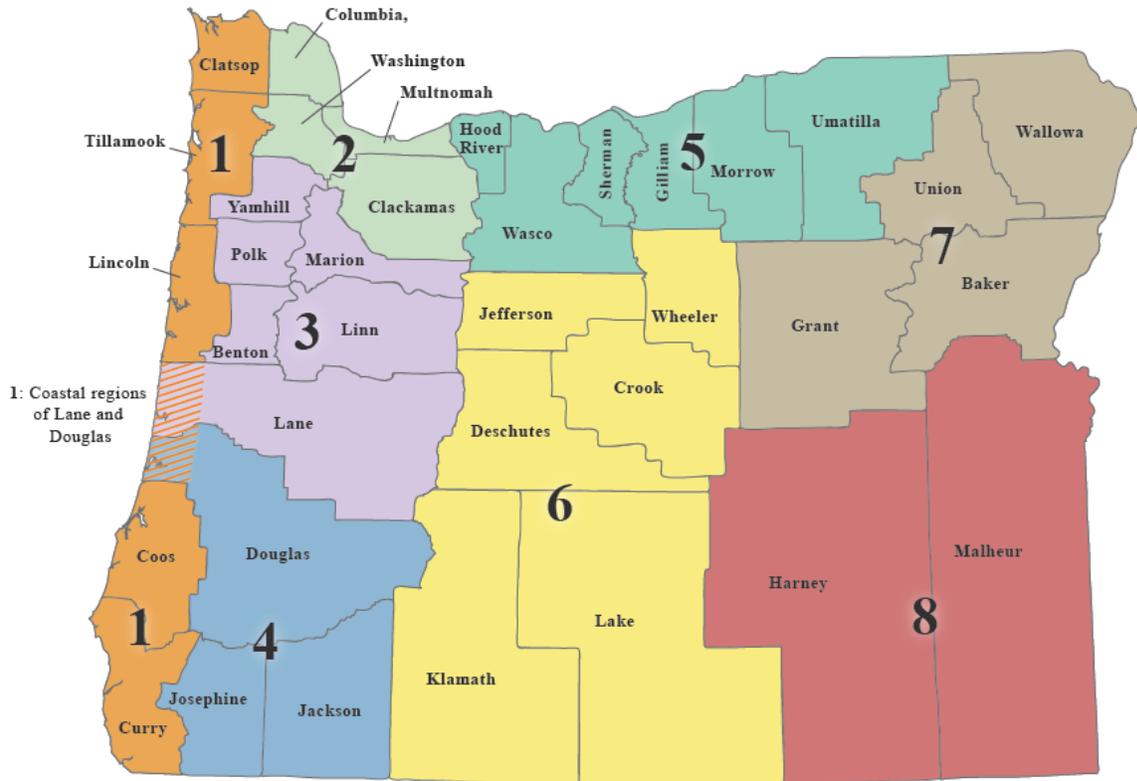


Table ES-1. Hazards Impacting Natural Hazard Mitigation Regions

Hazard	Region							
	1	2	3	4	5	6	7	8
Coastal Hazards	✓							
Droughts	✓	✓	✓	✓	✓	✓	✓	✓
Earthquakes	✓	✓	✓	✓	✓	✓	✓	✓
Extreme Heat	✓	✓	✓	✓	✓	✓	✓	✓
Floods	✓	✓	✓	✓	✓	✓	✓	✓
Landslides	✓	✓	✓	✓	✓	✓	✓	✓
Tsunamis	✓							
Volcanoes	✓	✓	✓	✓	✓	✓	✓	✓
Wildfires	✓	✓	✓	✓	✓	✓	✓	✓
Windstorms	✓	✓	✓	✓	✓	✓	✓	✓
Winter Storms	✓	✓	✓	✓	✓	✓	✓	✓

## Introduction to Climate Change in Oregon

Climate is an important element in certain natural hazards, even though in itself, climate is not a distinct natural hazard.

Climate change is an important stressor that significantly influences the incidence — and in some cases the location — of natural hazards and hazard events. Climate change is anticipated to affect the frequency, magnitude, or both of some natural hazards in Oregon. Over the period 1895–2011 (the observed record), temperatures across the Pacific Northwest have increased by 1.3°F while annual precipitation amounts have remained within the normal range of annual variability. During the same period, Cascade Mountain snowpacks have declined, and higher temperatures are causing earlier spring snowmelt and spring peak stream flows. On the coast, increasing deep-water wave heights in recent decades are likely to have increased the frequency of coastal flooding and erosion. In Oregon’s forested areas, large areas have been impacted by disturbances that include wildfire in recent years, and climate change is probably one major factor. A three-fold increase in heat-related illness has been documented in Oregon with each 10 °F rise in daily maximum temperature.

Every climate model shows an increase in temperature for the Pacific Northwest, with the magnitude of the increase depending on rate or magnitude of global greenhouse gas emissions. Each season will be warmer in the future, and the largest amount of warming will occur in the summer.

Sea levels and wave heights are the primary climate-related drivers that influence rates of coastal erosion. Recent research indicates that sea levels along Oregon’s coast are rising and that significant wave heights off the Oregon coast are increasing. Rising sea levels and increasing wave heights are both expected to increase coastal erosion and coastal flooding. Increased coastal erosion can lead to loss of natural buffering functions of beaches, tidal wetlands, and dunes, and will likely increase damage to private property and infrastructure situated on coastal shorelands.

Warmer, drier conditions are projected to increase the incidence of drought, wildfire, and extreme heat in all eight regions in the state, and particularly in southwest, central, and eastern Oregon. More frequent droughts are likely to cause significant economic damage to the agriculture industry through reduced yields and quality of some crops. Droughts can also significantly increase demand for groundwater and surface water, impacting drinking water supply and aquatic systems. Drought-dried soils increase the potential for wildfire. More frequent and intense wildfires are likely to damage larger areas, posing greater risk to human health through exposure to smoke and greater ecosystem and habitat damage. Increased risk of wildfire also leads to increased potential for economic damage (e.g., property infrastructure, commercial timber, recreational opportunities) at the urban-wildland interface.

The projected increase in extreme precipitation is expected to result in a greater risk of flooding in certain basins. Generally, western Oregon basins (Oregon NHMP Natural Hazard Regions 1–4) are projected to experience increased flood risk in future decades. In other areas of the state, flood risk may decrease in some basins and increase in others. Areas thought to be outside the floodplain may begin to experience flooding, increasing vulnerability of structures not built to floodplain management standards. Increased rainfall and extreme precipitation events are also likely to trigger more landslides. More floods and landslides will increase damage to property and infrastructure. Transportation systems may also be affected, potentially impacting distribution of water, food, and essential services.

**Table ES-2** shows which hazards in each Oregon NHMP Natural Hazard Region are expected to be impacted by climate change.

**Table ES-2. Climate Change Impacts Projected for Each Oregon NHMP Natural Hazard Region**

Hazard	Region							
	1	2	3	4	5	6	7	8
Coastal Erosion / Sea Level Rise	X							
Droughts	X	X	X	X	X	X	X	X
Extreme Heat	X	X	X	X	X	X	X	X
Wildfires	X	X	X	X	X	X	X	
Winter Storms					unknown			
Floods	X	X	X	X				
Landslides	X	X	X	X				
Windstorms					unknown			

Three important Oregon initiatives address climate change across the state. The [Oregon Climate Assessment Report](#) (Dello & Mote, 2010) was the first ever comprehensive scientific assessment of climate change in Oregon. This report was updated by the [2013 Northwest Climate Assessment Report](#) (Dalton, Mote, & Snover, 2013). In addition, the [Oregon Climate Change Adaptation Framework \(2010\)](#) was a collaborative effort among state agencies and institutes to begin to establish a rigorous framework for addressing the effects of climate change in Oregon. Oregon’s framework is the first state-level adaptation strategy based on *climate risks* as opposed to *affected sectors*. It is currently being updated, and the current draft ([Appendix 9.1.23](#)) together with the Oregon Climate Change Workshop Summary Report ([Appendix 9.1.24](#)) bring the interplay between climate risks and natural hazard events into sharp focus. Together, these bodies of work inform the state about changing climate conditions in Oregon and their principal effects on the natural hazards addressed in the Oregon NHMP.

Climate change is intentionally treated separately from hazards in this Plan, except for describing how climate change is predicted to impact the probability of a hazard occurring in the future. For the 2020 Oregon NHMP, data was able to be downscaled to the county level.

## State and Regional Risk Assessments

### Methodology

Currently, to identify the probability of each hazard and the communities most vulnerable to each hazard, each is assessed at the county level and statewide. Local emergency program managers, usually with the assistance of a team of local public safety officials, perform county-level assessments. At the state level, state agencies’ subject matter experts perform the assessments. The local and state assessments are presented together in the Regional Risk Assessments.

Local risk assessments (with an exception or two) employ the same methodology statewide. FEMA developed the methodology and together with the state adjusted it for Oregon. The local risk assessment team first identifies the community’s relevant hazards, then scores each one in four categories: history, probability, vulnerability, and maximum threat. Total scores range from

24 (low) to 240 (high). This method provides local jurisdictions with a sense of hazard priorities, or relative risk. It is also intended to provide comparison of the same hazard between local jurisdictions statewide.

Although this methodology is consistent statewide, the reported raw scores for each county are based on partially subjective rankings for each hazard. Because the rankings are used to describe the relative risk of a hazard within a county, and because each county conducted the analysis with a different team of people using slightly different assumptions, comparisons between local risk assessments must be treated with caution.

The state relies on subject matter experts in one or more agencies to determine the best method or combination of methods to establish probability of each hazard. Due to the wide range of data available for each hazard, the method used to assess probability varies from hazard to hazard. In general, each hazard is assessed using a combination of exposure, historical, and scenario analyses. Hazards for which more data exist have undergone a more robust analysis.

### *State and Local Vulnerability Comparison*

Some state and local vulnerability assessments are quite consistent, while others are starkly inconsistent. Similarities and differences between state and local level vulnerability assessments have not been analyzed. The state has prioritized communication and education among state and local staff responsible for assessing vulnerability to improve understanding and consistency for future local and state plan updates.

### *New Risk Assessment Methodology*

During the previous update, the Risk Assessment Sub-Committee of the State Interagency Hazard Mitigation Team conceptualized a new risk assessment methodology that would be standardized statewide and across all hazards. It is designed to identify the drivers of vulnerability and provide a comparison of vulnerability at the local level, improving the ability of the state to weigh various mitigation actions and direct resources to the most vulnerable areas. Despite several attempts, the state has not been able to secure funding to develop the model and implement it. Therefore, for 2020 update, the State piloted a much less sophisticated methodology to enable comparison of risk across the seven mapped hazards, using the value of state-owned and leased facilities and critical facilities and local critical facilities in hazard areas and the CDC's social vulnerability index factors of vulnerability. Then the subject matter experts' derived probability scores and the vulnerability scores were combined for an overall relative assessment of risk.

## **Profiles**

The descriptions of the natural environment, demographics, economy, infrastructure, and built environment in each Regional Risk Assessment's "Profile" section shows that region's existing strengths and weaknesses, highlighting potential vulnerabilities to natural hazard events. Together with information about the natural hazards that may impact each region, this understanding better enables policy makers to develop and implement effective mitigation actions. Following is a brief, general summary of the eight Oregon NHMP Natural Hazard Regions' social, economic, infrastructure, and built environment profiles.

### *Demographic Profile*

The demographic profile of Oregon's population varies widely from region to region. The Coast and Willamette Valley in particular have high numbers of tourists who may not be aware of the type and degree of hazard risk or preparedness needs in the area. Other more remote regions do attract tourists to more remote locations putting them potentially at risk from natural hazard events. Homelessness is on the rise in portions of the Willamette Valley and Southwest Oregon. In all regions except the Northern Willamette Valley and some counties in Southeast Oregon, there are high percentages of seniors. Conversely, in the Northern Willamette Valley and other counties in Southeast Oregon, there are high percentages of children. Educational attainment among the populations of some coastal communities and in Southwest Oregon, the Mid-Columbia Region, and Northeast Oregon tends to be lower. The share of persons who do not speak English very well is greater for some communities in Willamette Valley, Mid-Columbia, and Southeast Oregon.

### *Economic Profile*

Communities along the Oregon Coast and in Central, Southeast, and Southwest Oregon were hit particularly hard by the financial crisis that began in 2007 and are still experiencing low job recovery rates. In addition, in 2020 they have been impacted by the economic burdens of the novel coronavirus pandemic. Because these regions have few key industries, rebounding is especially difficult. In general, wages are higher in the Northern Willamette Valley. Unemployment rates are higher in the regions outside the Coast and Willamette Valley.

### *Infrastructure Profile*

Counties in all eight regions have transportation, energy, and water facilities or conveyance systems that are vulnerable to natural hazard events. The state's energy hub in the Portland Harbor area of the lower Willamette River is highly vulnerable to a seismic event due to liquefiable soils and to the age and poor condition of many facilities.

### *Built Environment Profile*

Populations tend to cluster around transportation corridors. The majority of growth is occurring in the Willamette Valley. Each region outside the Willamette Valley has at least one county with a high proportion of manufactured homes, which are inherently vulnerable to natural hazards. Also, in at least one county, half or more of the structures were built prior to current floodplain management or seismic standards.

## Hazards and Vulnerability

### *Coastal Hazards*

Wave-induced coastal erosion (both short- and long-term), wave runup and wave-induced flood hazards, wind-blown sand, coastal landslides, earthquakes, and potentially catastrophic tsunamis generated by the Cascadia Subduction Zone (CSZ) all affect Oregon's coastal strip. The region's natural landforms have restricted development to low-lying areas, chiefly along dunes, barrier spits, or along coastal bluffs subject to varying rates of erosion, and to low-lying areas adjacent to the numerous estuaries. Intense chronic storms at the coast gradually cause damage over time, impacting property, infrastructure, and ecosystem services.

Counties most vulnerable to coastal hazards: Tillamook, Lincoln, Clatsop, and Curry

Other communities considered vulnerable to coastal hazards: A few communities scattered through Coos County and the coastal area of Lane County, for example, adjacent to the south Coquille jetty in Bandon, along Lighthouse Beach near Cape Arago, Heceta Beach, and adjacent to the mouth of the Siuslaw River.

State-owned/leased facilities in the coastal erosion zone: In Region 1, there is a potential loss of over \$232M in state building and critical facility assets to a CSZ event.

### *Droughts*

Oregon is continuously confronted with drought and water scarcity issues, despite its rainy reputation. Droughts can occur in Oregon in both summer and winter months. These events generally affect areas east of the Cascades and some specific locales across the state. Severe or prolonged drought can impact Oregon's public health, infrastructure, facilities, economy, and environment.

Counties most vulnerable to droughts: Klamath and Baker

Other counties considered vulnerable to droughts: Lake, Malheur, Sherman, Gilliam, and Morrow

### *Earthquakes*

Oregon is susceptible to four types of earthquakes: subduction zone, crustal, intraplate and volcano-induced earthquakes. The greatest threat to Oregon is a Cascadia Subduction Zone (CSZ) event. A CSZ event will primarily impact western Oregon. The heavily populated metropolitan areas of Portland, Salem, and Eugene will experience major damage and loss of life.

In the period between 2013 and 2014, five major initiatives took place that boosted the state's understanding of its earthquake risk.

First, the Oregon Department of Transportation (ODOT) conducted the [Statewide Loss Estimates: Oregon Highways Seismic Options Report](#) project that identified priority state-owned lifelines in a CSZ event. A three-tier roadway system was devised:

- Tier 1 provides access from Central Oregon, Washington, and California, and provides access to each region within the study area
- Tier 2 extends the reach of the Tier 1 system throughout seismically vulnerable areas of the state and provides lifeline route redundancy in the Portland Metro Area and Willamette Valley
- Tier 3, together with Tiers 1 and 2, provides an interconnected network with redundant paths to serve all of the study area

Second, DOGAMI published Open File Report O-13-09, Earthquake Risk Study for Oregon's Critical Energy Infrastructure Hub (Wang, Bartlett, & Miles (2013); <http://www.oregongeology.org/sub/earthquakes/cei-hub-report.pdf>). This report highlights the concentration of critical energy facilities in the Portland area and the potential statewide impacts of a seismic event affecting this hub.

Third, in 2013 the Cascadia Region Earthquake Workgroup (CREW) issued an updated scenario for a CSZ magnitude 9.0 event (Appendix [9.1.25](#)). It explains the latest science and expected impacts, and suggests mitigation strategies.

Fourth, the Oregon Seismic Safety Policy Advisory Commission (OSSPAC) developed the [Oregon Resilience Plan](#) that was commissioned by a legislative resolution. The ORP estimated the impacts of a magnitude 9.0 CSZ earthquake on the state's population, buildings, and infrastructure. According to the ORP, recovery time estimates for coastal infrastructure in a Medium CSZ event will be:

- Electricity and natural gas, 3–6 months
- Drinking water and sewer systems, 1–3 years
- Healthcare facilities, 3 years

The ORP does not estimate recovery times for police and fire stations or the coastal transportation system. Recovery of the transportation system will no doubt be measured in years. Because the coast's economy is dependent on the transportation system, economic recovery would also be many years.

The ORP recommends actions for improving resilience to the CSZ event and that they be implemented over a 50-year period. Some examples:

- Comprehensively assessing key structures and systems
- Retrofitting Oregon's public buildings
- Helping Oregon's private sector improve resilience
- Revising public policies to streamline recovery and increase public preparedness

Finally, SB 33 (2013) established the Oregon Resilience Task Force to develop a plan to implement the ORP. The Task Force reported to the Oregon Legislature in October 2014 (Appendix [9.2.4](#)).

The 10 counties projected to incur the most loss and damage due to a CSZ earthquake (most to least): Multnomah, Lane, Coos, Washington, Marion, Benton, Lincoln, Josephine, Clatsop, and Jackson

The 10 counties projected to incur the most loss and damage due to combined crustal earthquakes (most to least): Multnomah, Washington, Lane, Marion, Clackamas, Coos, Jackson, Benton, Linn, and Klamath

Other communities vulnerable to earthquakes: Seaside is the most vulnerable coastal town.

State-owned/leased facilities in an earthquake hazard zone: Of 5,350 state facilities evaluated, 838 building were flagged as extensively or completely damaged following a CSZ event (Regions 1–4) or a 2,500-year probabilistic scenario (Regions 5–8) totaling over \$1.3 billion in potential damage to property. Among the 1,647 critical state facilities, 360 were flagged as extensively or completely damaged.

### *Extreme Heat*

Extreme heat is associated with more fatalities than any other severe weather event in the United States. For the first time, extreme heat is included as a hazard in the 2020 Oregon NHMP. This is due to the recognition that as the climate continues to warm, extreme heat events will be an emerging hazard with implications for public health as well as infrastructure. Extreme heat events are expected to increase in frequency, duration, and intensity in Oregon due to continued warming temperatures.

Vulnerability to extreme heat is experienced by both rural and urban people. On a regional basis, areas that climatologically see the greatest number of very hot temperature days include inland areas at lower elevations in eastern Oregon, as well as parts of southern Oregon, particularly the Rogue River Valley. People who work outside (including construction workers, farmworkers, foresters, and fishers), as well as outdoor athletes face higher exposures to extreme heat. Extreme heat in urban areas poses risk to human health and safety, especially for those living and working in urban heat islands. People living outdoors or in the upper floors of multi-family housing units may be particularly vulnerable.

Vulnerability to this hazard is defined as the combination of sensitivity to extreme heat (or maximum effects) and level of adaptive capacity (frequency of air conditioning use, for example) in response to extreme heat. Risk combines vulnerability with the probability or likelihood of occurrence. Region 4, Region 5, and Region 8 face the greatest risk from extreme heat. Morrow County alone (Region 5) is at very high risk. The counties at high risk are: Linn, Yamhill, Douglas, Jackson, Josephine, Gilliam, Sherman, Umatilla, Wasco, Crook, Jefferson, Lake, Baker, Harney, and Malheur.

This is the first time the Oregon NHMP has addressed extreme heat. The state has not collected or developed statewide data on the potential dollar loss to state assets from extreme heat. This may be developed through a vulnerability assessment proposed for implementation of the draft, updated Climate Change Adaptation Framework.

### *Floods*

Oregon has an extensive history of flooding, and there are localized risks of flooding across the state. Types of flooding in Oregon include riverine flooding, flash floods, coastal floods, shallow area flooding, urban flooding, playa flooding, and floods caused by ice jams and dam failure. In La Niña years, floods can be severe. In addition, channel migration has created hazardous

conditions along developed river banks. The National Flood Insurance Program (NFIP) identifies 251 communities in Oregon as flood-prone including locations in all 36 counties, 212 cities, and three Indian Tribal Nations. Damage and loss of life occur when flood waters come into contact with the built environment or other areas where people congregate. In addition to taking lives and damaging property, floods can cause stream channels to migrate and erode and can precipitate landslides.

FEMA's Community Information Systems (CIS) database identifies a total of 268 buildings in Oregon that qualify as RL properties. The NFIP defines an RL property as any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling 10-year period since 1978.

Counties most vulnerable to floods based on number of National Flood Insurance Program (NFIP) claims are in order from highest to lowest: Clackamas, Tillamook and Lane. Counties the most vulnerable based on the dollar amount of National Flood Insurance Program (NFIP) claims are in order from highest to lowest: Clackamas, Tillamook, and Columbia.

Cities most vulnerable to floods based on number of National Flood Insurance Program (NFIP) claims are in order from highest to lowest: Portland, Vernonia, Salem, and Tillamook. Cities the most vulnerable based on the dollar amount of National Flood Insurance Program (NFIP) claims are in order from highest to lowest: Vernonia, Tillamook, Lake Oswego, Salem and Portland.

The 10 cities with the greatest percentage of land area in a 1% annual flood zone are (most to least): Helix, Scio, Burns, Warrenton, Seaside, Vernonia, Sheridan, Lone, Adams, and Athena

State-owned/leased facilities in a flood hazard zone: Of the 5,350 state facilities evaluated, 632 were located within a flood hazard zone and had an estimated total value of over \$900M. Of these, 165 were identified as state critical facilities.

In addition, 683 local critical facilities were exposed to flood hazard, with a total value of \$1.6B.

### *Landslides*

Landslides occur across the state. In general, counties in Oregon have hundreds to thousands of existing landslides. Typically, areas with more relief and steeper slopes, such as the Coast Range and Cascade Mountains, tend to have more landslides. Three main factors influence an area's susceptibility to landslides: geometry of the slope, geologic material, and water. Landslides in Oregon are typically triggered by periods of heavy rainfall alone or with rapid snowmelt. Earthquakes, volcanoes, and human activities also trigger landslides. Average annual repair costs for landslides in Oregon exceed \$10 million. As population increases in Oregon and development encroaches upon landslide-susceptible terrain, greater losses are likely to result. Major landslides have severed key transportation routes such as highways and rail lines causing temporary but significant statewide economic damage. Landslides that close US-101 or any of the highways connecting the I-5 corridor to the coast have a significant effect on commerce in the Oregon Coast Region.

Clatsop, Coos, Curry, Douglas Coastal, Lincoln, Tillamook, Lane Coastal, Clackamas, Columbia, Multnomah, Washington, Lane, Linn, Marion, Benton, Yamhill, Douglas, Jackson, Josephine, Hood River, Wasco, Jefferson, Wheeler and Wallowa Counties are listed by DOGAMI as having

the highest hazard and risk to landslide in the state. Because of their importance to the state's economy, landslides occurring in Multnomah, Clackamas, and Washington Counties present the greatest vulnerability to impacts from this type of disaster. Landslides that close US-101 or any of the many highways connecting the I-5 corridor to the coast have a significant effect on commerce in the Oregon Coast Region.

State-owned/leased and local facilities in a landslide hazard area: Over \$777.5M in value of state buildings, state and local critical facilities is exposed to landslide hazards statewide.

### *Tsunamis*

The entire Oregon coast is at risk from distant and local tsunamis. Distant tsunamis caused by earthquakes on the Pacific Rim strike the Oregon coast frequently, but few have caused significant damage or loss of life. Local tsunamis caused by a Cascadia Subduction Zone (CSZ) event happen much less frequently but will cause catastrophic damage and, without effective mitigation actions, great loss of life. Most locally generated tsunamis will be higher and travel farther inland (overland and up river) than distant tsunamis. By the time a tsunami wave hits the coastline, it may be traveling at 30 mph and have heights of 20 to approximately 100 feet. The tsunami wave will break up into a series of waves that will continue to strike the coast for a day or more, with the most destructive waves arriving in the first 4-5 hours after the local earthquake. Significant loss of life and profound damage due to a local tsunami caused by a CSZ event is likely.

Counties most vulnerable to tsunami: All coastal counties. Clatsop and Tillamook counties have the greatest vulnerability. Gearhart, Cannon Beach, Rockaway Beach, Pacific City, Neskowin, Salishan Spit, Cutler City in Lincoln City, South Beach in Newport, and downtown Waldport are all extremely difficult to evacuate. The City of Seaside is a community where the school district constructed new facilities outside the hazard area. This is the subject of one of the success stories contained in the Plan.

State-owned/leased facilities in a tsunami hazard zone: . Over \$248M in value of state buildings and state critical facilities are located in tsunami hazard areas, and 67% of that value is located in Clatsop County. More than \$351K of value in local critical facilities is located in tsunami hazard areas. Again, most of that value, 49%, is located in Clatsop County.

### *Volcanoes*

Volcanic activity can impact central Oregon, the Cascade Range, Southeast Oregon, and the Northern Basin and Range ecoregion ([Figure 2-295, Region 8 Ecoregions](#)). Potentially hazardous volcanoes in Oregon exist along the crest of the Cascade Range and to a lesser extent in the Northern Basin and Range ecoregion. Volcanic hazards that can impact the state include ashfall that can travel long distances, lahars (volcanic debris flows), lava flows (streams of molten rock), pyroclastic flows and surges (avalanches of rock and gas at temperatures of 600–1500°F), landslides, earthquakes, flooding, and channel migration.

Counties most vulnerable to volcanic hazards: Clackamas, Douglas, Deschutes, Hood River, Jackson, Jefferson, Klamath, Lane, Linn, Marion, Multnomah, and Wasco

State-owned/leased facilities in a volcanic hazard zone: Close to \$306M in value of state buildings, state and local critical facilities is exposed to volcanic hazards statewide, all of it in Regions 2, 3, 5, and 6. The greatest amount of exposure is in Region 3, in Lane County. In addition, of the 58,872 historic buildings throughout the state, 693 are exposed to volcanic hazards: 140 in a high hazard area, 443 in a moderate hazard area, and 110 in a low hazard area.

### *Wildfires*

Wildfires occur throughout the state and may start at any time of the year when weather and fuel conditions combine to allow ignition and spread. Wildfires impact primarily southwest, central, and northeast Oregon, with localized risks statewide. The majority of wildfires take place between June and October. Wildfires may be broadly categorized as agricultural, forest, range, or wildland-urban interface (WUI) fires. Common sources of wildfire in Oregon include lightning, equipment use, railroad activity, recreational activity, debris burning, arson, and smoking.

The US Forest Service recently completed the Quantitative Wildfire Risk Assessment (QWRA). The Oregon Department of Forestry (ODF) has recently taken this assessment data and worked with Oregon State University Extension and Pyrologix, LLC (<http://pyrologix.com>) to create a portal to maps that can identify wildfire risk in the state of Oregon. The Oregon Wildfire Risk Explorer (OWRE) project makes data available for the Pacific Northwest, replacing the West-Wide Risk Assessment (WWRA) of 2013. The WWRA identified that six Oregon counties each have over 1 million wildland acres at moderate risk of wildfire. 751,672 Oregonians live in wildland development areas that are at risk of wildfire. Over 12 million acres of forest are at moderate to high risk of wildfire in Oregon.

Based on the Communities At Risk analysis, the regions most vulnerable to wildfire are Region 4 and Region 7, followed by Region 6, Region 8, and Region 5.

With respect to probability of wildfire, counties with an exposure rating of Very High include: Baker, Deschutes, Douglas, Grant, Jackson, Jefferson, Union, , and Wasco. Counties rated as High Exposure include: Josephine, Morrow, Umatilla, Crook, Deschutes, Wheeler, Harney and Malheur.

Other counties vulnerable to wildfire: All other counties in Oregon

State-owned/leased facilities in a wildfire hazard zone: Of the 5,530 state facilities evaluated, 1,111 are within the High or Moderate wildfire hazard zone and total about \$950 million in value. Three hundred sixty-five state critical facilities are within the High or Moderate wildfire hazard zone. Of the 8,757 local critical facilities evaluated, 955 were in High or Moderate hazard zones with a total value over \$775 million.

### *Windstorms*

The risk of windstorms is localized across the state. Windstorms are especially common in exposed coastal areas and in the mountains of the Coast Range, occur most frequently from October through March. Communities in the Willamette Valley and Columbia River Gorge also experience strong winds. The wind itself, the debris it carries, and the trees it may blow down

cause injury and damage property and infrastructure. The harmful effects of windstorms may extend for distances of 100 to 300 miles from the storm’s center of activity.

Counties most vulnerable to windstorms: Benton, Clatsop, Coos, Columbia, Curry, Douglas, Gilliam, Hood River, Lane, Lincoln, Linn, Marion, Morrow, Multnomah, Polk, Sherman, Tillamook, and Washington

*Winter Storms*

Winter storms bring freezing rain, sleet, black ice, heavy snow, ice accumulation, extreme cold, and snow avalanches to areas across the state. These storms may last several days and can paralyze a community. People can become homebound; motorists can become trapped in their vehicles; utilities and other services can be disrupted, and crops and other vegetation can be damaged by freezing temperatures. Airport and other transportation system closures can stop the flow of supplies and disrupt essential services.

Counties most vulnerable to winter storms: Linn, Benton, Marion, Polk, Yamhill, Columbia, Washington, Multnomah, Clackamas, Lane, Douglas, Josephine, and Jackson

## Mitigation Strategy

Oregon’s mission, vision, and goals for natural hazard mitigation are purposefully aspirational, providing the foundation for the state’s overall mitigation strategy. Natural hazard mitigation planning in Oregon is funded by the state, post-disaster FEMA mitigation grants, and non-disaster FEMA grant funding.

Given the current economic climate, it is important to acknowledge that state resources are limited. Oregon is not unique in that regard. Even so, Oregon is committed to remaining at the forefront of mitigation planning and will continue to innovate and leverage limited resources to reduce losses resulting from natural hazards in our state. The mitigation strategy presented in this 2020 Oregon NHMP reflects that commitment.

MISSION Create a disaster-resilient state of Oregon.

VISION Natural hazard events result in no loss of life, minimal property damage, and limited long-term impacts to the economy.

- GOALS
- 1 Protect life and reduce injuries resulting from natural hazards.
  - 2 Minimize property damage from natural hazards.
  - 3 Minimize damage to critical or essential infrastructure and services from natural hazards.
  - 4 Enhance the ability of Oregon’s economies to rebound quickly from the effects of natural hazard events.
  - 5 Minimize project impacts to the environment and utilize natural solutions to protect people and property from natural hazards.

- 6 Enhance the state’s capability to implement a comprehensive statewide natural hazards mitigation strategy.
- 7 Motivate the “whole community” to build resilience and mitigate against the effects of natural hazards through engagement, listening, learning, information-sharing, and funding opportunities.
- 8 Eliminate development within mapped hazardous areas where the risks to people and property cannot be practicably mitigated.
- 9 Minimize damage to historic and cultural resources from natural hazards.
- 10 Enhance communication, collaboration, and coordination among agencies at all levels of government, sovereign tribal nations, and the private sector to mitigate natural hazards.
- 11 Mitigate the inequitable impacts of natural hazards by prioritizing and directing resources and investments to build resilience in the most vulnerable populations and the communities least able to respond and recover.
- 12 Develop, integrate, and align natural hazards mitigation and climate adaptation efforts based on the evolving understanding of the interrelationships between climate change and climate-related natural hazard events.
- 13 Reduce repetitive and severe repetitive flood losses.
- 14 Minimize or eliminate potential impacts from dams posing the greatest risk to people, property, and infrastructure

## Goals: Linking the Risk Assessment and Mitigation Actions

Natural hazard mitigation plan goals link the risk assessment and mitigation actions, guiding the direction of future natural hazard risk reduction and loss prevention activities.

The risk assessment speaks directly to protection of life and property, infrastructure and services, and local, regional, and state economic resilience, the topics of Goals 1, 2, 3 and 4. The vulnerability assessments for each hazard and the potential loss estimates highlight the importance of informing and educating citizens about the risks and what they can do to reduce potential losses, including eliminating development where risks cannot be practicably mitigated, the topics of Goals 7, 8, 9, and 10. New Goal 13 specifically calls out the need to reduce losses from structures that have been damaged repetitively by flooding, one of the hazards with the greatest risk statewide according to the 2020 risk assessment. New Goal 14 sets policy direction for addressing the flood hazard posed by high-hazard potential dams. Goal 8 sets policy direction for prohibiting development in or moving development out of hazard areas, a clear connection to the vulnerabilities established by the risk assessment. Environmental stewardship, the topic of Goal 5, plays a role in mitigating some hazards, and must be considered in designing mitigation projects.

New Goal 12 speaks to the connections between natural hazards and climate change—discussed in the risk assessment—and sets policy direction for aligning climate adaptation and natural hazard mitigation efforts. New Goal 11 underscores the inequitable impacts of natural hazards and the importance of prioritizing and directing resources to vulnerable populations and those communities least able to

respond and recover from hazard events. This is also a focus of climate change adaptation. Both equity and climate change are among Governor Brown’s priorities and gaining attention statewide.

Finally, Goal 6 focuses on the state’s ability to implement the Plan, providing a policy foundation for state support of mitigation actions and activities.

The mitigation action tables (Priority, Ongoing, and Removed) demonstrate the link between the goals and mitigation actions by noting the goal(s) that each mitigation action addresses.

## Mitigation Actions

### Identification, Evaluation, Prioritization

Mitigation actions are detailed recommendations for activities that the state is considering implementing to reduce risk and prevent loss from natural hazards. Mitigation actions are sorted into one of three categories: priority, ongoing, or removed. Priority actions are those the state aspires to begin or complete. Ongoing actions are those the state is doing in the normal course of business, continually over a long period of time. Removed actions are those that have been completed; will not be completed for various reasons; have been replaced by other actions; are not mitigation actions; or have been determined not to be within the State’s purview.

The first step in updating the tables was to document the status of each action included in the 2015 plan. Based on the status reports, some mitigation actions were removed from the Priority and Ongoing tables. The next task was to prioritize the remaining mitigation actions. We decided to prioritize only the mitigation actions remaining on the Priority table along with new mitigation actions suggested by subject matter experts and hazard leads via an online survey. Reviewers were asked to evaluate each mitigation action based on nine criteria drawn from the 2015 Plan goals and the results of the 2020 Risk Assessment. Scores were calculated and used to prioritize mitigation actions within hazard groups and two others: all hazards and multiple hazards. Climate change actions were placed in the multiple hazards group.

A second survey ranked the mitigation actions on three additional statutory criteria: cost effectiveness, technical feasibility, and environmental soundness. No changes were found to be necessary to the earlier mitigation action rankings. The results of the two surveys may be found in Appendix [9.2.1](#) and Appendix [9.2.2](#), respectively.

### Changes in Mitigation Action Priorities

With the exception of three statutory criteria, the 2015 and 2020 Oregon NHMP mitigation actions were evaluated using different methods and different criteria. This makes a direct comparison and assessment of changes in priorities very difficult. The 2015 Plan contained 78 priority actions and 71 ongoing actions for a total of 149. The 2020 Plan contains 107 priority actions and 73 ongoing actions for a total of 180.

Of the 2015 Plan’s 149 actions:

- Twenty-two were completed

- Twenty-four are no longer being pursued.
- Ten are no longer being pursued due to lack of funding or other resources.
- Six are no longer being pursued because the intent is being met through other means.
- Four are no longer being pursued because they were dependent on another action that is no longer being pursued because it was determined no longer needed.
- The intent of two were incorporated into new mitigation actions and are therefore no longer being pursued.
- One is not actively being pursued but the State does engage upon request.
- One is not being pursued because it was linked to the State Risk MAP Coordinator, a position Oregon no longer has.

Of the ten no longer being pursued for lack of funding or other resources, only those that would establish new programs and therefore require large financial commitments would be unlikely to be reconsidered. The majority would probably be pursued once again were funding and other resources to become available. They could be generally categorized as outreach, education, data development, and capacity-building. Most of those no longer being pursued for other reasons have been addressed in other ways or determined unnecessary. Therefore, the removed items do not represent a major shift in mitigation priorities.

## **Funding Sources for Mitigation Actions**

Oregon's mitigation activities are funded directly and most visibly through sources such as FEMA's Pre-Disaster Mitigation Grant, Flood Mitigation Assistance, Public Assistance, Hazard Mitigation Grant Program and High Hazard Potential Dam Grants, as well as NOAA grants with state, local, or private funds providing the non-federal cost share. The State's Seismic Rehabilitation Grant Program is a direct funding source for earthquake mitigation projects. The Oregon Disaster Assistance Loan and Grant account provides post-disaster mitigation funds to local governments and school districts. Currently the state's 2021-2023 budget is being re-evaluated based on the drastically reduced state revenue forecast resulting from the global pandemic. Final State budget decisions will be made by the Oregon Legislature. More indirect and less visible funding comes from state general funds through in-kind activities and other state funds.

## **Mitigation Successes**

Oregon maintains documentation of "mitigation success stories." These are completed mitigation actions that have shown to be successful by either (a) avoiding potential losses; or (b) demonstrating cost-effectiveness through benefit-cost analysis, qualitative assessment, or both. Likewise, actions that support mitigation efforts, like risk or vulnerability assessment studies, are included. Mitigation success stories are completed by or with input from the action's coordinating agency. Eight mitigation success stories since 2015 are showcased in the 2020 Oregon NHMP.

## Capability Assessment

### State Capability Assessment

There have been a number of positive changes in Oregon’s natural hazard mitigation capability since 2012. Among them are:

- Establishment of the Governor’s Resilience Policy Office and hiring of a State Resilience Officer in 2016
- Establishment of the Governor's Council on Wildfire Response in January 2019
- Phase I of the Oregon Highways Seismic Plus Report received funding in 2017 that has allowed scoping for seismic work on I-5 near Eugene for the 2021-2024 State Transportation Improvement Program (STIP). Phase I also includes portions of I-84 that are planned for to be retrofitted moving from east to west. The 2021-2024 STIP funding includes \$31M to address ODOT bridge seismic needs.
- DLCDC stepped up to fill a need for directly assisting local governments with NHMP updates.
- DLCDC began reaching out to special districts and inviting them to participate in multi-jurisdictional NHMP updates, develop or update stand-alone NHMPs.
- DLCDC has worked with 13 counties on multi-jurisdictional plan updates covering about 36 cities, some for the first time, and a similarly large number of special districts. DLCDC has also worked with one community on its stand-alone city plan update and with one Tribe on its plan update. This is the first time a tribe in Oregon has worked with the state rather than directly with FEMA.
- DLCDC has assisted local governments with planning for tsunami mitigation, including adoption of tsunami overlay zones and development of vertical evacuation structures using its 2014 publication *Preparing for a Cascadia Subduction Zone Tsunami: A Land Use Guide for Oregon Coastal Communities*.
- in 2016 DOGAMI published a statewide landslide susceptibility map.
- DOGAMI and DLCDC partnered to produce *Preparing for Landslide Hazards: A Land Use Guide for Oregon Communities*, published in October, 2019
- DOGAMI and DLCDC have continued to partner on coordinating multi-hazard risk assessments with local NHMP updates.
- Between 2016 and 2019, the following coastal jurisdictions adopted Tsunami Hazard Overlay Zones into their comprehensive plans: Coos County, Douglas County, Reedsport, Florence, North Bend, Rockaway Beach, Gearhart, Port Orford, and Tillamook County. Most of those jurisdictions have also completed Tsunami Evacuation Facilities Improvement Plans to identify evacuation routes and improvement projects.
- Coos County adopted new and updated provisions to their Natural Hazard Overlay Zone, which addressed mitigation actions identified in their NHMP.
- ODF has also developed and rolled out an online interactive web application called the *Oregon Wildfire Risk Explorer*. It employs a new wildfire risk assessment model, the *Quantitative Wildfire Risk Assessment* prepared by Pyrologix for the US Forest Service in 2018.

- DLCD has engaged OCCRI to develop downscaled, county-level future projection reports for the local NHMP updates with which it is assisting directly. They have been very well received and very helpful in assessing risk.
- OCCRI and DLCD have reprised their partnership on the 2010 Climate Change Adaptation Framework (CCAF) to produce an update.
- In August 2019, OCCRI hosted an event entitled *Oregon Climate Change Effects, Likelihood, and Consequences Workshop* during which subject matter experts convened and discussed topics relevant to both the CCAF and Oregon NHMP updates. The outcomes of this workshop were captured in a report of the same title and used for both efforts
- DAS's Chief Financial Office with DOGAMI's assistance in 2015 issued *DAS-CFO Facility Planning Guidelines for Development with Natural Hazards*.
- DAS-CFO and DOGAMI partnered to address seismic issues with state buildings and developed a plan (currently on hold) to build two new buildings that would house state government core functions and continue to be operational during and after a Cascadia subduction zone event.
- The Office of Emergency Management is the proud recipient of an ESRI 2020 Special Achievement in GIS award for its GIS system (<https://oregon-oem-geo.hub.arcgis.com/>) that provides data and information to emergency managers and decision makers about current and anticipated hazard events.

Oregon continues to maintain robust pre- and post-disaster natural hazard mitigation policy and program frameworks, coordinated through the State Interagency Hazard Mitigation Team.

Funding comes from FEMA and NOAA grant programs, as well as the state's Seismic Rehabilitation Grant Program, Oregon Disaster Assistance Loan and Grant Account. The federal grant programs require a non-federal cost share which is funded by the state, local governments, and private entities. The State General Fund covers in-kind services performed by state employees. State funding to support hazard mitigation and risk reduction remains limited. However, Oregon has an excellent track record of leveraging limited local resources to successfully complete mitigation planning and projects throughout the state.

### **Local Capability Assessment**

Local natural hazard mitigation policies, programs, and capabilities along with a general assessment of their effectiveness are presented in table format as is the status of each community's NHMP and its participation in the National Flood Insurance Program and Community Rating System.

## **Coordinating State and Local Mitigation Planning**

Direct State technical planning assistance for local NHMPs is provided primarily by OEM, DLCD, and DOGAMI. This assistance is funded by full or partial State support of FTE positions whose duties include providing technical assistance in mitigation planning and project implementation to local communities. Technical assistance is also provided indirectly, in the form of access to products and information.

At OEM, the State Hazard Mitigation Officer (SHMO) assists with mitigation project development, execution, and grant compliance. Others provide oversight of mitigation plans; public information and outreach, particularly for earthquake and tsunami hazards; and tsunami evacuation planning.

DLCD staff provide local governments assistance in complying with Statewide Planning Goal 7 which requires planning for hazard mitigation and integrating local NHMPs with comprehensive plans and implementing programs and regulations. It encourages implementing the NFIP minimum and higher standards. In 2014, DLCD staff began assisting local jurisdictions with updating and developing new NHMPs. DOGAMI continues to develop local risk assessments that underpin local NHMPs through the Risk MAP Program

Together, OEM and DLCD provide technical assistance to property owners and local governments for mitigating repetitive loss (RL) and severe repetitive loss (SRL) properties.

DLCD and OEM provide notification and information regarding mitigation grant options and opportunities to local communities. OEM provides assistance, to the degree possible, to communities to help them prepare grant subapplications.

In addition to the Risk MAP Program's products, specific hazard information, risk, and vulnerability assessment products are provided by DOGAMI on a funding-contingent basis.

Numerous other agencies — federal (e.g., FEMA, U.S. Geological Survey, U.S. Army Corps, etc.), State (e.g., ODF, ODOT, OHA, etc.) and local (counties, cities, councils of governments, special districts, etc.) — also contribute valuable technical information and support to local mitigation planning efforts.

A critical source of technical hazard mitigation planning assistance in Oregon, the Oregon Partnership for Disaster Resilience at the University of Oregon assists local jurisdictions with grant writing, local plan development, plan update, process facilitation, stakeholder engagement, public outreach, and hazard research services and serves as a liaison between local communities and state, federal and NGO partners during the mitigation planning process. OPDR strives to ensure that local communities: (a) receive the tools and resources to successfully facilitate and document plan development or plan update processes (b) establish regional partnerships to discuss collaborative projects and implementation strategies, and (c) engage with a variety of state and local agencies and organizations that can assist with local risk reduction strategies.

The Land Conservation and Development Commission oversees a grant program through which each biennium local governments are awarded general funds for purposes that support the statewide land use planning program. One of the grants in the program is the Technical Assistance Grant or TA Grant. It is a competitive grant that, starting with the 2015-17 biennium, included natural hazards planning as Priority #3 out of five. It was to support natural hazards mitigation planning and integrating NHMPs with comprehensive plans. In the 2017-19 biennium, the scope was expanded. Its title is now *Plan for resilience to natural hazards and climate change adaptation*. It reads, *This priority is for grants that provide assistance with: (a) creating local natural hazard mitigation plans; (b) other studies and activities supporting local resilience to natural hazards and climate adaptation; and (c) incorporating new hazards data, and the response to the data, into comprehensive plans and zoning regulations*. It appears this funding will be affected by the budget cuts being contemplated by the legislature in Summer 2020 as a result of the deep revenue losses resulting from the novel coronavirus pandemic.

Oregon delivers a robust calendar of training classes and events each year that support mitigation planning, project development and implementation, and risk reduction.

Oregon also sponsors the Oregon Prepared Conference in the spring of each year which brings together emergency managers and others for a few days of discussion, coordination, and networking around disaster cycle topics.

OEM and DLCDC collaborated on an educational presentation to the Special Districts Association of Oregon in February 2018. The purpose of the presentation was to advise special district representatives about the requirement for having an NHMP to access HMA funding; the return on investment in mitigation; the process for developing NHMPs; and technical assistance available from the state. The presentation was well attended and appreciated.

## Planning Process

### Developing the Plan

The primary focus of this plan update was to improve the risk assessment by developing a single methodology to assess risk across all hazards statewide and use the results to inform and guide mitigation goals and actions. The goal was to connect hazard and vulnerability assessments to describe risk in a way that would identify the where and on which hazards the state should focus its mitigation efforts. The State identified a simple methodology that would be able to be implemented with a limited budget. A full description of the 2020 Risk Assessment methodology pilot is located in Section [2.1.2](#).

Another focus of the 2020 update was to coordinate with the simultaneous update of Oregon's 2010 Climate Change Adaptation Framework (CCAF) and integrate the two documents to the extent possible. While the degree of integration initially contemplated has not yet been possible, the Oregon NHMP does include a goal addressing climate change adaptation and several mitigation actions from the CCAF

Another benefit of the coordination with the CCAF update is the incorporation of an equity lens in the Oregon NHMP goals. Governor Brown has brought the issue of equity to the fore, and all state agencies are working to incorporate it into their work.

The IHMT's interest in social vulnerability was addressed in the 2020 risk assessment for the first time. DLCDC chose to use the CDC's index in the 2020 risk assessment because it is used by other state agencies. This will facilitate interagency coordination around issues of social vulnerability and equity.

DLCDC worked with historic preservation and archaeology staff to incorporate an exposure analysis of historic and archaeological resources into the risk assessment for the first time and it was largely successful.

A decision was made that dust storms would be dropped from the Plan as it has been well addressed primarily through implementation of best practices in land tilling techniques. Another decision was made to add extreme heat as a new natural hazard in the Plan. As temperatures, drought and wildfire are increasingly experienced across the state, and several local governments have included it in their plans, the state decided to do the same.

The State applied for and received a FEMA High Hazard Potential Dams grant to undertake risk assessments and related work concerning state-regulated dams. The grant required that high hazard potential dams be addressed the same way the eleven recognized natural hazards are addressed. As the State has not to date considered dam safety a natural hazard, and as it is primarily associated with flood hazards, the State has met this requirement by incorporating dam safety into the state and regional flood hazard risk assessment sections and into other relevant chapters of the Oregon NHMP. The Dam Safety risk assessments mimic the structure of the eleven state-recognized natural hazard risk assessments, effectively treating it as a twelfth natural hazard, but without a discrete chapter.

## Maintaining the Plan

DLCD will work with the State Hazard Mitigation Officer to conduct plan monitoring activities during and associated with each quarterly meeting of the IHMT. An expectation for IHMT members to participate in quarterly plan monitoring will be established. Plan monitoring activities will be guided by the mitigation goals and other evaluation criteria in Section [4.3.2.2](#). DLCD will update the 2020 Plan after each IHMT meeting with the information gleaned through that quarter's monitoring activities and IHMT members will review the changes for accuracy. In this way the 2020 Oregon NHMP will become a living document, and the effort needed to perform the 5-year update will be reduced.

Further, at a regular quarterly meeting as soon as feasible following a declared disaster event in Oregon, the State IHMT will discuss the event in the context of the Oregon NHMP and provide any necessary direction for updating the Plan. OEM will document this discussion as usual in IHMT meeting minutes and following the meeting DLCD will make any directed plan revisions.

## Enhanced Plan

In 2020, Oregon will lose enhanced plan status. Therefore, the 2020 Plan is being submitted as a standard plan. Oregon intends to make the changes necessary to regain enhanced plan status as quickly as possible. Chapter 5, Enhanced Plan is left in "placeholder" status, optimistic that Oregon will regain enhanced plan status during the effective period of the 2020 Oregon NHMP.

Enhanced plan approval constitutes FEMA's recognition that a state has demonstrated its commitment to maintaining a comprehensive natural hazard mitigation program and supporting that commitment through skilled and effective management of mitigation funding, projects, and planning; support of local mitigation plans and projects; integration of mitigation plans and projects with other state and federal plans, programs, and initiatives; and continual progress in implementation. This exceptional level of effort and demonstration of excellence yields dividends in the form of increased federal mitigation funding after disaster strikes.