

# **VOLUME IV: MITIGATION RESOURCES**

# APPENDIX A: ACTION ITEM FORMS

The following table lists the action item number, timeline, status, priority, affected jurisdictions, and applicable hazards.

Note: See addenda for each city's action item forms and action item prioritization.

**Table A-I Action Item Table of Contents and Affected Jurisdiction**

Action Item	Timeline	Status	Priority	Jurisdiction					Related Hazard								
				Deschutes	Bend	La Pine	Redmond	Sisters	Drought	Earthquake	Flood	Landslide	Volcano	Wildfire	Windstorm	Winter Storm	
MH #1	Ongoing	Ongoing		X	X	X	X	X	X	X	X	X	X	X	X	X	X
MH #2	Ongoing	Ongoing		X	X	X	X	X	X	X	X	X	X	X	X	X	X
MH #3	Ongoing	Ongoing		X	X	X	X	X	X	X	X	X	X	X	X	X	X
MH #4	Long Term	Ongoing	Yes	X	X	X	X	X	X	X	X		X	X	X	X	X
MH #5	Long Term	Ongoing	Yes	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MH #6	Long Term	Ongoing		X	X	X	X	X								X	X
MH #7	Long Term	Ongoing		X	X	X	X	X							X	X	X
MH #8	Medium Term	New	Yes	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MH #9	Long Term	New		X	X	X	X	X	X	X	X	X	X	X	X	X	X
EQ #1	Long Term	Deferred		X	X	X	X	X	X								
EQ #2	Long Term	Ongoing		X	X	X	X	X	X								
EQ #3	Short Term	New		X	X	X	X	X	X								
FL #1	Ongoing	Ongoing		X	X	X		X		X							
FL #2	Long Term	Deferred		X	X					X							
FL #3	Ongoing	Ongoing		X	X	X		X		X							
FL #4	Long Term	Ongoing		X	X	X		X		X							
FL #5	Long Term	Ongoing		X	X	X		X		X							
FL #6	Long Term	Deferred		X	X					X							
FL #7	Long Term	Ongoing		X				X		X							
VE #1	Long Term	Deferred		X								X					
WF #1	Ongoing	Ongoing	Yes	X	X	X	X	X							X		
WF #2	Ongoing	Ongoing	Yes	X	X	X	X	X							X		
WF #3	Ongoing	Ongoing	Yes	X	X	X	X	X							X		
WF #4	Medium Term	New	Yes	X	X	X	X	X							X		
WS #1	Ongoing	Ongoing		X	X	X	X	X								X	
WS #2	Ongoing	Ongoing		X	X	X	X	X								X	
WS #3	Ongoing	Ongoing		X	X	X	X	X								X	

Source: Deschutes County Steering Committee, Updated 2021

Action Item: Multi-hazard #1	Alignment with Plan Goals:			High Priority Action Item?	
Integrate training and education initiatives from the Deschutes County Natural Hazards Mitigation Plan into existing regulatory documents and programs where appropriate.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes
	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input checked="" type="checkbox"/> 7	<input type="checkbox"/> 8	
	<input type="checkbox"/> 9	<input type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Affected Jurisdictions:</b>					
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters					
<b>Alignment with Existing Plans/Policies:</b>					
City/ County Comprehensive Plans and Development Codes					
<b>Rationale for Proposed Action Item:</b>					
<p>The extreme population growth in the County and the region continues to bring people to the area who are not familiar with the climate, terrain, culture, etc.</p> <p>Additionally, this growth has placed new demands on the capacity of existing systems of support such as volunteer fire departments, city governments, and the service industry including hospitals, Red Cross and others.</p> <p>It is critical that the majority of the population be informed and skilled in mitigation efforts, particularly related to wildland fire and severe winter storms. Efforts placed in public awareness, education and training will strengthen the County's capacity to address an event should it happen; heighten understanding and knowledge of how to prevent and mitigate impacts; and strengthen the culture and sense of responsibility for life, property and safety.</p>					
<b>Ideas for Implementation:</b>					
<p>Public education and training for staff should routinely be conducted. Resorts and other businesses related to tourism should be included.</p> <p>Distribute education materials to home and business owners that support initiatives to reduce the risk of loss from natural hazards.</p>					
<b>Coordinating Organization:</b>	Deschutes County Natural Hazards Mitigation Committee				
<b>Internal Partners:</b>		<b>External Partners:</b>			
Emergency Services, Community Development, County Forester, Road Department, Public Works, Cities		ODF, American Red Cross, OSU Cascades			
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>		
Partner with OSU Cascades, Local Funding Resources			<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing		
<b>Form Submitted by:</b>	2010 NHMP Committee				
<b>Action Item Status:</b>	Ongoing				

Action Item: Multi-hazard #2	Alignment with Plan Goals:	High Priority Action Item?
Pursue coordination of mitigation initiative development, planning, and resource allocation (funding).	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input checked="" type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>		
City/ County Comprehensive Plans and Development Codes		
<b>Rationale for Proposed Action Item:</b>		
<p>The County has a good history of working together and building and sustaining systems of coordination. This is a result of facing events such as severe wildland fires and winter storms historically and recently. Stakeholders developing this plan concur that placing emphasis on coordinating efforts among public-private, geographic, and multi-interests is a sound investment in building capacity to mitigate hazards, using all resources to their greatest potential, and providing a basis for good communication among a wide range of individuals, groups, agencies and businesses.</p>		
<b>Ideas for Implementation:</b>		
<p>Establish a clear role for the Deschutes County Natural Hazards Mitigation Committee that results in a sustainable process for implementing, monitoring and evaluating mitigation activities.</p> <p>Integrate hazard mitigation initiatives into City and County Comprehensive Plans. Completed in 2011 for Deschutes County (review of natural hazards regulations is underway, 2015)</p> <p>Integrate planning between cities and county where appropriate.</p> <p>Integrate other possible natural hazards not specifically included in this plan.</p> <p>Advance coordination of resource and fund development among cities and private land owners where appropriate mitigation plans mutually benefit.</p> <p>Advance coordination efforts among and with home and business owners and emergency management actions that result in reducing risk of loss from natural hazards.</p>		
<b>Coordinating Organization:</b>	Deschutes County Natural Hazards Mitigation Committee	
<b>Internal Partners:</b>		<b>External Partners:</b>
Emergency Services, Community Development, County Forester, Road Department, Public Works		ODF, American Red Cross, OSU Cascades, USFS
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>
County and Cities, Grants, Local Funding Resources		<b>Timeline:</b> <input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2010 NHMP Committee	

<b>Action Item Status:</b>	Ongoing
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Action Item: Multi-hazard #3	Alignment with Plan Goals:			High Priority Action Item?	
Strengthen understanding of the probability of natural hazards, by continuing to support research specific to the region.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes
	<input checked="" type="checkbox"/> 5	<input type="checkbox"/> 6	<input checked="" type="checkbox"/> 7	<input type="checkbox"/> 8	
	<input type="checkbox"/> 9	<input checked="" type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Affected Jurisdictions:</b>					
<input checked="" type="checkbox"/> Deschutes County	<input checked="" type="checkbox"/> Bend	<input checked="" type="checkbox"/> Redmond			
	<input checked="" type="checkbox"/> La Pine	<input checked="" type="checkbox"/> Sisters			
<b>Alignment with Existing Plans/Policies:</b>					
Central Cascades Volcano Coordination Plan (2019) Currently in process of updating 2015 CCVC Plan					
<b>Rationale for Proposed Action Item:</b>					
<p>While indicators of the potential for earthquake and volcanic eruption events are evident, the probability of these events occurring is low based on current studies. Scientists continue to study activities surrounding these hazards and document their findings. It will continue to be a priority for this research to continue in order to learn more about the vulnerability of the region, potential impact, and recommendations for additional mitigation actions.</p> <p>The Central Cascades Volcano Coordination Plan (2019) is complete but does not currently have a local champion and has not been authorized by the participating jurisdictions. Kickoff meeting was 02/27/15.</p>					
<b>Ideas for Implementation:</b>					
<p>Continue to work with the scientific community to review existing and emerging conditions related to natural hazards identified in the Deschutes County NHMP.</p> <p>Integrate research findings into county and local planning efforts.</p> <p>Integrate natural hazards not included in this plan that are identified by research.</p>					
<b>Coordinating Organization:</b>	Deschutes County Natural Hazards Mitigation Committee				
<b>Internal Partners:</b>	<b>External Partners:</b>				
-	OSU Cascades, DOGAMI, USGS, ACOE, FEMA, DLCD, OEM, University of Oregon				
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>			
USGS, Counties (Deschutes, Jefferson, Linn, Lane), OSU Cascades, Local Funding Resources		<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing			
<b>Form Submitted by:</b>	2010 NHMP Committee				
<b>Action Item Status:</b>	Ongoing				

Action Item: Multi-hazard #4		Alignment with Plan Goals:	High Priority Action Item?
Assess power grid and determine methods to improve resiliency and encourage community preparedness for power loss.		<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input checked="" type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
<input checked="" type="checkbox"/> Deschutes County		<input checked="" type="checkbox"/> Bend	<input checked="" type="checkbox"/> Redmond
		<input checked="" type="checkbox"/> La Pine	<input checked="" type="checkbox"/> Sisters
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<p>The County relies on a range of energy sources to support and protect local residents, businesses, and government facilities. Accordingly, securing supplies of energy (e.g., electricity, gasoline, diesel fuel, natural gas, propane) to critical facilities/infrastructure, especially during emergency events, are of crucial importance to all segments of the community. An energy assurance plan is essentially a plan for how the County will recover and restore energy services to critical functions and facilities/infrastructure within a predetermined time after a partial or complete energy supply interruption. The Plan identifies critical facilities and critical infrastructure needing back-up power generation capacity to ensure continued operation during emergency events. The Plan establishes short-term communication protocols, actions and priorities by which critical facilities/infrastructure will be re-energized after a disruption, as well as long-term strategies for making critical facilities and critical infrastructure less vulnerable to disruptions of mainline energy sources.</p>			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2015</b>	
Develop a Local Energy Assurance Plan		<p><b>Ongoing</b> - CEC resiliency improvements            Projects resulting in decreased outages on CEC's system:</p> <ul style="list-style-type: none"> <li>· pole and underground cable replacement</li> <li>· enhanced vegetation management</li> </ul> <p>Projects allowing for future growth and redundancy to St. Charles and surrounding health services district:</p> <ul style="list-style-type: none"> <li>· Substation capacity upgrade in Bend</li> <li>· Additional capacity enhancements planned</li> </ul>	
<b>Coordinating Organization:</b>	Deschutes County Emergency Services		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Planning, Roads		Utility Companies, U.S. DOE, OEM	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
FEMA PDM, U.S. Department of Energy's Local Energy Assurance Planning Initiative,			<input type="checkbox"/> Short Term (1-2 years)

other grants, Local Funding Resources		<input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2015 NHMP Committee	
<b>Action Item Status:</b>	Ongoing	



Action Item: Multi-hazard #5	Alignment with Plan Goals:	High Priority Action Item?
Develop continuity of operations plans to ensure continued operation in the event of a natural hazard emergency.	<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input checked="" type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>		
City and County Emergency Operations Plans		
<b>Rationale for Proposed Action Item:</b>		
<p>Deschutes County is vulnerable to a number of different natural hazards that could affect the administration and management of local government. Developing continuity of operations plans for the County will assist in maintaining a basic level of government to continue to provide needed services within the community.</p> <p>According to the Florida Division of Emergency Management, continuity of operations is accomplished through the development of plans, comprehensive procedures, and provisions for alternate facilities, personnel, resources, interoperable communications, and vital records/databases. The plan establishes policy and guidance to ensure the execution of the organization’s most essential functions in any event which requires the relocation of selected personnel and functions to an alternate facility.</p> <p>Research conducted by Richard Wilson has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. It is important to prevent turnover so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can also help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress staff will have to endure.</p> <p>The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a continuity of operations plan will diminish the effects of a natural disaster by providing the cities and County of Deschutes with a framework for continuing operations in a potentially chaotic situation.</p>		
<b>Ideas for Implementation:</b>	<b>Actions Taken Since 2015</b>	
<p>Research and review completed continuity of operations plans to provide a foundation of expected content and issues to review.</p> <p>Utilize existing OEM Manuals and Templates available on their website (<a href="http://www.oregon.gov/OMD/OEM/pages/plans_train/coop.aspx">http://www.oregon.gov/OMD/OEM/pages/plans_train/coop.aspx</a>)</p> <p>The COOP should ensure shelter housing for critical staff and family members such as County officials, public works employees, emergency response, and others.</p> <p>Assess and prioritize critical positions and resources vital to the continuance of important County</p>	<p><b>Ongoing</b> - maintenance phase for the County - supporting cities in doing this. Have developed County plan. Paused due to COVID.</p>	

functions. Incorporate COOP into the existing Emergency Operations Plans where applicable.		
<b>Coordinating Organization:</b>	Deschutes County Emergency Services	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Public Works, Planning, Roads	OEM	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
State Homeland Security Project, Local Funding Resources		<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2015 NHMP Committee	
<b>Action Item Status:</b>	Ongoing	

Action Item: Multi-hazard #6	Alignment with Plan Goals:	High Priority Action Item?
Develop code language to mitigate the harmful impact of hazard trees located on private and/ or vacant property.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>		
Deschutes County Code		
<b>Rationale for Proposed Action Item:</b>		
<p>Educating property owners about how to prevent power outages on their private property can help reduce impacts of windstorm events on these homeowners.</p> <p>Overhead electrical lines are subject to high winds and winter storm damage. The risk is higher on the lines going to a mountaintop or peak.</p> <p>All of Deschutes County is at risk for winter storms. Due to the multitude of variables, such as wind speed, direction, and temperature, each storm is capable of causing extensive damage in any part of the County.</p> <p>High winds can topple trees and break limbs which in turn can result in power outages and disrupt telephone, computer, and TV and radio service.</p> <p>Windstorms affect Deschutes County on nearly a yearly basis.</p> <p>During winter storm access to the line by the utility is difficult. This difficulty delays the time for restoration of power to Deschutes County residents.</p> <p>The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards.[201.6(c)(3)(ii)] Educating property owners on how to properly maintain trees to prevent power loss on power lines off the right of way will reduce the impact of severe weather in Deschutes County.</p>		
<b>Ideas for Implementation:</b>	<b>Actions Taken Since 2015</b>	
<p>Gather information about the maintenance and removal of hazardous trees.</p> <p>Work with the community and partners to identify areas that are prone to damage from nearby trees and perform the necessary maintenance or removal of those trees.</p> <p>Create a hazardous tree inventory.</p> <p>Work with the community and Public Works Department to identify high wind and icing areas from previous outages and apply for grants to underground utilities in those areas (see MH #7)</p>	Added in 2015; Ongoing in 2021	
<b>Coordinating Organization:</b>	Deschutes County Emergency Services	
<b>Internal Partners:</b>	<b>External Partners:</b>	

County Forester, Community Development, Public Works		Electric Utilities, ODF	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Local Funding Resources			<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2015 NHMP Committee		
<b>Action Item Status:</b>	Ongoing		

Action Item: Multi-hazard #7	Alignment with Plan Goals:	High Priority Action Item?
Continue and enhance windstorm resistant construction methods where possible to reduce damage to utilities and critical facilities from windstorms. In part, this may be accomplished by encouraging electric utility providers to convert existing overhead lines to underground lines.	<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<p>Overhead electrical lines are subject to high winds and winter storm damage. The risk is higher on the lines going to a mountaintop or peak. Most of the services at the top are communication sites. The communication sites are used by ODOT, State Police, county sheriff, emergency services, telephone utilities and cell phone companies. During a disaster the sites are vital for communication. During winter storm access to the line by the utility is difficult and this difficulty delays the time for restoration of power to the services. The utility company has experienced costs each year to repair and maintain the lines. Converting the lines to underground would remove the risk of damage from wind and winter storm.</p> <p>The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards, with an emphasis on new and existing buildings and infrastructure.[201.6(c)(3)(ii)] Converting primary electrical overhead lines to mountaintop communication services with underground lines will reduce the impact of severe weather on power lines, and will continue power service to rural customers as well as ODOT, State Police, county sheriff, emergency services, telephone utilities, and cell phone companies.</p>		
<b>Ideas for Implementation:</b>	<b>Actions Taken Since 2015</b>	
<p>Work with the consumer-owned electric utility providers to identify “undergrounding districts” so that they can plan for future investments in the area to be undergrounded. Utilize utility franchise fees, urban renewal funds and other resources, including grants, to underground existing overhead lines. Continue to require that utilities be undergrounded with new subdivision approvals.</p> <p>In both rural and urban areas, identify overheard power circuits particularly vulnerable to downed trees (where are power outages are likely to occur). Areas that are difficult to access by power repair crews will be considered when prioritizing these areas for undergrounding power lines.</p>	Added in 2015; Ongoing in 2021	
<b>Coordinating Organization:</b>	Deschutes County Emergency Services	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Community Development, City Community	Electric Utilities	

Development/ Planning, and Public Works		
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
Electric Utilities, FEMA PDM, landowners, Local Funding Resources		<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2015 NHMP Committee	
<b>Action Item Status:</b>	Ongoing	

<b>Action Item: MULTI HAZARD #8</b> (What do we want to do?)		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Identify, inventory and prioritize hardening of critical communications infrastructure.		1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input checked="" type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/>	<input checked="" type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Sisters <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Bend			
<b>Alignment with Existing Plans/Policies:</b>			
EOP, SCIP (Statewide Communication Interoperability Plan)			
<b>Rationale for Proposed Action Item (why is it important?):</b>			
Resilient communications infrastructure will reduce the likelihood of communication failure(s) during disasters, thus, improving public alert and warning and operational coordination.			
<b>Ideas for Implementation (how will it get done?):</b>		<b>Action Status Report</b>	
GIS analysis of communication infrastructure and hazard zones, prioritization of hardening measures and collaboration with land managers and infrastructure owners to initiate mitigation efforts		<b>New in 2021</b>	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
Local, BRIC (Building Resilient Infrastructure and Communities) Grant, private investment, other state/federal mitigation funds	TBD	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input checked="" type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)	
<b>Coordinating/Lead Organization:</b>	Deschutes County Emergency Services		
<b>Internal Partners:</b>	<b>External Partners:</b>		

Deschutes County 911, Deschutes County Forester/Project Wildfire, Deschutes County Information Technology/GIS	ODOT, ODF, USFS, BLM, private landowners, private infrastructure owners
<b>Form Submitted by:</b>	Nathan Garibay
<b>Action Item Status (for existing actions only):</b>	NEW, 2021



<b>Action Item: MULTI HAZARD #9</b> (What do we want to do?)		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Support the development and coordination of the Regional Emergency Services Training and Coordination Center (RESTCC)		1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input checked="" type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/>	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Sisters <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Bend			
<b>Alignment with Existing Plans/Policies:</b>			
State EOP, County EOP, State Recovery Plan			
<b>Rationale for Proposed Action Item (why is it important?):</b>			
<p>Central Oregon, Oregon, and the Pacific Northwest are facing growing threats from natural disasters that severely impact our households, communities, and economies – including large-scale wildfire, flooding and landslides, future pandemics and public health crises, and the Cascadia Subduction Zone.</p> <p>Central Oregon has insufficient facilities to meet existing mandatory training needs of local, state, and federal public safety personnel. In a rapidly growing region, the need for trained public safety and emergency services professionals is increasing. Furthermore, the region lacks a dedicated, multi-agency coordination center for emergency operations, nor does it have an adequate backup 911-center with redundant emergency dispatch capabilities. And in the event of a major natural disaster such as a Cascadia Subduction Zone event, Redmond and the Redmond Airport have been envisioned as a primary staging ground for statewide rescue and recovery operations.</p> <p>The RESTCC would include all the high-priority training needs and props to ensure that critical law enforcement, fire/EMS, and other emergency and preparation needs (e.g train derailment, airport emergencies, etc.) are met. The facility will also offer a turnkey Emergency Operations Center (EOC) in the event of a major regional, statewide or larger-scale disaster (e.g. Cascadia or future pandemics).</p>			
<b>Ideas for Implementation (how will it get done?):</b>		<b>Action Status Report</b>	
<ul style="list-style-type: none"> <li>- Build a Master Plan</li> <li>- Initiate UGB Expansion Process</li> <li>- Create an MOU for regional partners</li> <li>- Design/Engineering</li> <li>- Capital funding: Phase 1 Capital = \$25-30 million</li> </ul>		The Strategic Business Plan for this facility was completed in September 2020, and since then COIC and partners have met to discuss the outcomes of the plan and identify next steps for this project over the coming 12-18 months. The highest priorities for the next phase of this project are securing a site, addressing land use and infrastructure issues, and completing design/engineering for the first phase.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	

Local, state, federal	\$100,000,000	<input type="checkbox"/> Ongoing <input checked="" type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)
<b>Coordinating/Lead Organization:</b>	COIC	
<b>Internal Partners:</b>	<b>External Partners:</b>	
DCSO, Board of County Commissioners, Cities, Special Service Districts	OEM, OSFM, ODF, OSP, DPSST, Governor's Office Regional Solutions, Central Oregon Fire Management Services (COFMS), Crook County, Jefferson County, Central Oregon Fire Chief's Association (COFCA), Central Oregon Law Enforcement Services (COLES)	
<b>Form Submitted by:</b>	Nathan Garibay	
<b>Action Item Status (for existing actions only):</b>	NEW, 2021	

Action Item: Earthquake #1	Alignment with Plan Goals:	High Priority Action Item?
Support development of in-depth studies to determine county and region's vulnerability to earthquake.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>		
Regular meetings and communication with the Oregon Resilience Plan (Cascadia Earthquake scenario). Possible opportunity to partner with OSU Cascades for research in the region.		
<b>Rationale for Proposed Action Item:</b>		
<p>Deschutes County is susceptible to earthquakes from four sources:</p> <p>Cascadia Subduction Zone: The Cascadia Subduction Zone (CSZ) is the boundary between the descending oceanic Juan de Fuca Plate and the overriding North American Plate. This area of contact, located off the Oregon coast, is capable of producing some of the largest earthquakes on Earth with magnitude (M) 9.0 or greater. Based on historical averages, there is a 10-15% chance that the CSZ could produce a M 9.0 earthquake in the next 50 years, and a 37% chance of a M 8.0 earthquake in the next 50 years. The effects of a CSZ earthquake would be felt most strongly along the coast and in the Willamette Valley, but strong shaking would also occur in central Oregon. All parts of Deschutes County are vulnerable to damage from a CSZ earthquake; unreinforced masonry buildings are especially vulnerable.</p> <p>Deep intraplate earthquakes: These earthquakes occur within the Juan de Fuca Plate as it descends beneath the North American Plate. They occur at depths between 30 and 100 kilometers (about 20 to 60 miles) and can approach M 7.5. Regions in Oregon most vulnerable to these earthquakes include a broad zone from the coast to the western foothills of the Cascades, but centered in the Willamette Valley. Residents of Deschutes County might feel some shaking from deep intraplate earthquakes, but the risk of damage is low.</p> <p>Shallow crustal earthquakes: These earthquakes occur on faults in the North American Plate and are associated with extension (pulling apart of the crust). They can be so shallow that they rupture or deform the ground surface, but can also occur up to 35 kilometers deep (about 20 miles) and may not be associated with faults observed at the surface. These earthquakes can reach M 7.0, causing extensive localized damage. Significant crustal earthquakes have occurred in central Oregon during historical times, but have been located in Klamath and Lake Counties. However, crustal fault zones in Klamath and Lake Counties extend into Deschutes County and all parts of Deschutes County are vulnerable to damage from these earthquakes.</p> <p>Volcanic earthquakes: Volcanic earthquakes are triggered by changes in the magmatic system below volcanoes. They are common in Deschutes County near volcanic centers in the Cascades and Newberry Volcano. These earthquakes are typically less than M 2.5 (too small to be felt) but may reach M 5.0. Swarms of volcanic earthquakes can persist for weeks to months before volcanic eruptions and often serve as precursors to an eruption. The likelihood of volcanic earthquakes occurring in Deschutes County is very high, but little to no damage is likely to occur to buildings or communities.</p>		
<b>Ideas for Implementation:</b>	<b>Actions Taken Since 2015</b>	
Work with OEM, DOGAMI, FEMA and USGS and expand existing studies to address scope of	Developed in 2015; deferred to 2026 Plan	

<p>vulnerability.</p> <p>Communicate study findings with key stakeholders affiliated with public awareness, education, policy and mitigation strategies identified in study.</p> <p>If needed, make policy and procedures changes that support study results that mitigate earthquake hazards.</p> <p>Determine the impact that an event located outside the county will have on Deschutes County including west side evacuation to central Oregon.</p>		<p><b>Deferred to 2020 Plan</b></p> <p><b>Deferred to 2020 Plan</b></p> <p><b>Deferred to 2020 Plan</b></p>	
<b>Coordinating Organization:</b>		Deschutes County Emergency Services	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development		FEMA, DOGAMI, OEM, USGS, OSU Cascades	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Oregon State University – Cascades, OEM, Local Funding Resources			<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2010 NHMP Committee		
<b>Action Item Status:</b>	Deferred		

Action Item: Earthquake #2	Alignment with Plan Goals:	High Priority Action Item?
Seismically retrofit vulnerable facilities and infrastructure to increase their resiliency to seismic hazards. Consider both structural and non-structural retrofit options.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input checked="" type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>		
DOGAMI RVS (2007)		
<b>Rationale for Proposed Action Item:</b>		
<p>The 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI identified buildings with a high to very high collapse potential ratings.</p> <p>Occupants of these buildings are often school age children and are vulnerable to potential injury should an event occur.</p> <p>Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities, including schools.</p> <p>Retrofitting of vital infrastructure, such as schools, emergency service, and other community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</p> <p>Deschutes County has a high vulnerability for seismic hazards (related to the Cascadia Earthquake event) and a moderate probability of a future seismic event occurring. Retrofitting seismically vulnerable buildings will significantly reduce the buildings' vulnerability to seismic hazards and improve the safety of occupants (emergency personnel, students, teachers, and community members that use the buildings).</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</p>		
<b>Ideas for Implementation:</b>	<b>Actions Taken Since 2015</b>	
<p>Conduct detailed structural evaluation that outlines recommendations for building deficiencies, and provides a cost estimate, incorporating DOGAMI's seismic assessment data to assist in retrofitting</p> <p>Apply for grant funding through the Oregon Seismic Rehabilitation Grant Program</p> <p>Apply for FEMA project grant funding.</p> <p>Conduct structural evaluations of critical and essential facilities (including historical buildings), and infrastructure and make recommendations (structural and non-structural) for fix. Align projects with regular maintenance programs.</p>	Developed in 2015; Ongoing in 2021	

<b>Coordinating Organization:</b>	Deschutes County Natural Hazards Mitigation Committee	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Public Works, Community Development, Building, Fire, Police, Sheriff	Deschutes County School Districts, Oregon Military Department - Office of Emergency Management (OEM), Oregon Department of Geology and Mineral Industries (DOGAMI), Federal Emergency Management Agency (FEMA), Oregon Department of Education (ODE); Oregon Business Development Department - Infrastructure Finance Authority (IFA), State Historic Preservation Office (SHPO)	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
Seismic Rehabilitation Grants (IFA), Local Funding Resources		<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2015 NHMP Committee	
<b>Action Item Status:</b>	Ongoing	

<b>Action Item: EARTHQUAKE #3</b> (What do we want to do?)		<b>Alignment with Plan Goals:</b>		<b>High Priority Action Item?</b>	
Develop outreach strategy and increase public awareness of ShakeAlert Early Warning System in Deschutes County.		1 <input checked="" type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>	4 <input checked="" type="checkbox"/>
		5 <input type="checkbox"/>	6 <input checked="" type="checkbox"/>	7 <input checked="" type="checkbox"/>	8 <input type="checkbox"/>
		9 <input type="checkbox"/>	10 <input checked="" type="checkbox"/>	11 <input type="checkbox"/>	12 <input type="checkbox"/>
			13 <input type="checkbox"/>	14 <input type="checkbox"/>	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>					
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Sisters <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Bend					
<b>Alignment with Existing Plans/Policies:</b>					
Cascadia Playbook, EOP					
<b>Rationale for Proposed Action Item (why is it important?):</b>					
Public outreach to spread awareness of WEA Shakealert messaging; appropriate actions will reduce injuries/casualties, and outreach campaign will prepare individuals/businesses for impacts of large-scale earthquake					
<b>Ideas for Implementation (how will it get done?):</b>			<b>Action Status Report</b>		
Social and traditional media campaign to utilize Facebook, Instagram, Twitter, NextDoor, and media partners. Incorporation of ShakeAlert within existing preparedness programs/initiatives.			New in 2021		
<b>Potential Funding Sources:</b>		<b>Estimated Cost:</b>	<b>Timeline:</b>		
Local		LOW	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input checked="" type="checkbox"/> Short (0-2 years)		
<b>Coordinating/Lead Organization:</b>		Deschutes County Sheriff's Office (Emergency Services)			
<b>Internal Partners:</b>			<b>External Partners:</b>		
Deschutes County Health Services, Deschutes County Board of County Commissioners (Communications), Deschutes County 911, incorporated cities & fire districts			OEM, DOGAMI, USGS,		

<b>Form Submitted by:</b>	Nathan Garibay
<b>Action Item Status (for existing actions only):</b>	NEW, 2021

<b>Action Item: Flood #1</b>		<b>Alignment with Plan Goals:</b>				<b>High Priority Action Item?</b>
Continue to coordinate mitigation activities with appropriate agencies and home and business owners/groups that include an inventory of actions to or within the floodplain.		<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes
		<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input checked="" type="checkbox"/> 7	<input type="checkbox"/> 8	
		<input type="checkbox"/> 9	<input checked="" type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Affected Jurisdictions:</b>						
<input checked="" type="checkbox"/> Deschutes County		<input checked="" type="checkbox"/> Bend		<input type="checkbox"/> Redmond		
		<input checked="" type="checkbox"/> La Pine		<input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>						
Comprehensive Plan, FEMA Flood Insurance Study, Flood Insurance Rate Maps						
<b>Rationale for Proposed Action Item:</b>						
Any mitigation activity within the floodplain will impact multiple stakeholders including property owners and State and Federal agencies dealing with water usage, recreation, wetlands, and wildlife habitat issues. Coordination of mitigation activities will ensure that any planned activities obtain required permits, meet the requirements and goals of relevant agencies.						
<b>Ideas for Implementation:</b>				<b>Actions Taken Since 2015</b>		
Establish protocol to regularly update mitigation actions and activities within the floodplain.				Developed in 2010; Ongoing in 2015; Ongoing in 2021		
<b>Coordinating Organization:</b>		Deschutes County Community Development				
<b>Internal Partners:</b>			<b>External Partners:</b>			
Emergency Services, Public Works, Building Division			Oregon Water Resources, DLCD, , USGS, Bureau of Reclamation, Oregon Department of State Lands, Army Corps of Engineers, Oregon Department of Fish and Wildlife, US Forest Service,			
<b>Potential Funding Sources:</b>			<b>Estimated cost:</b>		<b>Timeline:</b>	
Planning application fees cover stakeholder coordinations, other Local Funding Resources					<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing	
<b>Form Submitted by:</b>		2010 NHMP Committee				
<b>Action Item Status:</b>		Ongoing				



Action Item: Flood #2		Alignment with Plan Goals:	High Priority Action Item?
Maintain an inventory of all permitted in-water facilities in Deschutes County.		<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input type="checkbox"/> Redmond <input type="checkbox"/> La Pine <input type="checkbox"/> Sisters			
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
Craine Prairie Reservoir, Wickiup Reservoir, area canals that are above residential areas are chief concerns			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2010</b>	
Update appropriate seismic criteria and procedures for evaluating performance of existing dams.		Developed in 2010; Deferred in 2015; Deferred in 2021 to 2026 Plan	
<b>Coordinating Organization:</b>	Deschutes County Community Development		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Emergency Services		Oregon Water Resources, USGS, Bureau of Reclamation	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Local Funding Resources, Americorps/ RARE			<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2010 NHMP Committee		
<b>Action Item Status:</b>	Deferred		

Action Item: Flood #3	Alignment with Plan Goals:	High Priority Action Item?
Comply with National Flood Insurance Program to maintain participation in program.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input checked="" type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>		
Comprehensive Plan, FEMA Flood Insurance Study, Flood Insurance Rate Maps		
<b>Rationale for Proposed Action Item:</b>		
<p>Compliance with the NFIP is a prerequisite for County residents to receive flood insurance.</p> <p>The County currently includes about 170 flood insurance policies; roughly half of these are preferred risk policies (PRP). PRPs are not eligible to receive CRS Premium Discounts. Additionally, the county has a flood insurance market penetration of approximately 15% (as of 2012).</p> <p>Increasing flood insurance coverage will allow the county to reduce vulnerability, and facilitate recovery.</p>		
<b>Ideas for Implementation:</b>	<b>Actions Taken Since 2015</b>	
<p>Local Floodplain Manager to work with the State Floodplain Manager at DLCD (and federal NFIP liaison, as necessary) to identify any additional actions needed to maintain NFIP compliance including assessment of staff resources, need for Community Assistance Visits, and integration of updated Regulations.</p> <p>Work with DLCD to better identify and map floodplains.</p> <p>Work with DLCD to offer community education and outreach.</p> <p>Outreach to property owners with residences in the special flood hazard area and offer education about the benefits of purchasing flood insurance.</p> <p>Work with DLCD on any issues that arise from NFIP implementation monitoring activities.</p> <p>Track all community assistance, education and monitoring activities.</p> <p>Participate in and implement the Community Rating System as part of the NFIP.</p>	Developed in 2015; Ongoing in 2015; Ongoing in 2021	
<b>Coordinating Organization:</b>	Deschutes County Community Development	
<b>Internal Partners:</b>	<b>External Partners:</b>	

		DLCD, FEMA	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Local Funding Resources/ County Floodplain Manager/ DLCD			<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2010 NHMP Committee		
<b>Action Item Status:</b>	Ongoing		

Action Item: Flood #4		Alignment with Plan Goals:	High Priority Action Item?
Update the Flood Insurance Rate Maps for Deschutes County and revisit land use codes to determine if floodplain standards are still adequate.		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input checked="" type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
<input checked="" type="checkbox"/> Deschutes County		<input checked="" type="checkbox"/> Bend	<input type="checkbox"/> Redmond
		<input checked="" type="checkbox"/> La Pine	<input checked="" type="checkbox"/> Sisters
<b>Alignment with Existing Plans/Policies:</b>			
Comprehensive Plan, FEMA Flood Insurance Study, Flood Insurance Rate Maps			
<b>Rationale for Proposed Action Item:</b>			
<p>Areas of concern, listed below, are presently not mapped as areas of special flood hazard. In addition, current flood insurance rate maps (FIRMs) may be significantly enhanced by use of existing LiDAR data and an evaluation of reduced channel capacity in the Deschutes River due to sediment accumulation.</p> <p>Areas of concern: Indian Ford (west of Sisters), Trout Creek (Sisters), Whychus Creek drainage, Tumalo Creek, Little Deschutes River (La Pine area), Deschutes River (from Wickiup through the Tumalo area at certain points).</p>			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2015</b>	
Work with appropriate agencies to update Flood Insurance Rate Maps.  Revisit and update land use codes to determine if floodplain standards are adequate.		Developed in 2010; Ongoing in 2015; Ongoing in 2021	
<b>Coordinating Organization:</b>		Deschutes County Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
		FEMA, DOGAMI, DLCD	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
DLCD, Risk MAP Funding Consideration, Local Funding Resources			<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2010 NHMP Committee		
<b>Action Item Status:</b>	Ongoing		

Action Item: Flood #5		Alignment with Plan Goals:			High Priority Action Item?	
As funding becomes available, implement mitigation measures for individual properties adjacent to or within the floodplain as appropriate.		<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> Yes
		<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input checked="" type="checkbox"/> 8	
		<input type="checkbox"/> 9	<input checked="" type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Affected Jurisdictions:</b>						
<input checked="" type="checkbox"/> Deschutes County		<input checked="" type="checkbox"/> Bend		<input type="checkbox"/> Redmond		
		<input checked="" type="checkbox"/> La Pine		<input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>						
Comprehensive Plan, FEMA Flood Insurance Study, Flood Insurance Rate Maps						
<b>Rationale for Proposed Action Item:</b>						
<p>Although the county does not currently have repetitive flood loss properties, or severe repetitive flood loss properties, there are properties within the special flood hazard area that are vulnerable to flood.</p> <p>Areas of concern, listed below, are presently not mapped as areas of special flood hazard. In addition, current flood insurance rate maps (FIRMs) may be significantly enhanced by use of existing LiDAR data and an evaluation of reduced channel capacity in the Deschutes River due to sediment accumulation.</p> <p>Areas of concern: Indian Ford (west of Sisters), Trout Creek (Sisters), Whychus Creek drainage, Tumalo Creek, Little Deschutes River (La Pine area), Deschutes River (from Wickiup through the Tumalo area at certain points).</p>						
<b>Ideas for Implementation:</b>			<b>Actions Taken Since 2015</b>			
<p>Assess individual properties for possible mitigation measures (elevation, acquisition, relocation) to reduce or prevent future flood losses.</p> <p>Implement mitigation measures (elevation, acquisition, relocation) for properties within the floodplain.</p>			Developed in 2010; Deferred in 2015; Ongoing in 2021			
<b>Coordinating Organization:</b>		Deschutes County Community Development				
<b>Internal Partners:</b>			<b>External Partners:</b>			
			FEMA, DOGAMI, DLCD			
<b>Potential Funding Sources:</b>			<b>Estimated cost:</b>		<b>Timeline:</b>	
FEMA Flood Mitigation Assistance Project Grants; Local Funding Resources					<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing	
<b>Form Submitted by:</b>		2010 NHMP Committee				
<b>Action Item Status:</b>		Ongoing				

Action Item: Flood #6		Alignment with Plan Goals:	High Priority Action Item?
Analyze and implement mitigation measures related to ice jamming that occurs during winter storm events.		<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
<input checked="" type="checkbox"/> Deschutes County		<input checked="" type="checkbox"/> Bend	<input type="checkbox"/> Redmond
		<input type="checkbox"/> La Pine	<input type="checkbox"/> Sisters
<b>Alignment with Existing Plans/Policies:</b>			
Comprehensive Plan, FEMA Flood Insurance Study, Flood Insurance Rate Maps			
<b>Rationale for Proposed Action Item:</b>			
Ice jams on the Deschutes and Little Deschutes rivers have created flood conditions in the past and will continue to do so due to local topography. Ice jams commonly happen during the winter and early spring, while the river is still frozen. Sudden warming at higher altitudes can melt waters resulting in increased runoff of water and ice into large reaches of frozen river below. On the way downstream, the ice can “jam” in narrow places on the river or against a road crossing, effectively damming the river, sometimes followed by a sudden breach and release of the water and ice.			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2015</b>	
		Added in 2015; Deferred in 2021	
<b>Coordinating Organization:</b>	Deschutes County Emergency Services/ Planning		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Bend Parks and Recreation District		Oregon Water Resources, Pacific Power, Landowners, DLCD, DOGAMI	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
USACE Silver Jackets Program, OWEB, DSL; Local Funding Resources			<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2015 NHMP Committee		
<b>Action Item Status:</b>	Deferred		

Action Item: Flood #7	Alignment with Plan Goals:	High Priority Action Item?
Re-evaluate debris flow and flood hazards along Whychus Creek from moraine-dammed Carver Lake. Depending on outcome of study, consider suitable mitigative measures in City of Sisters and Deschutes County.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input type="checkbox"/> Bend <input type="checkbox"/> Redmond <input type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>		
Results of a 1987 USGS report (Hydrologic Hazards Along Squaw [Whychus] Creek from a Hypothetical Failure of the Glacial Moraine Impounding Carver Lake near Sisters, Oregon; USGS, Open File Report 87-41) were incorporated into the 2007 FEMA Flood Insurance Rate Map for Deschutes County (FIRM, Panel 0245E). USGS scientists consider the 1987 assessment in need of re-evaluation in light of new research results on past such events at Central Oregon moraine-dammed lakes and refined flood models that are now available.		
<b>Rationale for Proposed Action Item:</b>		
<p>Carver Lake, located at 7,800 feet on the east slope of South Sister volcano, contains about 740 acre-feet (900,000 cubic meters or 32 million cubic feet) of water. The lake is dammed by a glacial moraine formed chiefly during late 19<sup>th</sup> and early 20<sup>th</sup> centuries. Several other such moraine-dammed lakes in Central Oregon have experienced rapid outflows during the past 80 years that resulted in debris flows and floods along streams draining the lakes. Carver Lake and its outlet stream, a tributary to Whychus Creek, are susceptible to similar debris flows and floods in the future. The extent and magnitude of such flows will depend on several factors, including amount of water released, rate of release, and conditions along the flow path.</p> <p>A 1987 USGS report concluded that the annual probability of a flood from failure of the moraine dam of Carver Lake is 1 to 5 percent and that the magnitude of the <b>worst-case flow</b> could be ten times that of the 1-percent probability flood (100-year flood). Sisters would see rising flood waters 1.8 hours after a dam breach and the flood would peak about 30 minutes later. See P. 26 of report for a map of high and low risk areas.</p> <p>If an event of this magnitude happened, locally high velocities, damming, erosion, and sediment deposition could cause considerable property damage and possible loss of life in Sisters.</p> <p>Later research has questioned some aspects of the 1987 report. A report published in 2001 (USGS Professional Paper 1606, Debris flows from failures of neoglacial-age moraine dams in the Three Sisters and Mount Jefferson Wilderness Areas; <a href="http://pubs.er.usgs.gov/publication/pp1606">http://pubs.er.usgs.gov/publication/pp1606</a>) sheds new light on past events and outlook for future events. Among its findings:</p> <ol style="list-style-type: none"> <li>1. Since early 1920s, at least 11 (now 12 with 2012 event at Three-Fingered Jack) rapid water releases resulted from partial or total breaching of moraine dams.</li> <li>2. Partial breaches amounting to lake lowering of a few feet to a few tens of feet were halted as large boulders armored outlets and downcutting ceased.</li> <li>3. All partial and complete breaches formed debris flows, the farthest reaching about 6 miles from lake; sediment-laden floods and streamflow continued tens of miles farther.</li> <li>4. Probability of future events depends on such factors as likelihood of rock and ice avalanches reaching the lake and generating waves that rapidly erode outlets. If Prouty Glacier continues to thin and retreat, the likelihood of ice avalanches into the lake diminishes; the opposite would be true if Prouty Glacier undergoes a period of substantial thickening and advance.</li> </ol>		

5. Worst-case scenarios can be defined, but the likelihood of such worst-case events may be vanishingly small.

Such findings suggest that the 1987 report overstated greatly the degree of hazard and the probability of flows causing catastrophic impacts in Sisters.

<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2015</b>	
<p>USGS proposes to apply findings from the 2001 study and other applicable studies to define realistic scenarios for partial and complete breaching of the Carver lake moraine dam and evolution of debris flows and floods down Whychus Creek.</p> <p>These scenarios can be combined with modern flood-routing models and recently obtained detailed, accurate, lidar digital-elevation models, to provide refined estimates of potential for flood inundation in the low-relief fan area around the City of Sisters.</p> <p>On the basis of results of this study, Sisters and Deschutes County would be able to develop suitable mitigative measures, which could include, real time stream monitoring detection, early warning sirens, zoning, and planning studies to help prevent loss of life and property damage in the area downstream of the lake.</p>		<p>Added in 2015; Ongoing in 2021</p>	
<b>Coordinating Organization:</b>		Deschutes County Emergency Services	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Sisters, Community Development, Public Works		USGS, USACE, FEMA, DOGAMI, OEM, OSU Cascades	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
USACE Silver Jackets Program; Local Funding Resources			<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2015 NHMP Committee		
<b>Action Item Status:</b>	Ongoing		



Action Item: Volcano #1	Alignment with Plan Goals:	High Priority Action Item?
Continue to support on-going study of probability of volcanic eruption and potential impact.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input type="checkbox"/> Bend <input type="checkbox"/> Redmond <input type="checkbox"/> La Pine <input type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>		
Central Cascades Volcano Coordination Plan (2007) to be updated in 2015, local response plans, National Response Plan, Oregon State Emergency Management Plan		
<b>Rationale for Proposed Action Item:</b>		
<p>Volcanic activity could occur anywhere in Deschutes County. Eruptions are more likely to occur near volcanic centers in the Cascades and Newberry Volcano, but lava flows and ash deposits from vents located in these areas could reach all parts of the county.</p> <p>Lava flows: Future eruptions from the north flank of Newberry Volcano represent the most credible lava-flow threat to large settled areas in the United States outside of Hawai'i. Lava flows move relatively slowly and rarely threaten human life, but advancing flows ensure almost total destruction of property and infrastructure from burial and incineration. Lava flows also pose flooding hazards by damming waterways, which can initially trigger flooding upstream and later downstream if the lava dam fails. Lava flows can also initiate multiple forest fires, especially if they occur during dry months.</p> <p>Ash: Due to prevailing westerly winds, areas east of the Cascades have the greatest probability of being affected by ash from future eruptions anywhere in the Cascades. Volcanic ash limits visibility and, if wet, creates slippery road conditions. It is electrically conductive and abrasive, and can severely affect electrical and mechanical systems and is extremely dangerous to aircraft. Ash and other volcanic products can add large quantities of sediment to rivers and streams. This can initiate periods of years to decades during which waterways carry increased sediments loads and river channels become unstable and migrate. Such effects propagate downstream and can disrupt channels and flood plains far from where the actual eruption occurred. In particular, the Tumalo Creek watershed that supplies part of Bend's municipal water is likely to receive ash from any eruption in the Three Sisters area.</p> <p>Fields of mafic volcanoes: Hundreds of geologically young mafic volcanoes composed of cinders, ash, and lava flows dot the central Oregon landscape. Future eruptions of mafic volcanoes are possible anywhere in the central Cascades region, which includes large parts of Deschutes County. These eruptions could last for months to years or decades, producing ash and lava flows that periodically impact developed areas of Deschutes County.</p>		
<b>Ideas for Implementation:</b>	<b>Actions Taken Since 2015</b>	
Continue to partner with federal and state organizations supporting studies and monitoring volcanic eruption indicators and activities.  Participate in updating interagency communication plan for central Oregon volcanic activity.	Developed in 2010; Ongoing in 2015; Deferred in 2021	
<b>Coordinating Organization:</b>	Deschutes County Emergency Services	

<b>Internal Partners:</b>		<b>External Partners:</b>	
Health Department		CVO (USGS Cascades Volcano Observatory), FEMA, DOGAMI, OEM, USGS, OSU Cascades	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
OSU Cascades, USGS; Local Funding Resources			<input type="checkbox"/> Short Term (1-2 years) <input checked="" type="checkbox"/> Long Term (3-5 years) <input type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2010 NHMP Committee		
<b>Action Item Status:</b>	Deferred		

Action Item: Wildfire #1		Alignment with Plan Goals:	High Priority Action Item?
Expand public information/education initiatives in support of active hazardous fuels treatment.		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input checked="" type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters			
<b>Alignment with Existing Plans/Policies:</b>			
Upper Deschutes River Coalition CWPP, Greater La Pine CWPP, Sunriver CWPP, Greater Sisters Country CWPP, East and West Deschutes County CWPP, Greater Bend CWP, Greater Redmond CWPP			
<b>Rationale for Proposed Action Item:</b>			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2015</b>	
<p>Explore opportunities to expand the Project Wildfire mission addressing public awareness strategies.</p> <p>Expand school enrichment education about fuels reduction and wildland fire prevention near home sites.</p>		<p><b>Ongoing</b> - Project Wildfire maintains regular public awareness and education programs - websites, FireFree, CWPPs, public education. Completed. Will continue.</p>	
<b>Coordinating Organization:</b>	Deschutes County Forester/ Project Wildfire		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Emergency Services, County Forester		Firewise Communities, USFS, BLM, ODF, DEQ,	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Obtain education funding through federal and state grants; Local Funding Resources			<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2010 NHMP Committee		
<b>Action Item Status:</b>	Ongoing		

Action Item: Wildfire #2		Alignment with Plan Goals:				High Priority Action Item?
Review and upgrade existing building and land use codes to address landscape, fuel amounts and structure detail that reduces the incidence or spread of wildland fire in urban/rural interface areas.		<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> Yes
		<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input checked="" type="checkbox"/> 8	
		<input type="checkbox"/> 9	<input type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Affected Jurisdictions:</b>						
<input checked="" type="checkbox"/> Deschutes County		<input checked="" type="checkbox"/> Bend		<input checked="" type="checkbox"/> Redmond		
		<input checked="" type="checkbox"/> La Pine		<input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>						
City and County Comprehensive Plans/ Development Codes						
<b>Rationale for Proposed Action Item:</b>						
<b>Ideas for Implementation:</b>			<b>Actions Taken Since 2010</b>			
<p>Develop systems to regulate landscape, fuels and structure components for new construction.</p> <p>Develop and adopt countywide defensible space standards.</p> <p>Develop countywide classification system consistent with SB 360 to educate individual property owners and encourage compliance with defensible space standards.</p>			<p><b>Ongoing</b> - This is currently being considered by the BOCC, possible decisions pending Spring 2021</p>			
<b>Coordinating Organization:</b>		Deschutes County Community Development and County Forester				
<b>Internal Partners:</b>			<b>External Partners:</b>			
Community Development, County Forester, Emergency Services, Project Wildfire			ODF,			
<b>Potential Funding Sources:</b>			<b>Estimated cost:</b>		<b>Timeline:</b>	
Funding will be necessary to notify/educate property owners of their classification and recommended standards for defensible space. Obtain grant funding from federal and state programs, Local Funding Resources, OEM (Public awareness)					<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing	
<b>Form Submitted by:</b>		2010 NHMP Committee				
<b>Action Item Status:</b>		Ongoing				

Action Item: Wildfire #3		Alignment with Plan Goals:	High Priority Action Item?
Continue to prioritize and support fuels reduction projects on private lands utilizing FireFree and other programs; and identify and prioritize fuels reduction projects on public lands in the WUI.		<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input checked="" type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input checked="" type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters			
<b>Alignment with Existing Plans/Policies:</b>			
County CWPPs, City and County Comprehensive Plans			
<b>Rationale for Proposed Action Item:</b>			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2015</b>	
Provide opportunities for defensible space and fuels reduction through FireFree and Sweat Equity Programs.  Continue to revisit CWPPs annually and update priorities for fuels reduction projects on private and public lands.   Biomass accumulation reduction		<b>Ongoing</b> - Annually provide opportunities for homeowner participation in fuels reduction projects and FireFree projects.  Annually revisit each CWPP. Conduct new risk assessments and revise priorities on a three year rotation.  Maintain partnership and participation in Deschutes Forest Collaborative Project, Joint Chiefs, etc. to accomplish fuels reduction on public lands.	
<b>Coordinating Organization:</b>		Project Wildfire	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development, County Forester, Emergency Services, Project Wildfire		Firewise Communities, ODF	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Obtain grants and cost share agreements with landowners to participate in Sweat Equity fuels reduction programs. Partner with collaborators to fund FireFree recycling days.			<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing

<b>Form Submitted by:</b>	2010 NHMP Committee
<b>Action Item Status:</b>	Ongoing

<b>Action Item: Wildfire #4</b> (What do we want to do?)	<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Assess critical infrastructure resilience to wildfire	1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input checked="" type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/>	<input checked="" type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>		
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Sisters <input type="checkbox"/> Redmond  <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Bend		
<b>Alignment with Existing Plans/Policies:</b>		
<p>See 2015 Deschutes County NHMP:</p> <ul style="list-style-type: none"> <li>Goal 2 <i>Minimize public and private property damages and the disruption of essential infrastructure and services from natural hazards</i></li> </ul> <p>See March 17, 2020 Bend City Council adopted the Council’s goals for biennium FY ’21-’23.</p> <p>Goal: Environment &amp; Climate            Improve quality of life for more people in Bend by increasing equitable access to clear air, water and to a healthy environment. Implement solutions that fulfill the City’s commitment to being good stewards of our natural environment, decreasing carbon emissions and mitigating the effects of climate change.</p> <p><u>Strategy:</u> Preserve Bend’s natural environment, including clean air and water, wildlife and trees, through partnerships and policy</p> <ul style="list-style-type: none"> <li>Protect critical water resources and other essential city facilities with a focus on sustainability and resiliency</li> </ul> <p><u>Strategy:</u> Create wildfire and emergency resiliency plans that acknowledge our changing climate</p>		
<b>Rationale for Proposed Action Item (why is it important?):</b>		
<p>The Cities of Bend, Redmond, Sisters, and La Pine all rely on water and wastewater facilities located outside of their respective urban growth boundaries (UGBs). Bend, La Pine, and Sisters have critical infrastructure facilities located near or surrounded by forest lands. It is critical to assess whether this infrastructure is resilient to wildfire given high fire risk and the consequences of water and wastewater treatment facilities failing or going offline in the event of a catastrophic wildfire. This assessment needs to evaluate risk, potential barriers or defenses against encroaching wildfire, potential infrastructure improvement to continue operations. This action items is important because current plans, e.g. the 2015 NHMP and Community Wildfire Protection Plans (CWPP), put more of an emphasis on mitigating risk of wildfire around communities, structures, and neighborhoods. This action item is needed to add focus to critical infrastructure that is also located in areas subject to wildfires.</p>		

<b>Ideas for Implementation (how will it get done?):</b>		<b>Action Status Report</b>
<p>Assess risk of wildfire for each water and wastewater facility (e.g. forest or brush/ground wildfire)</p> <p>Identify potential barriers/defenses against wildfire (e.g. irrigated pasture, concrete buildings/barriers)</p> <p>Identify actions to take to ensure facility can operate during wildfire event or has minimal offline time (backup systems, backup power)</p>		New in 2021
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>
<p>Local (City) capital improvement programs (CIPs)</p> <p>State Funding wildfire resilience</p> <p>FEMA</p>	High	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input checked="" type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)
<b>Coordinating/Lead Organization:</b>	Deschutes County/State OEM	
<b>Internal Partners:</b>	<b>External Partners:</b>	
<p>City of Bend</p> <p>City of Sisters</p> <p>City of La Pine</p> <p>Deschutes County</p>	<p>State OEM</p> <p>State DLCDC – wildfire resilience</p>	
<b>Form Submitted by:</b>	Damian Syrnyk, City of Bend	
<b>Action Item Status (for existing actions only):</b>	NEW, 2021	



<b>Action Item: Winter Storm #1</b>		<b>Alignment with Plan Goals:</b>			<b>High Priority Action Item?</b>	
Continue to coordinate mitigation activities to reduce risk to the public from severe winter storms.		<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes
		<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input checked="" type="checkbox"/> 7	<input type="checkbox"/> 8	
		<input type="checkbox"/> 9	<input checked="" type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Affected Jurisdictions:</b>						
<input checked="" type="checkbox"/> Deschutes County		<input checked="" type="checkbox"/> Bend		<input checked="" type="checkbox"/> Redmond		
		<input checked="" type="checkbox"/> La Pine		<input checked="" type="checkbox"/> Sisters		
<b>Alignment with Existing Plans/Policies:</b>						
County and City Emergency Operations Plans						
<b>Rationale for Proposed Action Item:</b>						
Deschutes County is subject to severe winter storms. Although most residents are generally prepared for extreme and prolonged winter events can affect our population. These events can prevent access to healthcare, medications, food, and can interfere with residents' ability to heat their homes.						
<b>Ideas for Implementation:</b>			<b>Actions Taken Since 2015</b>			
Continue and expand partnerships with county, city, homeowner groups, businesses and other organizations on strategies that mitigate impact of snow, cold weather, ice and other events related to severe winter storms.  Provide training for setting-up/ operating Emergency Operations Center (EOC) and using Incident Command System (ICS)			Developed in 2010; Ongoing in 2015; Ongoing in 2021			
<b>Coordinating Organization:</b>		Deschutes County Emergency Services				
<b>Internal Partners:</b>			<b>External Partners:</b>			
City and County Public Works, Public Health			Utility companies, Vulnerable Populations Work Group, American Red Cross, other Community Organizations Active in Disasters.			
<b>Potential Funding Sources:</b>			<b>Estimated cost:</b>		<b>Timeline:</b>	
Pursue grant and budgetary funding for educational outreach and partnership development, Local Funding Resources					<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing	
<b>Form Submitted by:</b>		2010 NHMP Committee				
<b>Action Item Status:</b>		Ongoing				

Action Item: Winter Storm #2	Alignment with Plan Goals:				High Priority Action Item?
Continue public awareness of severe winter storm mitigation activities.	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes
	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input checked="" type="checkbox"/> 7	<input type="checkbox"/> 8	
	<input type="checkbox"/> 9	<input checked="" type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Affected Jurisdictions:</b>					
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters					
<b>Alignment with Existing Plans/Policies:</b>					
County and City Emergency Operations Plans					
<b>Rationale for Proposed Action Item:</b>					
Deschutes County is subject to severe winter storms. Although most residents are generally prepared for extreme and prolonged winter events can affect our population. These events can prevent access to healthcare, medications, food, and can interfere with residents' ability to heat their homes.					
<b>Ideas for Implementation:</b>			<b>Actions Taken Since 2015</b>		
Target new residents and businesses; continue coordination and expansion of public awareness system providing education about protecting life, property, and the environment from severe winter storm events.  Distribute educational information about alternative heating sources, equipment and supplies to use during severe winter storm and power outage.  Develop coordinated utility restoration plans with all utility sources.  Develop coordinated plan for housing large numbers of residents and tourists.  Develop Coordinated Plan for Outreach to Vulnerable Populations			Developed in 2010; Ongoing in 2015; Ongoing in 2021		
<b>Coordinating Organization:</b>		Deschutes County Emergency Services			
<b>Internal Partners:</b>			<b>External Partners:</b>		
City and County Public Works, Public Health			Vulnerable Populations Work Group, American Red Cross		
<b>Potential Funding Sources:</b>			<b>Estimated cost:</b>		<b>Timeline:</b>
County and Cities, Pursue grant funding for educational materials and distribution, Coordinate with OEM (Public awareness), Local Funding Resources					<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing

<b>Form Submitted by:</b>	2010 NHMP Committee
<b>Action Item Status:</b>	Ongoing

<b>Action Item: Winter Storm #3</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Continue to enhance coordination maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.		<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
<input checked="" type="checkbox"/> Deschutes County <input checked="" type="checkbox"/> Bend <input checked="" type="checkbox"/> Redmond <input checked="" type="checkbox"/> La Pine <input checked="" type="checkbox"/> Sisters			
<b>Alignment with Existing Plans/Policies:</b>			
County and City Emergency Operations Plans			
<b>Rationale for Proposed Action Item:</b>			
Deschutes County is subject to severe winter storms. Although most residents are generally prepared for extreme and prolonged winter events can affect our population. These events can prevent access to healthcare, medications, food, and can interfere with residents' ability to heat their homes.			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2015</b>	
Annually meet with county and city departments responsible for maintaining infrastructures including those addressing emergencies, roads, sewers, water etc. to address upgrades and improvements needed and needs of new and emerging neighborhoods.		Developed in 2010; Ongoing in 2015; Ongoing in 2021	
<b>Coordinating Organization:</b>	Deschutes County Emergency Services		
<b>Internal Partners:</b>		<b>External Partners:</b>	
City and County Public Works, Public Health		Utilities, Vulnerable Populations Work Group, American Red Cross	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
With department budgets at an all-time low, departmental funding is unlikely in the next five years. Pursue grant funding for educational materials and distribution. Coordinate with OEM (Public awareness), Local Funding Resources			<input type="checkbox"/> Short Term (1-2 years) <input type="checkbox"/> Long Term (3-5 years) <input checked="" type="checkbox"/> Ongoing
<b>Form Submitted by:</b>	2010 NHMP Committee		
<b>Action Item Status:</b>	Ongoing		

# APPENDIX B: PLANNING AND PUBLIC PROCESS

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## Memo

**To:** Federal Emergency Management Agency  
**From:** Central Oregon Intergovernmental Council  
**Date:** June 18, 2021  
**Re:** List of changes to the 2015 Deschutes County NHMP for the 2021 Plan Update

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### Purpose

This memo describes the changes made to the 2015 Deschutes County Natural Hazards Mitigation Plan (NHMP) during the 2021 plan update process. Major changes are documented by plan section in table B-1 below.

### Project Background

Deschutes County partnered with the Central Oregon Intergovernmental Council (COIC) to update the 2015 Deschutes County Natural Hazards Mitigation Plan (NHMP). The Disaster Mitigation Act of 2000 requires communities to update their mitigation plans every five years to remain eligible for Pre-Disaster Mitigation (PDM) program funding, Flood Mitigation Assistance (FMA) program funding, and Hazard Grant Mitigation Program (HMGP) funding. COIC met with members of the Deschutes County steering committee in December, January, February, and March to update portions of the county's NHMP. During this update cycle the cities of Bend, La Pine, Redmond, and Sisters opted to participate; as such the 2021 plan is multi-jurisdictional. Formal meetings with the steering committees for the four participating cities occurred during April 2021. All meetings were held virtually via Zoom given local, regional, and state COVID-19 guidelines and restrictions. COIC and the committees made several changes to the 2015 NHMP. Major changes are documented and summarized in this memo.

### 2021 Plan Update Changes

The sections below only discuss *major* changes made to the 2015 Deschutes County NHMP during the 2021 plan update process. Major changes include the replacement or deletion of large portions of text, changes to the plan's organization, and new, updated, or removed mitigation action items. If a section is not addressed in this memo, then it can be assumed that no significant changes occurred.

The plan's format and organization were altered to fit within Oregon Partnership for Disaster Resilience's plan templates in 2015. The steering committee opted to continue using this template and format in 2021.

**Table B-I Significant Changes from 2015 to 2021**

Deschutes County Multi-jurisdictional NHMP Sections	Significant Updates in 2021
Acknowledgements	Steering committee and partner lists updated with 2021 participants Replaced OPDR information with COIC
Approval Letters and Resolutions	Approval letters for 2021 included
Table of Contents	N/A
<b>Volume I: Basic Plan</b>	
Executive Summary	Participants list updated with 2021 steering committee representation Risk assessment summary table updated with 2021 scores Mitigation plan mission and goals updated with 2021 steering committee mission and goals Plan adoption dates updated for 2021
Section 1: Introduction	How the plan was developed was updated to reflect the 2021 process
Section 2: Risk Assessment	Hazard identification table to include 2020 State of Oregon NHMP identified hazards for Region 6 Extreme heat omitted justification Federal disaster declarations added through 2021 Updated community vulnerabilities and data Updated flood insurance detail table through April 2021 Vulnerability and probability ratings updated with 2021 scores Hazard analysis matrix updated with 2021 scores
Section 3: Mitigation Strategy	Steering committee updated mission and goals Four new action items were developed and included (MH#8, MH#9, EQ#3, and WF#4), and one existing was updated for clarity (MH#4) All existing action items were given a status update Priority action items were identified and agreed upon Action item worksheets explanation was updated to reflect 2021 worksheets Action item process updated to include 2021 process
Section 4: Plan Implementation and Maintenance	Members coordinating body list updated to reflect 2021 committee Deschutes county bi-annual update meeting schedule now includes two cities per meeting Public involvement process updated to reflect 2021 process
<b>Volume II: Hazard Annexes</b>	
Drought	See "significant changes" box at beginning of section
Earthquake	See "significant changes" box at beginning of section
Flood	See "significant changes" box at beginning of section
Landslide	See "significant changes" box at beginning of section

Volcano	See "significant changes" box at beginning of section
Wildfire	See "significant changes" box at beginning of section
Windstorm	See "significant changes" box at beginning of section
Winter Storm	See "significant changes" box at beginning of section
<b>Volume III: Jurisdictional Addenda</b>	
City of Bend	<p>How the plan was developed was updated to include 2021 process</p> <p>One new action item was developed (WF#5) and all existing action items were updated with new project leads</p> <p>A status updated was provided for all existing action items</p> <p>The implementation process was updated to reflect the new county 2021 schedule</p> <p>A tribal land acknowledgement statement was added to the Community Profile and Asset Identification section</p> <p>The existing plans list was updated</p> <p>Community asset lists and tables were updated</p> <p>The Hazard Analysis Matrix and the vulnerability and probability comparisons with the county's ratings were updated to reflect 2021 scores and ratings</p> <p>Each hazard description includes at least one update to reflect new understanding of risks and vulnerabilities in 2021</p> <p>All hazard ratings were updated within the hazard narratives to reflect 2021 ratings</p> <p>The mitigation plan mission and goals were updated to reflect adoption of the 2021 county mission and goals</p> <p>Action item forms were updated to reflect status changes and a new action item form was added for WF#5</p>
City of La Pine	<p>How the plan was developed was updated to include 2021 process</p> <p>Action item WS#1 was revised to MH#1, and the 2015 WF#1 action was removed and replaced with a new action item (WF#1)</p> <p>A status updated was provided for all existing action items</p> <p>The implementation process was updated to reflect the new county 2021 schedule</p> <p>A tribal land acknowledgement statement was added to the Community Profile and Asset Identification section</p> <p>The existing plans list was updated</p> <p>Community asset lists and tables were updated</p> <p>The Hazard Analysis Matrix and the vulnerability and probability comparisons with the county's ratings were updated to reflect 2021 scores and ratings</p> <p>Each hazard description includes at least one update to reflect new understanding of risks and vulnerabilities in 2021</p> <p>All hazard ratings were updated within the hazard narratives to reflect 2021 ratings</p> <p>The mitigation plan mission and goals were updated to reflect adoption of the 2021 county mission and goals</p> <p>Action item forms were updated to reflect status changes and a new action item form was added for WF#1</p>



<p>City of Redmond</p>	<p>How the plan was developed was updated to include 2021 process  A status updated was provided for all existing action items  One action item was removed (FL#1)  The implementation process was updated to reflect the new county 2021 schedule  A tribal land acknowledgement statement was added to the Community Profile and Asset Identification section  The existing plans list was updated  Community asset lists and tables were updated  The Hazard Analysis Matrix and the vulnerability and probability comparisons with the county's ratings were updated to reflect 2021 scores and ratings  Each hazard description includes at least one update to reflect new understanding of risks and vulnerabilities in 2021  All hazard ratings were updated within the hazard narratives to reflect 2021 ratings  The mitigation plan mission and goals were updated to reflect adoption of the 2021 county mission and goals  Action item forms were updated to reflect status changes</p>
<p>City of Sisters</p>	<p>How the plan was developed was updated to include 2021 process  Six new action items were developed (MH#1, FL#3, FL#4, WF#1, WF#2, WF#3)  A status updated was provided for all existing action items  One action item was removed (FL#2)  The implementation process was updated to reflect the new county 2021 schedule  A tribal land acknowledgement statement was added to the Community Profile and Asset Identification section  The existing plans list was updated  Community asset lists and tables were updated  The Hazard Analysis Matrix and the vulnerability and probability comparisons with the county's ratings were updated to reflect 2021 scores and ratings  Each hazard description includes at least one update to reflect new understanding of risks and vulnerabilities in 2021  All hazard ratings were updated within the hazard narratives to reflect 2021 ratings  The mitigation plan mission and goals were updated to reflect adoption of the 2021 county mission and goals  Action item forms were updated to reflect status changes and six new action item forms were added (MH#1, FL#3, FL#4, WF#1, WF#2, WF#3)</p>
<p>Volume IV: Mitigation Resources</p>	
<p>Appendix A: Action Item Forms</p>	<p>All existing action items were updated to reflect status changes in 2021  Priority action items were identified, marked, and provided with a detailed summary of actions taken since 2015  Four new action item forms were included (MH#8, MH#9, EQ#3, and WF#4)  Existing action item MH#4 was updated for clarity</p>
<p>Appendix B: Planning and Public Process</p>	<p>The full appendix was updated to reflect the planning and public process for 2021</p>

Appendix C: Community Profile	All data, tables, and charts were updated with the best available information as of April 2021
Appendix D: Economic Analysis of Natural Hazard Mitigation Projects	The newest template was added from OPDR (2020)
Appendix E: Grant Programs and Resources	The newest template was added from OPDR (2020) and additional resources were identified and included by the local committee
Appendix F: Deschutes County Natural Hazards Community Survey	The 2015 community survey results were replaced with the results from the 2021 survey

# 2021 NHMP PUBLIC PARTICIPATION PROCESS

## 2021 NHMP Update

Deschutes County is dedicated to directly involving the public in the review and update of the natural hazard mitigation plan. Although members of the steering committee represent the public to some extent, the residents of Deschutes County, Bend, La Pine, Redmond, and Sisters are also given the opportunity to provide feedback about the Plan. The Plan will undergo a full review every five years.

Deschutes County made the Plan available via the Central Oregon Intergovernmental Council's website for public comment from June 7<sup>th</sup>, 2021 through the FEMA review period. Additionally, The County hosted a public input session (virtually) on June 7<sup>th</sup>, 2021. The cities of Bend, La Pine, Redmond, and Sisters had at least one representative present at the public input meeting. Materials and comments from the public input session on June 7<sup>th</sup>, 2021 are included as Attachment B in this Appendix.

## Public Involvement Summary

COIC and Deschutes County issued a community preparedness survey in both English and Spanish in March 2021 to gauge household knowledge of mitigation tools and techniques to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness. COIC and Deschutes County received a total of 30 responses to the survey in English, and one response to the survey in Spanish. A detailed report of responses is provided in Appendix F of this NHMP.

During the public review period of June 7, 2021 – September 1, 2021 there were **zero** comments received via the COIC project page for the Deschutes County NHMP update. Members of the steering committee provided edits and updates to the NHMP during this period as reflected in the final document.

There were 2 comments received at the virtual public input session on June 7<sup>th</sup>, 2021. Both came from employees of Mid State Electric and were related to Continuity of Operations Plans. Deschutes County EMS agreed follow up with them for further discussion. For a more detailed review of the comments, see Attachment B of this Appendix.

COIC sent quarterly updates to emergency management staff in the neighboring communities of Lane County, Klamath County, Lake County, Crook County, and the Confederated Tribes of Warm Springs. Additionally, these neighboring communities were invited to participate in steering committee meetings, as well as the public input meeting on June 7<sup>th</sup>, 2021 and were sent a copy of the draft Plan for comments through the review period of June 7, 2021 – September 1, 2021. **Zero** comments were received from neighboring communities throughout the update period.

## Attachment A: Press Releases

# COIC

Central Oregon Intergovernmental Council

FOR IMMEDIATE RELEASE:

Name: Shelby Knight  
Title: Resilience Planner  
Phone number: 541-548-9535  
Email: sknight@coic.org



### **Jefferson and Deschutes Counties Are Asking for Public Input on Natural Hazard Preparedness and Risk to Support Updating Their Natural Hazard Mitigation Plans**

**March 9<sup>th</sup>, 2021, Bend, ORE** — Deschutes County and Jefferson County are partnering with the Federal Emergency Management Agency (FEMA) and Central Oregon Intergovernmental Council (COIC) to collect public feedback to support updating their Natural Hazards Mitigation Plans (NHMPs). Both counties are offering individuals an opportunity to weigh in by filling out a public survey. The goal of the survey is to collect information from the community to better understand individuals' preparedness, risk, and vulnerability to natural hazards. This information will be used to support both counties in updating their NHMPs and will help improve coordination of hazard mitigation and risk reduction efforts within the counties.

#### **Deschutes County Natural Hazards Survey**

The survey is available in both English and Spanish. All individual survey responses are strictly confidential and are for research purposes only. The survey is open now through March 19<sup>th</sup>.

English: <https://www.surveymonkey.com/r/deschutesNHMP>



*To request this information in an alternate format, please call **541-728-3872** or send an email to [emergency.management@deschutes.org](mailto:emergency.management@deschutes.org)*

#### **Jefferson County Natural Hazards Survey**

Surveys are available in English and Spanish. All individual survey responses are strictly confidential and are for research purposes only. The survey is open to the public now through March 15<sup>th</sup>.

English: <https://www.surveymonkey.com/r/JeffersonNHMP>



To request this survey in an alternate format, please call 541-475-6520 or send an email to [ayoung@jcsso.law](mailto:ayoung@jcsso.law)

### Los condados Jefferson y Deschutes están pidiendo las sugerencias del público para complementar la actualización de los planes de mitigación para desastres naturales de estos

**Marzo 9 del 2021, Bend, OR.** – El condado Deschutes y el condado Jefferson en colaboración con el Federal Emergency Management Agency, FEMA (La Agencia federal administradora de emergencias) y el Central Oregon Intergovernmental Council, COIC (el Concilio intergubernamental del centro de Oregón) están recopilando sugerencias para complementar la actualización de sus Natural Hazards Mitigation Plans, NHMPs (Los Planes de mitigación para los desastres naturales). Ambos condados están ofreciendo a los individuos una oportunidad de opinar mediante una encuesta pública. La meta de la encuesta es recoger información de la comunidad para entender mejor la preparación individual, el riesgo y la vulnerabilidad a los desastres naturales. Esta información será usada para apoyar a ambos condados en la actualización de sus NHMPs y ayudará a mejorar la coordinación de la mitigación en desastres y los esfuerzos de reducir los riesgos en estos condados.

#### El Condado Deschutes

La encuesta para el Plan de mitigación para los desastres naturales está disponible en español. Todas las respuestas a las encuestas individuales son estrictamente confidenciales y son solo con el propósito de investigación. Por favor, complete la encuesta a continuación antes del 19 de marzo.

Español: <https://www.surveymonkey.com/r/deschutesNHMP-Espanol>



Para solicitar esta información en un formato alternativo, llame 541-728-3872 o envíe un correo electrónico a [emergency.management@deschutes.org](mailto:emergency.management@deschutes.org)

#### El Condado Jefferson

La encuesta para el Plan de mitigación para los desastres naturales está disponible en español. Todas las respuestas a las encuestas individuales son estrictamente confidenciales y son solo con el propósito de investigación. Por favor, complete la encuesta a continuación antes del 15 de marzo.

Español: <https://www.surveymonkey.com/r/JeffersonNHMP-Espanol>



Para solicitar esta información en un formato alternativo, llame 541-475-6520 o envíe un correo electrónico a [ayoung@jcsso.law](mailto:ayoung@jcsso.law)

Central Oregon Intergovernmental Council (COIC) was designated a Council of Governments in 1972 under ORS 190 and serves the local governments of Central Oregon. COIC provides regional services for employment and training, alternative high school education, business loans, planning and governance, community and economic development, and public transportation services operated by Cascades East Transit.

**Attachment B:**

**June 7<sup>th</sup> Public Input Meeting Materials and Notes**



**Deschutes NHMP  
Public Input Meeting**

June 07, 2021 – 6:00 - 7:00pm



**Zoom Webinar Link:**

<https://zoom.us/j/92681466482?pwd=Z2Zlc29LV1Erc1RaWktoR0l6dlJkQT09>

**Meeting ID:** 926 8146 6482 | **Passcode:** 909129 | **Call-in #:** +1 669 900 6833

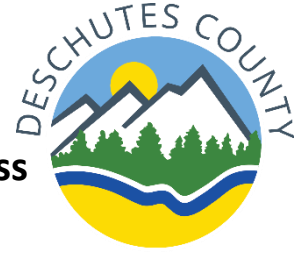
TIME	TOPIC
6:00 – 6:15p (15 mins)	<p><b>Welcome and Process Overview</b></p> <ul style="list-style-type: none"> <li>• Welcome/Agenda Overview/Zoom Overview <i>Shelby Knight, COIC Resilience Planner</i></li>   <li>• Process Overview <i>Nathan Garibay, Deschutes County Sheriff's Office Emergency Manager</i> <i>Ashley Volz, Deschutes County Sheriff's Office Emergency Services Coordinator</i></li> </ul> <ul style="list-style-type: none"> <li>○ What is the NHMP?</li> <li>○ Why is it important?</li> <li>○ What was our process for updating the document?</li> <li>○ How can the public review and comment?</li> </ul>
6:15-6:40p (25 mins)	<p><b>Review of Draft Plan</b></p> <ul style="list-style-type: none"> <li>• Elements of the NHMP <i>Shelby Knight, COIC Resilience Planner</i></li>   <li>• Key Changes &amp; Updates to the Plan <i>Shelby Knight, COIC Resilience Planner</i> <i>Nathan Garibay, Deschutes County Sheriff's Office Emergency Manager</i> <i>Ashley Volz, Deschutes County Sheriff's Office Emergency Services Coordinator</i></li> </ul>
6:40 – 6:55p (20 mins)	<p><b>Discussion and Q&amp;A</b></p> <ul style="list-style-type: none"> <li>• Facilitated Public Comments and Q&amp;A <i>Shelby Knight, COIC Resilience Planner</i></li> </ul>

6:55 – 7p (5 mins)	<b>Closing Comments</b> <i>Shelby Knight, COIC Resilience Planner</i> <i>Nathan Garibay, Deschutes County Sheriff's Office Emergency Manager</i> <i>Ashley Volz, Deschutes County Sheriff's Office Emergency Services Coordinator</i>
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## Deschutes County 2021 NHMP Process



### Public Input Meeting - Notes

June 7, 2021 | Zoom | 6:00 - 7:00pm

*This meeting was hosted by Deschutes County Office of Emergency Management and facilitated by Central Oregon Intergovernmental Council. Contact information for the panelists can be found in the materials for this meeting as well as at the end of these meeting notes. Materials for this meeting, including the agenda, meeting recording, and draft NHMP can be found at <https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/deschutes-county-nhmp/>.*

**Facilitator:** Shelby Knight, Resilience Planner at COIC

**Panelists:** Nathan Garibay and Ashley Volz, Deschutes County Sheriff's Office of Emergency Management; Will Groves, Deschutes County Planning; Damian Szyrnyck, City of Bend Planning; Boone Zimmerlee, Deschutes County Fire Adapted Communities Coordinator.

**Staff:** Sienna Fitzpatrick, COIC; Hayley Riach, Deschutes County Sheriff's Office

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## 1. Welcome and Process Overview

The meeting started with introductions and a review of the agenda and Zoom tools. Nathan and Ashley gave an overview of the NHMP process and why it is important for the county and the communities in Deschutes. In summary, the NHMP update is essential to be eligible for federal funding through FEMA for pre-disaster mitigation work as well as post-disaster recovery funding. The NHMP identifies hazards, vulnerabilities, and risks facing the region and prioritizes actions to reduce them. This plan looks at the whole county as well as each of the four incorporated communities (Bend, La Pine, Redmond, Sisters).

The NHMP Steering Committee has been meeting since January; what we have to share today is still a draft and we are looking for public input to improve that draft before it is submitted to OEM and FEMA for review. Public input is key to a successful NHMP process, as this is a community document. The draft is available for public comment until September 1, 2021 and can be found at the link at the top of these notes. Please email Sienna Fitzpatrick at [sfitzpatrick@coic.org](mailto:sfitzpatrick@coic.org) with any comments you have. We encourage public feedback.

## 2. Review of Draft Plan

Shelby gave an overview of each of the components of the plan. The plan elements can be found in the slides available on the project website.

## 3. Key Changes/Updates in the Plan

Shelby summarized the key elements of a successful NHMP review process (see slides). Ashley reviewed major updates made to the Plan in 2021 thus far and reviewed the hazard ranking process (available for viewing in the slides). Significant changes to hazard ranking involved Drought (from #6 to #4), and Earthquake (Cascadia), from #3 down to #6. A robust wildfire smoke section was included in the wildfire annex. Future climate variability sections were also added to relevant hazards in order to capture potential climate change impacts. Wind in the context of fire was emphasized in the update – these annexes overlap to show the connection between these two hazards. Information on hazard trees was also added to the windstorm annex. Windstorm and drought both had many additional hazard incidents in the last five years that were added to the history sections.

Nathan talked about the mitigation strategy action items; these mitigation action items and the hazard rankings are the most significant components of this plan. There are County wide items and jurisdictional items. He reviewed new action items and discussed their importance in mitigating new and relevant risks (MH#8, MH#9, EQ#3, and WF#4).

#### **4. Discussion**

Shelby opened up the meeting for public questions and comment.

Renita Cuevas (Mid State Electric, La Pine): Mid State is working on their business continuity plan and in that process, questions have come up around communications during a big event (wildfire, winter storm). She asked for recommendations for who to talk to when something happens and Mid State is unable to get a message out. Nathan said that it's important to have redundancy whether you're a utility or a citizen; hopefully during a disaster there will be some connection back to a public safety answering point (PSAP). This can be a number of ways; for internal communication structures, you should determine whether you have a network or VOIP system or a copper telephone (some legacy fax machines still have copper); he recommends having both. You can also try cellular or texting which won't always work. For critical infrastructure, he recommends having a satellite phone or similar to allow you to at least get emergency information out. A number of organizations are also tapping into amateur radio and auxiliary communications as a fallback. If all those things fail and you can get in touch with the City of La Pine, Deschutes Emergency Management will definitely be engaging with them during a disaster so contacting City Hall could be the fallback so they can pass it on to the County. They want to know how to use the emergency broadcast system if there was an issue – sounds like they're doing what they need to do at the moment. Reach out to Nathan if you have additional questions.

JD Powers (Mid State Electric, La Pine): JD is the Information Systems Manager for Mid State La Pine. He asked if there is a conduit through the County EMOC to get information out on the emergency broadcast system if they need to power down their systems. Nathan said they do have the ability to use mass notification tools depending on the circumstances and emergent nature of the event there are circumstances – he would need to work out details for that offline to make sure we know the situation and understand when that would need to be employed. Nathan added that the emergency broadcast system shouldn't be the first choice for an incident like that but they should talk about it to discuss the circumstances for that use. He also generally would like to have a discussion with folks in La Pine regarding planned public safety power outages as this is a new subject to tackle.

*Meeting concluded at 6:45pm.*

**Contact information:**

Shelby Knight, Resilience Planner, Central Oregon Intergovernmental Council  
[sknight@coic.org](mailto:sknight@coic.org)

Ashley Volz, Emergency Services Coordinator, Deschutes County Sheriff's Office  
[ashley.volz@deschutes.org](mailto:ashley.volz@deschutes.org)

Nathan Garibay, Emergency Services Manager, Deschutes County Sheriff's Office  
[nathan.garibay@deschutes.org](mailto:nathan.garibay@deschutes.org)

**Project Website:** <https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/deschutes-county-nhmp/>

Comments on the Draft Deschutes County 2021 NHMP will be accepted until September 1, 2021. Please submit all comments to Sienna Fitzpatrick at [sfitzpatrick@coic.org](mailto:sfitzpatrick@coic.org).

## Steering Committee Process

Steering committee members possessed familiarity with the Deschutes County community and how it's affected by natural hazard events. The steering committee guided the update process through several steps including goal confirmation and prioritization, action item review and development and information sharing to update the plan and to make the plan as comprehensive as possible. The steering committee met on the following dates:

- **Meeting #1, Kickoff:** December 14<sup>th</sup>, 2020
- **Meeting #2, Hazard Annexes and Risk Assessment:** January 13<sup>th</sup>, 2021
- **Meeting #3, Risk Assessment Continued and Mitigation Strategy:** February 10<sup>th</sup>, 2021
- **Meeting #4, Mitigation Strategy Continued and Plan Implementation and Maintenance:** March 10<sup>th</sup>, 2021

The county steering committee formed under the guidance of Nathan Garibay, Deschutes County Emergency Services Manager. The steering committee invested considerable time into the mitigation plan, inside and outside of meetings throughout the update process. For a full list of steering committee member see the Acknowledgements section of this NHMP.

In addition, several project management meetings between project managers and support staff were held to coordinate and follow-up on steering committee outcomes, action items, and needs for additional discussion/information.

- **Meeting #1:** January 1<sup>st</sup>, 2021
- **Meeting #2:** February 23<sup>rd</sup>, 2021
- **Meeting #3:** May 12<sup>th</sup>, 2021

Finally, four separate formal meetings (one for each city) were held for updating the jurisdiction addenda.

- **Meeting #1, La Pine Addendum:** April 8<sup>th</sup>, 2021
- **Meeting #2, Sisters Addendum:** April 9<sup>th</sup>, 2021
- **Meeting #3, Redmond Addendum:** April 16<sup>th</sup>, 2021
- **Meeting #4, Bend Addendum:** April 28<sup>th</sup>, 2021

The local steering committees formed under the guidance of each of the conveners. The steering committees invested considerable time into the mitigation plan, inside and outside of meetings throughout the update process. For a full list of steering committee members for each jurisdiction, see the Acknowledgements section of this NHMP.

The following pages provide copies of meeting agendas and attendance reports from county and city steering committee meetings. All steering committee meetings were held virtually via Zoom given local, regional, and state guidance on COVID-19. Therefore, role was called and attendance recorded at each meeting by the facilitator and formally captured in meeting minutes. Additionally, Zoom attendance reports were automatically generated in place of sign-in sheets and are included below.

**Attachment C:**

**Steering Committee Attendance and Materials**

**Meeting Agenda**  
**Deschutes County NHMP Kickoff Meeting**  
 December 14, 2020  
 9a-10a

Zoom Link: <https://zoom.us/j/93055544374?pwd=dVEzNG1xU0QzbXhadlhNaWNVR2hVUT09> |  
Meeting ID: 930 5554 4374 | Password: 647131 | Phone: 1 253 215 8782

TIME	AGENDA ITEM
9a – 9:10a <i>10 minutes</i>	<b>Welcome and Introductions</b> – <i>Shelby Knight, COIC</i>
9:10a – 9:20a <i>10 minutes</i>	<b>Purpose</b> – <i>Nathan Garibay, Deschutes County Emergency Manager</i>
9:20a – 9:30a <i>10 minutes</i>	<b>Roles</b> – <i>Shelby Knight, COIC; Nathan Garibay, Deschutes County Emergency Manager</i>  <ul style="list-style-type: none"> <li>• COIC</li> <li>• Deschutes County</li> <li>• Steering Committee</li> <li>• Project Management Team</li> </ul>
9:30a – 9:40a <i>10 minutes</i>	<b>Timeline and Scope of Work</b> – <i>Shelby Knight, COIC; Nathan Garibay, Deschutes County Emergency Manager</i>  ATTACHMENT A
9:40a – 9:50a <i>10 minutes</i>	<b>Match Tracking Process and Ask</b> – <i>Sienna Fitzpatrick, COIC; Scott Aycock, COIC</i>
9:50a – 9:55a <i>5 minutes</i>	<b>Follow Up and Next Steps</b> – <i>Shelby Knight, COIC</i>

## Zoom Attendance Report for December 14th, 2020

	Topic	Participants
	Deschutes County NHMP Kickoff Meeting	23
<b>Name (Original Name)</b>	<b>User Email</b>	
Shelby Knight (she/her) (Shelby Knight)	sknight@coic.org	
Geoffrey Wullschlager	gwullschlager@lapineoregon.gov	
Harry Ward		
Sienna Fitzpatrick (they/them)	sfitzpatrick@coic.org	
Ashley Volz	ashley.volz@deschutes.org	
Will Groves	willg@deschutes.org	
Damian Syrnyk		
Ben Duda		
Roger Johnson		
GORDONRFOSTER		
Scott Aycock (he/him) (Scott Aycock)	scotta@coic.org	
Damian Syrnyk		
Shad Campbell		
Scott Woodford		
David Phillips	dphillips@blackbutteranchfire.com	
Ed Keith	ed.keith@deschutes.org	
Vernita Ediger	vediger@coic.org	
Boone Zimmerlee	boone.zimmerlee@deschutes.org	
Larry Medina (He/Him/His)		
Nathan Garibay		
Cory Misyey		
Tanya Saltzman	tanya.saltzman@deschutes.org	
Deborah McMahon -		
David Pond		

# Deschutes NHMP Steering Committee

## Meeting 1

January 13, 2021 – 3:00 - 5:00pm

Zoom Link:

<https://zoom.us/j/96962364043?pwd=czRtSTd1VGw1WmY0TDJya0swUlhoUT09>

**Meeting ID:** 969 6236 4043 | **Passcode:** 890788 | **Call-in #:** +1 669 900 6833

TIME	TOPIC	ATTACHMENTS
3:00 – 3:10p	<b>Introductions &amp; Agenda Review</b> <i>Shelby Knight, COIC</i>	<u>Attachment A:</u> 2015 NHMP <u>Attachment B:</u> Agenda
3:10 – 3:20p	<b>Review Timeline and Match Tracking</b> <i>Shelby Knight, COIC ; Sienna Fitzpatrick, COIC</i> <ul style="list-style-type: none"> <li>• Review timeline</li> <li>• Scheduling jurisdictional meetings</li> <li>• Public meeting process</li> <li>• Match tracking update – <i>Sienna</i></li> </ul>	<u>Attachment C:</u> SOW and Timeline <u>Attachment D:</u> Rate Certification Template Letter <u>Attachment E:</u> Rate Certification Instructions
3:20 – 3:30p	<b>Discuss general roles / responsibilities &amp; format of meetings / updates</b> <i>Shelby Knight, COIC</i>	
3:30 – 4:00p	<b>Review and Update Section 2: Risk Assessment</b> <ul style="list-style-type: none"> <li>• Hazard Profile and ID           <ul style="list-style-type: none"> <li>▪ New hazards?</li> <li>▪ Hazard Annexes – how to incorporate</li> <li>▪ Review</li> </ul> </li> <li>• Vulnerability Assessment and Community Profile           <ul style="list-style-type: none"> <li>▪ Review</li> </ul> </li> </ul>	<u>Google Doc:</u> Section 2, Community Profile, and Hazard Annex Word Doc
4:00 – 4:45p	<b>Risk Analysis – Group Scoring Exercise</b>	<u>Attachment F:</u> Hazard Analysis Matrix Instructions <u>Attachment G:</u> Hazard Analysis Matrix (Blank)
4:45 – 5:00p	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> <li>• Next Meeting: February 10<sup>th</sup></li> </ul>	

## Zoom Attendance Report for January 13<sup>th</sup>, 2021

	Topic	Participants
	Deschutes County NHMP Steering Committee	26
<b>Name (Original Name)</b>	<b>User Email</b>	
Shelby Knight (she/her)	sknight@coic.org	
Sienna F. (they/them)		
Deborah McMahon		
Damian Syrnyk		
judyl		
Geoff Wullschlager		
Ashley Volz	ashley.volz@deschutes.org	
aaron wells		
Scott Woodford	swoodford@ci.sisters.or.us	
Ed Keith	ed.keith@deschutes.org	
Ben Duda		
Mandy (PGE) (E06477)		
Bill Boos (Billy B)		
Melinda Campbell		
Will Groves	willg@deschutes.org	
Tanya Saltzman	tanya.saltzman@deschutes.org	
Roger Johnson		
Jeremy Giffin (giffinjt)		
David Pond		
Ariel Cowan - OSU Extension (Cowan# Ariel)	cowana@oregonstate.edu	
Scott Aycock	scotta@coic.org	
Boone Zimmerlee	boone.zimmerlee@deschutes.org	
Nathan Garibay		
David Phillips	dphillips@blackbutteranchfire.com	
Jared Earnest		
Bill Boos		



# Deschutes NHMP Steering Committee Meeting 2

February 10, 2021 – 3:00 - 5:00pm

Zoom Link:

<https://zoom.us/j/96962364043?pwd=czRtSTd1VGw1WmY0TDJya0swUlhoUT09>

Meeting ID: 969 6236 4043 | Passcode: 890788 | Call-in #: +1 669 900 6833

TIME	TOPIC	ATTACHMENTS
3:00 – 3:15p (15 mins)	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>	<u>Attachment A</u> : Agenda
3:15-3:30 (15 mins)	<b>Housekeeping Items</b> <ul style="list-style-type: none"> <li>• <u>Action</u> - approve notes</li> <li>• Scheduling jurisdictional meetings</li> <li>• Match tracking/tracking individual hours</li> </ul>	<u>Attachment B</u> : 1/13 Meeting Notes
3:30 – 4:00p (30 mins)	<b>Section 2: Risk Assessment Changes Review</b> <ul style="list-style-type: none"> <li>• HVA discussion</li> <li>• “Extreme Heat” and “Wildfire Smoke”</li> <li>• Review and approve changes</li> <li>• Discuss information still needed/assign</li> </ul>	<u>Attachment C</u> : Changes Memo <u>Attachment D</u> : Extreme Heat Considerations
4:00 – 4:45p (45 mins)	<b>Section 3: Mitigation Strategy Review</b> <ul style="list-style-type: none"> <li>• Mission and Goals</li> <li>• Update status of existing actions</li> <li>• Discuss new actions</li> <li>• Prioritize actions</li> </ul>	<u>Google Doc</u> – Section 3: Mitigation Strategy <u>Attachment E</u> : Section 3 – Mitigation Strategy (Excel) <u>Attachment F</u> : 2020 Oregon NHMP Mitigation Strategy <u>Attachment G</u> : Action Item Worksheet
4:45 – 5:00p (15 mins)	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> <li>• Next Meeting: March 10<sup>th</sup> <ul style="list-style-type: none"> <li>○ Section 4: Plan Implementation and Maintenance</li> <li>○ Volume IV: Mitigation Resources of the 2016 NHMP</li> </ul> </li> </ul>	

## Zoom Attendance Report for February 10<sup>th</sup>, 2021

	Topic	Participants
	Deschutes County NHMP Steering Committee	23
<b>Name (Original Name)</b>	<b>User Email</b>	
Shelby Knight (she/her)	sknight@coic.org	
Sam Vanlaningham (OWRD) (Sam)	samvanlan@gmail.com	
Boone Zimmerlee	boone.zimmerlee@deschutes.org	
Damian Syrnyk		
Geoff Wullschlager		
Marc Austin - NWS Pendleton		
Ashley Volz	ashley.volz@deschutes.org	
David Pond		
Tanya Saltzman# Senior Planner		
Shad Campbell		
Scott Woodford		
Sienna F. (they/them)	sfitzpatrick@coic.org	
Deborah McMahon		
Jared Earnest		
Roger Johnson		
Ben Duda		
Melinda Campbell		
Peter Brewer	brewer.peter@deq.state.or.us	
Ariel Cowan - OSU Extension (Cowan# Ariel)	cowana@oregonstate.edu	
Will Groves	willg@deschutes.org	
Bill Boos		
Nathan Garibay		
Shad Campbell		

# Deschutes NHMP Steering Committee

## Meeting 3 Agenda

March 10, 2021 – 3:00 - 5:00pm

Zoom Link:

<https://zoom.us/j/96962364043?pwd=czRtSTd1VGw1WmY0TDJya0swUlhoUT09>

Meeting ID: 969 6236 4043 | Passcode: 890788 | Call-in #: +1 669 900 6833

TIME	TOPIC	ATTACHMENTS
3:00 – 3:15p (15 mins)	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>	<u>Attachment A</u> : Agenda
3:15-3:30 (15 mins)	<b>Housekeeping Items</b> <ul style="list-style-type: none"> <li>• <u>Action</u> - approve notes</li> <li>• April: jurisdictional meetings</li> <li>• Public survey</li> </ul>	<u>Attachment B</u> : 2/10 Meeting Notes
3:30 – 3:50p (20 mins)	<b>Section 2: Risk Assessment</b> <ul style="list-style-type: none"> <li>• <u>Action</u> - HVA review and approve</li> <li>• Discuss info still needed/assign</li> </ul>	<u>Attachment C</u> : HVA Update <u>Attachment D</u> : PMT Notes
3:50 – 4:35p (45 mins)	<b>Section 3: Mitigation Strategy</b> <ul style="list-style-type: none"> <li>• Review and update goals</li> <li>• Review Changes/Discuss info still needed</li> <li>• Brainstorm and develop new action items</li> <li>• Prioritize actions</li> </ul>	<u>Google Doc/Attachment H</u> – Section 3: Action Item Matrix <u>Attachment E</u> : Section 3 Changes Memo <u>Attachment F</u> : 2020 Oregon NHMP Mitigation Strategy <u>Attachment G</u> : Action Item Worksheet
4:35 – 4:50 (20 mins)	<b>Section 4: Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>• Review/update/assign</li> </ul> <b>Appendix E: Grant Programs and Resources</b> <ul style="list-style-type: none"> <li>• Review/update/assign</li> </ul>	<u>Google Doc</u> – Section 4: Plan Implementation and Maintenance <u>Google Doc</u> – Appendix E: Grant Programs and Resources
4:50 – 5:00p (10 mins)	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> <li>• Next Meeting:               <ul style="list-style-type: none"> <li>○ April Jurisdictional Meetings</li> <li>○ SC May 12<sup>th</sup></li> </ul> </li> </ul>	

## Zoom Attendance Report for March 10<sup>th</sup>, 2021

	Topic	Participants
	Deschutes County NHMP Steering Committee	26
<b>Name (Original Name)</b>	<b>User Email</b>	
Shelby Knight (she/her)	sknight@coic.org	
Sienna F. (they/them)		
Deborah McMahon		
Damian Syrnyk		
judyl		
Geoff Wullschlager		
Ashley Volz	ashley.volz@deschutes.org	
aaron wells		
Scott Woodford	swoodford@ci.sisters.or.us	
Ed Keith	ed.keith@deschutes.org	
Ben Duda		
Mandy (PGE) (E06477)		
Bill Boos (Billy B)		
Melinda Campbell		
Will Groves	willg@deschutes.org	
Tanya Saltzman	tanya.saltzman@deschutes.org	
Roger Johnson		
Jeremy Giffin (giffinjt)		
David Pond		
Ariel Cowan - OSU Extension (Cowan# Ariel)	cowana@oregonstate.edu	
Scott Aycock	scotta@coic.org	
Boone Zimmerlee	boone.zimmerlee@deschutes.org	
Nathan Garibay		
David Phillips	dphillips@blackbutteranchfire.com	
Jared Earnest		
Bill Boos		

# La Pine NHMP Addendum Update

## Meeting Agenda

April 8, 2021 – 11:00 - 2:00pm

**Zoom Link:**

<https://zoom.us/j/96429273206?pwd=bGVubTlrTEI2UHJSR2pNTm1ieXU0dz09>

**Meeting ID:** 964 2927 3206| **Passcode:** 278739| **Call-in #:** +1 253 215 8782

TIME	TOPIC	ATTACHMENTS
11:00 – 11:15a <i>(15 mins)</i>	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>	<u>Attachment A:</u> Agenda
11:15-11:30a <i>(15 mins)</i>	<b>Process Overview</b> <ul style="list-style-type: none"> <li>• Purpose and Need <i>(Nathan)</i></li> <li>• Roles</li> <li>• Timeline and Scope of Work</li> </ul>	<u>Attachment B:</u> Timeline and SOW <u>Attachment C:</u> Draft County NHMP 2021
11:30-12:00p <i>(30 mins)</i>	<b>Community Profile Asset Identification</b> <ul style="list-style-type: none"> <li>• Critical and essential facilities</li> <li>• Population</li> <li>• Land Use</li> <li>• Parks and Open Space</li> <li>• Economic Resources</li> <li>• Cultural and Historic Resources</li> </ul>	<u>Google Doc:</u> La Pine Addendum
12:00 – 12:45p <i>(45 mins)</i>	<b>Risk Assessment</b> <ul style="list-style-type: none"> <li>• HAM: Review and Approve</li> <li>• Review/Update Hazard Profiles               <ul style="list-style-type: none"> <li>○ Drought</li> <li>○ Earthquake</li> <li>○ Flood</li> <li>○ Landslide</li> <li>○ Volcano</li> <li>○ Wildfire</li> <li>○ Windstorm</li> <li>○ Winter Storm</li> </ul> </li> </ul>	<u>Google Doc:</u> Updated City & County Hazard Analysis Matrices <u>Google Doc:</u> La Pine Addendum
12:55 – 1:40p <i>(45 mins)</i>	<b>Mitigation Strategy</b> <ul style="list-style-type: none"> <li>• Review and approve mission and goals</li> <li>• Status update for mitigation actions</li> <li>• Brainstorm and develop new action items</li> </ul>	<u>Google Doc:</u> La Pine Addendum <u>Google Doc:</u> La Pine Mitigation Action Plan
1:40 – 1:55 <i>(15 mins)</i>	<b>Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>• Review and update</li> </ul>	<u>Google Doc:</u> La Pine Addendum
1:55 – 2:00p <i>(5 mins)</i>	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> </ul>	

### Zoom Attendance Report for April 8<sup>th</sup>, 2021

	Topic	Participants
	La Pine NHMP Meeting	19
Name (Original Name)	User Email	
Sam VanLaningham		
Cory Jones		
Ciara Williams	cwilliams@coic.org	
Nathan Garibay	nathan.garibay@deschutes.org	
Ashley Volz	ashley.volz@deschutes.org	
Sienna F. (they/them)	sfitzpatrick@coic.org	
Geoff Wullschlager		
Marie Manes		
tom Weller		
Oliver Tatom	owtatom@stcharleshealthcare.org	
arepko		
Will Groves	willg@deschutes.org	
Boone Zimmerlee	boone.zimmerlee@deschutes.org	
mhibbs		
chiefsupkis		
Charla DeHate		
Boone Zimmerlee	boone.zimmerlee@deschutes.org	

# Sisters NHMP Addendum Update

## Meeting Agenda

April 9, 2021 – 2:00 - 5:00pm

Zoom Link: <https://zoom.us/j/91725479520?pwd=SGx1M1JkRzQ3WUJQb1I5MUhJVHhWQT09>

Meeting ID: 917 2547 9520 | Passcode: 703103 | Call-in #: +1 669 900 6833

TIME	TOPIC	ATTACHMENTS
2:00 – 2:15 (15 mins)	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>	<u>Attachment A</u> : Agenda
2:15-2:30 (15 mins)	<b>Process Overview</b> <ul style="list-style-type: none"> <li>• Purpose and Need (<i>Nathan</i>)</li> <li>• Roles</li> <li>• Timeline and Scope of Work</li> </ul>	<u>Attachment B</u> : Timeline and SOW <u>Attachment C</u> : Draft County NHMP 2021
2:30-3:00 (30 mins)	<b>Community Profile Asset Identification</b> <ul style="list-style-type: none"> <li>• Critical and essential facilities</li> <li>• Population</li> <li>• Land Use</li> <li>• Parks and Open Space</li> <li>• Economic Resources</li> <li>• Cultural and Historic Resources</li> </ul>	<u>Google Doc</u> : Sisters Addendum
3:00 – 3:45 (45 mins)	<b>Risk Assessment</b> <ul style="list-style-type: none"> <li>• HAM: Review and Approve</li> <li>• Review/Update Hazard Profiles               <ul style="list-style-type: none"> <li>○ Drought</li> <li>○ Earthquake</li> <li>○ Flood</li> <li>○ Landslide</li> <li>○ Volcano</li> <li>○ Wildfire</li> <li>○ Windstorm</li> <li>○ Winter Storm</li> </ul> </li> </ul>	<u>Google Doc</u> : Updated City & County Hazard Analysis Matrices <u>Google Doc</u> : Sisters Addendum
3:55 – 4:40 (45 mins)	<b>Mitigation Strategy</b> <ul style="list-style-type: none"> <li>• Review and approve mission and goals</li> <li>• Status update for mitigation actions</li> <li>• Brainstorm and develop new action items</li> </ul>	<u>Google Doc</u> : Sisters Addendum <u>Google Doc</u> : Sisters Mitigation Action Plan
4:40 – 4:55 (15 mins)	<b>Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>• Review and update</li> </ul>	<u>Google Doc</u> : Sisters Addendum
4:55 – 5:00 (5 mins)	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> </ul>	

## Zoom Attendance Report for April 9<sup>th</sup>, 2021

	Topic	Participants
	Sisters NHMP Meeting	17
Name (Original Name)	User Email	
Sam VanLaningham	sam.j.vanlaningham@oregon.gov	
James Osborne		
Shelby Knight (she/her)	sknight@coic.org	
Emme Shoup	eshoup@uoregon.edu	
Ashley Volz	ashley.volz@deschutes.org	
Ben Duda		
Roger Johnson		
Ian Reid (Ian Reid# Deschutes NF)		
Scott Woodford	swoodford@ci.sisters.or.us	
Nathan Garibay	nathan.garibay@deschutes.org	
Gary Ross		
Jennifer Letz		
Will Groves	willg@deschutes.org	
Andrea blum		
Curt Scholl		
Paul Bertagna		
Brent	btenpas@cec.coop	



# Redmond NHMP Addendum Update

## Meeting Agenda

April 16, 2021 – 8:00 - 11:00am

### Zoom Link:

<https://zoom.us/j/92112390702?pwd=ek56dGtESE5QRnM2OU92OUxUeGZ3Zz09>

**Meeting ID:** 921 1239 0702 | **Passcode:** 468052 | **Call-in #:** +1 253 215 8782

TIME	TOPIC	ATTACHMENTS
8:00 – 8:15a (15 mins)	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>	<u>Attachment A:</u> Agenda
8:15-8:30a (15 mins)	<b>Process Overview</b> <ul style="list-style-type: none"> <li>• Purpose and Need (Ashley)</li> <li>• Roles</li> <li>• Timeline and Scope of Work</li> </ul>	<u>Attachment B:</u> Timeline and SOW <u>Attachment C:</u> Draft County NHMP 2021
8:30-9:00a (30 mins)	<b>Community Profile Asset Identification</b> <ul style="list-style-type: none"> <li>• Critical and essential facilities</li> <li>• Population</li> <li>• Land Use</li> <li>• Parks and Open Space</li> <li>• Economic Resources</li> <li>• Cultural and Historic Resources</li> </ul>	<u>Google Doc:</u> Redmond Addendum
9:00 – 9:45a (45 mins)	<b>Risk Assessment</b> <ul style="list-style-type: none"> <li>• HAM: Review and Approve</li> <li>• Review/Update Hazard Profiles               <ul style="list-style-type: none"> <li>○ Drought</li> <li>○ Earthquake</li> <li>○ Flood</li> <li>○ Landslide</li> <li>○ Volcano</li> <li>○ Wildfire</li> <li>○ Windstorm</li> <li>○ Winter Storm</li> </ul> </li> </ul>	<u>Google Doc:</u> City Hazard Analysis Matrix <u>Google Doc:</u> Redmond Addendum
9:45 – 10:30a (45 mins)	<b>Mitigation Strategy</b> <ul style="list-style-type: none"> <li>• Review and approve mission and goals</li> <li>• Status update for mitigation actions</li> <li>• Brainstorm and develop new action items</li> </ul>	<u>Google Doc:</u> Redmond Addendum <u>Google Doc:</u> Redmond Mitigation Action Plan
10:30 – 10:45a (15 mins)	<b>Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>• Review and update</li> </ul>	<u>Google Doc:</u> Redmond Addendum
10:45 – 11:00a (15 mins)	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> </ul>	

### Zoom Attendance Report for April 16<sup>th</sup>, 2021

	Topic	Participants
	Redmond NHMP Meeting	10
Name (Original Name)	User Email	
Sam VanLaningham	sam.j.vanlaningham@oregon.gov	
jpuckett		
Deborah McMahon		
Sienna F. (they/them)	sfitzpatrick@coic.org	
Ashley Volz	ashley.volz@deschutes.org	
Ken Kehmna	ken.kehmna@redmondfireandrescue.org	
John Roberts		
Bill Duerden		
Sam VanLaningham	sam.j.vanlaningham@oregon.gov	

# Bend NHMP Addendum Update

## Meeting Agenda

April 28, 2021 – 12:00 - 3:00pm

### Zoom Link:

<https://zoom.us/j/98938563296?pwd=cTJxbHVxNTNUOTJhaklrYUxOQk1FUT09>

Meeting ID: 989 3856 3296 | Passcode: 172620 | Call-in #: +1 669 900 6833

TIME	TOPIC	ATTACHMENTS
12:00 – 12:15p (15 mins)	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>Attendance</li> <li>Review agenda</li> </ul>	<a href="#">Attachment A</a> : Agenda
12:15-12:30p (15 mins)	<b>Process Overview</b> <ul style="list-style-type: none"> <li>Purpose and Need (<i>Nathan/Ashley</i>)</li> <li>Roles</li> <li>Timeline and Scope of Work</li> </ul>	<a href="#">Attachment B</a> : Timeline and SOW <a href="#">Attachment C</a> : Draft County NHMP 2021
12:30-12:50p (20 mins)	<b>Community Profile Asset Identification</b> <ul style="list-style-type: none"> <li>Critical and Essential Facilities</li> <li>Pop/Land Use</li> <li>Economic/Cultural/Historic</li> </ul>	<a href="#">Google Doc 1</a> : Bend Addendum
12:50 – 1:35p (45 mins)	<b>Risk Assessment</b> <ul style="list-style-type: none"> <li>Hazard Analysis Matrix: Update and Approve</li> <li>Review/Update Hazard Profiles                             <ul style="list-style-type: none"> <li>Drought</li> <li>Earthquake</li> <li>Flood</li> <li>Landslide</li> <li>Volcano</li> <li>Wildfire</li> <li>Windstorm</li> <li>Winter Storm</li> </ul> </li> </ul>	<a href="#">Google Doc 2</a> : Bend and County Hazard Scores <a href="#">Google Doc 1</a> : Bend Addendum
1:45 – 2:30p (45 mins)	<b>Mitigation Strategy</b> <ul style="list-style-type: none"> <li>Review and approve mission and goals</li> <li>Status update for mitigation actions</li> <li>Approve new action items</li> </ul>	<a href="#">Google Doc 1</a> : Bend Addendum <a href="#">Google Doc 2</a> : Bend and County Mitigation Action Plan <a href="#">Attachment D</a> : Action Item Worksheet
2:30 – 2:45 (15 mins)	<b>Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>Review and update</li> </ul>	<a href="#">Google Doc 1</a> : Bend Addendum
2:45 – 3:00p (15 mins)	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>“Homework” assignments for COIC and Committee Members</li> </ul>	

### Zoom Attendance Report for April 16<sup>th</sup>, 2021

	Topic	Participants
	Bend NHMP Meeting	10
Name (Original Name)	User Email	
Boone Zimmerlee (Boone)		
Shelby Knight (she/her)	sknight@coic.org	
Damian Syrnyk		
Dan Fishkin (Dan)		
Ciara Williams	cwilliams@coic.org	
Hayley Riach (she/her)		
Nathan Garibay	nathan.garibay@deschutes.org	
Boone Zimmerlee	boone.zimmerlee@deschutes.org	
Bill Boos		
Dan		

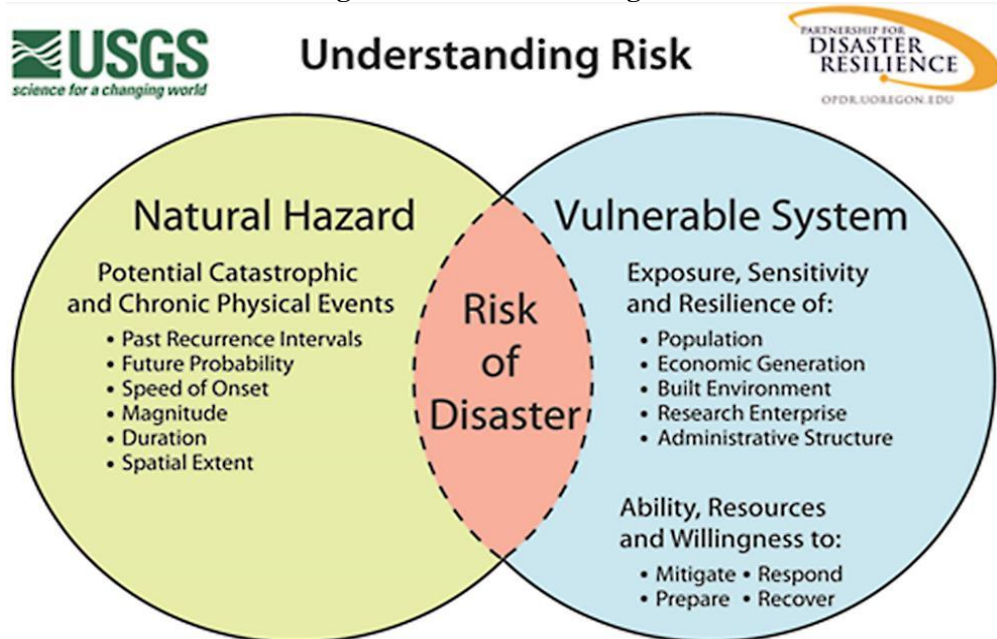
# APPENDIX C: COMMUNITY PROFILE

Community resilience can be defined as the community's ability to manage risk and adapt to natural hazard impacts. In order to help define and understand the County's sensitivity and resilience to natural hazards, the following capacities must be examined:

- **Natural Environment**
- **Social/ Demographic**
- **Economic**
- **Built Environment**
- **Community Connectivity**
- **Political**

The Community Profile describes the sensitivity and resilience to natural hazards of Deschutes County, and its incorporated cities, as they relate to each capacity. It provides a snapshot in time when the plan was developed and will assist in preparation for a more resilient county. The information in this section, along with the hazard assessments located in the Hazard Annex, should be used as the local level rationale for the risk reduction actions identified in Section 3 – Mitigation Strategy. The identification of actions that reduce the county's sensitivity and increase its resiliency assist in reducing overall risk of disaster, the area of overlap in the figure below.

Figure C-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience

# Natural Environment Capacity

Natural environment capacity is recognized as the geography, climate, and land cover of the area such as, urban, water and forested lands that maintain clean water, air and a stable climate.<sup>1</sup> Natural resources such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. However, natural systems are often impacted or depleted by human activities adversely affecting community resilience.

## Geography

Deschutes County is located in Central Oregon along the eastern side of the Cascades, and covers 3,055 square miles. The region is diverse and comprises high desert, mountain ranges, plateaus, river valleys, canyons, lava plains and partly forested mountains, with elevations ranging from 2,700 feet to 10,358 at the peak of South Sister. <sup>2</sup>

The county is located within several eco-regions: the Eastern Cascades Slopes and Foothills, the Cascades, Northern Basin and Range, and the Blue Mountains. The Deschutes River Valley lies in the northeast section of the county and covers the area of Bend, Redmond, and Sisters. La Pine is located within the Eastern Cascades Slopes and Foothills area in the southwest portion of the county. The Northern Basin and Range ecoregion in southeast Deschutes County consists of pluvial lake basins. In the Eastern Cascades Slopes and Foothills, located across the County, the eco-region includes ponderosa pine/ bitterbrush woodland, cold wet pumice plateau basin and pumice plateau forests. Lastly, the Cascades ecoregion in Deschutes County is located along the western border and in some southern areas in the County. The Cascades ecoregion geography includes Cascade Crest Montane Forests and Cascades Subalpine/alpine. <sup>3</sup>

## Deschutes River Basin

The Deschutes River Basin covers the majority of the County. Groundwater inflow on stream flows and volcanic activity influence the characteristics of upper Deschutes River Basin. Recent geology activity such as lava flows, pumice, and ash along with the glacial movement has reworked much of the area. It has allowed subsurface flows to travel in large quantities and at relatively rapid rates. This has resulted in a steady hydrologic flow with minimal fluctuations compared to rivers dominated by surface runoff.<sup>4</sup>

## Climate

Climate refers to the temperatures, weather patterns, and precipitation in the region. This section covers historic climate information. Estimated future climate conditions and possible impacts are also provided (for a more detailed analysis refer to the State Risk Assessment).

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<sup>1</sup> Mayunga, J. 2007. Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building.

<sup>2</sup> Monroe, William. Deschutes County Comprehensive Plan. Resource Element 1979.

<sup>3</sup> Loy, W. G., ed. 2001. Atlas of Oregon, 2nd Edition. Eugene, OR: University of Oregon Press

<sup>4</sup> Deschutes County/City of Bend River Study. April 1986

## Temperature

There is a large temperature range in Deschutes County. Deschutes' climate is typical of a high desert with cool nights and sunny days. Mean summer temperatures range from highs around 90 degrees Fahrenheit to lows around 40 degrees Fahrenheit. Mean winter temperatures range from highs around 50 degrees Fahrenheit to lows around 10 degrees Fahrenheit. The table below shows the mean annual rainfall ranges and temperatures for January and July for the various eco-regions of the county.

**Table C-1 Average Rainfall and Temperatures**

Ecoregion	Mean Annual Rainfall Range (inches)	Mean Temperature Range (°F) January min/max	Mean Temperature Range (°F) July min/max
<b>Cascades</b>			
Cascade Crest Montane Forest	55 to 100	21/35	43/72
Cascades Subalpine/ Alpine	75 to 140	36/48	52/68
<b>Eastern Cascades Slopes and Foothills</b>			
Ponderosa Pine/ Bitterbrush Woodland	16 to 35	20/40	40/82
Pumice Plateau	16 to 30	14/37	38/80
Pumice Plateau Basins	20 to 25	12/38	38/80
<b>Blue Mountains</b>			
Deschutes River Valley	8 to 12	22/41	46/84
<b>Northern Basin and Range</b>			
Pluvial Lake Basins	8 to 12	17/38	42/82
High Lava Plains	8 to 14	17/35	54/88

Source: US EPA. Ecoregions of Oregon: [http://www.epa.gov/wed/pages/ecoregions/or\\_eco.htm](http://www.epa.gov/wed/pages/ecoregions/or_eco.htm)

Temperatures in the Pacific Northwest region increased in the 20<sup>th</sup> Century by about 1.5 degrees Fahrenheit. Climate projection models indicate that temperatures could increasingly rise by an average of 0.2 degrees to 1.0 degrees Fahrenheit per decade. Average temperature change is projected to be 3.2 degrees Fahrenheit by 2040 and 5.3 degrees Fahrenheit by 2080. Temperature increases will occur throughout all seasons, with the greatest differences occurring in the summer months.<sup>5</sup>

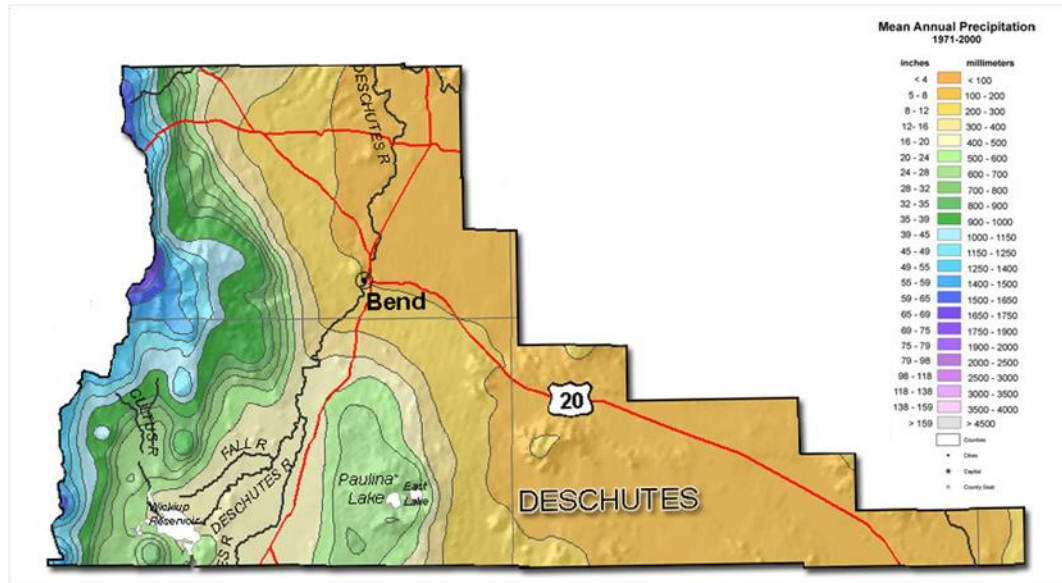
## Precipitation

The region receives relatively low levels of precipitation, approximately 8-35 inches per year (increased levels of precipitation occur in the mountains to the west of the populated areas of the county). This is in contrast to the 37 to 50 inches normally seen in other parts of the Pacific Northwest. There is large annual temperature variation with mean temperatures anywhere from the high fifties to seventies, and the maximum high temperature up to 102 degrees Fahrenheit from June to September, to average highs of low teens in the winter months. In most winters, there are frequent and severe winter storms characterized by temperature, wind

<sup>5</sup> Climate Impacts Group, "Climate Change," <http://cses.washington.edu/cig/pnwc/cc.shtml#anchor6>.

velocity, ground saturation, and snowpack. Winter storms can slow or halt traffic, damage power lines, and kill livestock. Summer precipitation is relatively low, increasing the risk of wildfire and requiring irrigation for crops.

**Figure C-2 Deschutes County Average Annual Precipitation**



Source: The Oregon Climate Service, NOAA Climate Stations. "1971-2000 Climate of Deschutes County".

Total precipitation in the Pacific Northwest region may remain similar to historic levels but climate projections indicate the likelihood of increased winter precipitation and decreased summer precipitation.<sup>6</sup>

Increasing temperatures affects hydrology in the region. Spring snowpack has substantially decreased throughout the Western part of the United States, particularly in areas with milder winter temperatures, such as the Cascade Mountains. In other areas of the West, such as east of the Cascades Mountains, snowfall is affected less by the increasing temperature because the temperatures are already cold and more by precipitation patterns.<sup>7</sup>

### Hazard Severity

Dynamic weather and diverse geography across Deschutes County are indicators of hazard vulnerability when combined with the changing climate and severe weather related events. Both wet and dry cycles are likely to last longer and be more extreme, leading to periods of deeper drought and more frequent flash flooding. Less precipitation in the summers and subsequently lower soil moisture with hotter temperatures will likely increase the amount of vegetation, such as rangeland and grasslands, consumed by wildfire.

<sup>6</sup> Ibid.

<sup>7</sup> Mote, Philip W., et. al., "Variability and trends in Mountain Snowpack in Western North America," <http://cses.washington.edu/db/pdf/moteetalvarandtrends436.pdf>



## **Synthesis**

The physical geography, weather, climate and land cover of an area represent various interrelated systems that affect overall risk and exposure to natural hazards. The projected climate change models representing Central Oregon indicate the potential for increased effects of hazards, particularly drought and wildfire due to the changing climate of the region. Central Oregon is projected to have warmer and drier summers with less precipitation. In addition, winter temperatures will be warmer, which means a decrease in mountain snowpack. These factors combined with periods of population growth and development intensification can lead to increasing risk of hazards, threatening loss of life, property and long-term economic disruption if land management is inadequate.

## Social/Demographic Capacity

Social/demographic capacity is a significant indicator of community hazard resilience. The characteristics and qualities of the community population such as language, race and ethnicity, age, income, educational attainment, and health are significant factors that can influence the community's ability to cope, adapt to and recover from natural disasters. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning. Deschutes County has a variety of residential community types: incorporated cities, unincorporated urban communities, rural communities, rural service centers, resort communities, and destination resorts.<sup>8</sup> Listed below are the residential communities by type:

### Incorporated Cities

Incorporated cities can levy taxes on residents and are required to provide services such as electricity, sewer, and water. The following list shows incorporated cities and their date of incorporation:

- Bend (1/19/1905)
- La Pine (12/11/2006)
- Redmond (7/16/1910)
- Sisters (4/9/1946)

### Urban Unincorporated Communities

Urban unincorporated communities have a minimum of 150 permanent residential dwellings, have three or more land use types, and are served by community sewer and water systems. Sunriver is the only unincorporated urban community in Deschutes County. The community is approximately 3,375 acres, was master planned in 1965, and has an estimated 1,733 permanent residents (during peak tourist seasons the population expands by approximately 12,000 residents). Additional information on Sunriver can be found in the Deschutes Comprehensive Plan Section 4.5.

### Rural Communities

Rural communities are primarily composed of residential land, but also have some employment land (commercial, industrial), and public land that serve the surrounding area. There are two rural communities in Deschutes County:

- Terrebonne – Located about six miles north of Redmond, this community was platted in 1909 and is the gateway to Smith Rock State Park, a premier rock climbing venue. The community has a population of about 1,658<sup>9</sup> in 2019. According to a 2009 vacant lands inventory, the community had 186 undeveloped lots.
- Tumalo–Located about three miles northwest of Bend the community was platted in 1904 and is a small farming community with most farms on fewer than five acres. The community has a population of about 535. According to a 2009 vacant lands inventory

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<sup>8</sup> Deschutes County, Oregon Adopted Budget Fiscal Year 2015.

<sup>9</sup> U.S. Census, American Community Survey 2019 5-Year Profile, Table DP05.

the community had 103 undeveloped lots. The community of Tumalo is bisected by the Deschutes River and includes land that is within the special flood hazard area.

## Resort Communities

Resort communities established for recreation or resort purposes predate the establishment of the destination resort designation. These communities primarily contain temporary residential units, and some permanent residences, and commercial and industrial services to support the community. Deschutes County has two resort communities:

- Black Butte Ranch-Founded in 1970 this community has 1,830 acres, with 1,252 lots for seasonal and permanent residents; in addition there are 82 acres of industrial uses that support the community.
- Inn of the Seventh Mountain/ Widgi Creek-Located about five miles southwest of Bend, this community was developed in the late 1960's with an expansion that occurred in 1983. The 260 acre community has 333 condominium units, 107 single family homes, a golf course, and commercial development primarily geared towards residents/ tourists. The community is completely surrounded by the Deschutes National Forest.

## Destination Resorts

Destination resort communities are self-contained developments that include developed recreational amenities in a natural setting. These communities were permitted under revised statewide planning laws in 1982. Under state law (ORS 197.455(2)), destination resorts are only allowed in areas designated on a county destination resort map. In 1992, the County supplemented the state's criteria by excluding large agricultural and forest parcels and resource lands within one mile of an Urban Growth Boundary (UGB). During periodic review, the mapping was done in a phased sequence, based on pending farm and forest studies. Additionally, as a result of a court case, lands within three miles of the county border were also excluded since most of the lands in Jefferson and Crook counties had not yet been evaluated.

Deschutes County has four destination resorts: Caldera Springs, Eagle Crest, Pronghorn, and Tetherow.

Notably, new destination resorts will no longer be eligible in Deschutes County when the City of Bend UGB reaches 100,000. Deschutes County Comprehensive Plan Policy 3.9.3(a)(1), which is consistent with ORS 197.455(1)(a) states:

To assure that resort development does not conflict with the objectives of other Statewide Planning Goals, destination resorts shall pursuant to Goal 8 not be sited in Deschutes County in the following areas:

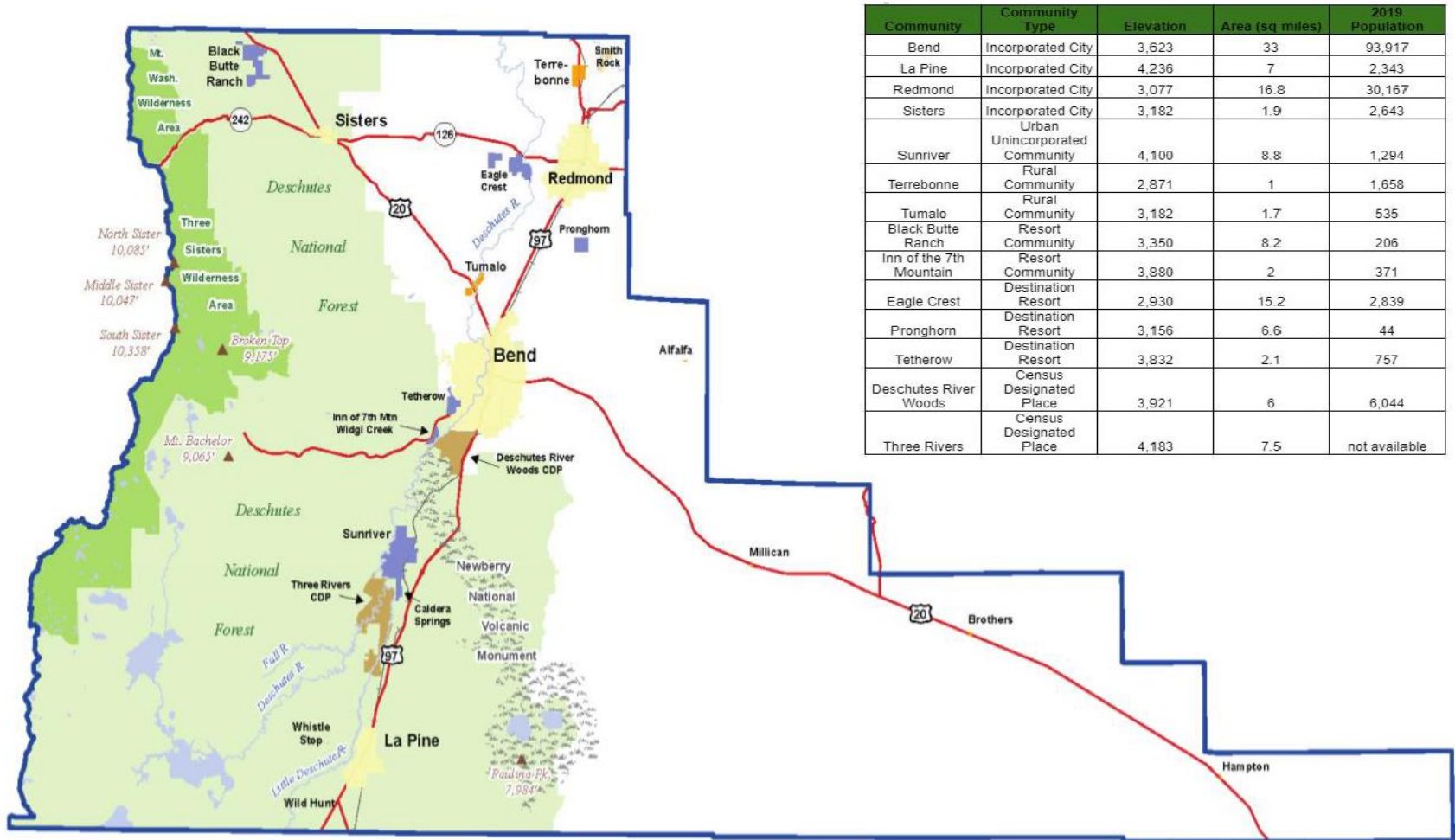
- Within 24 air miles of an Urban Growth Boundary with an existing population of 100,000 or more unless residential uses are limited to those necessary for the staff and management of the resort.

Portland State University's Population Research Center is an interdisciplinary public service, research, and training unit for population-related data and research for the State of Oregon. The 2020 forecast for the City of Bend, certified on December 15, was 92,840.

## Rural Service Centers

The comprehensive plan designates six areas as rural service centers (unincorporated communities that were developed prior to 1979 and recognized as exception areas from Goals 3 and 4): Alfalfa, Brothers, Hampton, Millican, Whistlestop, and Wildhunt.

Figure C-3 Deschutes County Map



Source: Deschutes County Fiscal Year 2021 Adopted Budget (map); U.S. Census American Community Survey 5-Year Estimates, 2019 (population data).

## Population

The majority of people across Deschutes County reside in Bend or within the unincorporated areas of the county. Between 2010 and 2019, Deschutes County experienced a 22.4% increase in population.<sup>10</sup> The Portland State University Population Research Center projects that by 2035 Deschutes County’s population will increase to 266,840 people, a 34% increase.<sup>11</sup>

Bend is by far the most populated city in the county, followed by Redmond; Sisters and La Pine are significantly smaller communities. The table below shows that population growth between 2000 and 2010 occurred in all areas of the county. However, growth in the unincorporated county was slower than in the cities. . The Coordinated Population Forecast projects that La Pine and Sisters will be the fastest growing communities between 2018 and 2043 and Bend will have the largest growth in population, with the unincorporated county growing, but at a slower rate than the cities. The unincorporated county growth rate slows notably in the more distant future (2043-2068).

**Table C-2 Historical Population, Population Forecast, and Average Annual Growth Rate for Deschutes County Cities**

	Historical			Forecast					
	2000	2010	AAGR (2000-2010)	2018	2043	2068	AAGR (2010-2018)	Percent Change	Percent Change
Deschutes County	115,367	157,733	3.2%	187,621	301,999	432,930	2.1%	1.9%	0.7%
Bend	52,163	77,010	4.0%	91,373	162,362	255,291	2.1%	2.3%	1.8%
La Pine	899	1,653	6.3%	1,833	3,594	5,894	1.3%	2.7%	2.0%
Redmond	15,524	26,508	5.5%	29,364	51,625	82,575	1.2%	2.3%	1.9%
Sisters	961	2,038	7.8%	2,691	5,169	8,431	3.4%	2.6%	2.0%
Outside UGBs	45,820	50,524	1.0%	62,360	79,249	80,739	2.6%	1.0%	0.1%

Source: Portland State University, Population Research Center, Deschutes County Coordinated Population Forecast 2018-2068.

Urban and rural growth patterns can impact how agencies, cities and counties prepare for emergencies, because changes in development can increase risk associated with hazards. The table below shows urbanization trends in Deschutes County. Deschutes County is becoming more urban, as growth in the unincorporated county slows.

<sup>10</sup> Portland State University Population Research Center, 2019 Annual Oregon Population Report Tables.

<sup>11</sup> Portland State University Population Research Center, Deschutes County Final Forecast Tables, accessed January 2021.

**Table C-3 Urban and Rural Populations, Larger Sub-Areas 2018-2068**

	2018	2043	2068	AAGR (2018-2043)	AAGR (2043-2068)	Share of County 2018	Share of County 2043	Share of County 2068
<i>Deschutes County</i>	187,621	301,999	432,930	1.9%	1.5%	-	-	-
Bend	91,373	162,362	255,291	2.3%	1.8%	48.7%	53.8%	59.0%
Redmond	29,364	51,625	82,575	2.3%	1.9%	15.7%	17.1%	19.1%
Outside UGBs	62,360	79,248	80,739	1.0%	0.1%	33.2%	26.2%	18.6%

**Table C-3B Urban and Rural Populations, Smaller Sub-Areas 2018-2068**

	2018	2043	2068	AAGR (2018-2043)	AAGR (2043-2068)	Share of County 2018	Share of County 2043	Share of County 2068
<i>Deschutes County</i>	187,621	301,999	432,930	1.9%	1.5%	-	-	-
La Pine	1,833	3,594	5,894	2.7%	2.0%	1.0%	1.2%	1.4%
Sisters	2,691	5,169	8,431	2.6%	2.0%	1.4%	1.7%	1.9%
Outside UGBs	62,360	79,248	80,739	1.0%	0.1%	33.2%	26.2%	18.6%

Source: Portland State University, Population Research Center, Deschutes County Coordinated Population Forecast 2018-2068.

Population size itself is not an indicator of vulnerability. More important is the location, composition, and capacity of the population within the community. Research by social scientists demonstrates that human capital indices such as language, race, age, income, education and health can affect the integrity of a community. Therefore, these human capitals can impact community resilience to natural hazards. As an example, Deschutes County’s trend towards urbanization suggests that the population may be becoming less self-reliant and more reliant on external goods and services.

## Tourists

Tourists are not counted in population statistics; and are therefore considered separately in this analysis. According to surveys conducted by Visit Bend, tourism activities in Deschutes County are largely centered on outdoor activities, touring, and special events, with the majority of trips occurring during the late spring and throughout the summer.<sup>12</sup> Visit Bend also noted the increasing popularity of “alternative lodging”— that is, condos, townhouses, houses, and vacation rentals such as Airbnb. For hazard preparedness and mitigation purposes, outreach to residents in Deschutes County will likely be transferred to these visitors in some capacity. Visitors staying at hotels/motels are less likely to benefit from local preparedness outreach efforts aimed at residents.

Tourists are specifically vulnerable due to the difficulty of locating or accounting for travelers within the region. Tourists are often at greater risk during a natural disaster because of unfamiliarity with evacuation routes, communication outlets, or even the type of hazard that may occur. Knowing whether the region’s visitors are staying in friends/relatives homes in hotels/motels, or elsewhere can be instructive when developing outreach efforts.<sup>13</sup>

<sup>12</sup> <https://www.visitbend.com/wp-content/uploads/2018/03/Visit-Bend-Summer-2017-Final-Report.pdf>

<sup>13</sup> MDC Consultants (n.d.). When Disaster Strikes – Promising Practices. Retrieved March 18, 2014, from <http://www.mdcinc.org/sites/default/files/resources/When%20Disaster%20Strikes%20-%20Promising%20Practices%20-%20Tourists.pdf>

## Language

Special consideration should be given to populations who do not speak English as their primary language. Language barriers can be a challenge when disseminating hazard planning and mitigation resources to the general public, and it is less likely they will be prepared if special attention is not given to language and culturally appropriate outreach techniques.<sup>14</sup>

There are various languages spoken across Deschutes County; the primary language is English. Overall, 1.6% of the total population in Deschutes County is not proficient in English. The table below shows that while the county as a whole has a better English proficiency level than the state. Sisters and La Pine have the highest percentage of residents who do not speak English “very well”. Outreach materials used to communicate with, plan for, and respond to non-English speaking populations, and those who do not speak English very well, should take into consideration the language needs of these populations.

**Table C-4 Deschutes County Language Barriers**

	Speak English less than "very well"	
	Estimate	Percent
Oregon	204,308	5.10%
Deschutes	3,116	1.60%
Bend	1,677	1.90%
La Pine	107	4.90%
Redmond	1,152	4.10%
Sisters	123	4.90%

Source: U.S. Census Bureau 2019. 2019 American Community Survey 5-Year Estimates. Table DP02

## Race

The impact in terms of loss and the ability to recover may also vary among minority population groups following a disaster. Studies have shown that racial and ethnic minorities can be more vulnerable to natural disaster events. This is not reflective of individual characteristics; instead, historic patterns of inequality along racial or ethnic divides have often resulted in minority communities that are more likely to have inferior building stock, degraded infrastructure, or less access to public services. The table below describes Deschutes County’s population by race and ethnicity.

The majority of the population in Deschutes County is racially white (92.1%). Approximately 8% of the population is ethnically Hispanic or Latino. It is important to identify specific ways to support all portions of the community through hazard mitigation, preparedness, and response. Culturally appropriate, and effective outreach can include both methods and messaging targeted to diverse audiences. For example, connecting to historically disenfranchised populations through already trusted sources or providing preparedness handouts and presentations in the languages spoken by the population will go a long way to increasing overall community resilience.

<sup>14</sup> State of Oregon Natural Hazards Mitigation Plan, Region 6 Regional Profile.



**Table C-5 Deschutes Race and Hispanic or Latino Origin**

Race	Deschutes	Bend	La Pine	Redmond	Sisters
Total Population	186,251	93,917	2,343	30,167	2,643
One Race	97.4%	97.0%	98.2%	96.3%	94.4%
White	92.1%	93.2%	93.5%	89.7%	91.4%
Black or African American	0.7%	0.6%	0.0%	1.4%	0.0%
American Indian and Alaska Native	1.4%	0.6%	1.6%	0.9%	1.1%
Asian	1.4%	1.1%	0.0%	0.5%	0.2%
Native Hawaiian and Other Pacific Islander	0.2%	0.2%	2.6%	0.5%	0.0%
Some Other Race	1.6%	1.3%	0.4%	3.4%	1.7%
Two or More Races	2.6%	3.0%	1.8%	3.7%	5.6%
Hispanic or Latino (of any race)	8.3%	8.00%	8.40%	12.30%	14.20%
Not Hispanic or Latino	91.70%	92.00%	91.60%	87.70%	85.80%

Source: U.S. Census Bureau, 2019 American Community Survey, Table DP05.

## Age

Of the factors influencing socio demographic capacity, the most significant indicator in Deschutes County may be age of the population. As depicted in the table below, as of 2019, 19.6% of the county population is over the age of 64, a percentage that is projected to rise to 23.3% by 2035. The Deschutes County age dependency ratio<sup>15</sup> is 57.1, which is higher than the State of Oregon, 55.4; La Pine has the highest ratio for the cities at 64.8. The age dependency ratio indicates a higher percentage of dependent aged people to that of working age; this trend is projected to continue as the county population ages.

**Table C-6 Deschutes Population by Vulnerable Age Groups**

2019	Total	< 15 Years		>64 Years		15-64	Age Dependency Ratio
		Number	Percent	Number	Percent		
Oregon	4,266,186	721,886	16.90%	799,114	18.70%	2,745,186	55.4
Deschutes	186,251	31,269	16.80%	36,450	19.60%	118,532	57.1
Bend	93,917	17,287	18.40%	15,660	16.70%	60,970	54
La Pine	2343	317	13.50%	604	25.80%	1422	64.8
Redmond	30,167	5751	19.00%	4776	15.80%	19,640	53.6
Sisters	2643	427	16.20%	476	18.00%	1740	51.9
2035							
Oregon	4,925,420	726625	14.80%	1107124	22.50%	3091670	59.3
Deschutes	266840	40261	15.10%	62221	23.30%	164356	62.4

Source: U.S. Census Bureau, American Community Survey 2019 5-Year Estimates Table S0101; Portland State University Population Research Center, Population Forecasts. Deschutes County Final Forecast Tables. Accessed January 2021.

The age profile of an area has a direct impact both on what actions are prioritized for mitigation and how response to hazard incidents is carried out. School age children rarely make decisions about emergency management. Therefore, a larger youth population in an area will increase the importance of outreach to schools and parents on effective ways to teach children about fire safety, earthquake response, and evacuation plans. Furthermore, children are more vulnerable to the heat and cold, have few transportation options and require assistance to access medical

<sup>15</sup> The age dependency ratio is derived by dividing the combined under 15 and 65-and-over populations by the 15-to-64 population and multiplying by 100. A number close to 50 indicates about twice as many people are of working age than non-working age. A number that is closer to 100 implies an equal number of working age population as non-working age population. A higher number indicates greater sensitivity.

facilities.<sup>16</sup> Older populations may also have special needs prior to, during and after a natural disaster. Older populations may require assistance in evacuation due to limited mobility or health issues. Additionally, older populations may require special medical equipment or medications, and can lack the social and economic resources needed for post-disaster recovery.<sup>17</sup>

## Gender

The concepts of sex and gender are often used interchangeably but are distinct; sex is based on biological attributes (chromosomes, anatomy, hormones) and gender is a social construction that may differ across time, cultures, and among people within a culture (U.S. Census Bureau, 2019, Apr. 3). Moreover, the two may or may not correspond (U.S. Census Bureau, 2019, Apr. 3).<sup>18</sup> Deschutes County has slightly more females than males (Male: 49.7%, Female 50.3%), which is a similar ratio to that of the state.<sup>19</sup> It is important to recognize that women tend to have more institutionalized obstacles than men during recovery due to sector-specific employment, lower wages, and family care responsibilities.<sup>20</sup>

## Household Composition

Those living alone have the potential to be more vulnerable to natural hazards for a variety of reasons, including physical and social isolation, particularly for those who are older. While Deschutes County has a lower percentage of those over 64 living alone, almost one-fifth of households in La Pine are composed of those over 64 living alone.

**Table C-7 Households and Householders Living Alone**

	Total Households	Householder Living Alone - Percent of Total Households	
		Any Age	>64
Oregon	1,649,352	28.10%	11.7%
Deschutes	76,528	25.40%	9.7%
Bend	39,371	28.50%	9.8%
La Pine	944	27.60%	19.2%
Redmond	11,369	25.40%	9.0%
Sisters	1,038	26.50%	14.0%

Source: U.S. Census Bureau, 2019 American Community Survey 5-Year Estimates, Table S1101

## Income

Household income and poverty status are indicators of sociodemographic capacity and the stability of the local economy. Household income can be used to compare economic areas as a whole, but does not reflect how the income is divided among the area residents. The 2019

<sup>16</sup> 2020 State of Oregon Natural Hazards Mitigation Plan, Region 6 Central Oregon Regional Profile.

<sup>17</sup> Wood, Nathan. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon. U.S. Geological Survey, Reston, VA, 2007.

<sup>18</sup> 2020 Oregon Natural Hazards Mitigation Plan

<sup>19</sup> U.S. Census Bureau. American Community Survey 2019 1-Year Estimates Data Profiles.

<sup>20</sup> Ibid.

median household income across Deschutes County is \$67043; this is higher than the State of Oregon median income of \$62818.

**Table C-8 Median Household Income**

2019	
Oregon	\$62,818
Deschutes	\$67,043
Bend	\$65,662
La Pine	\$37,991
Redmond	\$65,088
Sisters	\$60,318

Source: U.S. Census Bureau, 2019 American Community Survey 5-Year Estimates, Table DP03.

The table below identifies the percentage of individuals and children under 18 that are below the poverty level in 2019. It is estimated that 13.1% of individuals and 18.3% of children under 18 live below the poverty level across the county. Poverty rates in Deschutes County are lower than that of Oregon State. La Pine and Redmond have rates that are slightly higher than the county rates for the same two categories.

**Table C-9 Poverty Rates**

	Population in Poverty		Under-18 Population in Poverty	
	Number	Percent	Number	Percent
Oregon	470,643	11.4%	110,323	13.10%
Deschutes	19,054	9.7%	4,879	12.90%
Bend	10,214	10.2%	2,233	10.70%
La Pine	389	16.8%	93	22.70%
Redmond	3,623	12.1%	1,228	18.50%
Sisters	310	11.7%	48	8.30%

Source: U.S. Census Bureau, 2019 American Community Survey, Table S1701.

Cutter’s research suggests that lack of wealth contributes to social vulnerability because individual and community resources are not as readily available. Affluent communities are more likely to have both the collective and individual capacity to more quickly rebound from a hazard event, while impoverished communities and individuals may not have this capacity –leading to increased vulnerability. Wealth can help those affected by hazard incidents to absorb the impacts of a disaster more easily. Conversely, poverty, at both an individual and community level, can drastically alter recovery time and quality.<sup>21</sup>

Federal assistance programs such as food stamps are another indicator of poverty or lack of resource access. Statewide social assistance programs like the Supplemental Nutritional Assistance Program (SNAP) and Temporary Assistance for Needy Families (TANF) provide assistance to individuals and families. In Deschutes County, approximately 6100 households had

<sup>21</sup> Cutter, S. L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*.

received SNAP in 2019, which is 8 percent of the population.<sup>22</sup> Those reliant on federal assistance are more vulnerable in the wake of disaster because of a lack of personal financial resources and reliance on government support.

## Education

Educational attainment of community residents is also identified as an influencing factor in socio-demographic capacity. Educational attainment often reflects higher income and therefore higher self-reliance. Widespread educational attainment is also beneficial for the regional economy and employment sectors as there are potential employees for professional, service and manual labor workforces. An oversaturation of either highly educated residents or low educational attainment can have negative effects on the resiliency of the community.

According to the U.S. Census, 93.7% of the Deschutes County population over 25 years of age has graduated from high school or received a high school equivalency, with approximately 35% going on to earn a Bachelor’s Degree. La Pine has the lowest rate of high school graduates. Bend and Sisters have the highest percentages of their populations with a Bachelor’s degree or higher. Conversely, La Pine and Redmond have significantly lower percentages of their populations that have Bachelor’s degrees or higher.

**Table C-10 Educational Attainment 2019**

	Oregon	County	Bend	La Pine	Redmond	Sisters
<b>Population 25 Years and Older</b>						
Less than 9th grade	3.30%	2.20%	2.00%	5.00%	2.70%	1.60%
9th to 12th grade, no diploma	5.40%	4.50%	3.20%	9.40%	9.80%	6.70%
High school graduate or GED	23.00%	18.90%	16.20%	34.50%	27.50%	16.50%
Some college, no degree	24.80%	24.40%	21.20%	24.50%	29.30%	24.00%
Associate's degree	9.00%	11.10%	11.40%	12.40%	12.10%	16.90%
Bachelor's degree	21.00%	23.60%	27.60%	8.90%	13.00%	23.00%
Graduate or professional degree	13.50%	15.10%	18.40%	5.30%	5.60%	11.20%

Source: U.S. Census Bureau, 2019 American Community Survey, Table DP02.

## Health

Individual and community health play an integral role in community resiliency, as indicators such as health insurance, people with disabilities, dependencies, homelessness and crime rate paint an overall picture of a community’s well-being. These factors translate to a community’s ability to prepare, respond to, and cope with the impacts of a disaster.

The Resilience Capacity Index recognizes those who lack health insurance or are impaired with sensory, mental or physical disabilities, have higher vulnerability to hazards and will likely require additional community support and resources. The percentage of the population in Deschutes County without health insurance is similar to that of the State. The percentage of uninsured changes with age, the highest rates of uninsured are within the 18 to 64 year category; La Pine has the highest rate of this age group that is uninsured. Overall the county has a lower percentage of people under age 18 that are uninsured than Oregon; Redmond and

<sup>22</sup> U.S. Census, American Community Survey, 2019 5-Year Estimates, Table S2201.

Sisters have the highest rate of this age group that is uninsured. The ability to provide services to the uninsured populations may burden local providers following a natural disaster.

**Table C-11 Health Insurance Coverage**

Jurisdiction	Total Population	Population without Health Insurance			
		Total Population	Under 18	18-64	65+
Oregon	4,266,186	7.20%	4.10%	10.30%	0.60%
Deschutes	186,251	7.00%	2.50%	11.00%	0.00%
Bend	93,917	9.00%	3.70%	13.10%	0.00%
La Pine	2343	14.70%	0.00%	25.00%	2.20%
Redmond	30,167	7.70%	6.40%	10.10%	0.40%
Sisters	2643	10.10%	10.90%	12.80%	0.00%

Source: U.S. Census Bureau, 2019 American Community Survey 5-Year Estimates, Table S2701.

The table below describes disability status of the population. As of 2012, 12.6% of the Deschutes County population, 23,296 people, identifies with one or more disabilities; this rate is below the State percentage. La Pine has the highest percentage of its total population with a disability (21.0%) and also the highest percentage of individuals 65 years and over with a disability (45%). The county’s percentage of individuals under 18 years with a disability (3.9%) is lower than the state percentage.

**Table C-12 Deschutes County Disability Status**

	Total Population	Total Population with a Disability	Under 18 Population with a Disability	65+ Population with a Disability
Oregon	4,266,186	14.40%	4.60%	35.70%
Deschutes	186,251	12.60%	3.90%	29.50%
Bend	93,917	10.40%	2.90%	28.40%
La Pine	2343	21.00%	2.20%	45.00%
Redmond	30,167	13.70%	7.20%	34.70%
Sisters	2643	12.20%	0.90%	22.70%

Source: U.S. Census Bureau, 2008-2012 American Community Survey, Table DP02.

According to a point-in-time (PIT) study of homelessness conducted by Oregon Housing and Community Services (OHCS) in 2019, there are 700 homeless individuals identified in the county, 109 of them children.<sup>23</sup> The homeless have few resources to rely on, especially during an emergency. It will likely be the responsibility of the county and local non-profit entities to provide services such as shelter, food and medical assistance. Therefore, it is critical to foster collaborative relationships with agencies that will provide additional relief such as the American Red Cross and homeless shelters. It will also be important to identify how to communicate with

<sup>23</sup> Oregon Housing and Community Services, “2019 Point in Time Homeless Count”.  
<https://public.tableau.com/profile/oregon.housing.and.community.services#!/vizhome/2019Point-in-TimeDashboard/Story1>

these populations, since traditional means of communication may not be appropriate or available.

## **Synthesis**

For planning purposes, it is essential Deschutes County consider both immediate and long-term socio-demographic implications of hazard resilience. Immediate concerns include the growing elderly population and language barriers associated with a culturally diverse community. Even though the vast majority of the population is reported as proficient in English, there is still a small amount of the population not proficient in English. These populations would serve to benefit from mitigation outreach, with special attention to cultural, visual and technology sensitive materials. The current status of other Social/-demographic capacity indicators such as graduation rate, quality of schools, high violent crime rate, and poverty level higher and median household income lower than the State can have long-term impacts on the economy and stability of the community ultimately affecting future resilience.

## Economic Capacity

Economic capacity refers to the financial resources present and revenue generated in the community to achieve a higher quality of life. Income equality, housing affordability, economic diversification, employment and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. Once any inherent strengths or systematic vulnerabilities become apparent, both the public and private sectors can take action to increase the resilience of the local economy.

## Regional Affordability

The evaluation of regional affordability supplements the identification of Social/demographic capacity indicators, i.e. median income, and is a critical analysis tool to understanding the economic status of a community. This information can capture the likelihood of individuals' ability to prepare for hazards, through retrofitting homes or purchasing insurance. If the community reflects high-income inequality or housing cost burden, the potential for homeowners and renters to implement mitigation can be drastically reduced. Therefore, regional affordability is a mechanism for generalizing the abilities of community residents to get back on their feet without Federal, State or local assistance.

### Income Equality

Income equality is a measure of the distribution of economic resources, as measured by income, across a population. It is a statistic defining the degree to which all persons have a similar income. The table below illustrates the county and cities level of income inequality. The Gini index is a measure of income inequality. The index varies from zero to one. A value of one indicates perfect inequality (only one household has any income). A value of zero indicates perfect equality (all households have the same income).<sup>24</sup>

Deschutes County's income distribution is approximately reflective of the State as a whole. The cities within the county vary slightly with the greatest income equality within the city of Redmond. Based on social science research, the region's cohesive response to a hazard event may be affected by the distribution of wealth in communities that have less income equality.<sup>25</sup>

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<sup>24</sup>University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. <http://brr.berkeley.edu/rci/>.

<sup>25</sup>Susan Cutter, Christopher G. Burton, and Christopher T. Emrich. 2010. "Disaster Resilience Indicators for Benchmarking Baseline Conditions," *Journal of Homeland Security and Emergency Management* 7, no.1: 1-22

**Table C-13 Regional Income Equality**

Jurisdiction	Income Inequality Coefficient
Oregon	0.450
Deschutes	0.439
Bend	0.452
La Pine	0.466
Redmond	0.371
Sisters	0.448

Source: U.S. Census Bureau, 2019 American Community Survey, Table B19083.

Housing affordability is a measure of economic security gauged by the percentage of an area’s households paying less than 35% of their income on housing.<sup>26</sup> Households spending more than 35% are considered housing cost burdened. The table below displays the percentage of homeowners and renters reflecting housing cost burden across the region.

In comparison to the State, Deschutes County has a greater percentage of homeowners with a mortgage spending more than 35% of their income on housing. Among homeowners without a mortgage, Sisters has the greatest rate of households with housing cost burdens. Amongst homeowners with a mortgage, Sisters and Redmond have the highest rates of housing cost burden. Among renters, La Pine, Bend, and Sisters residents have the greatest rates of households with housing cost burdens. In general, the population that spends more of their income on housing has proportionally fewer resources and less flexibility for alternative investments in times of crisis.<sup>27</sup> This disparity imposes challenges for a community recovering from a disaster as housing costs may exceed the ability of local residents to repair or move to a new location. These populations may live paycheck to paycheck and are extremely dependent on their employer, in the event their employer is also impacted it will further the detriment experienced by these individuals and families.

**Table C-14 Households Spending > 35% of Income on Housing**

Jurisdiction	Owners		Renters
	With Mortgage	Without Mortgage	
Oregon	22.70%	11.50%	41.70%
Deschutes	26%	10.0%	41.70%
Bend	25%	9.7%	42.30%
La Pine	20%	10.4%	43.50%
Redmond	26%	9.3%	39.50%
Sisters	33%	11.6%	46.00%

Source: U.S. Census Bureau, 2019 American Community Survey, Table DP04.

## Economic Diversity

Economic diversity is a general indicator of an area’s fitness for weathering difficult financial times. One method for measuring economic diversity is through use of the Hachman Index, a

<sup>26</sup> University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. <http://brr.berkeley.edu/rci/>.

<sup>27</sup> Ibid.



formula that compares the composition of county and regional economies with those of states or the nation as a whole. Using the Hachman Index, a diversity ranking of 1 indicates the Oregon County with the most diverse economic activity compared to the state as a whole, while a ranking of 36 corresponds with the least diverse county economy. Deschutes County ranked 4<sup>th</sup> out of the 36 counties in the state overall. The table below describes the Hachman Index Scores for counties in the region.

**Table C-15 Regional Hachman Index Scores**

County	2019 Index Value
Crook County	0.378
Jefferson County	0.142
Deschutes County	0.789
Klamath County	0.555
Lake County	0.062
Wheeler County	0.109

Source: Oregon Employment Department

While illustrative, economic diversity is not a guarantor of economic vitality or resilience. A measure of “economic distress” is based on indicators of decreasing new jobs, average wages and income, and is associated with an increase of unemployment.<sup>28</sup> In the previous issue of this NHMP, Deschutes County was listed as “economically distressed” by the Oregon Business Development Commission; however, as of the latest analysis at the end of 2020, Deschutes County is no longer considered economically distressed.

## Employment and Wages

According to the Oregon Employment Department, unemployment has declined since 2016, until the COVID-19 pandemic drastically impacted businesses and jobs nationwide.

**Table C-16 Unemployment Rates in Region 6 (Seasonally Adjusted)**

	2016	2017	2018	2019	2020
Oregon	4.80%	4.10%	4.10%	3.70%	8.00%
Crook	6.90%	6.30%	5.90%	5.30%	9.70%
Jefferson	6.60%	5.60%	5.40%	5.10%	8.90%
Deschutes	4.90%	4.20%	4.10%	3.90%	8.60%
Klamath	6.80%	5.90%	6.20%	6.20%	9.20%
Lake	6.40%	5.70%	5.50%	5.40%	5.90%
Wheeler	4.20%	4.00%	3.30%	4.30%	4.40%

Source: Oregon Employment Department, “Local Area Employment Statistics”.  
<http://www.qualityinfo.org/olmisj/labforce>. Accessed January 2021.

<sup>28</sup> Business Oregon – Oregon Economic Data “Distressed Communities List”,  
<http://www.oregon4biz.com/Publications/Distressed-List/>

The table below displays the average annual wage for Deschutes County and the region. As of 2019, the average wage was \$47,595 in Deschutes County, which is the highest in the region.

**Table C-17 Regional Average Pay**

	Average Pay 2019
Crook County	\$46,356
Deschutes County	\$47,595
Jefferson County	\$40,436
Klamath County	\$40,136
Lake County	\$40,468
Wheeler County	\$31,038

Source: Oregon Employment Department, 2019 Wages Summary Report".  
<http://www.qualityinfo.org/olmisj/labforce>. Accessed January 2021.

In 2018, there were 7,564 employment establishments in Deschutes County of which about 6,788, or 90%, had fewer than 20 employees.<sup>29</sup> The prevalence of small businesses in Deschutes County is an indication of sensitivity to natural hazards because small businesses are more susceptible to financial uncertainty. If a business is financially unstable before a natural disaster occurs, financial losses (resulting from both damage caused and the recovery process) may have a bigger impact than they would for larger and more financially stable businesses.

## Industry

### Major Regional Industry

Key industries are those that represent major employers and are significant revenue generators. Different industries face distinct vulnerabilities to natural hazards, as illustrated by the industry specific discussions below. Identifying key industries in the region enables communities to target mitigation activities towards those industries' specific sensitivities. It is important to recognize that the impact that a natural hazard event has on one industry can reverberate throughout the regional economy.

This is of specific concern when the businesses belong to the basic sector industry. Basic sector industries are those that are dependent on sales outside of the local community; they bring money into a local community via employment. The farm and ranch, information, and wholesale trade industries are all examples of basic industries. Non-basic sector industries are those that

<sup>29</sup> U.S. Census Bureau, 2018 County Business Patterns (NAICS). Table CBP2018.

are dependent on local sales for their business, such as retail trade, construction, and health services.

## Employment by Industry

Economic resilience to natural disasters is particularly important for the major employment industries in the region. If these industries are negatively impacted by a natural hazard, such that employment is affected, the impact will be felt throughout the regional economy. Thus, understanding and addressing the sensitivities of these industries is a strategic way to increase the resiliency of the entire regional economy.

The table below identifies Employment by industry. The top three industry sectors in Deschutes County with the most employees, as of 2019, are Trade, Transportation & Utilities, Education & Health Services), and Leisure & Hospitality. Trending towards basic industries such as these can lead to higher community resilience. The sectors of highest projected growth within Deschutes County are Education & Health Services, Construction, and Information.

**Table C-18 Total Employment by Industry 2019, Expected Growth 2022**

	Firms (County)	Employees (County)	Percent of Workforce	Average Pay	Employment Forecast 2019-2029 (Region)
<b>Total Payroll Employment</b>	<b>9104</b>	<b>85372</b>	<b>100.00%</b>	<b>\$47,595</b>	<b>10%</b>
<b>Total Private</b>	<b>8874</b>	<b>75996</b>	<b>89.00%</b>	<b>\$46,568</b>	<b>10%</b>
<b>Natural Resources and Mining</b>	<b>124</b>	<b>818</b>	<b>1.00%</b>	<b>\$42,116</b>	<b>8%</b>
<b>Construction</b>	<b>1264</b>	<b>6765</b>	<b>7.90%</b>	<b>\$55,068</b>	<b>18%</b>
<b>Manufacturing</b>	<b>381</b>	<b>5655</b>	<b>6.60%</b>	<b>\$51,602</b>	<b>6%</b>
<b>Trade, Transportation &amp; Utilities</b>	<b>1457</b>	<b>16041</b>	<b>18.80%</b>	<b>\$40,544</b>	<b>6%</b>
<b>Information</b>	<b>276</b>	<b>1790</b>	<b>2.10%</b>	<b>\$79,191</b>	<b>15%</b>
<b>Financial Activities</b>	<b>883</b>	<b>3396</b>	<b>4.00%</b>	<b>\$62,434</b>	<b>3%</b>
<b>Professional and Business Services</b>	<b>1666</b>	<b>10266</b>	<b>12.00%</b>	<b>\$55,893</b>	<b>12%</b>
<b>Education and Health Services</b>	<b>918</b>	<b>14155</b>	<b>16.60%</b>	<b>\$57,935</b>	<b>18%</b>
<b>Leisure and Hospitality</b>	<b>743</b>	<b>13560</b>	<b>15.90%</b>	<b>\$23,677</b>	<b>7%</b>
<b>Other Services</b>	<b>1067</b>	<b>3484</b>	<b>4.10%</b>	<b>\$33,516</b>	<b>11%</b>
<b>Government</b>	<b>229</b>	<b>9376</b>	<b>11.00%</b>	<b>\$55,917</b>	<b>7%</b>
<b>Federal</b>	<b>34</b>	<b>967</b>	<b>1.10%</b>	<b>\$70,855</b>	<b>-3%</b>
<b>State</b>	<b>39</b>	<b>904</b>	<b>1.10%</b>	<b>\$64,656</b>	<b>13%</b>
<b>Local</b>	<b>157</b>	<b>7504</b>	<b>8.80%</b>	<b>\$52,947</b>	<b>8%</b>

Source: Oregon Employment Department, "2019 Covered Employment and Wages Summary Reports" and "East Cascades Industry Employment Projections, 2019-2029". <http://www.qualityinfo.org>. Accessed January 2021.

## High Revenue Sectors

In 2007, the three sectors with the highest revenue were Health Care & Social Assistance, Retail Trade, and Manufacturing. The table below shows the revenue generated by each economic

sector (Note: not all sectors are reported, i.e., Professional, Scientific & Technical Services). All of the sectors combined generated almost \$1,256,184 billion in revenue for the County.

Deschutes County relies on both basic and non-basic sector industries and it is important to consider the effects each may have on the economy following a disaster. Basic sector businesses have a multiplier effect on a local economy that can spur the creation of new jobs, some of which may be non-basic. The presence of basic sector jobs can help speed the local recovery; however, if basic sector production is hampered by a natural hazard event, the multiplier effect could be experienced in reverse. In this case, a decrease in basic sector purchasing power results in lower profits and potential job losses for the non-basic businesses that are dependent on them.<sup>30</sup>

## **Future Employment in Industry**

Sectors that are anticipated to be major employers in the future also warrant special attention in the hazard mitigation planning process. Between 2019 and 2029, the largest employment growth is anticipated within Construction (18%) and Private Educational and Health Services (18%).<sup>31</sup> Information is expected to increase by 15% while Profession and Business Services is expected to increase by 12%.

## **Synthesis**

The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery. Because the Health and Social Assistance industry as well as the Government sector are key to post-disaster recovery efforts, the region is bolstered by its major employment sectors. The county is expected to grow at a high rate over the next 10 years with much of the growth within the healthcare and construction industries.<sup>32</sup> It is important to consider what might happen to the county economy if the largest revenue generators and employers are impacted by a disaster.

## **Built Environment Capacity**

Built Environment capacity refers to the built environment and infrastructure that supports the community. The various forms, quantity, and quality of built capital mentioned above contribute significantly to community resilience. Physical infrastructures, including utility and transportation lifelines, are critical during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may

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<sup>30</sup> State of Oregon Natural Hazards Mitigation Plan, Region 6 Central Oregon Regional Profile.

<sup>31</sup> Oregon Employment Department, "East Cascades Industry Employment Projections, 2019-2029", <http://qualityinfo.org/>, accessed January 2021.

<sup>32</sup> State of Oregon Natural Hazards Mitigation Plan, Region 6 Central Oregon Regional Profile

experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

## Land Use and Development Patterns

The majority of the county has a low population density. Sixty-six percent of the population resides in the four incorporated cities. Three of the incorporated cities are located in the northern half of the county and one is located in the southern half. The majority of land (about 80% of 1,529,522 acres) in Deschutes County is publicly owned (76.6% Federal Government, 2.8% State Government, 0.6% County Government); the remaining lands are owned privately.<sup>33</sup> About 91% of the county lies within the Deschutes Basin, which covers 10,000 square miles throughout Central Oregon. Other land uses include agriculture and surface mining.<sup>34</sup> Wildfires pose a threat for the forested areas of the high desert Western ecosystem; of particular concern are the areas within the Wildland-Urban Interface.

According to the State Natural Hazards Mitigation Plan (2020):

Development pressure has been high in the Bend, Sisters, and Redmond areas in the past few decades. Between 1974 and 2009, the Bend area lost 13 percent of its land in resource land uses to more developed uses. However, since 1984 that rate has declined - annual average rates of conversion of land in resource land uses to low-density or urban uses in Deschutes County was 88 percent less in the 2005-2009 period when compared to the 1974-1984 period. Similar trends, although less pronounced, are seen in Klamath County....[between 2009 and 2014] the percentage of resource lands converted in each county in Region 6 was less than one percent of each county's total acreage. The majority of conversion during this period occurred in Crook and Deschutes Counties.

Responding to rapid growth and changing demographics, in 2011 Deschutes County completed a multi-year effort to establish the 2030 Comprehensive Plan Update (Plan 2030). This new plan incorporates updated goals and policies, community plans, and new projects like the South County Plan, destination resort remapping, a 2030 Transportation System Plan, and a South County Local Wetland Inventory.<sup>35</sup> Deschutes County is beginning a new Transportation System Plan in 2021 and aims to begin updating its Comprehensive Plan shortly thereafter. The City of Bend adopted an updated Transportation System Plan in September 2020.

## Housing

In addition to location, the characteristics of the housing stock affect the level of risk posed by natural hazards. The table below identifies the types of housing most common throughout the county. Of particular interest are mobile homes, which account for about 6.8% of the housing in Deschutes County. Mobile homes are particularly vulnerable to certain natural hazards, such as windstorms, and special attention should be given to securing the structures, because they are more prone to wind damage than wood-frame construction.<sup>36</sup> In other natural hazard events, such as earthquakes and floods, moveable structures like mobile homes are more likely to shift on their foundations and create hazardous conditions for occupants. La Pine (10.2%) has a

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<sup>33</sup> Deschutes County Comprehensive Plan. 2011.

<sup>34</sup> Ibid.

<sup>35</sup> Department of Land Conservation and Development, Oregon Natural Hazards Mitigation Plan Effective September 24, 2020 and Land Use Change on Non-Federal Land in Oregon and Washington, September, 2013, USFS, ODF

<sup>36</sup> Ibid.

higher percentage of mobile structures than other parts of the county; while Bend (2,298) and Redmond (540) have the greatest number.

**Table C-19 Housing Profile**

	Total Housing Units	Single Family		Multi-Family		Mobile Homes	
		Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Oregon	1,768,901	1202443	68.00%	421015	23.80%	140,183	7.9
Deschutes	88,714	69436	78.20%	13072	14.80%	6036	6.80%
Bend	41,926	31042	74.00%	8530	20.40%	2298	5.50%
La Pine	1,030	791	76.80%	113	11.10%	105	10.20%
Redmond	11,636	8991	77.30%	2089	18.00%	540	4.60%
Sisters	1,318	1004	76.20%	254	19.20%	60	4.60%

Source: U.S. Census Bureau, 2019 American Community Survey, Table DP04.

Aside from location and type of housing, the year structures were built has implications. Seismic building standards were codified in Oregon building code starting in 1974; more rigorous building code standards were passed in 1993 that accounted for the Cascadia earthquake fault.<sup>37</sup> Therefore, homes built before 1993 are more vulnerable to seismic events. Also in the 1970's, FEMA began assisting communities with floodplain mapping as a response to administer the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Upon receipt of floodplain maps, communities started to develop floodplain management ordinances to protect people and property from flood loss and damage. The table below illustrates the number and percent of homes built between 1970 and 2019. Within Deschutes County approximately 10% of the housing stock was built prior to 1970, before the implementation of floodplain management ordinances. Countywide, approximately 40% of the housing stock was built before 1990 and the codification of seismic building standards. Approximately 60% of the county's housing stock was built after 1990 (Redmond and Sisters have about two-thirds or more of their housing units built after 1990).

**Table C-20 Year Structure Built**

	Total Housing Units	Pre 1970		1970 to 1989		1990 or later	
		Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Oregon	1,768,901	596,219	33.70%	532,466	30.10%	640,216	36.20%
Deschutes	88,714	9,052	10.20%	26,540	29.90%	53,122	59.90%
Bend	41,926	4,268	11.10%	11,240	26.80%	26,058	62.10%
La Pine	1,030	216	21.10%	215	20.90%	599	58.20%
Redmond	11,636	1,751	15%	2,315	19.90%	7,570	65.10%
Sisters	1,318	94	7.20%	222	16.80%	1002	76.10%

Source: U.S. Census Bureau, 2019 American Community Survey, Table DP04.

As table C-20 indicates, the majority of the housing stock is single-family homes, a trend that is continuing with new construction. The table below shows the percent growth of the region's housing units in urban areas between 2000 and 2010 (40.7%) is almost twice the percent growth

<sup>37</sup> State of Oregon Building Codes Division. *Earthquake Design History: A summary of Requirements in the State of Oregon*, February 7, 2012. [http://www.oregon.gov/OMD/OEM/ospac/docs/history\\_seismic\\_codes\\_or.pdf](http://www.oregon.gov/OMD/OEM/ospac/docs/history_seismic_codes_or.pdf)

in rural areas (21.2%). Deschutes County gained the most urban housing units (approximately 21,150) and had the highest growth rate in urban housing (69.0%).

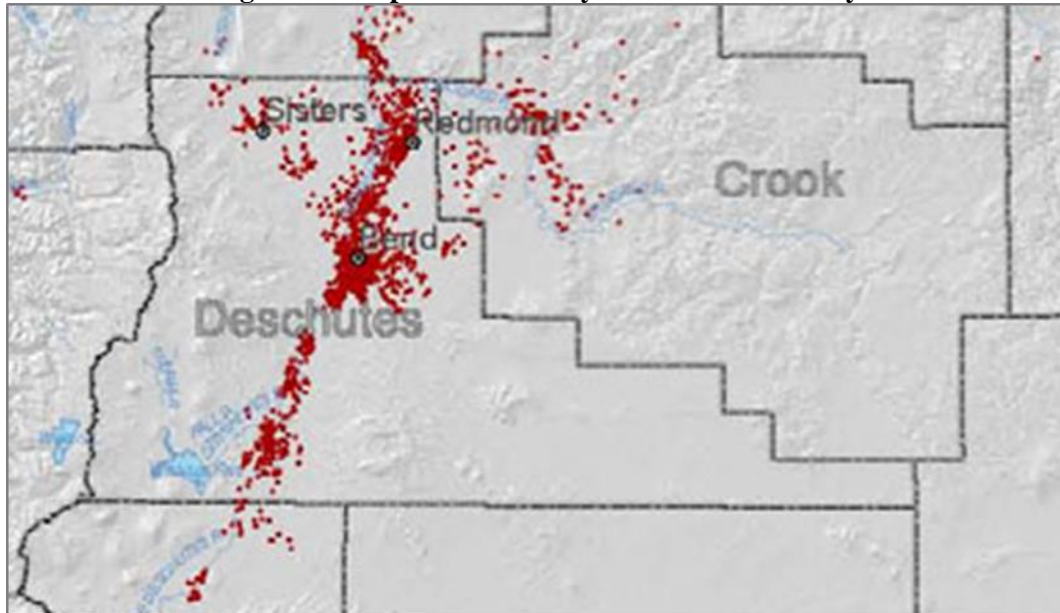
**Table C-21 Urban and Rural Housing Units in Region 6**

	Urban			Rural		
	2000	2010	Percent Change	2000	2010	Percent Change
<b>Oregon</b>	1,131,574	1,328,268	17.4%	321,135	347,294	8.1%
<b>Region 6</b>	57,098	80,325	40.7%	47,792	57,939	21.2%
<b>Crook</b>	4,190	4,884	16.6%	4,074	5,318	30.5%
<b>Deschutes</b>	30,684	51,844	69.0%	23,899	28,295	18.4%
<b>Jefferson</b>	2,735	3,382	23.7%	5,584	6,433	15.2%
<b>Klamath</b>	17,950	18,684	4.1%	10,933	14,090	28.9%
<b>Lake</b>	1,539	1,531	-0.5%	2,460	2,908	18.2%
<b>Wheeler</b>	0	0	-	842	895	6.3%

Source: U.S. Census Bureau. 2000 Decennial Census, Table H002 & 2010 Decennial Census, Table H2

The figure below shows population density in Deschutes County. The area’s population is clustered around the Highway 20 and 97 corridors and the cities of Bend, La Pine, Redmond, and Sisters. In addition to the county’s incorporated cities there are also significant populations in the resort communities of Black Butte Ranch and Sunriver; the populations in these two communities are significantly higher during summer than winter.

**Figure C-4 Population Density in Deschutes County**



Source: Integrated Water Resources Strategy: 2010 Open House Map Gallery, Water Resources Department, State of Oregon

The National Flood Insurance Program’s (NFIP’s) Flood Insurance Rate Maps (FIRMs) delineate flood-prone areas. They are used to assess flood insurance premiums and to regulate construction so that in the event of a flood, damage is minimized. The table below shows the initial and current FIRM effective dates for Deschutes County communities. For more information about the flood hazard, NFIP, and FIRMs, please refer to the Flood Hazard Chapter and Risk Assessment (Volume II).

**Table C-22 Community Flood Map History**

	Initial FIRM	Current FIRM
<b>Deschutes</b>	August 16, 1988	September 28, 2007
<b>Bend</b>	September 4, 1987	September 28, 2007
<b>La Pine</b>	September 28, 2007	September 28, 2007
<b>Sisters</b>	September 29, 1986	September 28, 2007

Source: Federal Emergency Management Agency, Community Status Book Report;  
(M) – No elevation determined, All Zone A, C and X

## Other Development

### Critical Facilities

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., hospitals, police, fire and rescue stations, school districts and higher education institutions). The interruption or destruction of any of these facilities would have a debilitating effect on incident management.

Critical facilities in Deschutes County are identified in the table below. Lifelines and other physical infrastructure, such as transmission lines, power generation facilities, levees and dams are critical, further information can be obtained in the “lifelines” subsection. This information provides the basis for informed decisions about the infrastructure and facilities already in place that can be used to reduce the vulnerability of the county to natural hazards.

**Table C-23 Deschutes County Critical Facilities**

	Hospitals			Law Enforcement	Fire and Rescue Stations	School Districts*	Universities and Colleges
	# Hospitals	# Beds	Trauma Level				
<b>Deschutes</b>	2	297	-	4	8	3	2
<b>Bend</b>	1	249	2	2	2	1	2
<b>La Pine</b>	0	-	-	0	1	1	0
<b>Sisters</b>	0	-	-	0	2	1	0
<b>Redmond</b>	1	48	3	1	1	1	0

Source: Oregon Association of Hospitals and Health Systems, 2020 Oregon Community Hospital Report, <https://oahhs.org/public-resources/2020-oregon-community-hospital-report.html>; Deschutes County District Attorney; Oregon State Police Oregon Office of State Fire Marshal, “Fire Department List” <https://www.oregon.gov/osp/programs/sfm/Pages/Fire-Agency-Contact-List.aspx>; Oregon Department of Education, “Education Institutions”, <http://www.osba.org/Links/LeftNav/Education%20Institutions.aspx>. Accessed April 2021.



## Dependent Facilities

In addition to the critical facilities mentioned above in the table above, there are other facilities that are vital to the continued delivery of health services and may significantly impact the public's ability to recover from emergencies. Assisted living centers, nursing homes, residential mental health facilities, and psychiatric hospitals are important to identify within the community because of the dependent nature of the residents; and also these facilities can serve as secondary medical facilities as they are equipped with nurses, medical supplies and beds.

Deschutes County has approximately 28 facilities that provide services for assisted living, retirement, and nursing homes; in addition there are three residential mental health or substance abuse facilities<sup>38</sup>. Saint Charles Medical Group, located in Bend, is the only inpatient psychiatric facility east of the Cascades. Most of the dependent facilities are located within Bend; however, a few are located in Redmond.

## Correctional Facilities

Correctional facilities are incorporated into physical infrastructure as they play an important role in everyday society by maintaining a safe separation from the public. There are two correctional facilities located in Deschutes County: the Deschutes County Adult Jail, located in Bend and adjacent to the sheriff's office and the Juvenile Detention Facility in Bend, which offers year-round schooling and self-improvement groups like TruThought, Skill Streaming, and drug and alcohol information.<sup>39</sup>

## Infrastructure Profile

Physical infrastructure such as dams, levees, roads, bridges, railways and airports support Deschutes County communities and economies. Due to the fundamental role that physical infrastructure plays both in pre and post-disaster, they deserve special attention in the context of creating resilient communities.

### Dams

Dam failures can occur rapidly and with little warning. Fortunately, most failures result in minor damage and pose little or no risk to life safety. However, the potential for severe damage still exists. The Oregon Water Resources Department has inventoried all dams located in Oregon and Deschutes County. There are five dams categorized as high hazard; North Canal Diversion, Crescent Lake, Crane Prairie Dam, Wickiup Dam, and the Sunriver Effluent Lagoon. In addition, the moraine lake dam on Whychus Creek (Carver Lake) above Sisters is identified as a potential flood concern, particularly with respect to impacts to the City of Sisters Wastewater Treatment Facility. (See Flood Hazard Annex and Sisters Addendum in Volume III for more information)

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<sup>38</sup> Oregon Care Planning Council, <http://www.carefororegon.org/>

<sup>39</sup> Deschutes County Detention, <https://www.deschutes.org/justice/page/detention-facility>.

**Table C-24 Deschutes County Dam Inventory**

Dam Name	River	Last Inspection	Next Inspection	Hazard
North Canal Diversion	Deschutes River	8/26/2019	2020	High
Crescent Lake	Deschutes River	9/10/2019	2020	High
Crane Prairie Dam	Deschutes River	7/7/2020	2021	High
Wickiup Dam	Deschutes River	8/20/2020	2021	High
Sunriver Effluent Lagoon	Off Channel	9/10/2019	2020	High
Fehrenbacher Reservoir 2	Dry River	8/11/2016	2022	Low
Upper Tumalo Reservoir	Tumalo Creek	2/14/2020	2026	Low
Squaw Creek Id Reservoir	Squaw Creek	2/19/2020	2026	Low
Cyrus Reservoir	Squaw Creek	2/18/2020	2026	Low
(Lagoon)	Effluent	7/23/2015	2021	Low
Bradetich Reservoir	Off Channel	8/6/2015	2021	Low
Eagle Crest	Off Channel	8/24/2017	2023	Low
Mckenzie Canyon Dam	Squaw Creek	7/18/2018	2021	Significant
Bend Hydro (Mirror Pond)	Deschutes River	8/26/2019	2022	Significant
Sparks	Off Channel	No Data	No Data	Significant

Source: Oregon water Resources Department, "Dam Inventory Query", [http://apps.wrd.state.or.us/apps/misc/dam\\_inventory/](http://apps.wrd.state.or.us/apps/misc/dam_inventory/), Accessed January 2021.

## Railroads

Railroads are major providers of regional and national cargo trade flows. The region's major (Class I) freight rail providers are the Union Pacific (UP) and the Burlington Northern-Santa Fe (BNSF) railroads. The Burlington Northern Santa Fe Railway runs through Deschutes County and along the Oregon Washington border.

Amtrak provides passenger rail service from the Willamette Valley south through Klamath County and southward to Los Angeles, California via the Coast Starlight line; (the nearest station is in Chemult).<sup>40</sup>

Rails are sensitive to icing from winter storms that can occur in the Central Oregon region. For industries in the region that utilize rail transport, these disruptions in service can result in economic losses. The potential for rail accidents caused by natural hazards can also have serious implications for the local communities if hazardous materials are involved.

## Airports

Deschutes County has four public airports, twelve private airports, and three private heliports.<sup>41</sup> One heliport is owned by St. Charles Medical Center. Of the public airports, two are municipal airports, respectively owned and operated by the City of Bend and City of Redmond. The Redmond Municipal Airport-Roberts Field (RDM) is the only commercial airport in the region.<sup>42</sup>

<sup>40</sup> State of Oregon Natural Hazards Mitigation Plan, Region 6 Central Oregon Regional Profile

<sup>41</sup> FAA Airport Facilities Data. 2014.

[https://www.faa.gov/airports/airport\\_safety/airportdata\\_5010/menu/contacts.cfm?Region=&District=&State=OR&County=DESCHUTES&City=&Use=&Certification=](https://www.faa.gov/airports/airport_safety/airportdata_5010/menu/contacts.cfm?Region=&District=&State=OR&County=DESCHUTES&City=&Use=&Certification=) Accessed January 2021.

<sup>42</sup> Redmond Airport Website, <http://www.flyrdm.com/>

The airport serves six passenger airlines (American Airlines, Alaska Air, Allegiant, Delta, United/United Express, Boutique Air) providing direct service to Denver, Las Vegas, Los Angeles, Phoenix, Portland, San Francisco, Salt Lake City, and Seattle.<sup>43</sup> Access to these facilities could become closed in the event of natural hazards. Another important consideration in identifying area air resources is the type and condition of runway surfaces at these various facilities, as they will impact the ability to utilize the airport and respond to major disasters.

## Energy

Several solar power facilities have been approved and constructed in Deschutes County. Pacific Power and Light (Pacific Power) and Central Oregon Irrigation District have power generator facilities at some in-water facilities. The county is served by several investor-owned, public, and cooperative and municipal utilities. The Bonneville Power Administration is the area's wholesale electricity distributor. Pacific Power is the primary investor-owned utility company serving Deschutes County. The county's electric cooperatives include Central Electric Cooperative, Midstate Electric Cooperative, and Harney Electric Cooperative.

## Roads

The region's major expressways are Highway 97 and Highway 20. Highway 97 bisects the center of Deschutes County and is a main passage for automobiles and trucks traveling from states to central Oregon. It merges with Highway 26 and connects Bend with Portland, a distance of 162 miles. It also merges with Interstate-5 and connects Bend with California.

- Highway 20 runs east-west across the State and connects Deschutes County with Newport on the coast and Idaho.

Other major highways that service this region include:

- Highway 372 also known as the Cascade Lakes Scenic Byway connects Bend to the Cascade Mountains and access to recreational activities.
- Highway 126 connects coastal, western, and central parts of Oregon.

Daily, transportation infrastructure capacity in the Central Oregon region is stressed by maintenance and lack of infrastructure in some areas. For example, some county roads are too narrow for fire equipment vehicles. Additionally, natural hazards can further disrupt automobile traffic and create gridlock. This is of specific concern in periods of evacuation and there are few alternative routes, especially in remote parts of the county.<sup>44</sup>

## Bridges

Because of earthquake risk, the seismic vulnerability of the county's bridges is an important issue. Non-functional bridges can disrupt emergency operations, sever lifelines, and disrupt local and freight traffic. These disruptions may exacerbate local economic losses if industries are unable to transport goods. The county's bridges are part of the state and interstate highway

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<sup>43</sup> Ibid.

<sup>44</sup> State of Oregon Natural Hazards Mitigation Plan, Region 6 Central Oregon Regional Profile.

system that is maintained by the Oregon Department of Transportation (ODOT) or that are part of regional and local systems that are maintained by the region’s counties and cities.

The table below shows the structural condition of bridges in the region. A distressed bridge (Di) is a condition rating used by the Oregon Department of Transportation (ODOT) indicating that a bridge has been identified as having a structural or other deficiency, while a deficient bridge (De) is a federal performance measure used for non-ODOT bridges; the ratings do not imply that a bridge is unsafe.<sup>45</sup> The table shows that the county has a lower percentage of bridges that are distressed and/or deficient (14%), than does the state (21%). About 31% of the region’s county and city owned bridges are distressed, compared to 11% of ODOT bridges.

**Table C-25 Bridge Inventory**

	State Owned			County Owned			City Owned			Other Owned			Area Total			Historic Covered
	Di	ST	%D*	De	ST	%D	De	ST	%D	De	ST	%D	D	T	%D	
<b>Oregon</b>	610	2,718	22%	633	3,420	19%	160	614	26%	40	115	35%	1,443	6,769	21%	334
<b>Region 6</b>	21	144	15%	27	240	11%	8	57	14%	4	9	44%	60	449	13%	12
<b>Deschutes</b>	5	48	11%	8	47	17%	5	35	14%	1	4	25%	19	132	14%	2

Source: Oregon Department of Transportation, 2014; Oregon Department of Transportation (2013), Oregon’s Historic Bridge Field Guide

Note: Di = ODOT bridges Identified as distressed with structural or other deficiencies; De = Non-ODOT bridge Identified with a structural deficiency or as functionally obsolete; D = Total od Di and De bridges; ST = Jurisdictional Subtotal; %D = Percent distressed (ODOT) and/or deficient bridges; \* = ODOT bridge classifications overlap and total (ST) is not used to calculate percent distressed, calculation for ODOT distressed bridges accounts for this overlap.

## Utility Lifelines

Utility lifelines are the resources that the public relies on daily, (i.e., electricity, fuel and communication lines). If these lines fail or are disrupted, the essential functions of the community can become severely impaired. Utility lifelines are closely related to physical infrastructure, (i.e., dams and power plants) as they transmit the power generated from these facilities.

Deschutes County receives oil and gas from Alaska by way of the Puget Sound through pipelines and tankers. Most of the natural gas Oregon uses originates in Alberta, Canada. TransCanada owns the main natural gas transmission pipeline in Central Oregon while Cascade Natural Gas supplies the greater part of Central Oregon.<sup>46</sup> The electric, oil, and gas lifelines that run through the County are both municipally and privately owned.<sup>47</sup> The network of electricity transmission lines running through the county may be vulnerable to severe, but infrequent natural hazards, such as windstorm, winter storms, and earthquakes.

Seismic lifeline routes help maintain transportation facilities for public safety and resilience in the case of natural disasters. Following a major earthquake, it is important for response and recovery agencies to know which roadways are most prepared for a major seismic event. The Oregon Department of Transportation has identified lifeline routes to provide a secure lifeline

<sup>45</sup> Oregon. Bridge Engineering Section (2012). 2012 Bridge Condition Report. Salem, Oregon: Bridge Section, Oregon Department of Transportation.

<sup>46</sup> Ibid.

<sup>47</sup> Loy, W. G., Allan, S., & Patton, C. P. (1976). *Atlas of Oregon*. Eugene: University of Oregon and Economic Development for Central Oregon, retrieved from <http://www.edcoinfo.com/business-resources/utilities/natural-gas/default.aspx>

network of streets, highways, and bridges to facilitate emergency services response after a disaster.<sup>48</sup>

System connectivity and key geographical features were used to identify a three-tiered seismic lifeline system. Routes identified as Tier 1 are considered to be the most significant and necessary to ensure a functioning statewide transportation network. The Tier 2 system provides additional connectivity to the Tier 1 system, it allows for direct access to more locations and increased traffic volume capacity. The Tier 3 lifeline routes provide additional connectivity to the systems provided by Tiers 1 and 2. The figure below shows Tiers 1, 2, and 3 seismic lifeline routes.<sup>49</sup>

The Tier 1 system in Central Oregon consists of the following corridors:

- I-84 from the The Dalles to Biggs Junction
- US 97

There are no Tier 2 corridors in the Central Geographic Zone

The Tier 3 corridor in the Central Geographic Zone consists of:

- US 197

## Synthesis

Given the unique dependent, rural nature of Deschutes County, maintaining the quality of built capacity throughout the area is critical. The planning considerations seemingly most significant for the county are contingency planning for medical resources and lifeline systems due to the imminent need for these resources. As mentioned above, functionality of hospitals and dependent care facilities are a significant priority in providing for Deschutes County residents. One factor that is critical to consider in planning is the availability of medical beds in local hospitals and dependent care facilities. In the event of a disaster, medical beds may be at a premium providing not just for the growing elderly population, but the entire county. Some of these facilities may run at almost full capacity on a daily basis, hospitals should consider medical surge planning and develop memorandums with surrounding counties for medical transport and treatment. Other facilities to consider are utility lifelines and transportation lifelines such as airports, railways, roads and bridges with surrounding counties to acquire utility service and infrastructure repair.

While these elements are traditionally recognized as part of response and recovery from a natural disaster, it is essential to start building relationships and establishing contractual agreements with entities that may be critical in supporting community resilience.

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<sup>48</sup> CH2MHILL, Prepared for Oregon Department of Transportation. Oregon Seismic Lifeline Routes Identification Project, *Lifeline Selection Summary Report*, May 15 2012.

<sup>49</sup> Ibid.

## Community Connectivity Capacity

Community connectivity capacity places strong emphasis on social structure, trust, norms, and cultural resources within a community. In terms of community resilience, these emerging elements of social and cultural capital will be drawn upon to stabilize the recovery of the community. Social and cultural capitals are present in all communities; however, it may be dramatically different from one city to the next as these capitals reflect the specific needs and composition of the community residents.

### Social Systems and Service Providers

Social systems include community organizations and programs that provide social and community-based services, such as employment, health, senior and disabled services, professional associations and veterans' affairs for the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income, etc.). The County can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. The presence of these services are more predominantly located in urbanized areas of the County, this is synonymous with the general urbanizing trend of local residents.

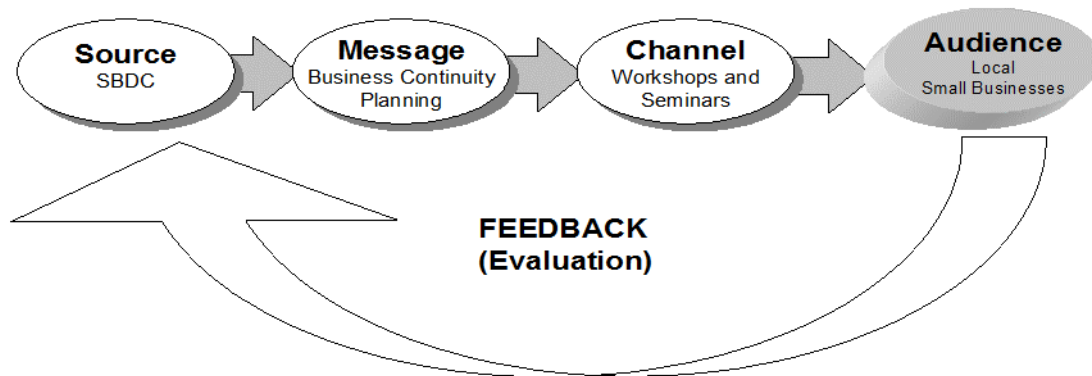
The following is a brief explanation of how the communication process works and how the community's existing social service providers could be used to provide natural hazard related messages to their clients.

There are five essential elements for communicating effectively to a target audience:

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

An example of an existing social system whose communication system can be linked to natural hazard mitigation is the Bend Chamber of Commerce. The Chamber (the source) provides local businesses (the audience) with information on business contingency planning (the message) through speakers at meetings (the channel). To target small businesses, Deschutes County can provide the Chamber with information on developing business continuity plans and strategies for recovering from a natural hazard. When local small businesses attend the Chamber's luncheons and seminars they can pick up this natural hazard mitigation information. This example is graphically presented in the following figure:

**Figure C-5 Communication Process**



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

Attachment C-A provides a list of existing social systems within Deschutes County. The document provides information on each organization or program’s service area, types of services offered, populations served, and how the organization or program could be involved in natural hazard mitigation. The three involvement methods identified in the table are defined below:

- Education and outreach – organization could partner with the community to educate the public or provide outreach assistance on natural hazard preparedness and mitigation.
- Information dissemination – organization could partner with the community to provide hazard related information to target audiences.
- Plan/project implementation – organization may have plans and/or policies that may be used to implement mitigation activities or the organization could serve as the coordinating or partner organization to implement mitigation actions.

The information provided in attachment C-A can also be used to complete action item worksheets by identifying potential coordinating agencies and internal and external partners.

## **Civic Engagement**

Civic engagement and involvement in local, state and national politics are important indicators of community connectivity. Those who are more invested in their community may have a higher tendency to vote in political elections. The 2020 Presidential General Election resulted in 84.0% voter turnout in the County as of November 20<sup>th</sup>, 2020.<sup>50</sup> These results are relatively higher compared to voter participation reported across the State (78.5%).<sup>51</sup> Other indicators such as volunteerism, participation in formal community networks and community charitable

<sup>50</sup> Deschutes County Current & Upcoming Elections, <https://www.deschutes.org/clerk/page/current-upcoming-elections>, accessed March 2021.

<sup>51</sup> Oregon Secretary of State Voter Statistics, General Elections Historical Turnout. <https://sos.oregon.gov/elections/pages/electionsstatistics.aspx>. Accessed March 2021

contributions are examples of other civic engagement that may increase community connectivity.

## Cultural Resources

### Historic Places

Historic and cultural resources such as historic structures and landmarks can help to define a community and may also be sources for tourism revenue. Protecting these resources from the impact of disasters is important because they have an important role in defining and supporting the community. According to the National Register Bulletin, “a contributing resource is a building, site, structure, or object adds to the historic associations, historic architectural qualities, or archeological values for which a property is significant because it was present during the period of significance, related to the documented significance of the property, and possesses historical integrity or is capable of yielding important information about the period; or it independently meets the National Register criteria.”<sup>52</sup> If a structure does not meet these criteria, it is considered to be non-contributing.

The table below identifies the number of eligible/significant (ES) and eligible/contributing (EC) historical sites in Deschutes County. The table also shows how many ES and EC sites are listed on the National Register. Overall, there are a total of 838 historically registered places in Deschutes County.

**Table C-26 Deschutes County Historic Places**

Eligible Sites	Total Sites	Listed on the
ES-Significant	153	44
EC-Contributing	685	245

Source: Oregon Historic Sites Database, [http://heritagedata.prd.state.or.us/historic/index.cfm?do=v.dsp\\_main](http://heritagedata.prd.state.or.us/historic/index.cfm?do=v.dsp_main)

### Libraries and Museums

Libraries and museums develop cultural capacity and community connectivity as they are places of knowledge and recognition, they are common spaces for the community to gather, and can serve critical functions in maintaining the sense of community during a disaster. They are recognized as safe places and reflect normalcy in times of distress. There are currently five community libraries in Deschutes County located in Bend, La Pine, Redmond, Sisters, and Sunriver. There are approximately three museums in Deschutes County, which have an emphasis on the history and culture of the region.

### Cultural Events

Other such institutions that can strengthen community connectivity are the presence of festivals and organizations that engage diverse cultural interests. Examples of events and institutions include the Art in the High Desert on the banks of the Deschutes River and the Bend Film Festival. Not only do these events bring revenue into the community, they have potential to

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<sup>52</sup> U.S. Department of the Interior, National Park Service, Cultural Resources, National Register Bulletin 16A: "How to Complete the National Register Registration Form".



improve cultural competence and enhance the sense of place. Cultural connectivity is important to community resilience, as people may be more inclined to remain in the community because they feel part of the community and culture.

## Community Stability

### Residential Geographic Stability

Community stability is a measure of rootedness in place. It is hypothesized that resilience to a disaster stems in part from familiarity with place, not only for navigating the community during a crisis, but also accessing services and other supports for economic or social challenges.<sup>53</sup> The table below estimates residential stability across the region. It is calculated by the number of people who have lived in the same house and those who have moved within the same county a year ago, compared to the percentage of people who have migrated into the region. Deschutes County overall has a geographic stability rating of about 94% (i.e., 94% of the population lived in the same house or moved within the county). The figures of community stability are relatively consistent across the region; La Pine (82.8%) and Sisters (92.8%) show the least geographically stable population while Bend (94%) have the most geographically stable populations. Bend and Redmond have the greatest percent of their populations that lived in the same house one year ago; while La Pine and Sisters have less population that was in the same house one year ago than other cities.

**Table C-27 Regional Residential Stability**

Jurisdiction	Population	Geographic Stability	Same House	Moved Within Same County
Oregon	4,088,374	92.40%	82.90%	9.50%
Deschutes	184,909	92.00%	82.10%	9.90%
Bend	93,050	90.50%	80.20%	10.30%
La Pine	2,339	92.70%	87.00%	5.70%
Redmond	30,056	93.20%	77.50%	15.70%
Sisters	2,643	92.90%	85.50%	7.40%

Source: U.S. Census Bureau, 2019 American Community Survey, Table B07003.

### Homeownership

Housing tenure describes whether residents rent or own the housing units they occupy. Homeowners are typically more financially stable but are at risk of greater property loss in a post-disaster situation. People may rent because they choose not to own, they do not have the financial resources for home ownership, or they are transient.

Collectively, over two-thirds of the occupied housing units in Deschutes County are owner-occupied. The county has a 4% higher owner occupied rate than the state. Conversely, one-third are renter occupied. The cities of Bend and Redmond have the highest percentage of owner-occupied households in the county. The city of Sisters has the highest renter-occupied

<sup>53</sup> Cutter, Susan, Christopher Burton, Christopher Emrich. "Disaster Resilience Indicators for Benchmarking Baseline Conditions". Journal of Homeland Security and Emergency Management.

rate. The county has a lower vacancy rate than the state; Sisters has the highest vacancy rate. In addition, seasonal or recreational housing accounts for approximately 12.5% of the county’s housing stock; Black Butte Ranch, Sisters, and Sunriver have the highest percentages.

**Table C-28 Housing Tenure and Vacancy**

	Total Occupied Units	Owner-occupied		Renter-occupied		Vacant <sup>^</sup>	
		Estimate	Percent	Estimate	Percent	Estimate	Percent
Oregon	1611982	1005896	62.40%	606086	37.60%	94510	5.90%
Deschutes	74397	49809	67.00%	24588	33.00%	3198	4.30%
Bend	38312	22971	60.00%	15341	40.00%	1519	4.00%
La Pine	944	425	45.00%	519	55.00%	40	4.20%
Redmond	11369	6818	60.00%	4551	40.00%	235	2.10%
Sisters	1038	564	54.30%	474	45.70%	73	7.00%

Source: U.S. Census Bureau, 2019 American Community Survey, Tables DP04 & B25004.

<sup>^</sup> = Functional vacant units, computed after removing seasonal, recreational, or occasional housing units from vacant housing units.

According to Cutter, wealth increases resiliency and recovery from disasters. Renters often do not have personal financial resources or insurance to assist them post-disaster. On the other hand, renters tend to be more mobile and have fewer assets at risk of natural hazards.<sup>54</sup> In the most extreme cases, renters lack sufficient shelter options when lodging becomes uninhabitable or unaffordable post-disaster.

## Synthesis

Deschutes County has distinct social and cultural resources that work in favor to increase community connectivity and resilience. Sustaining social and cultural resources, such as social services and cultural events, may be essential to preserving community cohesion and a sense of place. The presence of larger communities makes additional resources and services available for the public. However, it is important to consider that these amenities may not be equally distributed to the rural portions of the county and may produce implications for recovery in the event of a disaster.

In the long-term, it may be of specific interest to the county to evaluate community stability. A community experiencing instability and low homeownership may hinder the effectiveness of social and cultural resources, distressing community coping and response mechanisms.

## Political Capacity

Political capacity is recognized as the government and planning structures established within the community. In terms of hazard resilience, it is essential for political capital to encompass diverse government and non-government entities in collaboration; as disaster losses stem from a predictable result of interactions between the physical environment, social and demographic characteristics and the built environment.<sup>55</sup> Resilient political capital seeks to involve various

<sup>54</sup> Cutter, S. L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*.

<sup>55</sup> Mileti, D. 1999. Disaster by Design: a Reassessment of Natural Hazards in the United States. Washington D.C.: Joseph Henry Press.

stakeholders in hazard planning and works towards integrating the Natural Hazards Mitigation Plan with other community plans, so that all planning approaches are consistent.

## Government Structure

All mitigation is local, and the primary responsibility for development and implementation of risk reduction strategies and policies lies with local jurisdictions. There are numerous partners and resources at the state and federal levels that have a role in natural hazards and natural hazard mitigation.

### State and Federal

Key state agencies that are important in assisting Deschutes County include:<sup>56</sup>

**Oregon Military Department's Office of Emergency Management (OEM)** is responsible for disaster mitigation, preparedness, response, and recovery at the state level and the administration of federal funds after a major disaster declaration.

**Building Code Division (BCD) and local Community Development Departments** are responsible for building code construction and for some hazards that are building-specific in their occurrence (such as earthquakes); also included are provisions for expansive soils, and damage assessment of buildings following an earthquake.

**Oregon Department of Forestry (ODF)** is responsible for all aspects of wildland fire protection on designated private and state forest lands. Private unprotected lands exist in central Oregon and are not designated for protection by ODF. ODF administers forest practice regulations, including landslide mitigation on non-federal lands;

**USDA Forest Service and USDI Bureau of Land Management** provides wildland fire protection on the federal lands within Deschutes. Together, they are identified as the Central Oregon Fire Management Service (COFMS). COFMS includes the Deschutes National Forest, the Ochoco National Forest, the Crooked River National Grassland, and the Prineville District of the BLM. These four units are managed cooperatively under combined leadership.

**Oregon Department of Geology and Mineral Industries (DOGAMI)** is responsible for geological hazard characterization, public education, the development of partnerships aimed at reducing risk, and exceptions (based on science-based refinement of tsunami inundation zone delineation) to state mandated tsunami zone restrictions.

**Department of Land Conservation and Development (DLCD)** is responsible for planning-based hazard management including implementation of land use planning and Statewide Planning Goal 7 (natural hazards), with attention given to hazard assessments and hazard mitigation.

**Oregon Water Resources Department, South Central Region:** The State of Oregon Water Resources Department deals with water supply needs and restores and protects streamflows and watersheds through enforcing Oregon's water laws.

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<sup>56</sup> 2015 Deschutes County Natural Hazards Mitigation Plan

## County

The **Board of County Commissioners**, comprised of three elected officials, elected at large, serves as the public's elected advocates and is the policy making body of Deschutes County government. The Board's duties include executive, judicial (quasi-judicial) and legislative authority over policy matters of countywide concern. The executive duties include establishment of the budget, which is done with the aid of the three lay members of the Budget Committee. To implement policy and manage the day-to-day operations of the County, the Board appoints a county administrator.

The Board's charge also includes creation and enforcement of County ordinances and, in general, the resolution of any problems arising between the citizenry and various County departments. In addition, the Board is involved in a host of regional and community efforts.

**The County Counsel** provides legal advice to county employees, elected officials, and county boards.

Almost all governing departments within Deschutes County have some degree of responsibility in contributing to community resilience. Every department plays a role in ensuring that county functions and normal operations resume after an incident, and the needs of the population are met.

Some divisions and departments of Deschutes County government that have a role in hazard mitigation are:<sup>57</sup>

**Economic Development:** Supports business and industrial development, performs demographic and grant research, and is responsible for economic and community development in the county.

**Environmental Health:** Issues permits for septic systems and manages solid waste licensing and consultation programs.

**Health Department:** Offers preventive and community health services for county residents, such as immunizations, family planning, HIV testing and counseling, emergency preparedness, WIC, breast and cervical cancer programming, and maternal child health nurse home visiting programs.

**Geographic Information System (GIS) division:** Supports County Government by creating, managing, and analyzing spatial county data.

**Community Development Department:** Evaluates land use applications and submits staff reports to the Planning Commission and Board of County Commissioners, and responsible for zoning permits and facilitating the comprehensive planning process and long-range policy development.

**Road Department:** Responsible for county road and bridge maintenance and construction, as well as shop and weed control.

**Sheriff's Office:** Responsible for Sheriff's administration, civil, concealed handgun licenses, corrections and jail, dispatch, emergency services, patrol, and investigation.

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<sup>57</sup> Ibid.

**Surveyor:** Maintains a record of all surveys performed in the county by the county surveyor or licensed land surveyor and makes them available to the public. Protects, maintains, and reestablishes public land survey corners.

**Figure C-6 Deschutes County Organizational Chart**



Source: Deschutes County Fiscal Year 2021 Adopted Program Budget

The county’s incorporated communities have the following government structures as illustrated in the table below, for more information see the city addenda.

**Table C-29 Participating City Government Structure**

	Bend	La Pine	Redmond	Sisters
Government Form	Manager/Council	Manager/Council	Manager/Council	Manager/Council
City Manager/ Administrator	Yes	Yes	Yes	Yes
Mayor	Yes	Yes	Yes	Yes
City Council	7-Person	5-Person	7-Person	4-Person
Building	Yes	-	Yes	Yes
Parks/ Recreation	No	Yes	Yes	Yes
Planning	Yes	Yes	Yes	Yes
Public Works	Yes	Yes	Yes	Yes
Police	Yes	Yes**	Yes	Yes**
Fire	Yes	Yes	Yes	Yes
Information Technology	Yes	No	Yes	Yes

Source: City and County Websites

\*Deschutes County Building Division provides services to Redmond through a contract

\*\* Deschutes County Sheriff Substations in La Pine and Sisters

## Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.<sup>58</sup>

The Deschutes County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the county’s vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the county’s existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the Plan. Implementing the natural hazards mitigation plan’s action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the county’s resources. In addition to the plans listed below the county and incorporated cities also have zoning ordinances (including floodplain development regulations) and building regulations.

The table below is a list of plans and policies already in place in Deschutes County that have a connection to natural hazards mitigation, for more information on city plans/ policies review the city addenda:

<sup>58</sup> Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.

**Table C-30 Existing Plans**

Jurisdiction	Document	Year
Deschutes County	Natural Hazards Mitigation Plan	2015
Deschutes County	2030 Comprehensive Plan	2011
Deschutes County	Newberry Country Plan	2013
Deschutes County	Development Code (Flood Ch 18.96, 18.108.19.72)	2007
Deschutes County	Emergency Operations Plan	2016
Deschutes County	Intelligent Transportation Systems Plan	2011
Deschutes County	Sunriver CWPP	2020
Deschutes County	Upper Deschutes CWPP	2018
Deschutes County	East & West Deschutes County	2018
City of Bend	Greater Bend CWPP	2016
City of Bend	Comprehensive Plan	2020
City of Bend	Development Code (Flood Section 10.10.22A.4)	2014
City of Bend	Emergency Operation Plan	2016
City of Bend	Transportation System Plan	2020
City of Bend	Water Public Facility Plan	coming in 2021)
City of Bend	Sewer Public Facility Plan	2018
City of Bend	Stormwater Public Facility Plan	2014
City of La Pine	Greater La Pine CWPP	2020
City of La Pine	Comprehensive Plan	2018
City of La Pine	Development Code (Flood Section 9.12)	2012
City of La Pine	Transportation System Plan	2013
City Of Redmond	Greater Redmond CWPP	2018
City Of Redmond	Comprehensive Plan	2015
City Of Redmond	Development Code (No Mapped Flood Plain)	
City Of Redmond	Transportation Master Plan	2008
City Of Redmond	Wastewater and Water System Master Plan	2007
City of Sisters	Greater Sisters CWPP	2019
City of Sisters	Comprehensive Plan	2005
City of Sisters	Transportation System Plan	2010
City of Sisters	Development Code (Flood, Section 2.10)	2012
City of Sisters	Greater Sisters Area Emergency Operations Plan	2009
City of Sisters	Water Capital Facilities Plan	2017
City of Sisters	Water Management and Conservation Plan	2011
City of Sisters	Wastewater System Capital Facilities Plan	2016

Source: City and County Websites, \* - portions of these CWPPs include lands within County jurisdiction.

## Existing Mitigation Activities

Current mitigation programs and activities are being implemented in an effort to reduce the community’s overall risk to natural hazards. Documenting these efforts can assist the community in better understanding its risk and can assist in documenting successes. The list below consists of countywide efforts; city-specific mitigation activities are listed in the city addendums.

Note: OEM has not documented any state- or federally-funded mitigation projects in Deschutes County (neither pre-disaster nor recovery mitigation).

## Deschutes County Community Development Department

The community development department is responsible for providing comments and expertise on land use applications. The department reviews natural hazard impacts to development through enforcement of the county comprehensive plan and development code.

## County Forester/ Project Wildfire

The County Forester helps private landowners create defensible space around their homes and helps coordinate fire adapted communities throughout Deschutes County. The County Forester works with federal, state, county, and municipality law enforcement agencies to resolve issues during wildland fires through programs, such as FireFree and Project Impact.

The FireFree program is a nationally recognized model for homeowner education and mitigation programs in the wildland urban interface. Created in 1997 following the devastating Skeleton Fire in Bend, FireFree creates awareness and educates residents about the risks of wildland fire to homes and property and the ten simple steps they can take to reduce those risks. FireFree encourages homeowners to take responsibility for risk mitigation by creating defensible space around their property and disposing of debris. Project Wildfire, is a collaborative effort among local fire agencies, forestry departments, private businesses, and the insurance industry coordinates FireFree.<sup>59</sup>

Project Wildfire was established in 2002. Project Wildfire continues to provide coordination of a variety of wildland fire mitigation activities including the FireFree program, the facilitation of Community Wildfire Protection Plans, and serves as a source of information for local groups interested in obtaining grant funding to support mitigation activities.

Project Wildfire has established a web site ([www.projectwildfire.org](http://www.projectwildfire.org)) to help showcase the wide variety of hazardous fuels treatment, prevention projects and public information and educational opportunities.<sup>60</sup>

## Deschutes County Emergency Services

The overall emergency management responsibility rests with the Deschutes County Sheriff. An appointed Emergency Manager is delegated to oversee the Emergency Management Program. The position is responsible for coordinating the plans of the different components of the emergency management system and assisting in coordination and support of: fire, police, emergency medical services, public works, volunteers, and other groups involved with the community's management of emergencies.

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<sup>59</sup> Firefree. <http://www.firefree.org/>

<sup>60</sup> Project Wildfire. <https://www.projectwildfire.org/>



## Bureau of Land Management (BLM Prineville District)

Deschutes County is located in the Bureau of Land Management's Prineville District. Prineville is the largest district in Oregon with 1.65 million acres scattered over 13 million acres. The districts mitigation projects have the potential to positively impact both the natural and human environment in the county and include the following:<sup>61</sup>

- Fuels Reduction – Treatments have occurred in the La Pine and Cline Buttes area for hazardous fuels.
- John Day Basin Resource Management Plan – will provide guidance for any decisions made about 450,000 acres of public land in the John Day Basin for the next 20 years
- River Management Plans – contains management actions necessary to protect and enhance resource values and resolve key issues that exist within river corridors

As addressed above, many governmental entities are responsible for work relevant to hazards planning; however, from this perspective it is challenging to decipher whether these structures work collaboratively in practice towards improving hazard mitigation. On a similar note, in short of reviewing each of the relevant policy documents it is questionable whether the documents effectively integrate hazard initiatives into implementation policy. Further analysis is needed to evaluate the effectiveness of political capital in terms of community resilience.

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<sup>61</sup> <http://www.blm.gov/or/districts/prineville/index.php>

## ATTACHMENT A: DESCHUTES COUNTY SOCIAL SERVICE PROVIDERS

Name & Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation	
			Businesses	Children	Disabled	Elders	English Second Language	Families		Low Income
<b>Boys &amp; Girls Club- Redmond</b> 1379 SW 15th Street Redmond, OR 97756 Phone: 541-504-9060	To inspire and enable all young people, especially those from disadvantaged circumstances, to realize their full potential as productive, responsible, and caring citizens	Redmond		X					X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Boys &amp; Girls Club- East Bend</b> 1701 Tempest Drive Bend, OR 97702 Phone: 541-385-3009	To inspire and enable all young people, especially those from disadvantaged circumstances, to realize their full potential as productive, responsible, and caring citizens	Bend		X					X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Central Oregon Intergovernmental Council</b> 2363 SW Glacier Place Redmond, OR 97756 Phone: 541-548-8163 Fax: 541-548-9548	To provide education, retraining and economic development services	Crook, Deschutes and Jefferson counties and the cities of Bend, Culver, Madras, Metolius, Prineville, Redmond and Sisters							X	<ul style="list-style-type: none"> <li>• Information dissemination</li> </ul>

<b>Healthy Beginnings</b> 1029 NW 14th Street Bend, OR 97701	Provides physical, developmental and behavioral screenings to children age five and younger.	Deschutes County		X					X	
<b>Money Management International</b> 1010 NW 14th Street, Suite 100 Bend, OR 97701	Offers financial counseling and workshops.	Deschutes County	X					X	X	
<b>CaCoon</b> 2577 NE Courtney Drive Bend, OR 97701 Phone: 541-322-7400 Fax: 541-322-7465	CaCoon (Care COordinatiON) program that serves families with children who have a chronic health condition or disability.	Deschutes County		X	X			X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Veteran's Services</b> 1130 NW Harriman Street Bend, OR 97701 Phone: 541-38-3214	The Veterans' Service Office assists veterans and their dependents with submitting claims to the Veterans' Administration for several benefit programs related to disability.	Jefferson County			X	X				<ul style="list-style-type: none"> <li>• Information dissemination</li> </ul>
<b>Deschutes Onsite Clinic</b> 1340 NW Wall Street Bend, OR 97701 Phone: 541-317-3190	Provides health care to Deschutes County employees and their family members.	Deschutes County		X	X	X		X		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

<p><b>Economic Development for Central Oregon (EDCO)</b> 109 NW Greenwood Ave Suite 102 Bend, OR 97701 Phone: 541-388-3236</p>	<p>EDCO is a private non-profit organization dedicated to building a vibrant and thriving regional economy by attracting new investment and jobs through marketing, recruitment and working with existing employers.</p>	<p>Jefferson County, Crook, Deschutes</p>	<p>X</p>						<p>X</p>	<p>Coordinating mitigation activities with economic development in Jefferson County.</p>
<p><b>Girl Scouts of Oregon and SW Washington</b> 908 NE 4th Street, Suite 101 Bend, OR 97701 Phone: 541-389-8146</p>	<p>To provide numerous volunteer services to community members in addition to preparing girls and young women for active participation in community life.</p>	<p>Central Oregon</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>			<p>X</p>	<p>• Education and outreach • Information dissemination</p>
<p><b>OSU Extension Service Deschutes County</b> 3893 SW Airport Way Redmond, OR 97756 Phone: 541-548-6088</p>	<p>Provide research-based objective information to help people solve problems, develop leadership, and manage resources wisely surrounding the topics of horticulture, forestry and natural resources, youth development, family and community development, and nutrition information.</p>	<p>Deschutes County</p>	<p>X</p>	<p>X</p>					<p>x</p>	<p>• Education and outreach • Information dissemination • Plan/project implementation</p>

Name & Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation	
			Businesses	Children	Disabled	Elders	English Second Language	Families		Low Income
<b>High Desert Food and Farm Alliance</b> P.O. Box 1782 Bend, OR 97701 Phone: 541-504-3307	The High Desert Food and Farm Alliance is a non-profit whose mission is to support a sustainable community based food system in Central Oregon so that community members can have access to fresh and healthy food.	Deschutes County						X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>The Rotary Club of Greater Bend</b> P.O. Box 6561 Bend, OR 97708	Rotary is a worldwide organization of business and professional leaders that provides humanitarian service, encourages high ethical standards in all vocations, and helps build goodwill and peace in the world.	Deschutes County	X	X	X	X		X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Deschutes County Search and Rescue Foundation</b> P.O. Box 5722 Bend, OR 97708 Phone: 541-357-7273	"The mission of the Foundation is to increase resources, raise funds, and promote public awareness in support of search and rescue volunteer activities conducted by the Deschutes County Sheriff's Office."	Deschutes County		X	X	X		X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Redmond Area Park and Recreation District</b> 2241 SW Canal Blvd Redmond, OR 97756 Phone: 541-526-1847	Provides park and recreation facilities for community members in the Redmond Area	Redmond Area		X				X		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination"</li> </ul>

<b>Sisters Park and Recreation District</b> 11650 W. McKinney Butte Rd Sisters, OR 97759 Phone: 541-549-2091	Provides youth and adult programs in Sisters. The park district is a non-profit organization which provides sports and recreation opportunities to community members.	Sisters			X		X			X		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination"</li> </ul>
<b>La Pine Park and Recreation</b> P.O Box 664 La Pine, OR 97739 Phone: 541-536-2223	Provides adult education opportunities, after school programs for children, and activities for seniors.	La Pine			X		X			X		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination"</li> </ul>
<b>Bend Park and Recreation District</b> 799 SW Columbia Street Bend, OR 97702 Phone: 541-399-7275	Maintains parkland around the community and offers recreational activities for children, families, and seniors.	Bend			X		X			X		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination"</li> </ul>
<b>Bend Senior Center</b> 1600 SE Reed Market Rd Bend, OR 97702 Phone: 541-288-1133	Provides recreational activities and social activities and events for seniors in Bend.	Bend					X	X				<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>The Bend Kiwanis Club</b> P.O. Box 102 Bend, OR 97709 Phone: 541-617-0003	The Bend Kiwanis Club supports the purchase park land in the community, Boy and Girl Scout clubs, scholarships, and other local nonprofits.	Bend			X					X		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Bend Elks Lodge #1371</b> 63120 Boyd Acres Rd Bend, OR 97701 Phone: 541-389-7439	The group, made up of people who work to create a stronger community by supporting local and national charities that benefit children, the disabled, the elderly and low-income populations.	Deschutes County			X	X	X			X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Name & Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second Language	Families	Low Income	
<b>Sisters Area Chamber of Commerce</b> 291 E Main St Sisters, OR 97759 Phone: 541-549-0251	Provide economic development assistance to local businesses.	Sisters	X							<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Redmond Chamber of Commerce</b> 446 SW 7th St. Redmond, OR 97756 Phone: 541-923-5191	Provide economic development assistance to local businesses.	Redmond	X							<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>La Pine Chamber of Commerce</b> P.O. Box 616 La Pine, OR 97739 Phone: 541-536-8410	Provide economic development assistance to local businesses.	La Pine	X							<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Bend Chamber of Commerce</b> 777 NW Wall Street, Suite 200 Bend, OR 97701 Phone: 541-385-9929	Provide economic development assistance to local businesses.	Bend	X							<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>

<b>Deschutes County Personnel Office</b> 1300 NW Wall Street, 2nd Floor Bend, OR 97701 Phone: 541-716-4722 Fax: 541-330-4626	Employment service	Deschutes County								<b>X</b>	<ul style="list-style-type: none"> <li>• Information dissemination</li> </ul>
<b>Mid Oregon Personnel Services, INC.</b> 2248 NE Division St Bend, OR 97701 Phone: 541-382-0445 Fax: 541-389-6094	Employment Service	Deschutes County								<b>X</b>	<ul style="list-style-type: none"> <li>• Information dissemination</li> </ul>
<b>Opportunity Foundation of Central Oregon</b> P.O. Box 430 835 Hwy 126 Redmond, OR 97756 Phone: 541-548-2611 Fax: 541-548-9573	The Opportunity Foundation of Central Oregon (OFCO) is a benchmark organization that is a leader in providing services to people in Central Oregon with disabilities.	Jefferson, Crook and Deschutes Counties			<b>X</b>						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Oregon Council for Hispanic Advancement</b> 2600 NW College Way Bend, OR 97701 Phone: 541-330-4363 Fax: 541-317-3070	OCHA is a champion for Hispanics in Oregon, ensuring equity in education and economic opportunity by empowering Latino youth. OCHA's educational and advocacy activities empower Hispanics to make positive changes in their lives to optimize their future success.	Deschutes County				<b>X</b>				<b>X</b>	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Salvation Army</b> 515 NE Dekalb Avenue Bend, OR 97701 Phone 541-389-8888	The group provides emergency assistance to people in need.	Bend								<b>X</b>	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>



<p><b>NeighborImpact</b>  Redmond Administrative Office  2303 SW First Street  Redmond, OR 97756  Phone: 541-548-2380</p>	<p>The Head Start Program helps make sure that children 3-4 years old from low-income families are ready for school.</p>	<p>Crook and Deschutes County</p>	<p>X</p>							<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<p><b>Housing Works</b>  405 SW 6th Street  Redmond, Oregon 97756  Phone: (541) 923-1018</p>	<p>Housing Works is the local housing authority for Deschutes, Crook and Jefferson counties. We provide affordable housing, rental assistance and new beginnings for low-and moderate-income Central Oregonians.</p>	<p>Deschutes, Crook, and Jefferson Counties</p>							<p>X</p>	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

# Appendix D: Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon's Institute for Policy Research and Engagement (IPRE). It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

The appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon Military Department – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how an economic analysis can be used to evaluate mitigation projects.

## Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, law enforcement, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce “ripple-effects” throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value from a public policy perspective, in assessing the positive and negative impacts from mitigation activities and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

# Mitigation Strategy Economic Analyses Approaches

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the three methods is outlined below:

## Benefit/Cost Analysis

Benefit/cost analysis is a key mechanism used by the state Oregon Office of Emergency Management (OEM), the Federal Emergency Management Agency (FEMA), and other state and federal agencies in evaluating hazard mitigation projects and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding. Unless an alternate approach is approved by FEMA, jurisdictions must use the latest available approved FEMA benefit/cost analysis (BCA) toolkit. Alternate approaches should be used with consultation from the State Hazard Mitigation Officer. See <https://www.fema.gov/benefit-cost-analysis> for more information.

## Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

## Investing in Public Sector Mitigation Activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

## Investing in Private Sector Mitigation Activities

Private sector mitigation projects may occur based on one or two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or

landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost-effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchases. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

## **STAPLE/E Approach**

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic fashion. This set of criteria requires the Steering Committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process."

**Social:** Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

**Technical:** The city or county public works staff and building department staff can help answer these questions.

- Will the proposed action work?

- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action considering other community goals?

**Administrative:** Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

**Political:** Consult the mayor, city council or city board of commissioners, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

**Legal:** Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

**Economic:** Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private?)
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?

- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

**Environmental:** Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

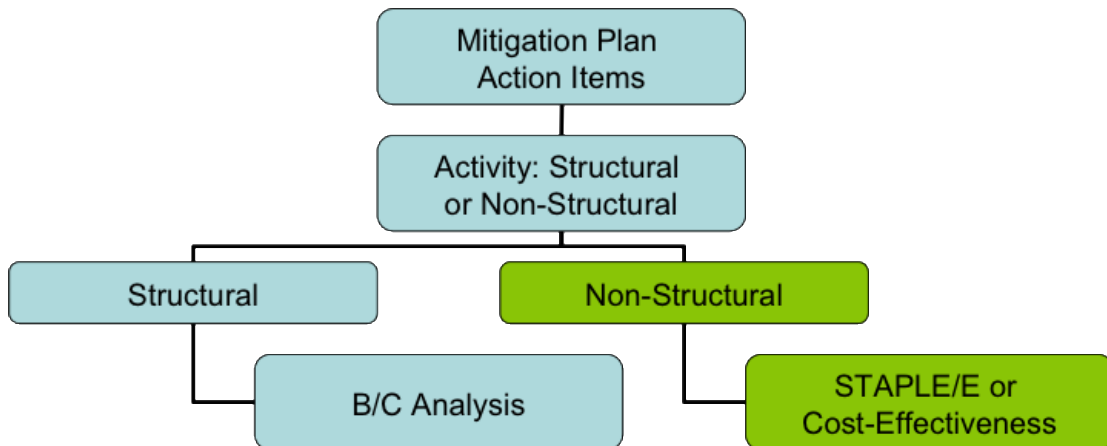
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed benefit/cost analyses.

## When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

**Figure D-I Economic Analysis Flowchart**



Source: Oregon Partnership for Disaster Resilience. 2005.

## Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether to implement a mitigation activity. A framework for evaluating

mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

## 1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to natural hazards but do so at varying economic costs.

## 2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

- **Determine the project cost.** This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- **Estimate the benefits.** Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.
- **Consider costs and benefits to society and the environment.** These are not easily measured but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- **Determine the correct discount rate.** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

## 3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- **Net present value.** Net present value is the value of the expected future returns of an investment minus the value of the expected future cost expressed in today's dollars. If the net present value is greater than the projected costs, the project may be determined feasible for implementation. Selecting the discount rate and

identifying the present and future costs and benefits of the project calculates the net present value of projects.

- **Internal rate of return.** Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked based on economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

## **Economic Returns of Natural Hazard Mitigation**

The estimation of economic returns, which accrue to building or land owners because of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over time.

## **Additional Costs from Natural Hazards**

Property owners should also assess changes in a broader set of factors that can change because of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports



- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

## **Additional Considerations**

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, small business development, critical infrastructure, and transportation projects among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

## Resources

CUREe Kajima Project, *Methodologies for Evaluating the Socio-Economic Consequences of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eiding, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates, Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation Projects*, Riverine Flood, Version 1.05, Hazard Mitigation Economics, Inc., 1996

Federal Emergency Management Agency, [Report on the Costs and Benefits of Natural Hazard Mitigation](#). Publication 331, 1996.

Goettel & Horner Inc., *Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in the City of Portland*, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects Volume V, Earthquakes*, Prepared for FEMA's Hazard Mitigation Branch, October 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olsen Associates, Prepared for Oregon Military Department – Office of Emergency Management, July 1999.

Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000.)

Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

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# APPENDIX E: GRANT PROGRAMS AND RESOURCES

## Introduction

There are numerous local, state and federal funding sources available to support natural hazard mitigation projects and planning. The following section includes an abbreviated list of the most common funding sources utilized by local jurisdictions in Oregon. Because grant programs often change, it is important to periodically review available funding sources for current guidelines and program descriptions.

## Post-Disaster Federal Programs

### Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP involves a paper application which is first offered to the counties with declared disasters within the past year, then becomes available statewide if funding is still available.

<http://www.fema.gov/hazard-mitigation-grant-program>

### Physical Disaster Loan Program

When physical disaster loans are made to homeowners and businesses following disaster declarations by the U.S. Small Business Administration (SBA), up to 20% of the loan amount can go towards specific measures taken to protect against recurring damage in similar future disasters. <http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans>

## Pre-Disaster Federal Programs

### Building Resilient Infrastructure and Communities Grant Program

The Building Resilient Infrastructure and Communities (BRIC) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. BRIC grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds. The BRIC grant program is offered annually; applications are submitted online. Applicants need a user profile approved by the State Hazard Mitigation Officer, which should be garnered well before the application period opens. <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities>

## **Flood Mitigation Assistance Program**

The overall goal of the Flood Mitigation Assistance (FMA) Program is to fund cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other National Flood Insurance Program (NFIP) insurable structures. This specifically includes:

- Reducing the number of repetitively or substantially damaged structures and the associated flood insurance claims;
- Encouraging long-term, comprehensive hazard mitigation planning;
- Responding to the needs of communities participating in the NFIP to expand their mitigation activities beyond floodplain development activities; and
- Complementing other federal and state mitigation programs with similar, long-term mitigation goals.

<http://www.fema.gov/flood-mitigation-assistance-program>

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the FY15 Hazard Mitigation Assistance Unified Guidance, available at: <https://www.fema.gov/media-library/assets/documents/103279>. Note that guidance regularly changes. Verify that you have the most recent edition. Flood mitigation assistance is usually offered annually; applications are submitted online. Applicants need a user profile approved by the State Hazard Mitigation Officer, which should be garnered well before the application period opens.

For Oregon Office of Emergency Management (OEM) grant guidance on Federal Hazard Mitigation Assistance, visit:

<https://www.oregon.gov/OEM/emresources/Grants/Pages/HMA.aspx>

Contact: Amie Bashant, [amie.bashant@state.or.us](mailto:amie.bashant@state.or.us) or [shmo@mil.state.or.us](mailto:shmo@mil.state.or.us)

## **State Programs**

### **Special Public Works Fund**

The Special Public Works Fund (SPWF) provides funds for publicly owned facilities that support economic and community development in Oregon. Funds are available to public entities for: planning, designing, purchasing, improving and constructing publicly owned facilities, replacing publicly owned essential community facilities, and emergency projects as a result of a disaster. Public agencies that are eligible to apply include: cities, counties, county service districts, (organized under ORS Chapter 451), tribal councils, ports, districts as defined in ORS 198.010, and airport districts (ORS 838). Facilities and infrastructure projects that are eligible for funding are: airport facilities, buildings and associated equipment, levee accreditation, certification, and repair, restoration of environmental conditions on publicly-owned industrial lands, port facilities, wharves, and docks, the purchase of land, rights of way and easements necessary for a public facility, telecommunications facilities, railroads, roadways and bridges, solid waste disposal sites, storm drainage systems, wastewater systems, and water systems. <https://www.orinfrastructure.org/Infrastructure-Programs/SPWF/>

## **Seismic Rehabilitation Grant Program**

The Seismic Rehabilitation Grant Program (SRGP) provides state funds to strengthen public schools and emergency services buildings so they will be less damaged during an earthquake. Reducing property damage, injuries, and casualties caused by earthquakes is the goal of the SRGP. <http://www.orinfrastructure.org/Infrastructure-Programs/Seismic-Rehab/>

## **Community Development Block Grant Program**

The Community Development Block Grant Program promotes viable communities by providing: 1) decent housing; 2) quality living environments; and 3) economic opportunities, especially for low- and moderate-income persons. Eligible activities most relevant to natural hazards mitigation include: acquisition of property for public purposes; construction/reconstruction of public infrastructure; community planning activities. Under special circumstances, CDBG funds also can be used to meet urgent community development needs arising in the last 18 months which pose immediate threats to health and welfare.

[http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/comm\\_planning/communitydevelopment/programs](http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs)

## **Oregon Watershed Enhancement Board**

While OWEB's primary responsibilities are implementing projects addressing coastal salmon restoration and improving water quality statewide, these projects can sometimes also benefit efforts to reduce flood and landslide hazards. In addition, OWEB conducts watershed workshops for landowners, watershed councils, educators, and others, and conducts a biennial conference highlighting watershed efforts statewide. Funding for OWEB programs comes from the general fund, state lottery, timber tax revenues, license plate revenues, angling license fees, and other sources. OWEB awards approximately \$20 million in funding annually. More information at: <http://www.oregon.gov/OWEB/Pages/index.aspx>

# **Federal Mitigation Programs, Activities & Initiatives**

## **Basic & Applied Research/Development**

National Earthquake Hazard Reduction Program (NEHRP), National Science Foundation.

Through broad based participation, the NEHRP attempts to mitigate the effects of earthquakes. Member agencies in NEHRP are the US Geological Survey (USGS), the National Science Foundation (NSF), the Federal Emergency Management Agency (FEMA), and the National Institute for Standards and Technology (NIST). The agencies focus on research and development in areas such as the science of earthquakes, earthquake performance of buildings and other structures, societal impacts, and emergency response and recovery. <http://www.nehrp.gov/>

Decision, Risk, and Management Science Program, National Science Foundation.

Supports scientific research directed at increasing the understanding and effectiveness of decision making by individuals, groups, organizations, and society. Disciplinary and interdisciplinary research, doctoral dissertation research, and workshops are funded in the areas of judgment and decision making; decision analysis and decision aids; risk analysis,

perception, and communication; societal and public policy decision making; management science and organizational design. The program also supports small grants for exploratory research of a time-critical or high-risk, potentially transformative nature.

[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5423](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423)

## **Hazard ID and Mapping**

### **National Flood Insurance Program: Flood Mapping; FEMA**

Flood insurance rate maps and flood plain management maps for all NFIP communities.

<http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping>

### **National Map: Orthoimagery, DOI – USGS**

Develops topographic quadrangles for use in mapping of flood and other hazards.

<https://nationalmap.gov/ortho.html>

### **Mapping Standards Support, DOI-USGS**

Expertise in mapping and digital data standards to support the National Flood Insurance Program. <http://ncgmp.usgs.gov/standards.html>

### **Soil Survey, USDA-NRCS**

Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes. [http://soils.usda.gov/survey/printed\\_surveys/](http://soils.usda.gov/survey/printed_surveys/)

### **Resilience Analysis and Planning Tool, FEMA**

A free GIS web map that allows federal, state, local, tribal and territorial emergency managers and other community leaders to examine the interplay of census data, infrastructure locations, and hazards, including real-time weather forecasts, historic disasters and estimated annualized frequency of hazard risk.

<https://www.fema.gov/emergency-managers/practitioners/resilience-analysis-and-planning-tool>

### **Oregon Wildfire Risk Explorer (OWRE)**

The OWRE Advanced Report provides wildfire risk information for a customized area of interest to support Community Wildfire Protection Plans (CWPPs), Natural Hazard Mitigation Plans (NHMPs), and fuels reduction and restoration treatments in wildfire-prone areas in Oregon.

The Advanced OWRE map viewer provides wildfire risk assessment data primarily from the 2018 Pacific Northwest Quantitative Wildfire Risk Assessment, produced by the US Forest Service with a coalition of local fire managers, planners, and natural resource specialists in both Washington and Oregon. The assessment uses the most current data (incorporating 2017 fires) and state-of-the art fire modeling techniques, and is the most up-to-date wildfire risk assessment for Oregon. The assessment characterizes risk of large wildfires (>250 acres). Data also comes from the 2013 West Wide Wildfire Risk Assessment, Oregon

Department of Forestry (ODF), and other sources.

[https://tools.oregonexplorer.info/oe\\_htmlviewer/index.html?viewer=wildfireplanning](https://tools.oregonexplorer.info/oe_htmlviewer/index.html?viewer=wildfireplanning)

## **Project Support**

### **Coastal Zone Management Program, NOAA**

Provides grants for planning and implementation of non-structural coastal flood and hurricane hazard mitigation projects and coastal wetlands restoration.

<http://coastalmanagement.noaa.gov/>

### **Community Development Block Grant Entitlement Communities Program, US Department of Housing and Urban Development**

Provides grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate- income persons.

[http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/comm\\_planning/communitydevelopment/programs/entitlement](http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/entitlement)

### **National Fire Plan (DOI – USDA)**

The NFP provides technical, financial, and resource guidance and support for wildland fire management across the United States. This plan addresses five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability.

<http://www.forestsandrangelands.gov/>

### **Assistance to Firefighters Grant Program, FEMA**

FEMA AFGM grants are awarded to fire departments to enhance their ability to protect the public and fire service personnel from fire and related hazards. Three types of grants are available: Assistance to Firefighters Grant (AFG), Fire Prevention and Safety (FP&S), and Staffing for Adequate Fire and Emergency Response (SAFER).

<http://www.fema.gov/welcome-assistance-firefighters-grant-program>

### **Emergency Watershed Protection Program, USDA-NRCS**

Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp>

### **Rural Development Assistance – Utilities, USDA**

Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.

[http://www.rurdev.usda.gov/Utilities\\_Programs\\_Grants.html](http://www.rurdev.usda.gov/Utilities_Programs_Grants.html)

### **Rural Development Assistance – Housing, USDA**

The RDA program provides grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary. <http://www.rurdev.usda.gov/HAD-HCFPGGrants.html>



## Public Assistance Grant Program, FEMA

The objective of FEMA Public Assistance (PA) Grant Program is to aid State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. <http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit>

## National Flood Insurance Program, FEMA

The NFIP makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements. <http://www.fema.gov/national-flood-insurance-program>

## HOME Investments Partnerships Program, HUD

The HOME IPP provides grants to states, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons. <http://www.hud.gov/offices/cpd/affordablehousing/programs/home/>

## Disaster Recovery Initiative, HUD

The DRI provides grants to fund gaps in available recovery assistance after disasters (including mitigation).  
[http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/comm\\_planning/communitydevelopment/programs/dri](http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/dri)

## Emergency Management Performance Grants, FEMA

EMPG grants help state and local governments to sustain and enhance their all-hazards emergency management programs. <http://www.fema.gov/fy-2012-emergency-management-performance-grants-program>

## Partners for Fish and Wildlife, DOI – FWS

The PFW program provides financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats. <http://www.fws.gov/partners/>

## North American Wetland Conservation Fund, DOI-FWS

NAWC fund provides cost-share grants to stimulate public/private partnerships for the protection, restoration, and management of wetland habitats. <http://www.fws.gov/birdhabitat/Grants/index.shtm>

## Federal Land Transfer / Federal Land to Parks Program, DOI-NPS

Identifies, assesses, and transfers available federal real property for acquisition for State and local parks and recreation, such as open space. <http://www.nps.gov/ncrc/programs/flp/index.htm>

## Wetlands Reserve program, USDA-NCRS

The WR program provides financial and technical assistance to protect and restore wetlands through easements and restoration agreements.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands>

## Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service

Reauthorized for FY2012, it was originally enacted in 2000 to provide five years of transitional assistance to rural counties affected by the decline in revenue from timber harvests on federal lands. Funds have been used for improvements to public schools, roads, and stewardship projects. Money is also available for maintaining infrastructure, improving the health of watersheds and ecosystems, protecting communities, and strengthening local economies. <http://www.fs.usda.gov/pts/>

# APPENDIX F: DESCHUTES COUNTY NATURAL HAZARDS COMMUNITY SURVEY

## Survey Purpose and Use

The purpose of this survey was to gauge the overall perception of natural disasters, determine a baseline level of loss reduction activity for residents in the community, and assess citizen's support for different types of individual and community risk reduction activities.

Data from this survey directly informs the natural hazard planning process. Deschutes County can use this survey data to enhance action item rationale and ideas for implementation. Other community organizations can also use survey results to inform their own outreach efforts. Data from the survey provides the county with a better understanding of desired outreach strategies (sources and formats), a baseline understanding of what people have done to prepare for natural hazards, and desired individual and community strategies for risk reduction.

## Background

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved NHMP in order to receive federal funds for mitigation projects. Development of the Natural Hazards Mitigation Plan update process for Deschutes County was pursued in compliance with subsections from 44 CFR 201.6 guidelines.

Citizen involvement is a key component in the natural hazard mitigation planning process. Citizens should have the opportunity to voice their ideas, interests and concerns about the impact of natural disasters on their communities. To that end, the DMA2K requires citizen involvement in the natural hazard mitigation planning process. It states: "An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

1. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval
2. An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process."

According to Bierle<sup>1</sup>, the benefits of citizen involvement include the following: (1) educate and inform public; (2) incorporate public values into decision making; (3) substantially improve the quality of decisions; (4) increase trust in institutions; (5) reduce conflict; and (6) ensure cost effectiveness.

## Methodology

In March 2021, Central Oregon Intergovernmental Council (COIC) and Deschutes County administered a survey online via Survey Monkey. The survey was made available in both Spanish and English and was distributed via the County webpage, and COIC's project website. A press release was created, and at least one news article directed the public to the survey (See Appendix B: Public Process for a copy of the press release). Two flyers (Spanish and English), as shown in figures F-1 and F-2 below, were also distributed via the County and COIC's social media pages (Facebook, Twitter, Instagram).

**Figure F-1: 2021 Community Preparedness Survey Flyer (English)**

**Deschutes County is updating the Natural Hazard Mitigation Plan!**

**COIC**

**And we need your input to help make your community safer. Please fill out the survey below by March 19.**

*This survey is organized in partnership with Central Oregon Intergovernmental Council (COIC). All results are confidential and help develop a robust Natural Hazard Mitigation Plan (NHMP) for Deschutes County and its cities.*

<https://www.surveymonkey.com/r/DeschutesNHMP>

La encuesta para el Plan de mitigación para los desastres naturales está también disponible en español:  
<https://www.surveymonkey.com/r/DeschutesNHMP-Espanol>

**Espanol**

Questions?  
Contact  
Shelby Knight at  
sknight@coic.org or  
541-548-9535

To request this information in an alternate format, please call **541-728-3872** or send an email to [emergency.management@deschutes.org](mailto:emergency.management@deschutes.org)

<sup>1</sup> Bierle, T. 1999. "Using social goals to evaluate public participation in environmental decisions." Policy Studies Review. 16(3/4), 75---103.

Figure F-2: 2021 Community Preparedness Survey Flyer (Spanish)



**¡El condado Deschutes está actualizando el Plan de mitigación de desastres naturales!**

**Y necesitamos sus sugerencias para ayudar a que su comunidad sea más segura. Por favor, complete la encuesta a continuación antes del 19 de marzo.**

*Esta encuesta es organizada en asocio con el Central Oregon Intergovernmental Council, COIC (El Consejo intergubernamental del Centro de Oregon). Todas las respuestas son confidenciales y ayudan a desarrollar un robusto Natural Hazard Mitigation Plan, NHMP (Plan de mitigación de desastres naturales) para el condado Deschutes y sus ciudades.*

<https://www.surveymonkey.com/r/DeschutesNHMP-Espanol>

The survey for the Natural Hazard Mitigation Plan is also available in English:  
<https://www.surveymonkey.com/r/DeschutesNHMP>

¿Preguntas?  
Contacte a  
[emergency.management@deschutes.org](mailto:emergency.management@deschutes.org)  
o 541-728-3872



Para solicitar esta información en un formato alternativo, llame **541-728-3872** o envíe un correo electrónico a [emergency.management@deschutes.org](mailto:emergency.management@deschutes.org)

A total of 30 surveys in English, one in Spanish were submitted, however, the Spanish survey did not include any responses and is therefore omitted from the results below. The survey consisted of 44 questions divided into four sections: natural hazard information, community natural hazard mitigation strategies and priorities, mitigation and preparedness activities in your household, and general household information. The questions were designed to determine public perceptions and opinions regarding natural hazards. Questions also focused on the methods and techniques survey respondents prefer to use in reducing the risks and losses associated with natural hazards. The intent of this survey was not to be statistically valid but instead to gain the perspective and opinions of resident's regarding natural hazards in the region. Our assessment is that the results reflect a range attitudes and opinions of residents throughout the county.

## Survey Results

This section presents the response report generated by Survey Monkey (Attachment A). Key themes and considerations gleaned from the outcomes of the survey are also discussed below. Finally, Attachment B includes the initial surveys distributed in both Spanish and English.

### Key Consideration and Outcomes

The Project Management Team reviewed the survey results in detail, and noted the following outcomes as key considerations:

- The top concerns for survey respondents in regards to hazards were Wildfire, Drought, and Winter Storm.
- Over 85% of respondents have received information about natural hazards. The main sources of information received were government agencies, news media, Red Cross, and utilities.
- Survey respondents identified the following as the most effective routes for emergency services professionals and agencies for sharing information: social media, online news outlets, fact sheets/brochures/university or research institutions.
- Respondent top priorities were as follows: protecting critical facilities, protecting and reducing damage to utilities, preventing development in hazard areas.
- Respondents felt Deschutes County is either somewhat prepared (38%) or weren't sure (31%) for natural hazards.
- 73% of respondents felt they have an awareness of mitigation activities in Deschutes County.
- A majority of respondents have participated in some form of personal preparedness activities, but were least likely to have a utility shut off plan.
- Feedback for next time included having more options for cultural and traditional resources in the area, and reducing the overall length of the survey.

In response to the survey outcomes and key considerations, the Project Management Team agreed to review the mitigation action plan to ensure there are action items that address the gaps and needs highlighted by responses. After a thorough review, the Team agreed community concerns and needs are addressed in the action plan.

# **ATTACHMENT A: SURVEY RESULTS**

# **ATTACHMENT B: COMMUNITY PREPAREDNESS SURVEY (ENGLISH)**



**ATTACHMENT C:  
COMMUNITY PREPAREDNESS SURVEY (SPANISH)**