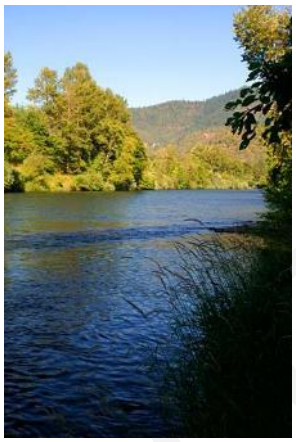
Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan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Prepared for
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The University of Oregon
Institute for Policy Research & Engagement
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About the Institute for Policy Research and Engagement

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The Institute for Policy Research & Engagement (IPRE) is a research center affiliated with the School of Planning, Public Policy, and Management at the University of Oregon. It is an interdisciplinary organization that assists Oregon communities by providing planning and technical assistance to help solve local issues and improve the quality of life for Oregon residents. The role of IPRE is to link the skills, expertise, and innovation of higher education with the transportation, economic development, and environmental needs of communities and regions in the State of Oregon, thereby providing service to Oregon and learning opportunities to the students involved.

About the Oregon Partnership for Disaster Resilience

The Oregon Partnership for Disaster Resilience (OPDR) is a coalition of public, private, and professional organizations working collectively toward the mission of creating a disaster resilient and sustainable state. Developed and coordinated by the Institute for Policy Research and Engagement at the University of Oregon, the OPDR employs a service-learning model to increase community capacity and enhance disaster safety and resilience statewide.

NHMP Template Disclaimer

This NHMP is based in part on a plan template developed by the Oregon Partnership for Disaster Resilience. The template is structured to address the requirements contained in Title 44 CFR Section 201.6; where language is applicable to communities throughout Oregon, OPDR encourages the use of standardized language. As part of this regional planning initiative, OPDR provided copies of the plan templates to communities for use in developing or updating their hazards mitigation plans. OPDR hereby authorizes the use of all content and language provided to Josephine County in the plan template.

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Plan Summary

Jackson County updated this Multi-Jurisdictional Natural Hazard Mitigation Plan (NHMP) to prepare for the long-term effects resulting from hazards. It is impossible to predict exactly when these hazards will occur, or the extent to which they will affect the community. However, with careful planning and collaboration among public agencies, private sector organizations and residents within the community, it is possible to create a resilient community that will benefit from long-term recovery planning efforts.

The Federal Emergency Management Agency (FEMA) defines mitigation as ". . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk." Said another way, hazard mitigation is a method of permanently reducing or alleviating the losses of life, property and injuries resulting from hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as non-English speaking residents or the elderly. Hazard mitigation is the responsibility of the "Whole Community." FEMA defines Whole Community as, "private and nonprofit sectors, including businesses, faith-based and disability organizations and the general public, in conjunction with the participation of local, tribal, state, territorial and Federal governmental partners."

> *44 CFR 201.6 – The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. . . .*

Why Develop this Mitigation Plan?

The Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions (counties, cities, special districts, etc.) maintain an approved Natural Hazard Mitigation Plan (NHMP) to receive FEMA Hazard Mitigation Assistance funds for mitigation projects. To that end, Jackson County is involved in a broad range of hazard and emergency management planning activities. Local and federal approval of this NHMP ensures that the County and listed jurisdictions will (1) remain eligible for pre- and post-disaster mitigation project grants and (2) promote local mechanisms to accomplish risk reduction strategies.

> *44 CFR 201.6(a)(1) – A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants . . .*

What is Mitigation?

"Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event."

- U.S. Federal Emergency Management Agency

Who Participated in Developing the NHMP?

The Jackson County NHMP is the result of a collaborative effort between the County, cities, special districts, residents, public agencies, non-profit organizations, the private sector and regional organizations. County and City steering committees guided the NHMP development process.

For a list of individual County steering committee participants, refer to the acknowledgements section above. The update process included representatives from the following jurisdictions and agencies:

Jackson County Emergency Management

Jackson County Development Services

Jackson County Roads and Parks

City of Ashland

Town of Butte Falls

City of Central Point

City of Eagle Point

City of Gold Hill

City of Jacksonville

City of Medford

City of Phoenix

City of Rogue River

City of Shady Cove

City of Talent

Applegate Valley Fire District

Jackson County Fire District #3

Jackson County Fire District #4

Medford Water

Emergency Communications of Southern Oregon

Jackson County Soil and Water Conservation District

Rogue Valley Sewer Services

Rogue Valley Transportation District

Oregon Department of Emergency Management

Oregon Water Resources Department, District 13

Rogue Valley Council of Governments

44 CFR 201.6(c)(1) – Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

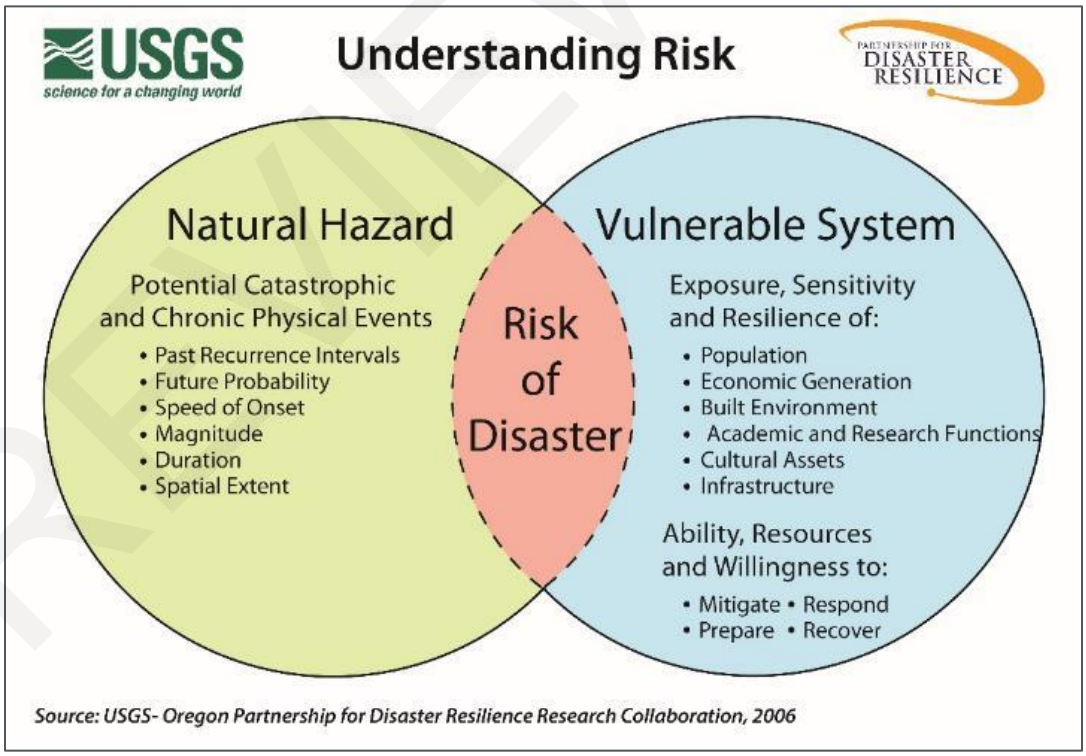
The Jackson County Emergency Manager convened the planning process and will take the lead in implementing, maintaining, and updating the County NHMP. Each of the participating jurisdictions have also named a local convener who is responsible for implementing, maintaining, and updating their addendum (see addenda, Volume III, for specific names and positions). Jackson County is dedicated to directly involving the public in the continual review and update of the Natural Hazards Mitigation Plan. The County achieves this through systematic engagement of a wide variety of active groups, organizations, or committees, including but not limited to: The Rogue Valley Emergency Management Advisory Group (EMAG), Rogue Valley Fire Chiefs Association, public and private infrastructure partners, watershed and neighborhood groups and numerous others. The public is encouraged to provide feedback about the NHMP throughout the implementation and maintenance period.

How does Mitigation Planning Reduce Risk

44 CFR 201.6(c)(2) – A Risk Assessment that provides the factual basis for activities proposed in the strategy . . .

The NHMP is intended to assist Jackson County reduce the risk from hazards by identifying resources, information, and strategies for risk reduction. It is also intended to guide and coordinate mitigation activities throughout the County. A risk assessment consists of three phases: hazard identification, vulnerability assessment and risk analysis, as illustrated in the following graphic.

Figure PS-1-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience.

By identifying and understanding the relationship between hazards, vulnerable systems and existing capacity, Jackson County is better equipped to identify and implement actions aimed at reducing the overall risk to hazards. Notably, Jackson County took the unique step of directly engaging representatives in four critical lifeline sectors: Communication, Energy, Transportation and Water. Because these four lifeline sectors are critical to virtually all other activity in the county, this approach was used to better understand each sector's unique vulnerabilities, threats, and hazards. The County utilized the information collected to inform specific, targeted actions aimed at reducing risks across each of the four lifeline sectors.

What is Jackson County's Overall Risk to Hazards?

Jackson County reviewed and updated the risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. Table PS-1 below summarizes hazard probability and vulnerability as determined by the County steering committee (Volume I, Section 3).

Table PS-1-1 Hazard and Vulnerability Assessment Summary

Hazard	History	Vulnerability	Maximum Threat	Probability	Total Threat Score	Hazard Rank	Hazard Tiers
Wildfire	20	40	100	70	230	1	*Top Tier*
Emerging Infectious Disease	16	40	100	49	205	2	
Earthquake (Cascadia)	2	40	100	49	191	3	
Extreme Heat Event	20	25	70	70	185	4	
Drought	20	30	70	63	183	5	*Middle Tier*
Air Quality	18	40	60	63	181	6	
Winter Storm	20	30	60	70	180	7	
Windstorm	20	25	60	70	175	8	
Flood (Riverine)	20	20	60	70	170	9	*Bottom Tier*
Landslide	10	15	30	70	125	10	
Earthquake (Crustal)	2	15	30	21	68	11	
Volcano	2	5	50	7	64	12	

Source: Jackson County NHMP Steering Committee, 2023

Community Vulnerability

Community vulnerabilities are an important component of the NHMP risk assessment. For more in-depth information regarding specific community vulnerabilities see Volume II, Appendix C and Volume III. Changes to population, economy, built environment, critical facilities, and infrastructure have not significantly influenced vulnerability. New development has complied with the standards of the Oregon Building Code and the county's development code including their floodplain ordinance. Data sources for the following community vulnerability information can be found in Volume II, Appendix C unless otherwise noted below.

Population

The socio-demographic qualities of the community population such as language, race and ethnicity, age, income, and educational attainment are significant factors that can influence the community's ability to cope, adapt to and recover from natural disasters. Historically, 80 percent of the disaster burden falls on the public.[1] Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities and low-income persons. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning.

Population Vulnerabilities

- As of 2021, approximately 22% of Jackson County's population is over the age of 64; that number is projected to rise to about 28% (or roughly 73,278 individuals) by 2040.
- The Jackson County age dependency ratio[2] is 64.2 indicating a higher percentage of dependent aged people to that of working aged. The ratio is expected to decrease to 53.9 by 2040.
- Approximately 29% of Jackson County population lives alone; this percentage is greatest in Talent (43%).
- Approximately 13% of the total Jackson County population lived at or below the poverty line in 2021, with 25% being children.
- While over 91% of the population over 25 has graduated high school or higher, about 30% have a bachelor's degree or higher.
- Approximately 15% of the Jackson County population is estimated to have a disability. Of that, 15,218 individuals over 65 (7% of total county population) are disabled.
- Approximately 51% of all homeless individuals and families in Jackson County are unsheltered as of 2019.

Economy

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. 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.

[1] Hazards Workshop Session Summary #16, *Disasters, Diversity and Equity*, University of Colorado, Boulder (2000).

[2] Dependency Ratio: the ratio of population typically not in the work force (less than 15, greater than 64)

Economic Vulnerabilities

- Over 49% of Jackson County renters spend more than 30% of their income on housing. The city with the highest percentage of renters spending 30% or more of their income on housing is Gold Hill (75%).
- According to the Oregon Employment Department, Jackson County unemployment has remained about the same as at about 5%.
- About 27% of the workforce comes into the county from outside of the county and about 26% of the population travels to outside of the county for work.
- The top five industry sectors in Jackson County with the most employees, as of 2021, are Trade, Transportation & Utilities (22%, 19,788), Education and Health Services (20%, 7,864), Leisure and Hospitality (20%, 17,864), Retail Trade (16%, 14,066), and Manufacturing (9%, 7,643).
- The Leisure and Hospitality sector is expected to have the most growth from 2021-2031 at 24%. Professional and Business Services (15%), and Education and Health Services (16%) are the next closest growth sectors in terms of employment.

Environment

The capacity of the natural environment is essential in sustaining all forms of life including human life, yet it often plays an underrepresented role in community resiliency to natural hazards. The natural environment includes land, air, water and other natural resources that support and provide space to live, work and recreate.[3] Natural capital 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. When natural systems are impacted or depleted by human activities, those activities can adversely affect community resilience to natural hazard events.

Environmental Vulnerabilities

- Forest ecosystems are vulnerable to drought, wildfire, and severe storm impacts.
- Water and air quality may be affected in both long- and short-term measures because of direct and indirect impacts from natural hazards.

Built Environment, Critical Facilities, and Infrastructure

Critical facilities (i.e. police, fire and government facilities), housing supply and physical infrastructure are vital 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 experience isolation from surrounding cities and counties due to

[3] Mayunga, J. "Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building," (2007).

infrastructure failure. These conditions force communities to rely on local and immediately available resources.

Housing Vulnerabilities

- Mobile homes and other non-permanent residential structures account for 14% of the housing in Jackson County. In Shady Cove, mobile homes account for about 40% and 32% within Butte Falls. These structures are particularly vulnerable to certain natural hazards, such as earthquakes, windstorms, and heavy flooding events.
- Based on U.S. Census data, approximately 61% of the residential housing in Jackson County was built before the current seismic building standards of 1990.[4]
- Approximately 30% of residential structures were constructed prior to the local implementation of the flood elevation requirements of the 1970's (county Flood Insurance Rate Maps –FIRMs- were not completed until the late 1970s and early 1980s).
- The housing vacancy rate in Jackson County was estimated at 7% in 2015. Approximately 19% of the housing units in Butte Falls (37 units) and 8% in Eagle Point (287 units), Gold Hill (43 units) and Rogue River (111 units) were estimated to be vacant.

Critical Facilities and Infrastructure Vulnerabilities

- Virtually all state and county roads and bridges in Jackson County are vulnerable to multiple hazards including floods, landslides, and earthquakes. Impacts to the transportation system can result in the isolation of vulnerable populations, limit access to critical facilities such as hospitals and adversely impact local commerce, employment, and economic activity.
- There are three (3) general hospitals in the county with 24/7 emergency room and inpatient services, located in Ashland and Medford.
- There are three power plants located in Jackson County including one located in White City, which uses biomass as its energy source. There are some redundancies in power transmission but limited redundancy in the power distribution network, especially in relation to the more rural or unincorporated areas of the county.
- There are 21 "high threat potential" dams (Appendix C). According to the Oregon Water Resources Department (OWRD) four of them quality for FEMAs Rehabilitation of High Hazard Potential Dams grant program as of 6/9/2022. How are the Action Items Organized?

The action items are organized within an action matrix (Table 3-1) included within Volume I, Section 3.

Data collection, research and the public participation process resulted in the development of the action items. The Action Item Matrix portrays the overall

44 CFR 201.6(c)(3)(ii) – A section that identifies and analyzes a comprehensive range of specific mitigation actions . . .

[4] Ibid.

NHMP framework and identifies linkages between the NHMP goals and actions. The matrix documents the title of each action along with, the coordinating organization, timeline and the NHMP goals addressed. City specific action items are included in Volume III, Jurisdictional Addenda.

High Priority NHMP Actions: Jackson County

The following summarizes specific priority NHMP actions. Refer to Volume I, Section 3 for a complete list of county actions and Volume III for a complete list of city and special district actions.

Jackson County High Priority NHMP Actions

Multi-Hazard

1.1 Sustain an education and outreach program for local jurisdictions about natural hazards and assist them in developing emergency operations, public information, and hazard mitigation plans.

1.2 Develop and maintain a GIS inventory of all critical facilities, large employers/public assembly areas and lifelines, and use GIS to evaluate their vulnerability by comparing them with hazard-prone areas to be used in emergency planning.

1.3 Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularly Goal 7).

1.4 Communities cannot be resilient without resilient buildings. In keeping with its mission to support the health, safety and welfare of communities and their citizens, the Jackson County enforces the Oregon structural and all specialty building codes with a strong building safety focus to provide the information and tools to support achievement of whole community resilience.

Wildfire

12.1 Coordinate fire mitigation action items through the Rogue Valley Integrated Fire Protection Plan (AKA Jackson County CWPP).

How will the NHMP be implemented?

44 CFR 201.6(c)(3)(iii) – An action plan describing how the actions . . . will be prioritized, implemented and administered . . .

44 CFR 201.6(c)(4) – A plan maintenance process . . .

Volume I, Section 4 of this NHMP details the formal process that will ensure that the Jackson County NHMP remains an active and relevant document. The NHMP will be implemented, maintained, and updated by a designated convener. The Jackson County Emergency Manager is the designated convener (NHMP Convener) and is responsible for overseeing the review and implementation processes (see City Addenda for city conveners). The NHMP maintenance process includes a schedule for monitoring and evaluating the NHMP quarterly and producing a NHMP revision every five years. This section also describes how the communities will integrate public participation throughout the NHMP maintenance process.

NHMP Adoption

44 CFR 201.6(c)(5) – Documentation that the plan has been formally adopted by the governing body of the jurisdiction . . .

44 CFR 201.6(d) – Plan review [process] . . .

Once the NHMP is locally reviewed and deemed complete the NHMP Convener (or their designee) submits it to the State Hazard Mitigation Officer at the Oregon Department of Emergency Management (OEM). OEM reviews the NHMP and submits it to the Federal Emergency Management Agency (FEMA – Region X) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201.6. Once the NHMP is pre-approved by FEMA, the County and cities formally adopt the NHMP via resolution. The Jackson County NHMP Convener will be responsible for ensuring local adoption of the NHMP and providing the support necessary to ensure NHMP implementation. Once the resolution is executed at the local level and documentation is provided to FEMA, the NHMP is formally acknowledged by FEMA and the County (and participating cities) will maintain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and the Flood Mitigation Assistance program funds.

The accomplishment of the NHMP goals and actions depends upon regular Steering Committee participation and adequate support from County and City leadership. Thorough familiarity with this NHMP will result in the efficient and effective implementation of appropriate mitigation activities and a reduction in the risk and the potential for loss from future natural hazard events.

The Steering Committees for Jackson County and participating cities and special districts each met to review the NHMP update process, and their governing bodies adopted the NHMP.

The county date of adoption, FEMA approval, and plan expiration is shown below. See Volume III for dates specific to each participating city and special district.

Jackson County adopted the NHMP on [Month Day], 2023. FEMA Region X approved the Jackson County NHMP on [Month Day], 2023. With approval of this NHMP, the entities listed above are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through [Month Day-1], 2023.

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Section 1: Introduction

This section provides a general introduction to natural hazard mitigation planning in Jackson County. In addition, it addresses the planning process requirements contained in 44 CFR 201.6(b) thereby meeting the planning process documentation requirement contained in 44 CFR 201.6(c)(1). The section concludes with a general description of how the NHMP is organized.

What is Natural Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines mitigation as ". . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk."[5] Said another way, natural hazard mitigation is a method of permanently reducing or alleviating the losses of life, property and injuries resulting from natural hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, seismic retrofits to critical facilities and education and outreach to targeted audiences, such as Spanish speaking residents or the elderly. Natural hazard mitigation is the responsibility of the "Whole Community"; individuals, private businesses and industries, state and local governments and the federal government.

Engaging in mitigation activities provides jurisdictions (counties, cities, special districts, etc.) with many benefits, including reduced loss of life, property, essential services, critical facilities, and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within the community through the planning process; and increased potential for state and federal funding for recovery and reconstruction projects.

Why Develop a Mitigation Plan?

Jackson County updated this Multi-Jurisdictional Natural Hazard Mitigation Plan (NHMP) to reduce future loss of life and damage to property resulting from natural hazards. It is impossible to predict exactly when natural hazard events will occur, or the extent to which they will affect community assets. However, with careful planning and collaboration among public agencies, private sector organizations and residents within the community, it is possible to minimize the losses that can result from natural hazards.

[5] FEMA, *What is Mitigation?* http://www.fema.gov/what-mitigation

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 to receive federal funds for mitigation projects. Local and federal approval of this NHMP ensures that the County and listed cities will remain eligible for pre- and post-disaster mitigation project grants.

What Federal Requirements Does This NHMP Address?

DMA2K reinforces the importance of mitigation planning and emphasizes planning for natural hazards before they occur. As such, this Act established the Pre-Disaster Mitigation (PDM) grant program (often referred to as the non-disaster grant program) and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). Section 322 of the Act specifically addresses mitigation planning at the state and local levels. State and local jurisdictions must have approved mitigation plans in place to qualify to receive post-disaster HMGP funds. Mitigation plans must demonstrate that State and local jurisdictions' proposed mitigation measures are based on a sound planning process that accounts for the risk to the individual and State and local jurisdictions' capabilities.

Title 44 Code of Federal Regulations (CFR), section 201.6, also requires a local government to have an approved NHMP in order to receive HMGP project grants.[6] Pursuant of Title 44 CFR, the NHMP planning processes shall include opportunity for the public to comment on the NHMP during review and the updated NHMP shall include documentation of the public planning process used to develop the NHMP.[7] The NHMP update must also contain a risk assessment, mitigation strategy and a NHMP maintenance process that has been formally adopted by the governing body of the jurisdiction.[8] Lastly, the NHMP must be submitted to the Oregon Office of Emergency Management (OEM) for initial review and then sent to FEMA for federal approval.[9] Additionally, the way OEM administers the Emergency Management Performance Grant (EMPG), which helps fund local emergency management programs, also requires a FEMA-approved NHMP.

What is the Policy Framework for Natural Hazard Planning in Oregon?

Planning for natural hazards is an integral element of Oregon's statewide land use planning program, which began in 1973. All Oregon cities and counties have comprehensive plans

[6] Code of Federal Regulations, Title 44, Part 201, Section 201.6, subsection (a).

[7] ibid, subsection (b).

[8] ibid, subsection (c).

[9] ibid, subsection (d).

(Comprehensive Plans) and implementing ordinances that are required to comply with the statewide planning goals. The challenge faced by state and local governments is to keep this network of local plans coordinated in response to the changing conditions and needs of Oregon communities.

Statewide land use planning Goal 7: Areas Subject to Natural Hazards calls for local plans to include inventories, policies, and ordinances to guide development in or away from hazard areas. Goal 7, along with other land use planning goals, has helped to reduce losses from natural hazards. Through risk identification and the recommendation of risk-reduction actions, this NHMP aligns with the goals of the jurisdiction's Comprehensive Plan and helps each jurisdiction meet the requirements of statewide land use planning Goal 7.

The primary responsibility for the development and implementation of risk reduction strategies and policies lies with local jurisdictions. However, additional resources exist at the state and federal levels. Some of the key agencies in this area include Oregon Department of Emergency Management (OEM), Oregon Building Codes Division (BCD), Oregon Department of Forestry (ODF), Oregon Department of Geology and Mineral Industries (DOGAMI) and the Department of Land Conservation and Development (DLCD).

How was the NHMP Developed?

The NHMP was developed by the Jackson County Natural Hazard Mitigation Plan Steering Committee and the Steering Committees for the cities of Ashland, Butte Falls, Central Point, Eagle Point, Gold Hill, Jacksonville, Phoenix, Rogue River, Shady Cove, and Talent, as well as Medford Water, Jackson County Fire District #3, and Jackson County Fire District #5. *Note: The City of Medford has a stand-alone NHMP.* The Jackson County Steering Committee formally convened on several occasions to discuss and revise the NHMP. Each of the participating city and special district Steering Committees met at least once formally. Steering Committee members contributed data and maps, reviewed, and updated the community profile, risk assessment, action items and implementation and maintenance plan.

An open public involvement process is essential to the development of an effective NHMP. To develop a comprehensive approach to reducing the effects of natural disasters, the planning process shall include opportunity for the public, neighboring communities, local and regional agencies, as well as private and non-profit entities to comment on the NHMP during review.[10] Jackson County provided an accessible project website for the public to provide feedback on the draft NHMP. In addition, Jackson County provided a press release on their website to encourage the public to offer feedback on the NHMP update. The County and city websites continue to be a focal point for distribution natural hazard information using hazard viewers, emergency alerts, hazard preparation and annual natural hazard progress reports.

[10] Code of Federal Regulations, Chapter 44. Section 201.6, subsection (b). 2015

How is the NHMP Organized?

Each volume of the NHMP provides specific information and resources to assist readers in understanding the hazard-specific issues facing county and city residents, businesses and the environment. Combined, the sections work in synergy to create a mitigation plan that furthers the community's mission to reduce or eliminate long-term risk to people and their property from hazards and their effects. This NHMP structure enables stakeholders to use the section(s) of interest to them.

Volume I: Basic Plan and Appendices

Plan Summary

The NHMP summary provides an overview of the FEMA requirements, planning process and highlights the key elements of the risk assessment, mitigation strategy and implementation and maintenance strategy.

Section 1: Introduction

The Introduction briefly describes the countywide mitigation planning efforts and the methodology used to develop the NHMP.

Section 2: Hazard Identification and Risk Assessment

This section provides the factual basis for the mitigation strategies contained in Volume I, Section 3. (Additional information is included within Volume II, Appendix C, which contains an overall description of Jackson County and the 11 incorporated cities.) This section includes a brief description of community sensitivities and vulnerabilities. The Risk Assessment allows readers to gain an understanding of each jurisdiction's vulnerability and resilience to natural hazards.

A hazard summary is provided for each of the hazards addressed in the NHMP. The summary includes hazard history, location, extent, vulnerability, impacts, and probability. This NHMP addresses the following hazards:

Air Quality

Drought

Earthquake

Emerging Infectious Disease

Flood

Landslide

Severe Weather

- Extreme Heat
- Windstorm
- Winter Storm

Volcanic Event

Wildfire

Additionally, this section provides information on each jurisdictions' participation in the National Flood Insurance Program (NFIP).

Section 3: Mitigation Strategy

This section documents the NHMP vision, mission, goals, and actions (mitigation strategy) and describes the components that guide implementation of the identified actions. Actions are based on community sensitivity and resilience factors and the risk assessments in Volume I, Section 2.

Section 4: Plan Implementation and Maintenance

This section provides information on the implementation and maintenance of the NHMP. It describes the process for prioritizing projects and includes a suggested list of tasks for updating the NHMP, to be completed at the semi-annual and five-year review meetings.

Volume II: Appendices

The appendices are designed to provide the users of the Jackson County NHMP with additional information to assist them in understanding the contents of the NHMP and provide them with potential resources to assist with NHMP implementation.

Appendix A: Glossary and Acronyms

This appendix includes a list of terms, and their acronyms, related to natural hazard mitigation that are found throughout this NHMP.

Appendix B: Planning and Public Process

This appendix includes documentation of all the countywide public processes utilized to develop the NHMP. It includes invitation lists, agendas, sign-in sheets, and summaries of Steering Committee meetings as well as any other public involvement methods.

Appendix C: Community Profile

The community profile describes the County and participating cities from several perspectives to help define and understand the region's sensitivity and resilience to natural hazards. The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the region when the plan was updated.

Appendix D: Economic Analysis of Natural Hazard Mitigation Projects

This appendix describes the Federal Emergency Management Agency's (FEMA) requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities.

Appendix E: Grant Programs and Resources

This appendix lists state and federal resources and programs by hazard.

Appendix F: Community Survey

The survey was designed to get a better understanding of the community's understanding and needs relating to prescribed burning and wildfire smoke throughout the county.

Volume III: Jurisdictional Addenda

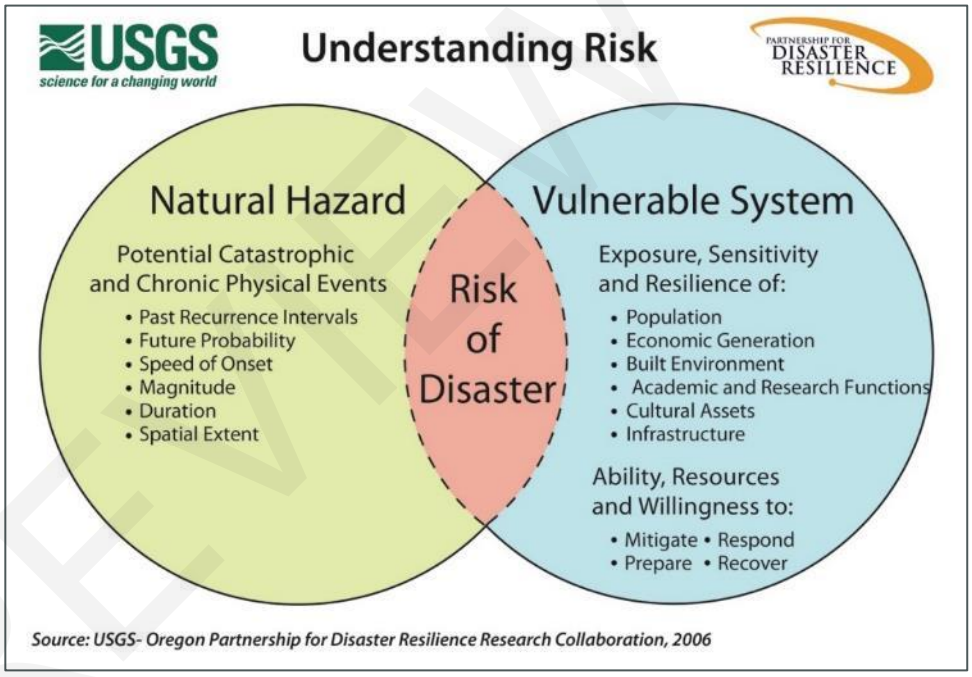
Volume III of this NHMP is reserved for any city and special district addenda developed in this multi-jurisdictional planning process. Ten of the cities and three special districts within the County created addenda. As such, the five-year update cycle will be the same for these cities, special districts, and the County. The city of Medford has a stand-alone NHMP. Central Point, Jackson County Fire District #3, Jackson County Fire District #5, and Medford Water developed addenda to this plan for the first time. Future updates to the NHMP will seek to incorporate Medford and other eligible special districts in the county.

Section 2: Hazard Identification and Risk Assessment

This section of the NHMP addresses 44 CFR 201.6(b)(2) - Risk Assessment. The Risk Assessment applies to Jackson County and the city addenda included in the NHMP. We address city specific information where relevant. In addition, this chapter can assist with addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards.

We use the information presented in this section, along with community characteristics presented in Volume II, Appendix C to inform the risk reduction actions identified Volume I, Section 2. Figure 2-1 shows how we conceptualize risk in this NHMP. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.

Figure 2-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience.

What is a Risk Assessment?

A risk assessment consists of three phases: hazard identification, vulnerability assessment and risk analysis.

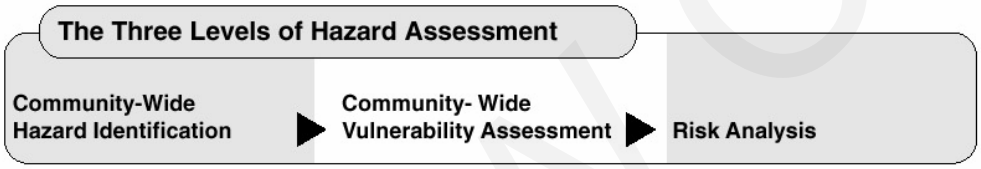
Phase 1: Identify hazards that can affect the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.

Phase 2: Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.

Phase 3: Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The following figure illustrates the three-phase risk assessment process:

Figure 2-2 Three Phases of a Risk Assessment



Source: Planning for Natural Hazards: Oregon Technical Resource Guide, 1998

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

Hazard Identification

Jackson County identifies nine natural hazards that could have an impact on the County and participating cities. Table 2-1 lists the hazards identified in the county in comparison to the hazards identified in the Oregon NHMP for the Southwest Oregon (Region 4), which includes Jackson County.

Table 2-1 Jackson County Hazard Identification

Jackson County	State of Oregon NHMP Region 4: Southwest Oregon
Air Quality	-
Drought	Drought
Earthquake	Earthquake
Emerging Infectious Disease	-
Flood	Flood
Landslide	Landslide
Severe Weather	
Extreme Heat Event	-
Windstorm	Windstorm
Winter Storm	Winter Storm
Volcanic Event	Volcano
Wildfire	Wildfire

Source: Jackson County NHMP Steering Committee (2023) and State of Oregon NHMP, Region 4: Southwest Oregon (2020)

Risk Assessment

Multi-jurisdictional Risk Assessment - §201.6(c) (2) (iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

Hazard Analysis Matrix

For hazard mitigation planning at the county and local level, conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with a sense of hazard priorities but does not predict the occurrence of a hazard. . It doesn't predict the occurrence of a hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest.

For the purposes of this NHMP, the County and cities utilized the Oregon Office of Emergency Management (OEM) Hazard Analysis methodology. The hazard analysis methodology in Oregon was first developed by FEMA circa 1983 and gradually refined by OEM over the years.

The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). Vulnerability and probability are the two key components of the methodology. Vulnerability examines both typical and maximum credible events and probability reflects how physical changes in the jurisdiction and scientific research modify the historical record for each hazard. Vulnerability accounts for approximately 60% of the total score and probability approximately 40%. The hazard analysis summary is included here to ensure consistency between the EOP and NHMP.

Risk has two measurable components: (1) the magnitude of the harm that may result, defined through the vulnerability assessment (assessed in the previous sections) and (2) the likelihood or probability of the harm occurring. Table 2-2 presents the entire updated hazard analysis matrix for Jackson County. The hazards are listed in rank order from high to low. The table shows that hazard scores are influenced by each of the four categories combined. With considerations for past historical events, the probability or likelihood of a hazard event occurring, the vulnerability to the community and the maximum threat or worst-case scenario, earthquake (Cascadia), Pandemic/Epidemic and Wildland Fire events rank as the top hazard threats to the County (top tier). Drought, winter storm and windstorm events rank in the middle (middle tier). Flood, Earthquake (Crustal), Landslide and Volcano comprise the lowest ranked hazards in the county (bottom tier).

Table 2-2 Hazard Analysis Matrix – Jackson County

Hazard	History	Vulnerability	Maximum Threat	Probability	Total Threat Score	Hazard Rank	Hazard Tiers
Wildfire	20	40	100	70	230	1	*Top Tier*
Emerging Infectious Disease	16	40	100	49	205	2	
Earthquake (Cascadia)	2	40	100	49	191	3	
Extreme Heat Event	20	25	70	70	185	4	
Drought	20	30	70	63	183	5	*Middle Tier*
Air Quality	18	40	60	63	181	6	
Winter Storm	20	30	60	70	180	7	
Windstorm	20	25	60	70	175	8	
Flood (Riverine)	20	20	60	70	170	9	*Bottom Tier*
Landslide	10	15	30	70	125	10	
Earthquake (Crustal)	2	15	30	21	68	11	
Volcanic Event	2	5	50	7	64	12	

Source: Jackson County Steering Committee (2023); Analysis and Ranking by OPDR

For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with a sense of hazard priorities but does not predict the occurrence of a particular hazard.

City Specific Risk Assessment

Multi-jurisdictional Risk Assessment - §201.6(c) (2) (iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The ten (10) participating cities and three special districts held Steering Committee meetings and completed a jurisdiction specific hazard analysis. The multi-jurisdictional risk assessment information is located herein and within the Risk Assessment of each jurisdiction's addendum (Volume III).

Federal Disaster and Emergency Declarations

Reviewing past events can provide a general sense of the hazards that have caused significant damage in the county. Where trends emerge, disaster declarations can help inform hazard mitigation project priorities.

President Dwight D. Eisenhower approved the first federal disaster declaration in May 1953 following a tornado in Georgia. Since then, federally declared disasters have been approved within every state because of natural hazard related events. As of March 2023, FEMA has approved a total of 39 major disaster declarations, 98 fire management assistance declarations and four (4) emergency declarations in Oregon.[11] When governors ask for presidential declarations of major disaster or emergency, they stipulate which counties in their state they want included in the declaration. Table 2-3 summarizes the major disasters declared in Oregon that affected Jackson County, since 1955. The table shows that there have been six (6) major disaster declarations for the County. All of which were related to weather events resulting primarily in flooding, snow, and landslide related damage.

Table 2-3 FEMA Major Disaster (DR) for Jackson County

Declaration Number	Declaration Date	Incident Period		Incident	Individual Assistance	Public Assistance Categories
		From	To			
DR-184	12/24/1964	12/24/1964	12/24/1964	Heavy rains and flooding	Yes	A, B, C, D, E, F, G
DR-413	1/25/1974	1/25/1974	1/25/1974	Severe Storms, Snowmelt, Flooding	Yes	A, B, C, D, E, F, G
DR-1160	1/23/1997	12/25/1996	1/6/1997	Severe Winter Storms/Flooding	Yes	A, B, C, D, E, F, G
DR-1632	3/20/2006	12/18/2005	1/21/2006	Severe Storms, Flooding, Landslides, and Mudslides	None	A, B, C, D, E, F, G
DR-4499	3/28/2020	1/20/2020	5/11/2023	Oregon Covid-19 Pandemic	Yes	A, B, C, D, E, F, G
DR-4562	9/15/2020	9/7/2020	11/3/2020	Oregon Wildfires and Straight-line Winds	Yes	A, B, C, D, E, F, G

Source: FEMA, Oregon Disaster History. Major Disaster Declarations.

Table 2-4 summarizes fire management assistance and emergency declarations. Fire Management Assistance may be provided after a State submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" for a fire emergency

[11] FEMA, *Declared Disasters by Year or State*, http://www.fema.gov/news/disaster_totals_annual.fema#markS. Accessed March 2, 2016.

exists. There are fourteen (14) fire management assistance declarations on record for the County.

An Emergency Declaration is more limited in scope and without the long-term federal recovery programs of a Major Disaster Declaration. Generally, federal assistance and funding are provided to meet a specific emergency need or to help prevent a major disaster from occurring. Jackson County has four (4) recorded Emergency Declarations: the 1977 Drought, 2005 Hurricane Katrina evacuation, and Covid-19 and the Oregon Wildfires in 2020.

Table 2-4 FEMA Emergency (EM) and Fire Management Assistance (FMA) Declarations for Jackson County

Declaration Number	Declaration Date	Incident Period From	Incident Period To	Incident	Individual Assistance	Public Assistance Categories
FM-2014	9/7/1973	9/7/1973	-	Hillsview Fire	None	-
FM-2063	9/2/1987	8/30/1987	-	Savage Creek Fire	None	-
FM-2064	9/2/1987	8/30/1987	-	Sykes Creek Fire	None	-
FM-2083	8/4/1992	8/3/1992	-	East Evans Creek Fire	None	-
FM-2112	8/24/1994	8/24/1994	-	Hull Mountain Fire	None	-
FM-2445	7/17/2002	7/16/2002	7/21/2002	Squires Peak Fire	None	B
FM-2454	7/28/2002	7/27/2002	8/5/2002	Timbered Rock Fire	None	B
FM-2496	9/6/2003	9/5/2003	9/8/2003	Cove Road Fire	None	B, H
FM-2838	9/22/2009	9/21/2009	9/24/2009	South County Fire Complex	None	B, H
FM-5066	8/1/2014	7/31/2014	7/31/2014	Oregon Gulch Fire	None	-
FM-5256	7/19/2018	7/18/2018	9/8/2018	Garner Fire Complex	None	B, H
FM-5274	8/24/2018	8/23/2018	8/30/2018	Ramsey Canyon Fire	None	B, H
FM-5364	9/9/2020	9/8/2020	9/15/2020	Almeda Glendower Fire	None	B, H
FM-5367	9/9/2020	9/8/2020	-	South Obenchain Fire	None	B, H
EM-3039	4/29/1977	4/29/1977	4/29/1977	Drought	None	A, B
EM-3228	9/7/2005	8/29/2005	10/1/2005	Hurricane Katrina Evacuation	None	B
EM-3429	3/13/2020	1/20/2020	5/11/2023	Oregon Covid-19	None	B
EM-3542	9/10/2020	9/8/2020	9/15/2020	Oregon Wildfires	None	B

Source: FEMA, Oregon Disaster History. Major Disaster Declarations.

Hazard Profiles

The following subsections briefly describe relevant information for each hazard. For additional background on the hazards, vulnerabilities and general risk assessment information for hazards in Southwest Oregon (Region 4), refer to the State of Oregon NHMP, Region 4, Southwest Oregon Risk Assessment (2020)

Air Quality

Significant Changes since Previous NHMP:

The air quality hazard section has been added to the plan since the previous NHMP. No development changes affected the jurisdiction's overall vulnerability to this hazard.

Characteristics

Air Quality is impacted by airborne particles like dust, soot, smoke, and droplets. These particles can be measured by the amount of particulate matter or "PM" in the air. PM is a mixture of not only very small particles and liquid droplets but also many different components like acids, organic chemicals, metals, and dust. PM is measured in micrometers (microns, µm). PM2.5 is less than or equal to 2.5µm in diameter.[12]

The Clean Air Act of 1970 and the U.S. Environmental Protection Agency (EPA) established health-based National Ambient Air Quality Standards (NAAQS) for these relevant air pollutants:

- Carbon Monoxide: Carbon monoxide is a colorless and odorless gas that interferes with the body's ability to use oxygen. Carbon monoxide in ambient air is formed primarily by the incomplete combustion of carbon-containing fuels and photochemical reactions in the atmosphere, with on-road mobile sources representing significant sources of CO to ambient air. Microenvironments influenced by on-road mobile sources are important contributors to ambient CO exposures, particularly in urban areas. Where present, other (non-ambient) CO sources can also be important influences on total CO exposure and on the impact of ambient CO exposure.
- Ozone: Ozone (O3) is part of the ozone layer in the Earth's stratosphere. Ozone is harmful outside of the ozone layer in our lower atmosphere and at that point it is often referred to as smog, ground level ozone, or ozone pollution. Ozone typically forms on days when the temperature is warm and stable. Ground level ozone is not

[12] Outdoor Air Quality. Oregon Health Authority. Accessed 10 May 2022 from: https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/TRACKINGASSESSMENT/ENVIRONMENTALPUBLICHEALTHTRACKING/Pages/EPHT-Indicator-Outdoor-Air.aspx#outdoorair

emitted directly into the air, it is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NOx and VOC. Breathing ozone can trigger a variety of health problems, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma. Ground level ozone can also have harmful effects on sensitive vegetation and ecosystems.

- **Particulate Matter:** Particulate matter (PM10 and PM2.5) is the generic term for a broad class of chemically and physically diverse substances that exist as discrete liquid and/or solid particles over a wide range of sizes. Particulate matter Particles originate from a variety of anthropogenic stationary and mobile sources, as well as from natural sources - mostly from smoke, dust, and vehicle exhaust. Particles may be emitted directly or formed in the atmosphere by transformations of gaseous emissions such as sulfur oxides (SOX), oxides of nitrogen (NOX), and volatile organic compounds.

The areas that fail to meet the standards are designated "non-attainment" and are required to develop plans to come into compliance with the standards. Once compliance with the standard is achieved, a maintenance plan is developed to ensure that air quality will not be compromised in the future. The Air Quality Maintenance Area (AQMA) in Jackson County is the Medford-Ashland AQMA. Figure 2-3 shows the Medford-Ashland AQMA.

The Oregon Department of Environmental Quality (DEQ) is a regulatory agency with the responsibility to protect and enhance the quality of Oregon's environment. DEQ is responsible for providing accurate scientific data concerning the State of Oregon's air quality "to ensure that the state meets the National Ambient Air Quality Standards (NAAQS) as required by the Federal Clean Air Act".

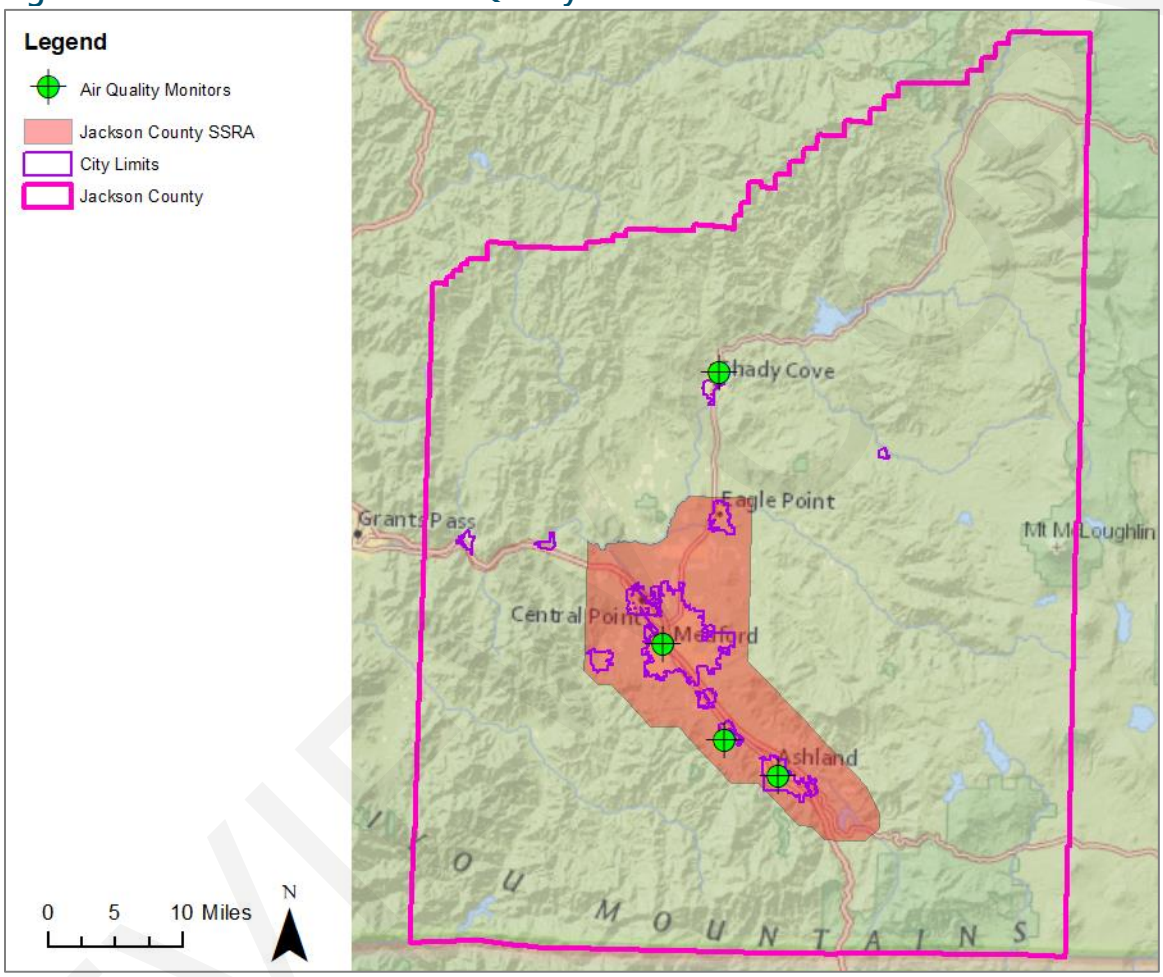
Location and Extent

Air quality varies throughout Jackson County. The Medford-Ashland Air Quality Maintenance Area (AQMA) has certain thresholds for PM2.5, ozone, and air toxics to comply with DEQ and EPA requirements. The strength or magnitude of the hazard is variable. Factors that contribute to variability include direction and strength of prevailing winds, temperature, and emissions from wood stoves, industry, motor vehicles, and wildfires.

Given its bowl-like shape, the Rogue Valley experiences periods of air stagnation and atmospheric temperature inversions that trap pollution, particularly during the months of November, December, January, and February. During these months, the temperature near the ground decreases rapidly toward sunset. As the surface air cools, it flows down the mountain slopes, forming a pool of cold air on the valley floor with the warmer air above acting as a lid. The cooling within this layer typically produces fog, and, as air pollutants are discharged, they become trapped. During these stagnant conditions, the fog and trapped air can remain under this "lid" for several days, becoming increasingly polluted and unhealthy.

In the past, the largest sources of air pollution in the region included industry and residential wood stoves, which emit particulate matter and carbon monoxide. Substantial efforts have been made to reduce these emissions. More recently, concerns for air quality arise when smoke from regional wildfires either blows through the valley or becomes trapped during inversions.

Figure 2-3 Medford-Ashland Air Quality Maintenance Area



Source: Oregon DEQ, OPDR

History

The following poor air quality episodes have occurred within City of Medford – over 50 days of poor air quality events were added to this hazard history section since the previous plan.

- 1978: The Medford UGB was established as the non-attainment boundary for CO.
- 1980s: The NAAQS for CO was exceeded most of the 1980s in Medford.
- 1982: A Jackson County State Improvement Plan (SIP) was developed for CO because it exceeded the NAAQS in the Medford-Ashland AQMA. It was approved by the EPA.
- 1989: Jackson County began programs to improve PM10 levels, including regulating industry, outdoor burning, and wood stoves, to reduce the regional smoke.

- **1999-2000:** CO standards were twice exceeded in the Medford-Ashland Air Quality Maintenance Area (AQMA).
- **2002:** Smoke from the Timbered Rock Fire blew in from the NE and choked the valley. DEQ advised people with health problems to stay in air-conditioned environments and avoid exercise outside. Smoke continued from summer to Labor Day.
- **2013:** Wildfires brought the Medford AQI to a high of 238.5 ug/m3 and the 24-hour average to 188.3 ug/m3.
- **2015:** Wildfires resulted in the AQI of 183.6 ug/m3 and the 24-hour average was 118.6 ug/m3.
- **2017:** Chetco Bar Fire contributed wildfire smoke to the Rogue Valley.
- **2018:** Regional wildfire led to poor air quality with an AQI of 163.7 ug/m3 on August 23, 2018.
- **2020:** Wildfires across the state led to the worst air quality in Medford's history. Air was so hazardous that it topped off state's air monitors.
- **2021:** Wildfires resulted in the AQI of 192 ug/m3. The number of PM2.5 was 13 times higher than the World Health Organization's suggested maximum.

Table 2-5 shows the US EPAs Air Quality Index summary data for Jackson County from 2010 through 2022. During this 12-year period there have been an annual average of 6.2 days of unhealthy air quality for sensitive groups (AQI 101 to 150), 7.2 days of unhealthy air quality (AQI 151 to 200), 1.4 days of very unhealthy air quality (AQI 201 to 300), and 0.5 days of hazardous air quality (AQI 301 or higher). Since the last plan update there has been an increase in days with higher AQI associated with wildfire smoke in 2017, 2018, 2020, and 2021.

Table 2-5 Air Quality Index Summary Report

Year	Days				Annual	
	Unhealthy for Sensitive Groups AQI 101-150	Unhealthy AQI 151-200	Very Unhealthy AQI 201-300	Hazardous AQI 301 or higher	AQI Maximum	Days AQI 101 or higher
2022	5	3	0	0	161	8
2021	6	24	5	0	241	35
2020	2	5	4	4	517	15
2019	3	4	0	0	180	7
2018	11	27	4	0	233	42
2017	16	11	2	2	356	31
2016	0	0	0	0	81	0
2015	18	10	1	0	284	29
2014	2	0	0	0	121	2
2013	12	9	2	0	238	23
2012	3	0	0	0	110	3
2011	3	0	0	0	121	3
2010	0	0	0	0	93	0
Average	6.2	7.2	1.4	0.5	210.5	15.2
Total Days	81	93	18	6	-	

Source: US EPA Outdoor Air Quality Data: Air Quality Index Report. Accessed March 22, 2023.

Future Climate Projection

According to OCCRI report *Future Climate Projections: Jackson County* climate change is expected to cause worsening outdoor air quality. The risk of wildfire smoke in Jackson County is expected to increase. The number of days per year where concentration of fine particulate matter from wildfire leads to poor air quality is projected to decrease by 20% but the concentration is expected to increase by 81%.

Probability Assessment

Based on the available data and research the Steering Committee determined the **probability of experiencing an Air Quality Event is "high",** meaning one incident may occur within the next 35-year period. *This hazard was not included in the previous plan and was added for this version of the plan.*

Parts of Jackson County experience winter air stagnation. Depending upon climate conditions, these stagnations can be infrequent or numerous in any given year, which can have a potential impact to air quality levels for both PM2.5 and ozone in the area.[46] Prevailing wind direction and strength can influence the location and extent of the air quality impacts. The probability of air quality at one level or another varies, as air quality is a range based on multiple factors such as those measured for CO, PM2.5 and others described herein. Air quality is also impacted by wildfire smoke which is expected to be an increasing concern as temperatures rise and droughts persist.

Vulnerabilities

The NHMP Steering Committee rated the county as having a **"high" vulnerability to Air Quality events**, meaning that 10% or more of the city's population could be affected by a major air quality event. *This hazard was not included in the previous plan and was added for this version of the plan.*

Due to insufficient data and resources, Jackson County is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard.

Due to the high level of exposure to climatic hazard event such poor air quality in Jackson County, populations sensitive to poor air quality are especially susceptible to the greatest impacts.

Air pollution affects health in several ways. They range from upper respiratory tract irritation, coughing and shortness of breath to aggravating conditions such as asthma, emphysema, and bronchitis. Long-term exposure to PM2.5 is associated with reduced lung function, development of chronic bronchitis, heart disease and premature death. The small size of these particles allows them to get deep into the lungs and reach the bloodstream.

Exposure to Carbon Monoxide can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced

oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress. For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion.

Exposure to ground-level ozone can aggravate asthma and cause respiratory symptoms like coughing and lung inflammation. Repeated exposure may cause permanent damage to lung tissue. While the effects of acute, short-term episodes of ozone exposure are reversible, the human body's response to long-term exposure may not be reversible. Exposure to ozone at levels we commonly encounter in many of our own communities permanently scars the lungs of experimental animals, causing long-term impairment of lung capacity, or the volume of air that can be expelled from fully inflated lungs. Ozone may have similar effects on human lungs. Studies in animals also suggest that ozone may reduce the human immune system's ability to fight bacterial infections in the respiratory system.

Exposure to Particulate Matter is directly linked to the size of the PM regarding their potential for causing health problems. Small particles less than 10 micrometers in diameter pose the greatest problems, because they can get deep into lungs and the bloodstream. Exposure to such particles can affect both the lungs and heart. People with heart or lung diseases, children, and older adults are the most likely to be affected by particle pollution exposure. Numerous scientific studies have linked particle pollution exposure to problems, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.

Apart from the health effects, air quality is a constraining factor on transportation choices and commercial/industrial development. Cars, trucks, industry and commerce and diverse activities discharge pollutants into the air.

Jackson County Community Response Plan (CRP)

Jackson County has completed a Community Response Plan for Wildfire and Prescribed Fire Smoke. The purpose of this plan is to improve methods of communication and notification of smoke events within Jackson County and provide strategies for helping members of the community, especially those that are most vulnerable, avoid smoke from wildfire and prescribed burning.

The Oregon Department of Forestry (ODF) and Department of Environmental Quality (DEQ) regulate CRPs under Oregon Administrative Rule (OAR 629-048) The rule provides minimum standards to obtain a one-hour smoke intrusion threshold exemption. OAR 629-048-0180 (2)(a) requires the plan to include:

(A) A description of populations in an SSRA community that are vulnerable to the health effects of short-term smoke exposure

(B) Adequate means by which the public, especially vulnerable populations in the SSRA community will be notified in a clear and reliable way of anticipated smoke impacts in a timely manner
(C) Adequate options for protection the health of vulnerable populations (or helping such populations to protect themselves) from short-term exposure to smoke; and
(D) A plan and program for communications between the entities that conduct prescribed fire, the local public health authority, and the community's public and vulnerable populations who may be impacted by smoke.

Drought

Significant Changes since Previous NHMP:

The drought hazard section has been edited to reference new history since the previous NHMP. No development changes affected the jurisdiction's overall vulnerability to this hazard.

Characteristics

A drought is a period of drier than normal conditions. Drought occurs in virtually every climatic zone, but its characteristics vary significantly from one region to another. Drought is a temporary condition; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate. The extent of drought events depends upon the degree of moisture deficiency and the duration and size of the affected area. Typically, droughts occur as regional events and often affect more than one city and county.

Location and Extent

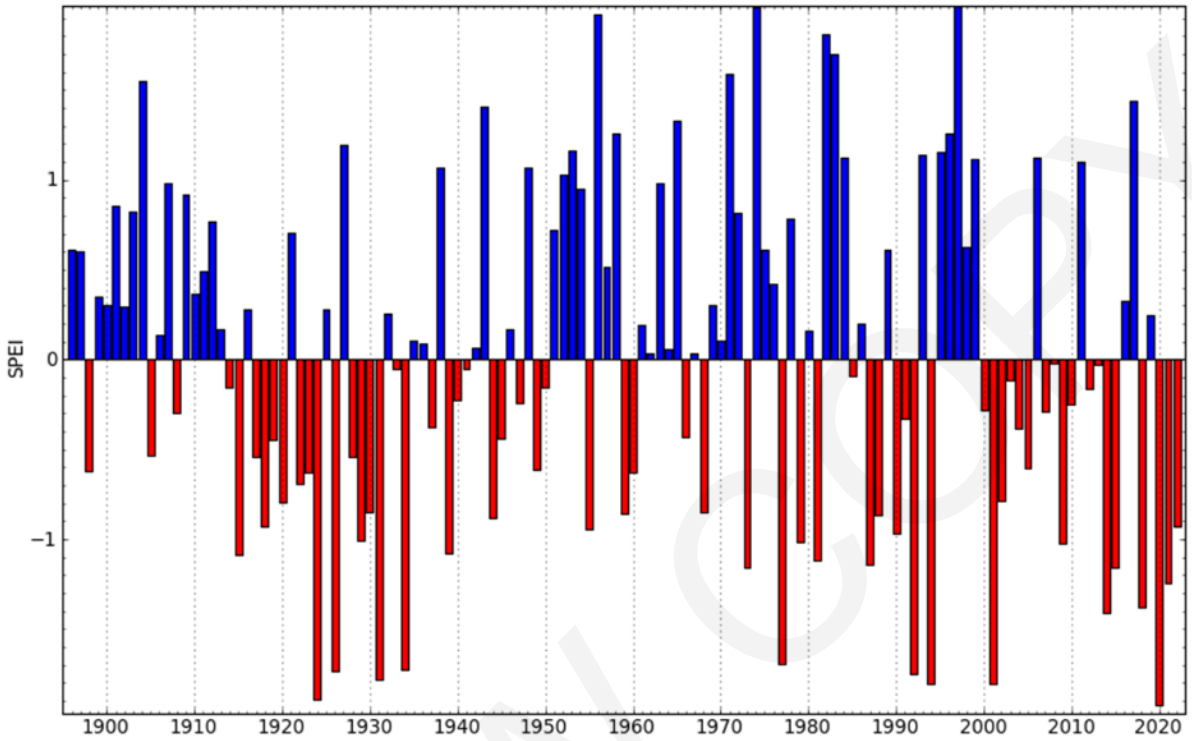
Droughts occur in every climate zone and can vary from region to region. Drought may occur throughout Jackson County and may have profound effects on the economy, particularly the agricultural and hydro-power sectors. Drought is typically measured in terms of water availability in a defined geographical area. It is common to express drought with a numerical index that ranks severity. Most federal agencies use the Palmer Method which incorporates precipitation, runoff, evaporation, and soil moisture. However, the Palmer Method does not incorporate snowpack as a variable. Therefore, it is not believed to provide a very accurate indication of drought conditions in Oregon and the Pacific Northwest.

The Standardized Precipitation-Evapotranspiration Index (SPEI) is an index of water conditions throughout the state. The index is designed to account for precipitation and evapotranspiration to determine drought. The lowest SPEI values, below -2.0, indicate extreme drought conditions. Severe drought occurs at SPEI values between -2.0 and -1.5, and moderate drought occurs between -1.5 and -1.0.

Figure 2-4 shows the water year (October 1 – September 30) history of SPEI from 1923 to 2023 for Jackson County. The SPEI record indicates that the county has experienced no periods of extreme drought and nine years of severe drought (water years 1924, 1926, 1931, 1934, 1977, 1992, 1994, 2001, and 2020). In addition, there are 11 years of moderate drought and 42 years of mild drought.[13]

[13] Oregon Water Resources Department Public Declaration Status Report, http://apps.wrd.state.or.us/apps/wr/wr_drought/declaration_status_report.aspx, accessed April 7, 2023.

Figure 2-4 Standardized Precipitation-Evapotranspiration Index, 12-Months Ending in September, Jackson County, OR (1895-2022)



Source: Western Regional Climate Center. West Wide Drought Tracker. https://wrcc.dri.edu/wwdt/time/. Created April 7, 2023. Data retrieval method: Counties.

History

- **1904-1905:** Statewide drought period for about 18 months.
- **1928-1941:** A significant drought affected all of Oregon from 1928 to 1941. The prolonged statewide drought created significant problems for the agricultural industry. The first of the three Tillamook Forest burns occurred during this drought in 1933.
- **1976-1981:** Low stream flows prevailed in western Oregon during the period from 1976-1981, but the worst year by far was 1976-1977, the single driest year of the century.
- **1985-1997:** A dry period lasting from 1985 to 1994 caused significant problems statewide. The peak year was 1992 when the state declared a drought emergency. In the seven-year period from 1986-1992, Medford received only five years' worth of precipitation and other areas of southern Oregon were also significantly affected. Forests throughout Oregon suffered from a lack of moisture with fires common and insect pests flourishing. *Drought status was declared by the governor in 1991 (EO-91-05), 1992 (EO-92-21) and 1994 (EO-94-09).*
- **2000-2001:** Klamath drought intensifies; low snowpack in mountains worsen conditions. Draw down at Detroit Lake, all but curtails lake recreation. Drought status was declared by the governor in 2001 (EO-01-11).

- **2005:** February 2005 was the driest month on record since 1977, surpassing 2001 conditions. Above normal temperatures contributed to decreased water availability for the summer. Stream and river levels dropped significantly and Watermasters regulated live flow use by irrigators. Drought conditions also led to the use of stored water when it was available.
- **2010:** Determination of a State of Drought Emergency in Klamath County and adjacent counties (including Jackson County) due to Drought and Low Water Conditions (EO-10-03).
- **2014:** Determination of a State of Drought Emergency in Jackson County due to Drought and Low Water Conditions (EO-14-04).
- **2015:** Determination of a state of drought emergency in Deschutes, Grant, Jackson, Josephine, Lane, Morrow, Umatilla and Wasco counties due to drought, low snow pack levels and low water conditions. Drought status was also declared by the President (EO-15-05).
- **2020:** Determination of a state of drought emergency in Jackson County due to unusually low streamflow and hot, dry conditions (EO 20-23).
- **2021:** Determination of a state of drought emergency in Jackson County due to unusually low snow pack, lack of precipitation, low streamflow, and low reservoir levels (EO 21-08).
- **2022:** Determination of a state of drought emergency in Gillam, Harney, and Jackson Counties (EO 22-06)
- **2023:** Determination of a state of drought emergency in Jackson County due to continued abnormally dry conditions and below average reservoir storage (EO 23-15)

El Niño/La Nina

El Niño Southern Oscillation (ENSO) weather patterns can increase the frequency and severity of drought. During El Niño periods, alterations in atmospheric pressure in equatorial regions yield an increase in the surface temperature off the west coast of North America. This gradual warming sets off a chain reaction affecting major air and water currents throughout the Pacific Ocean; La Niña periods are the reverse with sustained cooling of these same areas. In the North Pacific, the Jet Stream is pushed north, carrying moisture laden air up and away from its normal landfall along the Pacific Northwest coast. In Oregon, this shift results in reduced precipitation and warmer temperatures, normally experienced several months after the initial onset of the El Niño. These periods tend to last nine to twelve months, after which surface temperatures begin to trend back towards the long-term average. El Niño periods tend to develop between March and June and peak from December to April. ENSO generally follows a two to seven-year cycle, with El Niño or La Niña periods occurring every three to five years. However, the cycle is highly irregular and no set pattern exists. The last major El Niño was during 1997-1998 and in 2015-2016 Oregon experience a

"super" El Niño (the strongest in 15 years, the two previous events occurred in 1982-1983 and 1997-1998) that included record rainfall and snowpack in areas of the state.[14]

Future Climate Projection[15]

Climate models for Oregon suggest, future regional climate changes include increases in temperature around 0.2-1°F per decade in the 21st Century, along with warmer and drier summers and some evidence that extreme precipitation will increase in the future. Increased droughts may occur in the Rogue Valley under various climate change scenarios as a result of various factors, including reduced snowpack, rising temperatures and likely reductions in summer precipitation. Climate models suggest that as the region warms, winter snow precipitation will likely shift to higher elevations and snowpack will be diminished as more precipitation falls as rain altering surface flows. The negative effect of climate change on winter snow precipitation plays a significant role in anticipating drought risk in Jackson County as periods of drought (see Figure 2-4) occur during the winter seasons. According to OCCRI report *Future Climate Projections: Jackson County* the probability of future drought conditions (low summer soil moisture, low spring snowpack, low summer runoff, low summer precipitation, and high summer evaporation) is expected to be more frequent by the 2050s.

Probability Assessment

Droughts are not uncommon in the State of Oregon, nor are they just an "east of the mountains" phenomenon. They occur in all parts of the state, in both summer and winter. Oregon's drought history reveals many short-term and a few long-term events. The average recurrence interval for severe droughts in Oregon is somewhere between 8 and 12 years. According to SPEI analysis there have been five years of severe drought between 1923 and 2023 (see Figure 2-4). Based on the available data and research for Jackson County the NHMP Steering Committee assessed the **probability of experiencing a locally severe drought as "High,"** meaning one incident is likely within the next 10 to 35 years; *this rating has not changed since the previous NHMP.*

Vulnerability Assessment

The environmental and economic consequences can be significant, especially for the agricultural sector. Drought also increases the probability of wildfires – a major natural hazard concern for Jackson County. Drought can affect all segments of Jackson County's population, particularly those employed in water-dependent activities (e.g., agriculture, hydroelectric generation, recreation, etc.). Also, domestic water-users may be subject to

[14] Cho, Renne. "El Nino and global warming – what's the connection." Phys.org, February 3, 2016. https://phys.org/news/2016-02-el-nino-global-warmingwhat.html

[15] Oregon Climate Change Research Institute (OCCRI), Oregon Climate Assessment Report (2010) and Northwest Climate Assessment Report (2013). http://occri.net/reports

stringent conservation measures (e.g., rationing) as per the County's water management plan.

All parts of Jackson County are susceptible to drought, however, the following areas and issues are of particular concern:

- Drinking water system
- Power and water enterprises
- Residential and community wells in rural areas
- Fire response capabilities
- Fish and wildlife

Major county water supplies include the Rogue River, Bear Creek and Big Butte Creek. Potential impacts to these water supplies and the agriculture industry are the greatest threats. Additionally, long-term drought periods of more than a year can impact forest conditions and set the stage for potentially destructive wildfires. The NHMP Steering Committee rated the County as having a "moderate" vulnerability to drought hazards, meaning 1 - 10% of the region's population or assets would be affected by a major drought emergency or disaster; *this rating has not changed since the previous NHMP.*

Earthquake

Significant Changes since Previous NHMP:

No significant changes have been made to this section since the previous update. No development changes affected the jurisdiction's overall vulnerability to this hazard. An exposure assessment is included in Table 2-11.

Characteristics

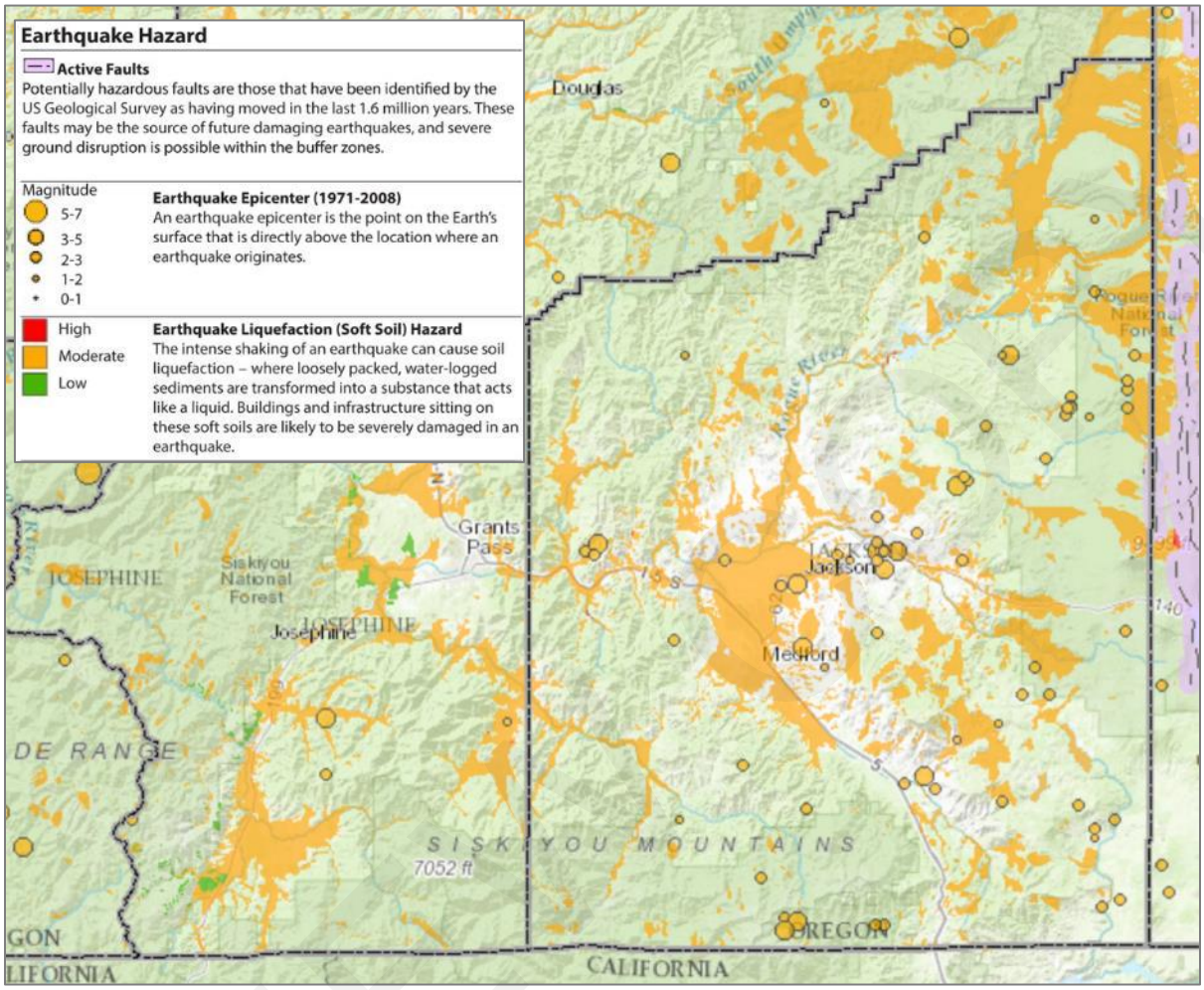
The Pacific Northwest in general is susceptible to earthquakes from four sources: 1) the offshore Cascadia Subduction Zone; 2) deep intraplate events within the subducting Juan de Fuca Plate; 3) shallow crustal events within the North American Plate and 4) earthquakes associated with volcanic activity.

According to the Oregon NHMP, the return period for the largest of the CSZ earthquakes (Magnitude 9.0+) is 530 years with the last CSZ event occurring 323 years ago in January of 1700. The probability of a 9.0+ CSZ event occurring in the next 50 years ranges from 7 - 12%. Notably, 10 - 20 "smaller" Magnitude 8.3 - 8.5 earthquakes occurred over the past 10,000 years that primarily affected the southern half of Oregon and northern California. The average return period for these events is roughly 240 years. The combined probability of any CSZ earthquake occurring in the next 50 years is 37 - 43%.

Location and Extent

Figure 2-5 shows earthquake epicenters, active faults, and earthquake liquefaction (soft soils). Areas of moderate liquefiable soft soil hazards are concentrated around corridors of the Rogue and Applegate Rivers and the Rogue River tributaries of Evans Creek and Bear Creek. The central-county region around Medford, Jacksonville, Eagle Point, Central Point, Gold Hill, Phoenix, Rogue River, Shady Cove, and surrounding Ashland. Most of the earthquakes shown in the figure below are low-impact events below M 3.0, although 6 mapped events are shown with M 3-5. The larger events may have been slightly felt but little to no structural/property damage resulted. Thus, the seismic hazard for Jackson County arises predominantly from major earthquakes in the Cascadia Subduction Zone. Smaller, crustal earthquakes in or near Jackson County could be locally damaging but would not be expected to produce widespread or major damage.

Figure 2-5 Earthquake Epicenters (1971-2008), Active Faults and Soft Soils

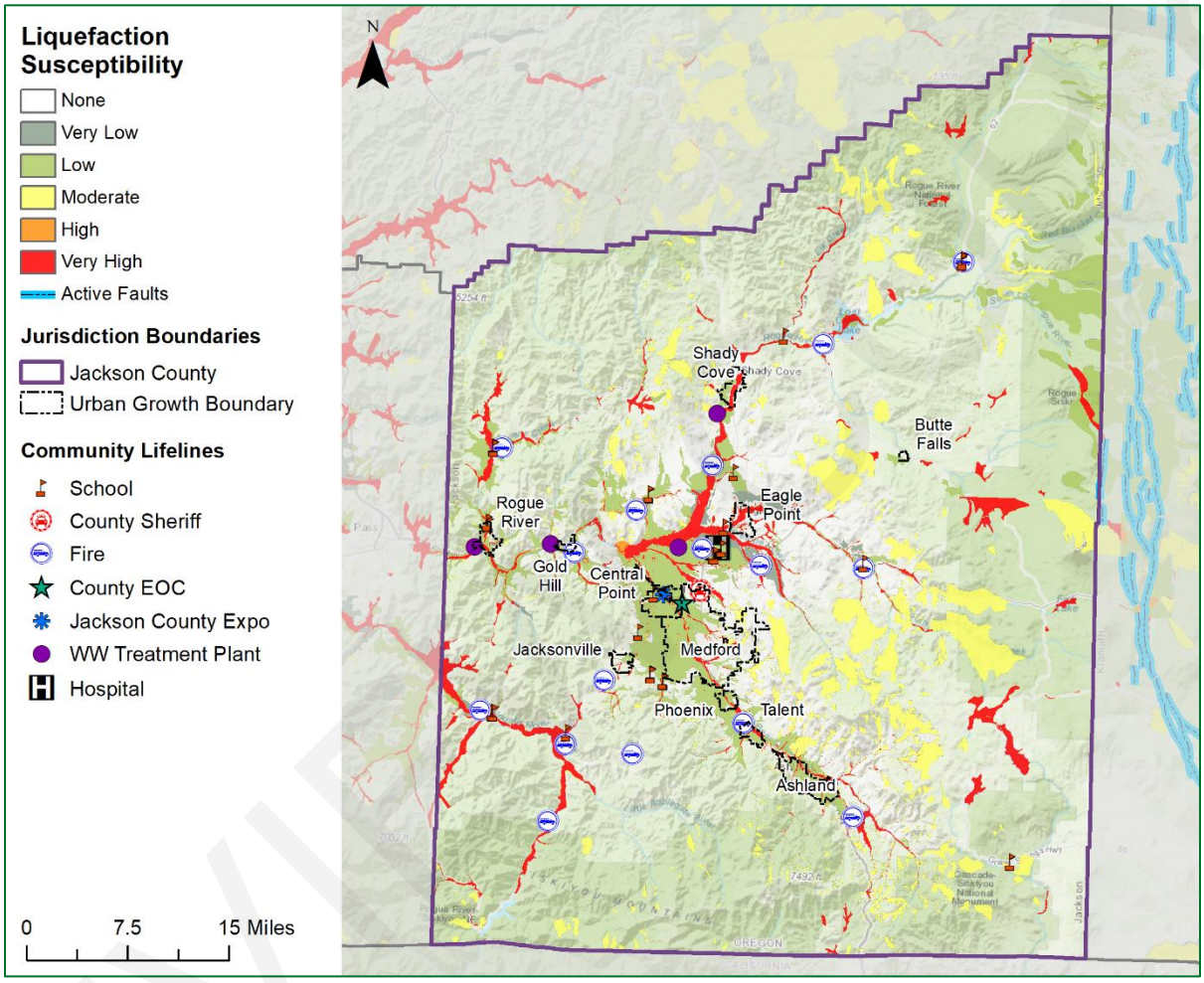


Source: Oregon Department of Geology and Mineral Industries.
Note: To view detail click this link to access Oregon HazVu.

The Oregon Department of Geology and Mineral Industries (DOGAMI), in partnership with other state and federal agencies, has undertaken a rigorous program in Oregon to identify seismic hazards, including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction and earthquake induced landslides. DOGAMI has published several seismic hazard maps that are available for communities to use. The maps show liquefaction, ground motion amplification, landslide susceptibility and relative earthquake hazards. OPDR used the DOGAMI Statewide Geohazards Viewer to present a visual map of recent earthquake activity, active faults, and liquefaction; ground shaking is generally expected to be higher in the areas marked by soft soils in Figure 2-5. The severity of an earthquake is dependent upon several factors including: 1) the distance from the earthquake's source (or epicenter); 2) the ability of the soil and rock to conduct the earthquake's seismic energy; 3) the degree (i.e., angle) of slope materials; 4) the composition of slope materials; 5) the magnitude of the earthquake; and 6) the type of earthquake.

Figure 2-6 and Figure 2-7 show Jackson County's community lifelines overlaid over the liquefaction probability. For more information about community lifelines' susceptibility to earthquake liquefaction, refer to Table 2-11 at the end of this chapter.

Figure 2-6 Liquefaction Susceptibility and Community Lifelines (Safety and Security)



Source: Oregon Partnership for Disaster Resilience. Oregon Department of Geology and Mineral Industries.
Note: To view detail click this link to access Oregon HazVu. Refer to Appendix F: Community Lifelines Hazard Risk Exposure Assessment for more information about the community lifelines.

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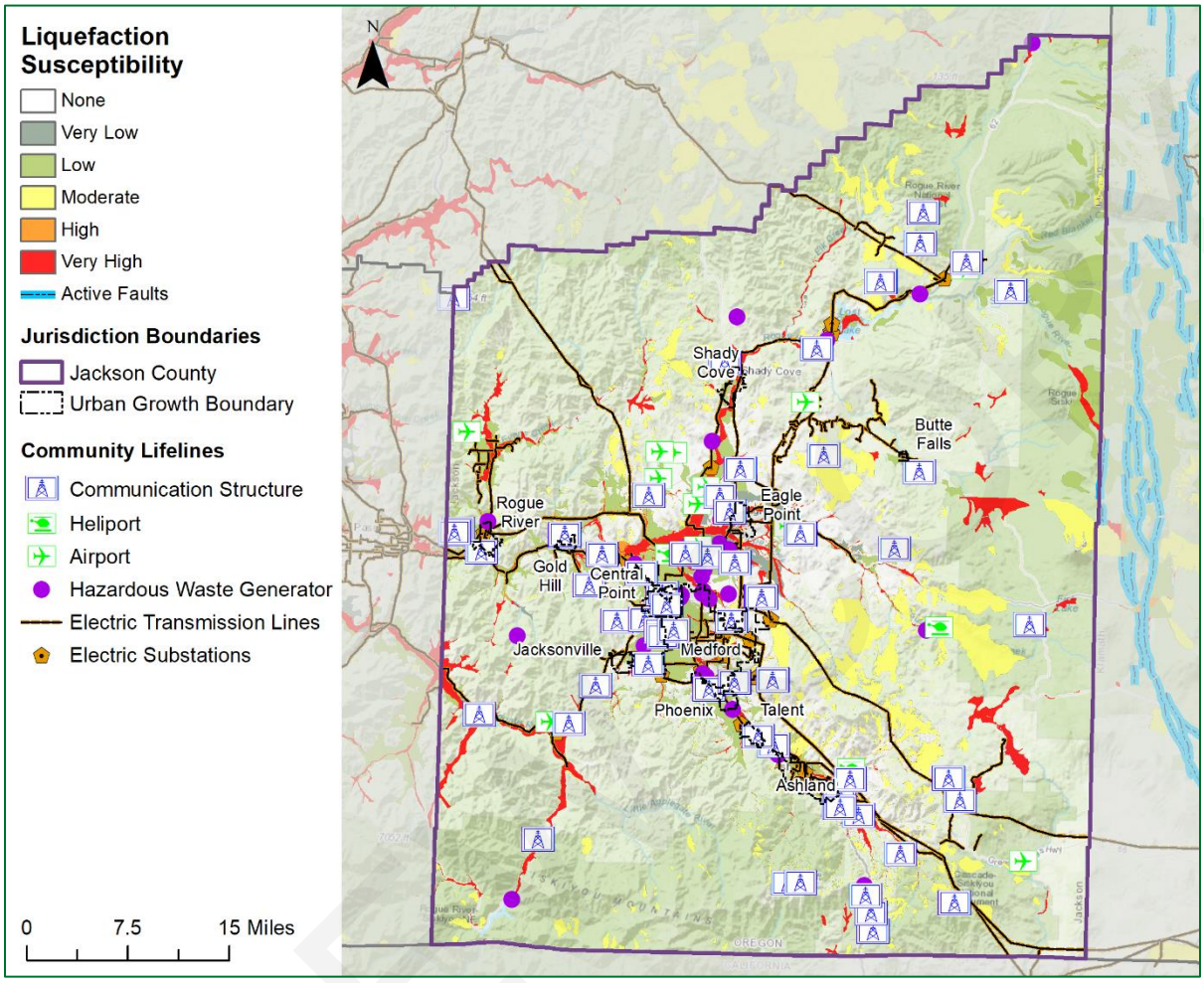
Figure 2-7 Liquefaction Susceptibility and Community Lifelines (All Others)



Source: Oregon Partnership for Disaster Resilience. Oregon Department of Geology and Mineral Industries.
Note: To view detail click this link to access Oregon HazVu. Refer to Appendix F: Community Lifelines Hazard Risk Exposure Assessment for more information about the community lifelines.

Refer to Appendix F for a full hazard risk exposure assessment. The only community lifeline with a high risk of liquefaction susceptibility is the ODFW Cole M Rivers Fish Hatchery.

For more information, see the following reports:

- Open File Report - O-13-06 Statewide Cascadia Earthquake Hazard Data, 2013
- Open-File-Report: O-2003-02 – Map of Selected earthquakes for Oregon (1841-2002), 2003
- Open-File-Report: O-2007-02 - Statewide seismic needs assessment: Implementation of Oregon 2005 Senate Bill 2 relating to public safety, earthquakes, and seismic rehabilitation of public buildings, 2007
- Interpretive Map Series: IMS-9 - Relative earthquake hazard maps for selected urban areas in western Oregon 2000

- Open-File-Report: O-2013-22 - Cascadia Subduction Zone earthquakes: A magnitude 9.0 earthquake scenario, 2013
- Additional reports are available via DOGAMI's Publications Search website: https://www.oregongeology.org/pubs/pubsearch.htm

Other agency/ consultant reports:

- Oregon Resilience Plan (2013)

History

Jackson County has not experienced any major earthquake events in recent history. Seismic events do, however, pose a significant threat. There have been several significant recent earthquakes in the region, primarily located in Klamath and Lake Counties in southern Oregon. The region has also been shaken historically by crustal and intraplate earthquakes and prehistorically by subduction zone earthquakes centered outside Central Oregon. A Cascadia Subduction Zone (CSZ) event could produce catastrophic damage and loss of life in Jackson County.

While Jackson County has not experienced any significant earthquakes in recent history, earthquakes in Oregon that have affected the county are listed below[16] (there have not been any significant earthquake events since the previous NHMP):

- **Approximate Years: 1400 BCE, 1050 BCE, 600 BCE, 400, 750, 900:** Offshore, Cascadia Subduction Zone (CSZ) – probably 8-9 based on studies of earthquake and tsunami at Willapa Bay, Washington; these are the mid points of the age ranges for these six events. Most likely affected local Native American Populations.
- **1700 (January 26)**: Offshore, Cascadia Subduction Zone (CSZ)- Approximate 9.0 magnitude earthquake generated a tsunami that struck Oregon, Washington and Japan; destroyed Native American villages along the coast (additional CSZ events occurred approximately in 1400 BCE, 1050 BCE, 600 BCE, 400, 750 and 900)
- **1873 (November 23):** 6.75 quake near California Border. Damage was reported along the coast and in Josephine and Jackson Counties. Source is speculated to be originated from the Cascadia Subduction Zone.
- **1920 (April 14):** Quake centered near Crater Lake – No record of reported damage.
- **1983 (September 20 – mid-December):** Series of quakes M5.1-6.0. No record of reported damage in City of Medford
- **1993 (September 20)**: Klamath Falls Earthquakes, two (2) magnitude 5.9 and 6.0 earthquakes that caused $7.5 million in damages and killed two (2; one heart attack, one crushed by a boulder while driving); felt in Southern Oregon.
- **1999 (November 28)**: This earthquake's epicenter was located 13.9 miles west-northwest of Klamath Falls, almost precisely where two earthquakes originated six

[16] Ivan Wong and Jacqueline D.J. Bolt, 1995, "A Look Back at Oregon's Earthquake History, 1841-1994", Oregon Geology, pp. 125-139.

years prior. Ground motion was felt in Medford, 45 miles away, but there were no reported injuries or damages.

- **2003 (January 16):** 6.3 offshore quake at the Blanco Fracture Zone, Oregon.

Probability Assessment

Jackson County is susceptible to deep intraplate events within the Cascadia Subduction Zone (CSZ), where the Juan de Fuca Plate is diving beneath the North American Plate and shallow crustal events within the North American Plate.

Establishing a probability for crustal earthquakes is difficult given the small number of historic events in the region. Earthquakes generated by volcanic activity in Oregon's Cascade Range are possible, but likewise unpredictable. For more information, see DOGAMI reports linked above.

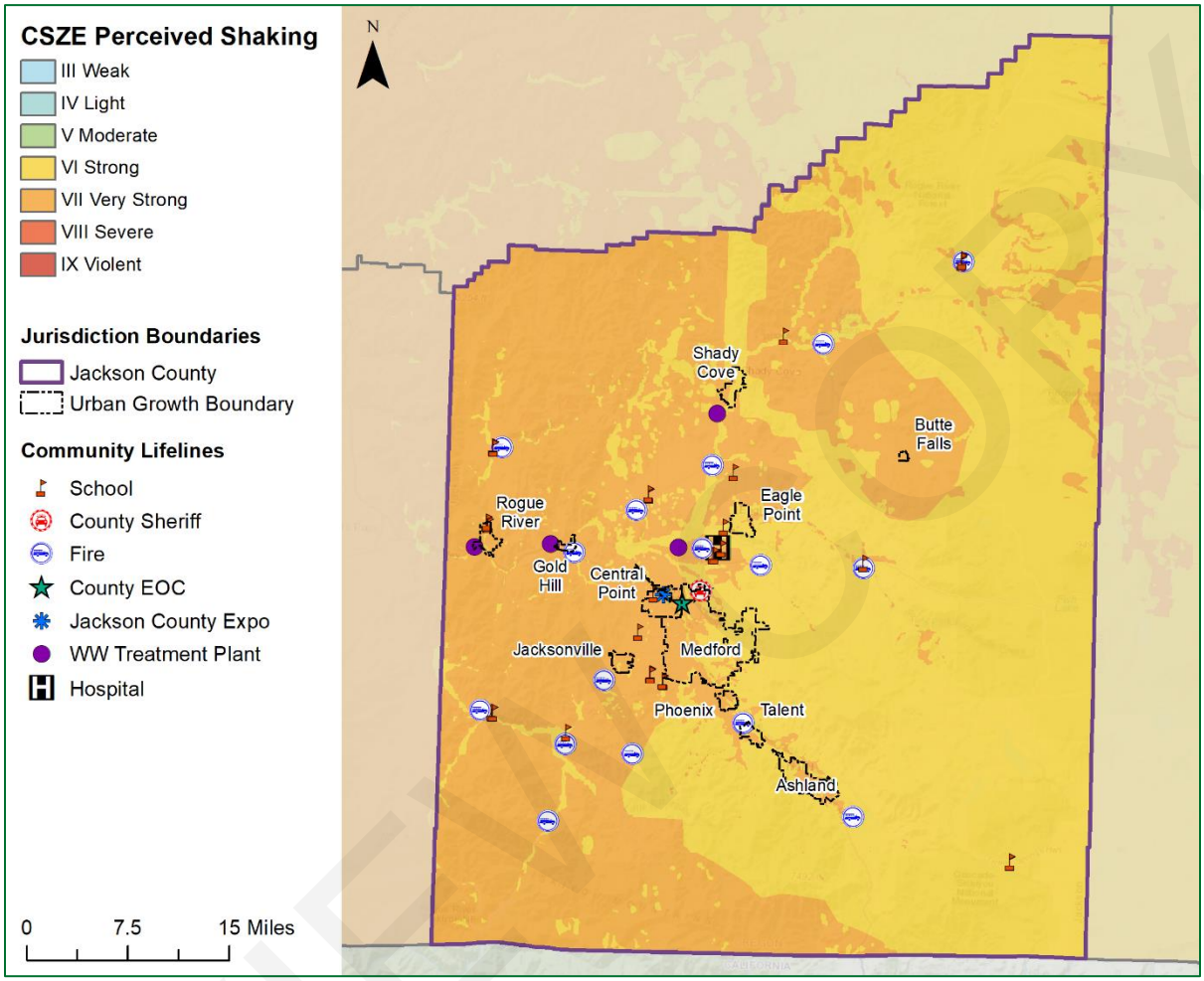
Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing a Cascadia Subduction Zone (CSZ) is "medium",** meaning one incident is likely within the next 35 to 75 years. *This is decreased from the previous NHMP which rated the probability as high.* Additionally, the **probability of a crustal earthquake is "low",** meaning one incident is likely within the next 75 to 100 years. *This is the same rating as the previous NHMP*

Vulnerability Assessment

The local faults, the county's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the county a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places Jackson County predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Southwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.

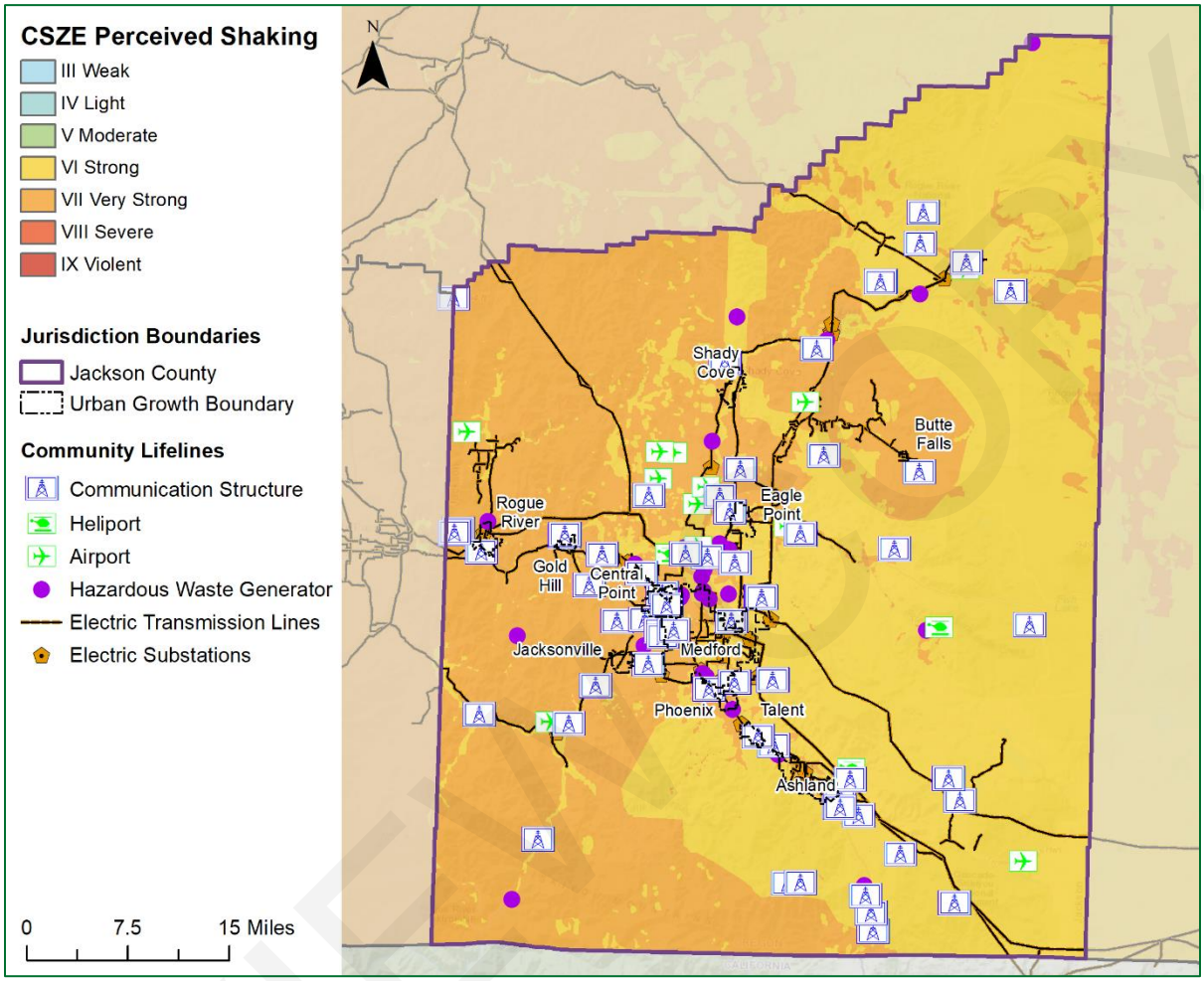
Figure 2-8 and Figure 2-9 show the expected shaking/ damage potential for Jackson County because of a Cascadia Subduction Zone (CSZ) earthquake event. The figure shows that the county will experience "strong" to "very strong" shaking that will last two to four minutes. The strong shaking will be extremely damaging to lifeline transportation routes including I-5, Highway 140, and Highway 238. For more information on expected losses due to a CSZ event see the Oregon Resilience Plan (note, several of the County and City mitigation actions utilize the analysis within the ORP as justification and to inform their rationale).

Figure 2-8 Cascadia Subduction Zone Perceived Shaking and Community Lifelines (Safety and Security)



Source: Oregon Partnership for Disaster Resilience. Oregon Department of Geology and Mineral Industries.
Note: To view detail click this link to access Oregon HazVu. Refer to Appendix F: Community Lifelines Hazard Risk Exposure Assessment for more information about the community lifelines.

Figure 2-9 Cascadia Subduction Zone Perceived Shaking and Community Lifelines (All Others)



Source: Oregon Partnership for Disaster Resilience. Oregon Department of Geology and Mineral Industries.
Note: To view detail click this link to access Oregon HazVu. Refer to Appendix F: Community Lifelines Hazard Risk Exposure Assessment for more information about the community lifelines.

The NHMP Steering Committee rated the County as having a **"high" vulnerability to the Cascadia Subduction Zone (CSZ) earthquake hazard** meaning that more than 10% of the region's population or assets would be affected by a major CSZ event. Additionally, the Steering Committee rated the County as having a **"low" vulnerability to a crustal earthquake event**, meaning that less than 1% of the region's population or assets would be affected by a major crustal earthquake event. *The previous NHMP rated CSZ earthquake vulnerability as "high" and crustal earthquake vulnerability as "moderate".*

2007 Rapid Visual Survey

In 2007, DOGAMI completed a rapid visual screening (RVS) of educational and emergency facilities in communities across Oregon, as directed by the Oregon Legislature in Senate Bill 2 (2005). RVS is a technique used by the Federal Emergency Management Agency (FEMA),

known as FEMA 154, to identify, inventory and rank buildings that are potentially vulnerable to seismic events. DOGAMI ranked each building surveyed with a 'low,' 'moderate,' 'high,' or 'very high' potential for collapse in the event of an earthquake. It is important to note that these rankings represent a probability of collapse based on limited observed and analytical data and are therefore approximate rankings. To fully assess a buildings potential for collapse, a more detailed engineering study completed by a qualified professional is required, but the RVS study can help to prioritize which buildings to survey.

As noted in the community profile approximately 68% of residential buildings were built prior to 1990, which increases the county's vulnerability to the earthquake hazard. Information on specific public buildings' (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table 2-6; each "X" represents one building within that ranking category. Of the facilities evaluated by DOGAMI using a Rapid Visual Survey (RVS), 12 have a high (greater than 10% chance) collapse potential (one has been mitigated) and one (1) has a very high (100% chance) collapse potential.

Table 2-6 Rapid Visual Survey Scores

		Level of Collapse Potential			
Facility	**Site ID***	**Low (< 1%)**	**Moderate (>1%)**	**High (>10%)**	**Very High (100%)**
Schools					
Sams Valley Elementary (Central Point SD 6) (14235 Table Rock Rd)	**Jack_sch12**	**X,X**		**X**	
Table Rock Elementary (Eagle Point SD 9) (2830 Maple Court Dr, White City)	**Jack_sch16**	**X,X, X,X**		**X**	
Mountain View Elementary (Eagle Point SD 9) (7837 Hale Way)	Jack_sch17	X,X,X		X	
White Mountain Middle (Eagle Point SD 9) (550 Wilson Way)	Jack_sch40	X			
Ruch Elementary School (Medford SD 549C) (156 Upper Applegate Rd)	**Jack_sch48**	**X,X,X**	**X,X,X**		**X**
Prospect School (Prospect SD 59) (160 Mill Creek Rd)	**Jack_sch49**	**X,X,X**		**X**	
Evans Valley School (Rogue River SD 35) (8205 E Evans Creek Rd)	Jack_sch50	X		X	

Elk Trail Elementary (Eagle Point SD 9) (591 Elk Creek Rd)	Jack_sch51	X		X
Applegate Elementary School (Three Rivers/JoCo SD) (14188 Highway 238)	Jack_sch53	X		X,X
Community Colleges				
Table Rock - Table Rock Campus (Rogue CC) (7800 Pacific Avenue)	Jack_coc06	X		
Table Rock - Workforce Training Center (Rogue CC) (7800 Pacific Avenue)	Jack_coc07			X
Table Rock - Crater Lake Center (Rogue CC) (7800 Pacific Avenue)	Jack_coc08			X
Public Safety				
Applegate Valley RFPD 9 (Applegate Valley RFPD) (1095 Upper Applegate Rd)	Jack_fir19	X,X		
Applegate Valley RFPD 9 (Applegate Valley RFPD) (2170 Hwy 238)	Jack_fir04	X		
Applegate Valley RFPD 9 (Applegate Valley RFPD) (7774 Upper Applegate Rd)	Jack_fir05	X		
Evans Valley Fire District #6 (86777 E Evans Creek Rd)	Jack_fir07	X		
Jackson County Fire District #3 (8333 Agate Rd)	Jack_fir02			X
Jackson County Fire District #5 (716 S Pacific Hwy)	Jack_fir15	X		
Lake Creek Rural Fire District (Lake Creek RFPD) (1584 S Fork Little Butte)	Jack_fir17	X		
Prospect Fire Department (276 Mill Creek Dr)	**Jack_fir25**			**X**
Prospect Police Department (300 Mill Creek Dr)	Jack_pol10	X		
Rogue River RFPD (5474 N River Rd)	Jack_fir06			X

Source: DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment. "*" – Site ID is referenced on the RVS Jackson County Map

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage. In addition, there is a low probability that a major earthquake will result in failure of upstream dams.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water and wastewater treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.[17]

For more information, see: Open-File-Report: O-2007-02 - Statewide seismic needs assessment: Implementation of Oregon 2005 Senate Bill 2 relating to public safety, earthquakes and seismic rehabilitation of public buildings, 2007 and

DOGAMI Statewide Seismic Needs Assessment Using Rapid Visual Screening (RVS)

[17] Regional All Hazard Mitigation Master Plan for Jackson, Lane and Linn Counties: Phase II (2001)

Emerging Infectious Disease

Significant Changes since Previous NHMP:

The emerging infectious diseases hazard section has been edited to reference new history since the previous NHMP (including the addition of COVID-19 content). No development changes affected the jurisdiction's overall vulnerability to this hazard.

Characteristics

Emerging Infectious Diseases are natural disasters not typically found in NHMPs. They are hazards that are not physically affecting the environment, but rather ones that are physically affecting the people living in the environment.

Disease is a sickness, illness, or loss of health[18] Terms such as disease outbreaks, epidemics, and pandemics are often used to describe situations where multiple cases of infection are identified.

"The amount of a particular disease that is usually present in a community is referred to as the baseline or endemic level of the disease. This level is not necessarily the desired level, which may in fact be zero, but rather is the observed level."[19]

The Centers for Disease Control and Prevention (CDC) states, "While some diseases are so rare in a given population that a single case warrants an epidemiologic investigation (e.g., rabies, plague, polio), other diseases occur more commonly so that only deviations from the norm warrant investigation" The following definitions are all from the CDC:[20]

- Sporadic refers to a disease that occurs infrequently and irregularly.
- Endemic refers to the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area.
- Hyperendemic refers to persistent, high levels of disease occurrence.

Occasionally, the amount of disease in a community rises above the expected level.

- Epidemic refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area.

[18] Centers for Disease Control and Prevention (CDC). "Definition of Disease." Retrieved October 4, 2016 from http://www.cdc.gov/vaccines/terms/glossary.html

[19] CDC. "Lesson 1: Introduction to Epidemiology. Section 11: Epidemic disease occurrence. In Principles of epidemiology in public health practice: An introduction to applied epidemiology and biostatistics (Self-Study Course SS1978)" (3rd ed.) U.S. Department of Health and Human Services, Office of Workforce and Career Development, 18 May 2012.

[20] Centers for Disease Control and Prevention. "Mission, role, and pledge". Retrieved 9 Sep, 2016 from https://www.cdc.gov/about/organization/mission.html

- **Outbreak** carries the same definition of epidemic but is often used for a more limited geographic area.
- **Cluster** refers to an aggregation of cases grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known.
- **Pandemic** refers to an epidemic that has spread over several countries or continents, usually affecting many people.

Understanding how and why a particular disease spreads requires a multi-disciplinary study of biology, culture, society, economics, environment, and technology. Diseases are caused by viruses, bacteria, or protozoa, which infect humans in a variety of ways. Some are water borne, air borne, or food borne; others are transmitted via interpersonal contact or contact with a vector, such as a mosquito. Norovirus and influenza are examples of familiar viruses. Examples of bacteria are E. coli and streptococcus. Cryptosporidium and giardia are caused by protozoa.

The fatality rate of a disease outbreak depends upon:

- The number of people who become infected.
- The severity of disease caused by the virus (its virulence).
- The vulnerability of affected populations.
- The effectiveness of preventive steps. [21]

Location and Extent

Over the years, many emerging and reemerging infectious disease outbreaks have occurred in the U.S. and around the world. To name a few: West Nile Virus; salmonella; E. coli; cryptosporidiosis; norovirus; Severe Acute Respiratory Syndrome (SARS); pertussis or whooping cough; Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS); H1N1, influenza, measles, Ebola, legionnaires, Zika, and, most notably, COVID-19.

The diseases Identified are not the only diseases that exist or could potentially impact Jackson County. The location and extent of diseases can vary greatly. An emerging infectious disease could occur anywhere in Jackson County, at any time. It could come suddenly or slowly, lightly, or severely, and it could remain here briefly or for an extended amount of time.

Diseases are identified, researched, and managed as much as possible by the following public health agencies:

- **Jackson County Public Health** is a division under Jackson County Health & Human Services, and is the agency that provides surveillance, investigates reportable disease, infections, or conditions, and carries out appropriate control measures for emerging infectious diseases. The mission of Jackson County Health and Human Services is "to

[21] WebMD. "What are epidemics, pandemics, and outbreaks?" Retrieved 9 Sep. 2016 from: http://www.webmd.com/cold-and-flu/what-are-epidemics-pandemics-outbreaks.

plan, coordinate, and provide services that protect and promote the health and well-being of county residents."[22]

- Oregon Health Authority (OHA) aids Jackson County Public Health. The mission of the Oregon Health Authority is "Helping people and communities achieve optimum physical, mental and social well-being through partnerships, prevention and access to quality, affordable health care."[23]
- The Centers for Disease Control and Prevention (CDC) is the national leading public health agency in the U.S. Their mission states, "Whether diseases start at home or abroad, are chronic or acute, curable, or preventable, human error or deliberate attack, CDC fights disease and supports communities and citizens to do the same."[24]

Disease information is reported and tracked but generally not mapped. However, to identify patterns in diseases, the Jackson County Health Department used GIS technology in 2004 to map all reported diseases. The result showed no geographic patterns to epidemics, with the exception that outbreaks of norovirus occur in large care facilities for the elderly and disabled. Subsequently, there have been no maps of that sort created by the Jackson County Health Department.[25]

History

Jackson County regularly experiences outbreaks of infectious disease. Recent history of infectious disease is listed below:

- 1970s: Medford/Jackson County - Outbreaks of hepatitis related to sewage disposal and septic systems that failed in clay soils.
- 1980s: Medford/Jackson County -Outbreaks of bacterial infection and illnesses associated with E.coli related to food preparation in restaurants.
- 1992: Medford/Jackson County- People became ill with cryptosporidiosis, a waterborne parasite. Between January and June of 1992, approximately 15,000 people had diarrheal illness lasting at least 4-days.
- 1992-present: Medford/Jackson County- Periodic outbreaks of Norovirus and salmonella in nursing homes, assisting living facilities, and restaurants.
- 2003: Medford/Jackson County - Outbreak of pertussis (aka whooping cough) in children. The County had the highest rate in Oregon with 53.8 cases per 100,000 residents.
- 2004: Oregon - West Nile Virus arrives in Oregon.
- 2009: Medford/Jackson County - H1N1 outbreak.

[22] Jackson County Health and Human Services. "Public health, About us." Retrieved 15 Apr. 2022 from http://jacksoncountyor.org/hhs/Public-Health/About-Us
[23] Oregon Health Authority, "About the Oregon Health Authority." Retrieved 15 Apr. 2022 from http://www.oregon.gov/oha/Pages/about_us.aspx
[24] Centers for Disease Control and Prevention. "Mission, role, and pledge". Retrieved 9 Sep, 2016 from https://www.cdc.gov/about/organization/mission.html
[25] Phillips, Tanya, Health Promotion Program Manager, Jackson County Health & Human Services. Interview. 20 Sep. 2016.

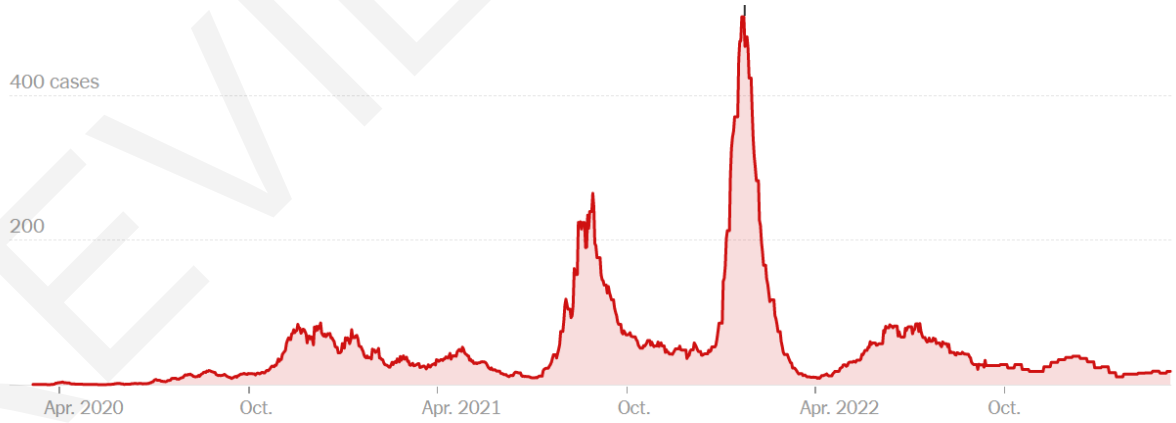
- **2010:** Jackson County - Outbreak of pertussis (aka whooping cough). Jackson County incidence rate was between 8.0 and 19.1 cases per 100,000 people.
- **2010-2015:** Jackson County - 23 outbreaks of Norovirus during this period.
- **2014-2015:** Jackson County - 18 communicable disease outbreaks during this period.
- **2017:** Ashland/Jackson County - Outbreak of pertussis (aka whooping cough).
- **2020:** Oregon- Determination of state of emergency due to Covid-19 outbreak in Oregon. State of emergency also declared by the President *(EO-20-03)*
- **2022:** Oregon - Declaration of emergency due to surge in pediatric respiratory infections in Oregon (*EO-22-23*)

COVID-19

Since the previous plan update, the world has globally felt the vulnerability caused by emerging infectious diseases. COVID-19, or the Coronavirus, has been a global pandemic since March of 2020.

As of March 2023, COVID-19 has appeared in four waves with three different variants. Figure 2-10 shows the number of reported cases in Jackson County since March 2020. The original variant, which comprises the first two waves, was first documented in Jackson County on March 9, 2020.[26] The first wave (not pictured in graph) led to a statewide lockdown starting March 8, 2020. The second wave emerged in winter of 2020. The third wave was caused by the Delta variant of COVID-19 and peaked in Late Summer 2021. The Delta Variant of COVID-19 was both more infectious and more likely to lead to severe cases than the original variant of COVID-19. [27] The fourth wave of coronavirus came in early 2022 with the Omicron Variant, which is extremely infectious but less likely to lead to severe cases.

Figure 2-10 COVID-19 Reported Infections in Jackson County, March, 2020 – March, 2023.



Source: "Tracking Coronavirus in Jackson County, Ore.: Latest Map and Case Count." *New York Times.* Accessed March 12, 2023.

[26] Morgan, Nick. "Jackson County Sees Its First COVID-19 Case." *Mail Tribune*. 9 Mar. 2020.
[27] Center for Disease Control and Prevention. "What You Need to Know About Variants." 25 Feb. 2022.

As of March 12, 2023, Jackson County has had 54,594 reported cases and a total of 637 deaths. Jackson County residents were 15% more likely to catch COVID-19 and 18% more likely to die from their illness than the Oregon average. In addition to loss of health and life, COVID-19 and its subsequent lockdowns directly impacted businesses, education, workforce, and culture.

Probability Assessment

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing an emerging infectious disease event is "moderate",** meaning one incident is likely within the next 35 to 75-year period; *This rating has not changed since the previous NHMP.*

Vulnerability Assessment

The Steering Committee also determined that the County's **vulnerability to emerging infectious disease is "high"** meaning that greater than 10% of the region's population would be affected by a major disaster. *This rating has not changed since the previous NHMP.*

More information on this hazard can be found at the Centers for Disease Control and Prevention website. For more detail on regional events see the Medford NHMP and visit the Jackson County Public Health website.

Flood

Significant Changes since Previous NHMP:

Two significant flood events have been added since the previous NHMP. This section has updated data for the National Flood Insurance Program and hazard history. No development changes affected the jurisdiction's overall vulnerability to this hazard. An exposure assessment is included in Table 2-11.

Characteristics

Flooding results when rain and snowmelt creates water flow that exceeds the carrying capacity of rivers, streams, channels, ditches and other watercourses. In Oregon, flooding is most common from October through April when storms from the Pacific Ocean bring intense rainfall. Most of Oregon's destructive natural disasters have been floods.[28] The principal types of floods that occur in Jackson County include: riverine floods, shallow area floods and urban floods.

Location and Extent

Jackson County lies within the Rogue River Valley between the Coastal Range to the west, the Cascade Range to the east and the Siskiyou Range to the south. Melting snow and winter rains combine to produce flood events because of the watersheds alluvial floodplain topography on the main valley floor. The main soil types of the valley are clay-loams and silty clay-loams along with extensive gravel deposits along the Rogue River and Bear Creek. These waterways easily exceed their banks in areas of flat terrain.

Floods frequently occur in Jackson County during periods of heavy rainfall and/or snowmelt. The primary sources of riverine flooding include the Rogue River, Applegate River, Bear Creek and Evans Creek along with many lesser creeks and tributaries including Ashland Creek (Ashland) and Little Butte Creek (Eagle Point). Communities near these waterways are all susceptible to flood damage during a flood event. A common threat from these water courses is their potential to disrupt infrastructure by causing landslides, inundating roads and eroding river banks and bridge abutments.

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as streamflow gages, to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year.

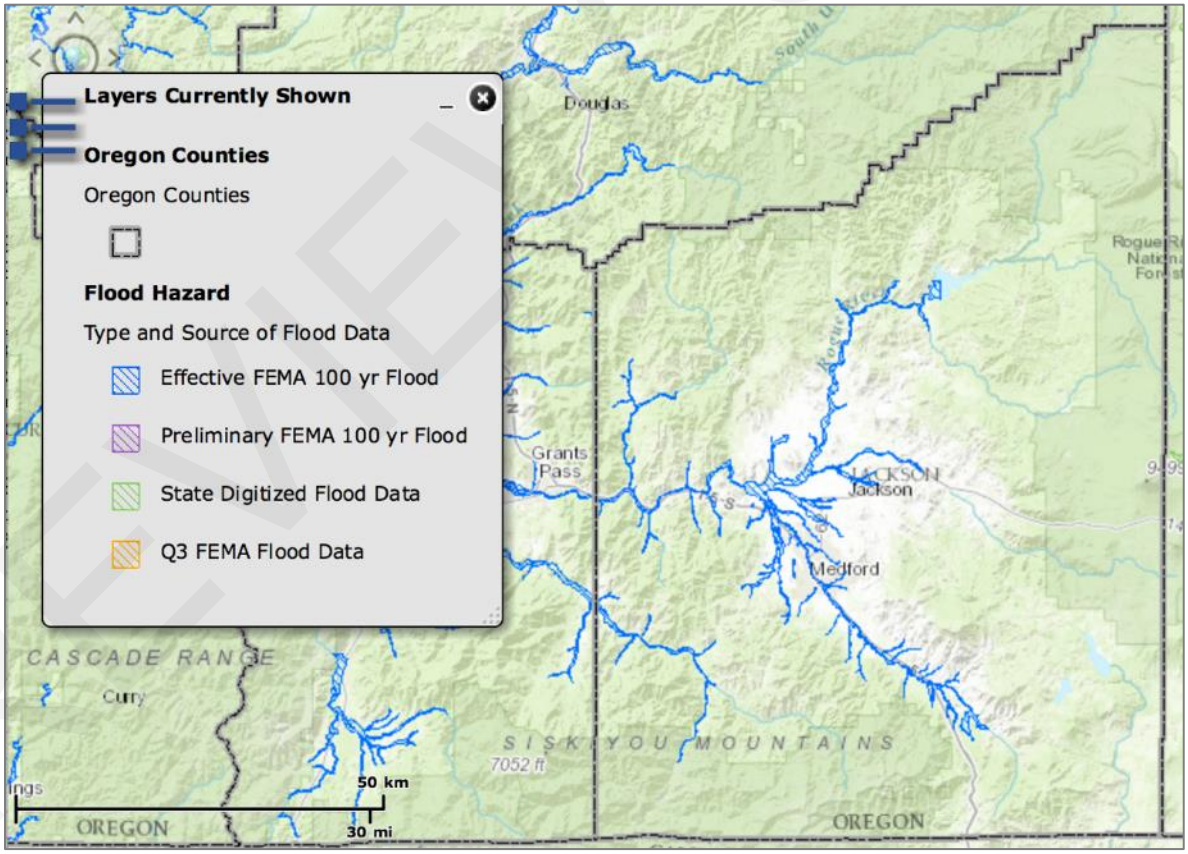
[28] Taylor, George H. and Chris Hannan. *The Oregon Weather Book*. Grants Pass, OR: Oregon State University Press. 1999

The magnitude of flood used as the standard for floodplain management in the United States is a flood having a one percent probability of occurrence in any given year. This flood is also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of Flood Insurance Rate Maps (FIRMs) prepared by FEMA. These maps are used to support the National Flood Insurance Program (NFIP). The FIRMs show 100-year floodplain boundaries for identified flood hazards. These areas are also referred to as Special Flood Hazard Areas (SFHAs) and are the basis for flood insurance and floodplain management requirements.

Areas with significant development in the mapped Rogue River floodplain include Gold Hill, Eagle Point, Rogue River, Shady Cove and White City (unincorporated); and areas of the Bear Creek floodplain within the cities of Ashland, Central Point, Jacksonville, Medford, Phoenix and Talent along I-5 (Bear Creek). For more information, refer to the following Flood Insurance Study (FIS) and associated Flood Insurance Rate Maps (FIRM):

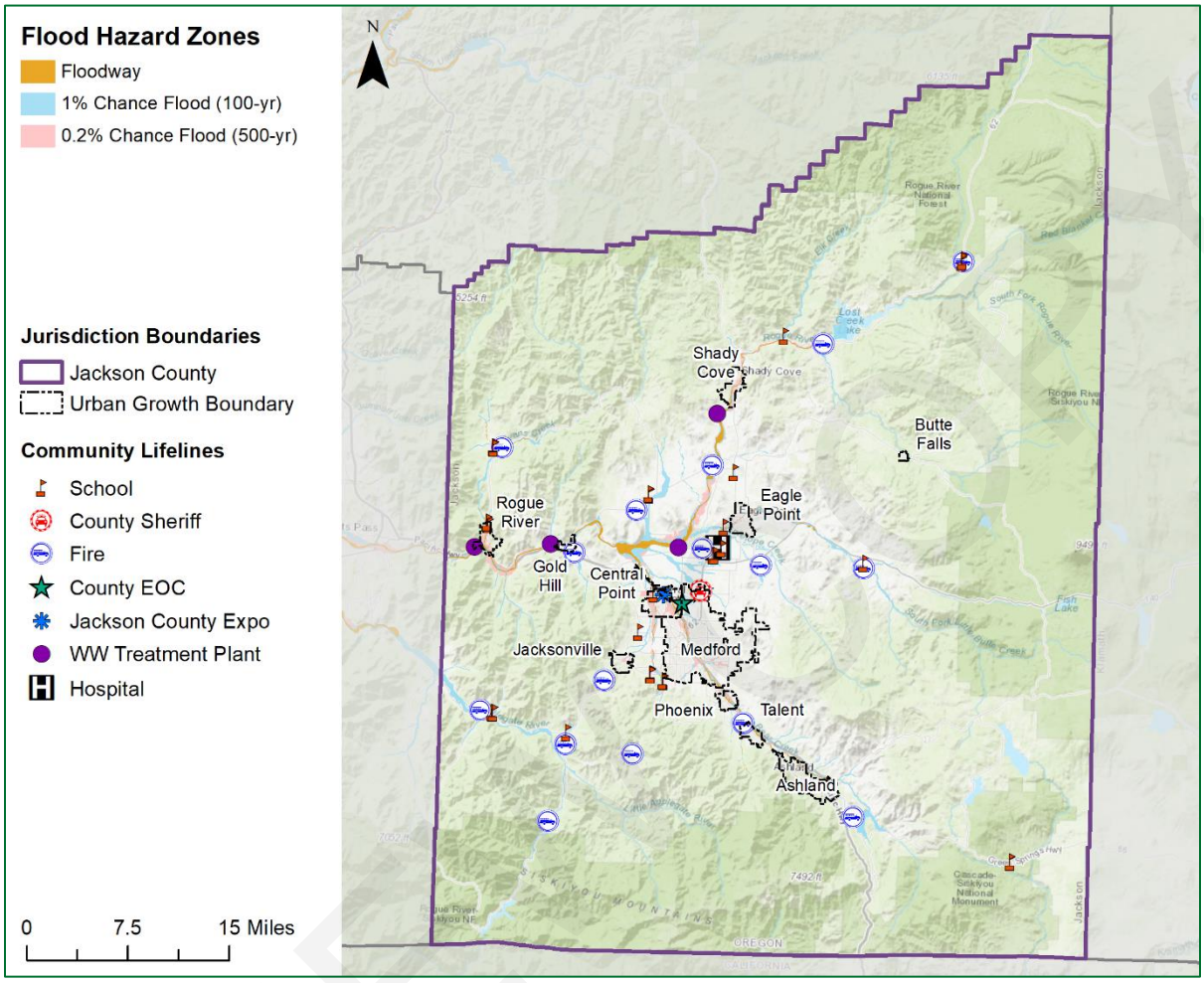
- Jackson County FIS (2018) - Volume 1
- Jackson County FIS (2018) - Volume 2
- Jackson County FIS (2018) - Volume 3

Figure 2-11 Special Flood Hazard Area



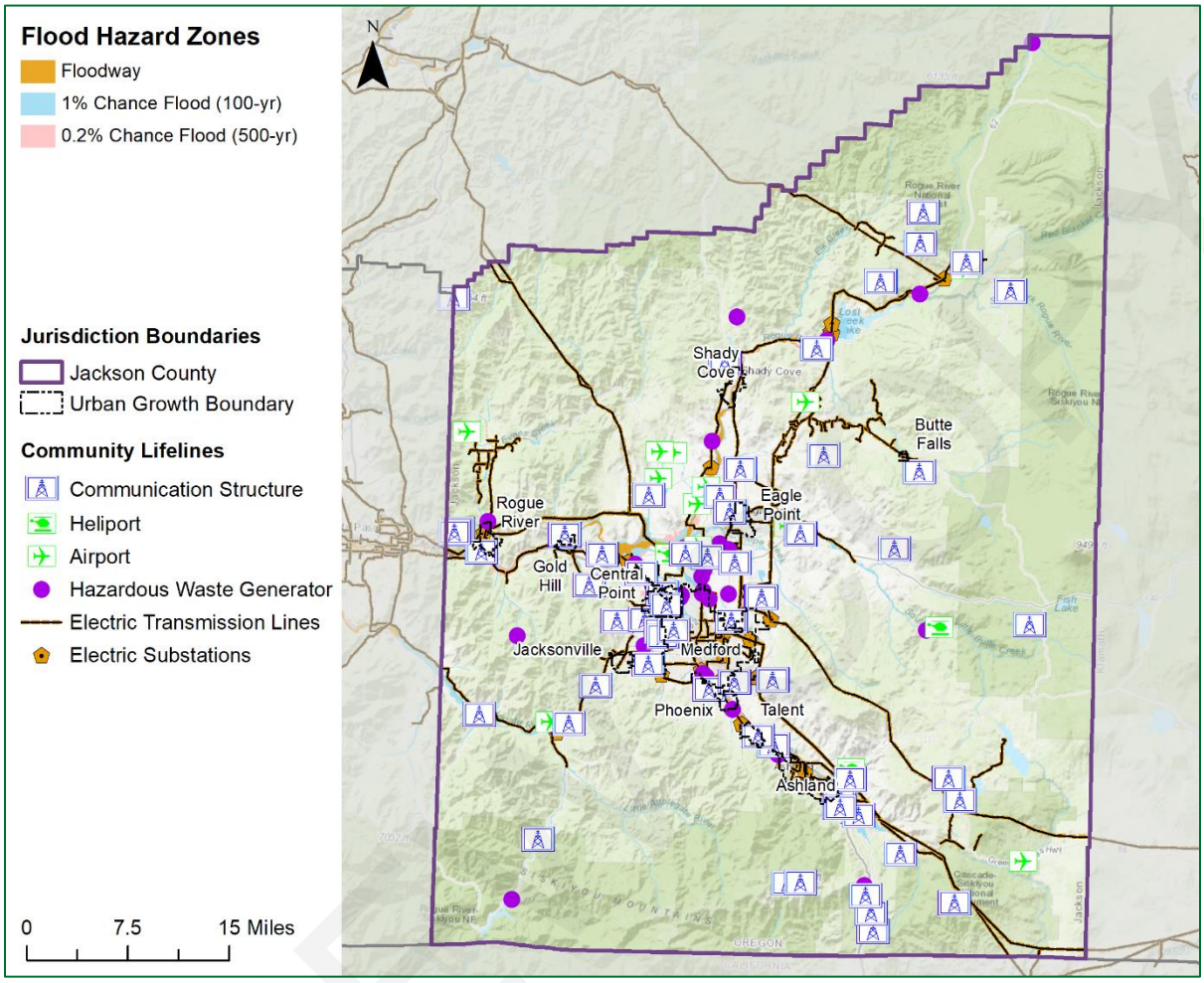
Source: Oregon HazVu: Statewide Geohazards Viewer (HazVu)
Note: To view detail click the link above to access Oregon HazVu.

Figure 2-12 Flood Risk to Community Lifelines (Safety and Security)



Source: Oregon Partnership for Disaster Resilience. Oregon Department of Geology and Mineral Industries.
Note: To view detail click this link to access Oregon HazVu. Refer to Appendix F: Community Lifelines Hazard Risk Exposure Assessment for more information about the community lifelines.

Figure 2-13 Flood Risk to Community Lifelines (all others)



Source: Oregon Partnership for Disaster Resilience. Oregon Department of Geology and Mineral Industries.
Note: To view detail click this link to access Oregon HazVu. Refer to Appendix F: Community Lifelines Hazard Risk Exposure Assessment for more information about the community lifelines.

For more information about community lifelines' susceptibility to flood, refer to Table 2-11 at the end of this chapter. Community lifelines that fall in the 100-year flood plain are:

- USACE Rogue River Basin Project
- Crater Lake Charter Academy
- Elk Trail Community School
- LTM, Incorporated
- Communication structure (42.7517, -122.4847)

Community lifelines that fall within the 500-year flood plain are:

- Rogue River STP
- Chevron
- Community Health Center – Upper Rogue
- Griffin Creek Elementary

- Jackson County Fire District 3 – Gold Hill
- Butler Ford Inc.

Additional reports are available via FEMA's Flood Map Service Center website:

https://msc.fema.gov/portal

Additional reports are available via DOGAMI's Publications Search website:

https://www.oregongeology.org/pubs/pubsearch.htm

History

Between the 1850's and the present, human activity significantly changed the hydrology of the Rogue and Umpqua watershed, including dams and flood control systems constructed throughout the drainage basin. More recently, increasing urbanization has contributed to changes in basin hydrology. Prior to human alteration of the river system, rivers in the region flooded larger areas more often.

Listed below are historical flooding events that affected the Rogue/Umpqua River Basin and including events related to the Rogue River and its main tributaries, Bear Creek, Evans Creek and the Applegate River. Six significant flood events have been added since the previous NHMP (shown in *italics below*):

- **1890 (February) –** Rain on snow, flooding. Solid snowpack and heavy snowfall between October 1889 and January 1890. February temperatures of 45-55 F with 7 inches of rain. Floods followed. Nearly every bridge on every creek and river within the county was lost.
- **1931 (March)**: Wet, mild weather consisting of rain-on-snow (ROS) with bridges and homes destroyed.
- **1950 (October):** Severe flooding and ROS in Region 4. Six fatalities. Bridges and roads destroyed.
- **1955 (December) –** Rain, snow, and high winds caused flooding in Medford. 5 fatalities.
- **1956 (July) –** storms and flooding across the region
- **1962 (January):** Heavy rain (3"-4" in Rogue Valley); 84 people evacuated. Great loss of farmland.
- **1964 (December):** Infamous 1964 flood that has become an Oregon flood of record. Record flows on Rogue and Umpqua Rivers.
- **1974 (January):** Series of storms with mild temperatures; large snowmelt with rapid runoff. Two fatalities.
- **1986 (January):** Significant flooding in western Oregon attributable to warm, intense rain.
- **1990 (January):** Significant flooding in western Oregon.
- **1996 (February):** Severe storm, flooding. $280 million in damage.

- **1996 (November):** Tropical air mass; intense rain; landslides; power outages. (FEMA-1149-DR-OR).
- **1996 (December) – 1997 (January):** Mild weather continues. Severe flooding in Ashland. (FEMA-1160-DR-OR).
- **2005 (December):** $2,840,000 in flood damage centered in Douglas, Jackson and Josephine counties.
- **2006 (June):** Heavy rain brought flash flooding and riverine to Jacksonville, but no reported damages.
- **2007 (August):** Heavy rains caused flash flooding and riverine floods near Ashland, no major estimated damages.
- **2010 (August):** Heavy rains in Central Point caused riverine flooding.
- **2012 (December 2):** The Rogue River at Gold Ray exceeded flood stage during this interval.
- **2014 (February 14):** Heavy rains caused a brief flood on Little Butte Creek at Eagle Point.
- **2014 (March 9):** Heavy rains led to flooding of some small streams near Eagle Point including Little Butte Creek.
- **2015 (February 6):** Near the community of Wimer, ODOT reported that a portion of OR 66 from milepost 1 to 14 was closed by floodwaters and mudslides on Friday afternoon. Downed trees blocked other roads in the area. Tyler Creek road, Wagner Creek road, Savage Creek road and several BLM roads were washed out or covered by mudslides.
- **2015 (December 13):** Jackson County Dispatch reported flood waters between 4 inches and 1-foot deep entering 3 homes in Shady Cove and entering one home in White City and one home in Eagle Point.
- **2016 (January 17):** Evans Creek flowed out of its banks as a result of heavy regional rains.
- **2019 (February 28-March 30):**Severe storms caused heavy snow and ice accumulation, high winds, flooding, landslides, and erosion at various locations throughout the state (EO 19-02)
- **2022 (December 22-January 6):** Severe storms resulted in heavy rain, high winds, flooding, ice accumulation, landslides, and erosion at various locations within these counties (EO 23-01)

Future Climate Projection:

According to OCCRI report *Future Climate Projections: Jackson County* winter flood risk at mid-elevations where the temperature is close to freezing and precipitation is mixed rain and snow, is expected to increase as temperatures increase. This will lead to more precipitation as rain rather than as snow.

Probability Assessment

The Federal Emergency Management Agency (FEMA) has mapped the 10, 50, 100 and 500-year floodplains in portions of Jackson County (see referenced 2011 FIS for more information). This corresponds to a 10%, 2%, 1% and 0.2% chance of a certain magnitude flood in any given year. The 100-year flood is the benchmark upon which the National Flood Insurance Program (NFIP) is based.

Based on the available data and research for Jackson County, the NHMP Steering Committee determined the **probability of experiencing a flood is "high",** meaning one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP*.

Vulnerability Assessment

Flooding can occur every year depending on rainfall, snowmelt or how runoff from development impacts streams and rivers. Surveys by the Department of Geology and Mineral Industries (DOGAMI), the County and FEMA have established the 100-year floodplain.

The floodplains in Jackson County are generally located along the Rogue and Applegate Rivers, Bear Creek and Evans Creek. Jackson County development regulations restrict, but do not prohibit, new development in areas identified as floodplain. This reduces the impact of flooding on future buildings. As new land has been brought into the regional Urban Growth Boundary, the applicable development codes have been applied to prevent the siting of new structures in flood prone areas.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of the county outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage.

The NHMP Steering Committee rated the county as having a **"moderate" vulnerability to flood hazards**, meaning that between 1-10% of the region's population or assets would be affected by a major flood event; *this rating has not changed since the previous NHMP*.

High Hazard Potential Dams – THIS SECTION UNDER DEVELOPMENT

There are 21 high-hazard potential dams in Jackson County (Table C-26). There are four dams (Duggan, Osborne Creek, Walch, and Woodrat Knob) that are currently eligible for the *Rehabilitation of High Hazard Potential Dam Grant Program* as of 8/25/2023. However, each of these dams is privately owned and the owners cannot be direct subrecipients of the HHPD grant. Dam owners should work with an eligible non-federal governmental organization or non-profit organization that can meet the compliance requirements.

The Oregon Water Resources Department (OWRD) has performed Emergency Action Plans (EAPs) for Duggan Dam (November 2016), Walch Dam (December 9, 2019), and Lake Creek, Osborne Creek, and Woodrat Knob dams (B Bar K Cascade Dams EAP, June 22, 2017). The EAPs include mitigation opportunities for internal erosion, landslide or major deformation,

water flowing over the crest, and other damage. loss estimate for McMullen Dam (contact OWRD for details of each EAP). For more information see Table C-26.

National Flood Insurance Program (NFIP) Vulnerability

FEMA updated the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) in 2018 (effective January 19, 2018). The County is a member of the Community Rating System (CRS) and has a Class 9 rating.

The community repetitive flood loss record identifies fifteen (15) RL properties countywide, eight of which are in unincorporated areas. Six of the RL properties in unincorporated areas not insured. There have been 16 paid repetitive loss claims totaling $515,589 in the unincorporated areas of the county There are no SRL properties identified in Jackson County. Substantially damaged buildings located in the Special Flood Hazard Area do not require benefit-cost analysis to qualify for mitigation funds.

Table 2-7 provides information on the identified RL properties. gives the general location of these properties. For details on county repetitive loss properties see Volume I, Section 2. The County complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

Table 2-7 Repetitive Flood Loss Detail

RL or SRL Property	Jurisdiction Name	Insured?	Flood Zone	Occupancy	Total Paid Claims	Total Paid Amount
RL	Unincorporated	YES	AE	Single-Family	2	$134,944.34
RL	Unincorporated	NO	B	Single-Family	2	$37,335.94
RL	Unincorporated	NO	C	Single-Family	2	$57,610.41
RL	Unincorporated	NO	X	Single-Family	2	$83,938.93
RL	Unincorporated	NO	X	Single-Family	2	$53,899.55
RL	Unincorporated	NO	C	Single-Family	2	$21,469.91
RL	Unincorporated	NO	A05	Single-Family	2	$39,193.97
RL	Unincorporated	YES	A	Single-Family	2	$87,196.59
Total					**16**	**$515,589.64**

Source: Information compiled by Department of Land Conservation and Development, 2023. RL = Repetitive Loss, SRL=Severe Repetitive Loss

Landslide

Significant Changes since Previous NHMP:

Two (2) significant landslide events have been added since the previous NHMP. The landslide hazard section has been edited to reference new history since the previous NHMP. No development changes affected the jurisdiction's overall vulnerability to this hazard. An exposure assessment is included in Table 2-11.

Characteristics

A landslide is any detached mass of soil, rock, or debris that falls, slides or flows down a slope or a stream channel. Landslides are classified according to the type and rate of movement and the type of materials that are transported. In a landslide, two forces are at work: 1) the driving forces that cause the material to move down slope, and 2) the friction forces and strength of materials that act to retard the movement and stabilize the slope. When the driving forces exceed the resisting forces, a landslide occurs.

Jackson County is subject to landslides or debris flows (mudslides), especially in the Cascade Range to the east of the county, which may affect buildings, roads and utilities.

Additionally, landslides often occur together with other natural hazards, thereby exacerbating conditions, as described below:

- Shaking due to earthquakes can trigger events ranging from rockfalls and topples to massive slides.
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides.
- Landslides into a reservoir can indirectly compromise dam safety and a landslide can even affect the dam itself.
- Wildfires can remove vegetation from hillsides, significantly increasing runoff and landslide potential.

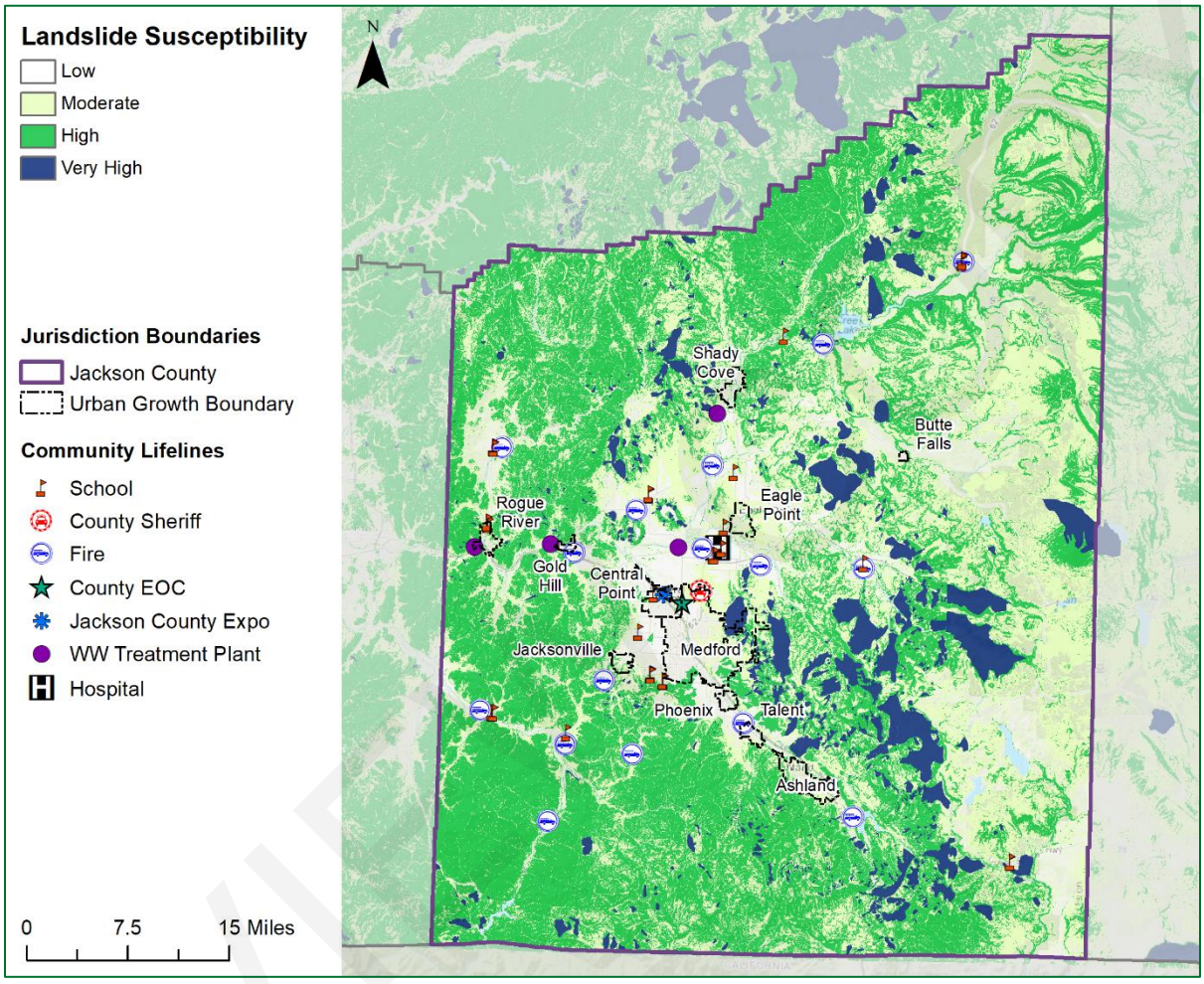
Location and Extent

The characteristics of the minerals and soils present in Jackson County indicate the potential types of hazards that may occur. Rock hardness and soil characteristics can determine whether an area will be prone to geologic hazards such as landslides.

Landslides and debris flows are possible in any of the higher slope portions of Jackson County, including much of the central and eastern portions of the county. Landslide prone areas also include portions of the communities of Ashland, Gold Hill, Jacksonville, Phoenix and Talent.

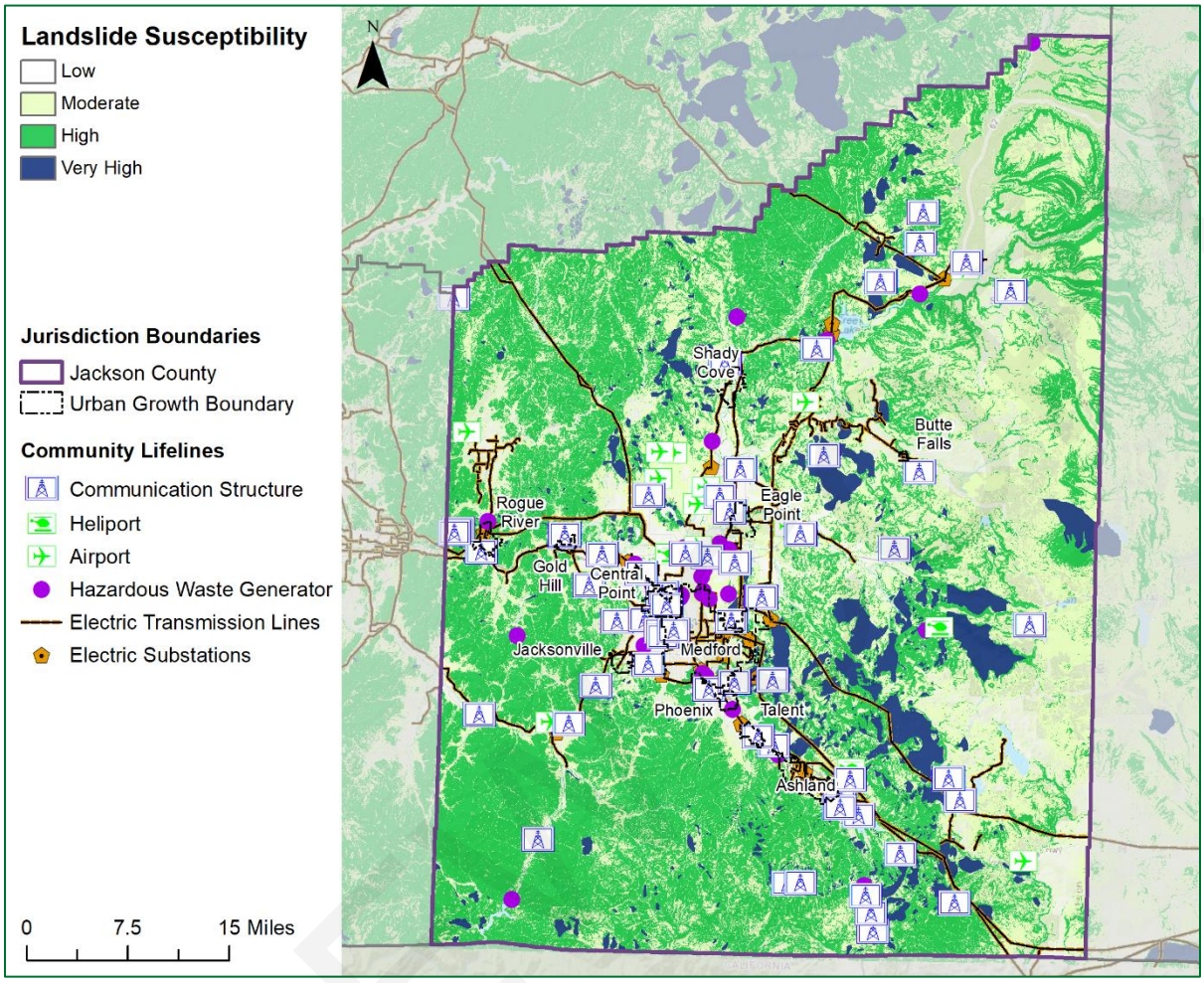
Figure 2-14 and Figure 2-15 show the landslide susceptibility of Jackson County's community lifelines. For more information about community lifelines' susceptibility to landslide refer to Table 2-11 at the end of this chapter.

Figure 2-14 Landslide Susceptibility of Community Lifelines (Safety and Security)



Source: Oregon Partnership for Disaster Resilience. Oregon Department of Geology and Mineral Industries.
Note: To view detail click this link to access Oregon HazVu. Refer to Appendix F: Community Lifelines Hazard Risk Exposure Assessment for more information about the community lifelines.

Figure 2-15 Landslide Susceptibility of Community Lifelines (all others)



Source: Oregon Partnership for Disaster Resilience. Oregon Department of Geology and Mineral Industries. Note: To view detail click this link to access Oregon HazVu. Refer to Appendix F: Community Lifelines Hazard Risk Exposure Assessment for more information about the community lifelines.

Refer to Table 2-11 for a full hazard risk exposure assessment. Community lifelines that have high susceptibility to landslide are:

- ODFW Cole M. Rivers Fish Hatchery
- Applegate Valley RFPD 9 – HQ – Auxiliary Building
- Oak Harbor Freight Lines
- CSC, Inc.
- USACE TP6 Area 5 Elk Creek Project
- Rogue Valley Adventist School
- Communication Structures located at the following coordinates:
    - 42.2373,-122.7687
    - 42.1203, -123.0822
    - 42.0318,-122.5961
    - 42.1745,-122.4753

- 42.1977, -122.4926
- 42.198, -122.4929
- 42.252, -123.1721
- 42.295, -122.8056
- 42.2952, -122.805
- 42.3567, -122.9777
- 42.4264, -123.1769
- 42.4494, -123.2111
- 42.728, -122.6091
- 42.8036, -122.5491

More detailed landslide hazard assessment at specific locations requires a site-specific analysis of the slope, soil/rock, and groundwater characteristics at a specific site. Such assessments are often conducted prior to major development projects in areas with moderate to high landslide potential, to evaluate the specific hazard at the development site.

For Jackson County, many high landslide potential areas are in hilly-forested areas. Landslides in these areas may damage or destroy some timber and impact logging roads. Many of the major highways in Jackson County are at risk for landslides at one or more locations with a high potential for road closures and damage to utility lines. Especially in the central-eastern portions of Jackson County, with a limited redundancy of road network, such road closures may isolate some communities.

In addition to direct landslide damage to roads and highways, affected communities are also subject to the economic impacts of road closures due to landslides, which may disrupt access to/egress from communities. Table 2-8 shows landslide susceptibility exposure for Jackson County and the incorporated cities. Approximately 51% of the county land has high or very high landslide susceptibility exposure. Cities within the county show no rating of very high landslide exposure susceptibility except for Ashland (0.1%) and Medford (2.6%). Most Jackson County cities have ratings of low to moderate landslide exposure. Gold Hill has the highest percentage of high landslide susceptibility (21%), followed by Ashland (18%) and Jacksonville (18%). Note that even if a County or city has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.

Table 2-8 Landslide Susceptibility Exposure

Jurisdiction	Area, ft^2	Low	Moderate	High	Very High
Jackson County	78,133,339,144	17.8%	31.3%	44.5%	6.4%
Ashland	182,893,560	39.5%	42.6%	17.8%	0.1%
Butte Falls	10,731,642	83.7%	9.8%	6.5%	0.0%
Central Point	107,071,293	91.9%	7.5%	0.6%	0.0%
Eagle Point	81,613,814	32.5%	62.1%	5.4%	0.0%
Gold Hill	20,166,729	51.1%	27.9%	21.0%	0.0%
Jacksonville	53,163,321	50.4%	31.9%	17.7%	0.0%
Medford	715,933,475	58.7%	32.6%	6.2%	2.6%
Phoenix	37,694,474	76.0%	20.8%	3.2%	0.0%
Rogue River	26,623,249	62.1%	26.5%	11.5%	0.0%
Shady Cove	56,666,101	53.2%	33.7%	13.1%	0.0%
Talent	36,432,983	75.3%	21.3%	3.5%	0.0%

Source: DOGAMI Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon (2016)

The severity or extent of landslides is typically a function of geology and the landslide triggering mechanism. Rainfall initiated landslides tend to be smaller and earthquake induced landslides may be very large. Even small slides can cause property damage, result in injuries or take lives.

For more information, refer to the following report and maps provided by DOGAMI:

- Open File Report: O-16-02, Landslide Susceptibility Overview Map of Oregon
- Open File Report: O-15-01, Landslide Susceptibility analysis of lifeline routes in the Oregon Coast Range (2015)
- Special Paper 34: Slope failures in Oregon: GIS inventory for three 1996/97 storm events, 2000
- Open File Report: O-06-11, Preliminary Geologic Map of the Sexton Mountain, Murphy, Applegate, and Mount Isabelle 7.5' Quadrangles, Jackson and Josephine Counties, Oregon (2006)
- Open File Report: O-2009-02, Preliminary geologic map of the Robinson Butte 7.5' quadrangle, Jackson County, Oregon (2009)
- Open File Report: O-2011-11, Geologic database and generalized geologic map of Bear Creek Valley, Jackson County, Oregon (2011)

Additional reports are available via DOGAMI's Publications Search website: https://www.oregongeology.org/pubs/pubsearch.htm

History

Landslides may happen at any time of the year. In addition to landslides triggered by a combination of slope stability and water content, earthquakes may also trigger landslides. Areas prone to seismically triggered landslides are generally the same as those prone to

ordinary (i.e., non-seismic) landslides. As with ordinary landslides, seismically triggered landslides are more likely for earthquakes that occur when soils are saturated with water.

Debris flows and landslides are a very common occurrence in hilly areas of Oregon, including portions of Jackson County. Many landslides occur in undeveloped areas and thus may go unnoticed or unreported. For example, DOGAMI conducted a statewide survey of landslides from four winter storms in 1996 and 1997 and found 9,582 documented landslides, with the actual number of landslides estimated to be many times the documented number. For the most part, landslides become a problem only when they impact developed areas and have the potential to damage buildings, roads, or utilities.

Landslide maps are available via Oregon Hazvu: Statewide Geohazards Viewer:

Oregon HazVu

Landslide maps are available via DOGAMI's Statewide Landslide Information Layer for Oregon (SLIDO):

DOGAMI Statewide Landslide Information Layer for Oregon (SLIDO)

Below are listed the most severe landslide events, one (1) landslide event has been added since the previous NHMP (as shown in *italics* below):

- 1997 (January): New Year's flood caused a broad series of landslides in Jackson County resulting from heavy rain and flood conditions. Road damages near Butte Falls and other areas of the county caused a total of $1,740,000 in damage.
- 2015 (February 6): ODOT reported that a portion of OR 66 from milepost 1 to 14 was closed by floodwaters and mudslides on Friday afternoon. Downed trees blocked other roads in the area. Tyler Creek road, Wagner Creek road, Savage Creek road and several BLM roads were washed out or covered by mudslides.
- 2019 (February 28-March 30): Severe storms caused heavy snow and ice accumulation, high winds, flooding, landslides, and erosion at various locations throughout the state (EO 19-02)
- 2022 (December 22-January 6): Severe storms resulted in heavy rain, high winds, flooding, ice accumulation, landslides, and erosion at various locations within these counties (EO 23-01)

For additional history see flood section above for events that included landslides.

Probability Assessment

The probability of rapidly moving landslide occurring depends on a number of factors, including steepness of slope, slope materials, local geology, vegetative cover, human activity and water. There is a strong correlation between intensive winter rainstorms and the occurrence of rapidly moving landslides (debris flows). Consequently, the National Weather Service tracks storms during the rainy season, monitors rain gauges and snow melt and issues warnings as conditions warrant. Given the correlation between precipitation,

snowmelt and rapidly moving landslides, it would be feasible to construct a probability curve. The installation of slope indicators or the use of more advanced measuring techniques could provide information on slower moving slides.

Geo-engineers with the Oregon Department of Geology and Mineral Industries (DOGAMI) estimate widespread landslides about every 20 years; landslides at a local level can be expected every two or three years.[29]

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing a landslide or debris flow is "high",** meaning at least one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP*.

Vulnerability Assessment

To a large degree, landslides are very difficult to predict. Vulnerability assessments assist in predicting how different types of property and population groups will be affected by a hazard.[30] The optimum method for doing this analysis at the city or county level is to use parcel-specific assessment data on land use and structures.[31] Data that includes specific landslide-prone and debris flow locations in the county can be used to assess the population and total value of property at risk from future landslide occurrences.

Landslides can impact major transportation arteries, blocking residents from essential services and businesses. Many aspects of the county are vulnerable to landslides including land use and development patterns, the economy, population segments, ecosystem services and cultural assets.

A quantitative landslide hazard assessment requires overlay of landslide hazards (frequency and severity of landslides) with the inventory exposed to the hazard (value and vulnerability) by considering:

- Extent of landslide susceptible areas;
- Inventory of buildings and infrastructure in landslide susceptible areas;
- Severity of earthquakes or winter storm event (inches of rainfall in 24 hours);
- Percentage of landslide susceptible areas that will move and the range of movements (displacements) likely; and
- Vulnerability (amount of damage for various ranges of movement).

The NHMP Steering Committee rated the County as having a **"low" vulnerability to landslide hazards**, meaning that less than 1% of the region's population or assets would be affected by a major disaster; *this rating has not changed since the previous NHMP*.

[29]Mills, K. 2002. Oregon's Debris Flow Warning System. Cordilleran Section–98th Annual Meeting. Corvallis.

[30] Burby, R., ed. 1998. Cooperating with Nature. Washington D.C.: Joseph Henry Press.

[31] Burby, R., ed. 1998. Cooperating with Nature. Washington D.C.: Joseph Henry Press.

Severe Weather

Severe weather in Jackson County includes a variety of intense and potentially damaging weather events. These events include windstorms and winter storms. The following section describes the unique probability and vulnerability of each identified weather hazard. Other more abrupt or irregular events such as hail are also described in this section.

Extreme Heat

Significant Changes since Previous NHMP:

The Extreme Heat section has been added to the NHMP since the previous plan. No development changes affected the jurisdiction's overall vulnerability to this hazard.

Characteristics

Excessive Heat Events are a geographically widespread temperature spike with days reaching over 90 degrees in all parts of the region. Jackson County has the potential to become a place of extreme temperature events. Extreme temperature events have the potential to inflict serious health damage especially during summer months. In extreme heat environments, the body must work harder to maintain a normal temperature, potentially causing dehydration and heatstroke from over-exposure. These heat-related illnesses are particularly impactful among vulnerable population types[32]. Between 1979 and 2003, heat waves killed at least 8,015 Americans, according to the Centers for Disease Control and Prevention. That's more than hurricanes, lightning, tornadoes, floods, and earthquakes combined. And it's largely an urban problem—the bulk of those deaths occur in cities.[49]

Location and Extent

Excessive Heat Events are generally region wide. Jackson County, like the rest of Southern Oregon, experiences some of the hottest temperatures in the state and is projected to experience greater frequency of extreme temperatures. Extreme Heat can occur yearly; Jackson County has an average of 48 days that exceed 90° Fahrenheit (F) per year.[33]

It is extremely likely (>95%) that the frequency and severity of extreme heat events will increase over the next several decades across Oregon due to current projected climate variations.

[32] FEMA "Extreme Heat" http://www.ready.gov/heat

[33] Oregon State NHMP 2020, 844.

History

The following extreme heat episodes have occurred within Jackson County --:[34]

- **2017 (Aug 1-4):** Excessive Heat Event - Strong high pressure brought record breaking heat to many parts of southwest, south central, and northwest Oregon. Reported high temperatures during this interval ranged from 98 to 112 degrees Fahrenheit (F) in Jackson County.
- **2019 (Aug 27-28):** Excessive Heat Event - High pressure aloft forced a thermal trough near the coast to move inland, bringing hot and dry conditions to the inland west side valleys in southwest Oregon. Reported high temperatures ranged from 92 to 106 degrees F in Jackson County.
- **2020 (Aug 14-17):** Excessive Heat Event - High pressure and a dry air mass supported very hot temperatures over inland areas during this interval. The minimum temperatures were quite warm as well. The heat was occasionally tempered by high clouds streaming over the area. High temperatures in the county ranged from 88 to 108 degrees F in Jackson County.
- **2020 (Sep 6-7):** Excessive Heat Event - Strong high pressure aloft combined with a hot air mass already in place made for very hot conditions over southern Oregon. Reported high temperatures in this zone ranged from 95 to 102 degrees F in Jackson County.
- **2021 (Jun 20-21):** Excessive Heat Event - Strong ridging aloft and strong surface heating made for hot temperatures across inland portions of southwest Oregon. Reported high temperatures ranged from 95 to 102 degrees F in Jackson County.
- **2021 (Jun 26-30):** Excessive Heat Event -A historic heat wave affected the Pacific Northwest during this interval. It was caused by a strong upper-level ridge that created dry and stable conditions over the area with strong subsidence. Many daily, monthly, and all-time high temperature records were set over southwest and south-central Oregon. Medford tied its record high at 115 degrees F.
- **2021 (Jul 29-31):** Excessive Heat Event- Strong high pressure brought another heat wave to southern Oregon. Reported high temperatures ranged from 90 to 105 degrees F in Jackson County Executive Order NO. 21-26 was called by Governor Kate Brown regarding this event's burden on local governments to provide health and safety to residents.
- **2021 (Aug 10-15):** Excessive Heat Event- A strong ridge supported a heat wave over inland areas of southwest and south-central Oregon during this interval. Reported high temperatures ranged from 86 to 102 degrees F in Jackson County Executive Order NO. 21-27 was called by Governor Kate Brown regarding this event's burden on local governments to provide health and safety to residents.

[34] Taylor, George H., and Ray Hatton, 1999, The Oregon Weather Book; The Spatial Hazard Events and Losses Database for the United States, [Online Database]. Columbia, SC: University of South Carolina. Available at http://www.sheldus.org; U.S. Department of Commerce. National Climatic Data Center. Available at http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms; National Weather Service Forecast Office. Available at http://www.wrh.noaa.gov/pqr/paststorms/wind.php

- **2022 (July 25-31):** Excessive Heat Event – A strong persistent ridging over the Pacific Northwest supported a prolonged heat wave over inland portions of southwest and south-central Oregon. Reported high temperatures ranged from 93-99 degrees. Executive Order NO.22-13 was called by Governor Kate Brown regarding this event's burden on local governments to provide health and safety to residents.

Future Climate Projection

According to OCCRI report *Future Climate Projections: Jackson County* the number, duration, and intensity of extreme heat events is expected to increase. The number of days per year with temperatures of 90 degrees Fahrenheit or higher is expected to increase by an average of 28 days and the temperature on the hottest day of the year is expected to increase by an average of 7 degrees Fahrenheit.

Probability Assessment

Based on the available data and research the NHMP Steering Committee determined the **probability of experiencing an extreme heat event is "high",** meaning one incident may occur within the next 35-year period. *This hazard was not rated in the previous plan.*

Extreme heat events occur every few years within the region, however, they are generally not long lasting. Climate models for Oregon suggest future regional climate changes include increases in temperature around 0.2-1°F per decade in the 21st Century, along with warmer and drier summers.

Vulnerabilities

The NHMP Steering Committee rated the city as having a **"moderate" vulnerability to extreme heat events**, meaning that between 1% and 10% of the region's population or assets could be affected by a major heat event. *This hazard was not rated in the previous plan.*

Due to insufficient data and resources, Jackson County is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard.

However, due to the expected high level of exposure to a climatic hazard event such as extreme heat in Jackson County, many vulnerable populations are especially susceptible to the greatest impacts.

Windstorm

Significant Changes since Previous NHMP:

Two (2) significant windstorm events have been added since the previous NHMP. No development changes affected the jurisdiction's overall vulnerability to this hazard.

Characteristics

A windstorm is generally a short duration event involving straight-line winds and/or gusts more than 50 mph. Although windstorms can affect the entirety of Jackson County, they are especially dangerous near developed areas with large trees or tree stands. The extent of any windstorm is determined by its track, intensity, and local terrain.[35] In the southwest Oregon, wind speed is typically 60 mph for 25-year storm events, 70 mph for 50-year storm events and 80 mph for 100-year storm events. Jackson County has experienced multiple 25-, 50- and 100-year windstorm events over the past century with impacts often occurring countywide. A windstorm will frequently knock down trees and power lines, damage homes, businesses, public facilities and create tons of storm related debris. Windstorms are a common, chronic hazard in Jackson County.

Location and Extent

The most common type of wind pattern affecting Jackson County is straight-line winds, which originate as a downdraft of rain-cooled air and reach the ground and spread out rapidly. Straight- line winds can produce gusts of 100 mph or greater. Records of major Pacific windstorms are documented by state agencies and weather stations throughout Oregon, including several official weather stations in Jackson County's lower valleys. Jackson County experienced record-setting Pacific windstorms in December 1951 (peak gust 72 mph), a storm in February 1958 came close with peak gusts of 71 mph.[36] During the 1958 storm, every major highway in Oregon was at some point blocked by fallen trees.[37] During the Columbus Day Storm (November 1962), considered by many to be Oregon's most powerful windstorm, top wind speeds in Medford reached 58 mph.

Oregon's second most powerful windstorm occurred in December of 1995.[38] This storm caused massive damage throughout the state. The 113 mph gusts measured in Portland illustrate the force of the 1995 storm.[39] However, in Medford the sustained one-minute wind

[35] State of Oregon Natural Hazard Mitigation Plan (2020)

[36] Wolf, Read. The Strongest Windstorms in the Western Pacific Northwest 1950-2007, http://www.climate.washington.edu/stormking/PNWStormRanks.html. Accessed January 26, 2018.

[37] Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.

[38] Oregon Climate Service website: http://www.ocs.orst.edu.

[39] Ibid.

speeds from this storm did not reach 44 mph, which was the local record for the month of December, set thirty years earlier in 1965.[40]

Typically, mountainous terrain slows down wind movement, which is why Oregon's sheltered valley areas have the slowest wind speed in the state. However, in the foothills, the wind speeds may increase due to down-sloping winds from the mountains. Although windstorms can affect the entirety of the county, they are especially dangerous in developed areas with significant tree stands and major infrastructure, especially above ground utility lines. A windstorm will frequently knock down trees and power lines, damage homes, businesses, public facilities and create tons of storm related debris.

History

Windstorms occur yearly; more destructive storms occur once or twice per decade, most recently in April 2016.[41] -

There have been 2 significant windstorm events, emergency declarations, or presidential disaster declarations since the previous NHMP:

- **2012 (Dec 16):** After a lull in storm activity, a strong cold front brought high winds back to portions of southern Oregon. 85 mph gusts.
- **2012 (Dec 19):** The stormy pattern continued as another cold front brought high winds to portions of southern Oregon. Peak gusts of 99 mph in some areas.
- **2013 (Sept 28):** The first strong system of the season brought high winds to portions of southern Oregon. Average gusts of 75 mph with peak gusts of 92 mph. The Oregon Department of Transportation reported 8-9 trees down across Oregon Highway 230, 12 trees down across Oregon Highway 62 and numerous trees down across Oregon Highway 138. Based on all this, it is assumed that the winds in ORZ027 met high wind warning criteria. Average gusts of 75 mph with peak gusts of 89 mph.
- **2014 (Feb 15):** An incoming front brought high winds to several areas around southern Oregon. Average gusts between 75-80 mph.
- **2014 (Mar 5-6):** An incoming front brought strong winds to portions of southern Oregon. Peak gusts of 92 mph.
- **2014 (Oct 22):** A member of the public reported wind gusts estimated at 50-60 mph downed several trees in the Dark Hollow area southwest of Medford. The tops of two large healthy trees were broken, one an oak and the other a poplar. No property damage. The high winds lasted around 45 minutes. Peak gust of 79 mph.
- **2014 (Oct 24-25):** A strong front brought high winds to many parts of southwest and south central Oregon. Peak gusts of 105 mph.
- **2014 (Dec 10):** An incoming front on 12/10/14 brought strong winds to many parts of southern Oregon and northern California. A rapidly developing low pressure system behind the first front brought another round of high winds on 12/11/14. Both of

[40] City of Medford weather data book, Table 28.
[41] NOAA, National Centers for Environmental Information, https://www.ncdc.noaa.gov/stormevents/

these events were covered by a long duration High Wind Warning. Average gusts of 79 mph with peak gusts of 84 mph.

- 2014 (Dec 11): An incoming front on 12/10/14 brought strong winds to many parts of southern Oregon and northern California. A rapidly developing low pressure system behind the first front brought another round of high winds on 12/11/14. Both of these events were covered by a long duration High Wind Warning. Peak gusts of 117 mph. ODOT reported that a truck was blown over on Highway 140 near Meridian Road.
- 2015 (Feb 5-6): The Medford Mail Tribune reported numerous trees down across southern Jackson County. There were power outages due to trees falling across power lines. A falling tree fell on a house and car in Ashland, damaging both. Peak gust of 124 mph.
- 2015 (Feb 7): The second in a series of fronts brought strong winds to many areas in Southern Oregon. Peak gusts of 116 mph.
- 2015 (Feb 8-9): The third in a series of fronts brought strong winds to many areas in Southern Oregon. Peak gusts of 94 mph.
- 2015 (Dec 3-3): A strong front brought high winds to parts of southwest and south central Oregon. Peak gusts of 107 mph.
- 2015 (Dec 5-21): A series of 5 distinct windstorm events impacted many regions in Southwest and south central Oregon. Peak gusts ranged from 76-88 mph.
- 2016 (Jan 16): Another in a series of cold fronts brought high winds to portions of the southern Oregon coast and the higher terrain of the Cascades and Siskiyous. Peak gusts of 82 mph.
- 2016 (Jan 19): Another in a series of cold fronts brought high winds to portions of the southern Oregon coast and the higher terrain of the Cascades and Siskiyous. Peak gusts of 102 mph.
- 2016 (Jan 21-22): The peak gust was 92 mph recorded at 2200 PST. Earlier that evening, strong winds were reported at Mount Ashland ski park. Kids were blown over in the parking lot. A ski lift was also closed due to winds. A chaperone stated that this was the first time he has ever been scared for the safety of skiers and snowboarders at Mount Ashland due to the weather.
- 2016 (Feb 17): One of the last of a series of fronts brought high winds to portions of southwest and south central Oregon. Peak gust of 79 mph.
- 2016 (Feb 19): The last of a series of fronts brought high winds to portions of southwest and south central Oregon. Peak gust of 91 mph.
- 2016 (Mar 1): A strong front brought high winds to portions of southwest and south central Oregon. Peak gust of 87 mph.
- 2016 (Apr 13): Central Point reported a measured gust to 45 mph. A storage shed on the property was blown apart by the winds. Large branches down. A spotter in Applegate reported 2 inch branches coming off of trees. Winds were estimated gusting to 45 mph. An estimated 998 customers were without power.

- **2019 (February 28-March 30) –** Severe storms caused heavy snow and ice accumulation, high winds, flooding, landslides, and erosion at various locations throughout the state (EO 19-02)
- **2022 (December 22-January 6) –** Severe storms resulted in heavy rain, high winds, flooding, ice accumulation, landslides, and erosion at various locations within these counties (EO 23-01)

Additionally, Jackson County has experienced some severe weather events (not considered windstorms or winter storms) that do not necessarily exhibit windstorm conditions. Three (3) severe weather events were added to this hazard history section since the previous NHMP:

- **2013 (Aug 7):** Hail - Monsoonal moisture combined with passing upper level disturbances to create thunderstorms over southern Oregon. Some of these storms became severe. 1-inch hail reported on Squires Peak and near the community of Ruch. An orchardist from a orchard near Talent reported a 50% loss of the pear crop due to hail damage. Estimated hail size was 0.5 to 1.0 inches judging from holes in the ground. The monetary value of the loss is not known.
- **2015 (July 7):** Thunderstorm/Hail - A strong thunderstorm developed at the head of the Rogue Valley on the evening of 7/7/15. This storm spawned damaging winds from Ashland to Medford and small hail as well. A member of the public reported trees down at the Church of Jesus Christ of Latter Day Saints (Medford). The Mail Tribune newspaper and the police scanner indicated that numerous trees were knocked down in the Medford area. Some fell into power lines, causing multiple power outages. Other fell into vehicles and homes. Lightning also was the suspected cause of at least one structure fire.
- **2016 (Jun 6):** Thunderstorm - KDRV-TV reported a large tree was blown down, closing Highway 62 until it was cleared.

Several additional, small windstorm events have occurred since the previous NHMP, see the Storm Events Database provided by the National Oceanic and Atmospheric Administration for more information.

Future Climate Projection

According to OCCRI report Future Climate Projections: Jackson County, limited research shows that very little if any change in the frequency of windstorms will occur in the Northwest due to climate change.

Probability Assessment

Windstorms in the county usually occur in the winter from October to March and their extent is determined by their track, intensity (the air pressure gradient they generate) and local terrain. Summer thunderstorms may also bring high winds along with heavy rain and/ or hail. The National Weather Service uses weather forecast models to predict oncoming windstorms, while monitoring storms with weather stations in protected valley locations throughout Oregon.

Table 2-9 shows the wind speed probability intervals that structures 33 feet above the ground would expect to be exposed to within a 25, 50 and 100-year period. The table shows that structures in Region 4, which includes Jackson County, can expect to be exposed to 60 mph winds in a 25-year recurrence interval (4% annual probability).

Table 2-9 Probability of Severe Wind Events (Region 4)

	25-Year Event (4% annual probability)	50-Year Event (2% annual probability)	100-Year Event (1% annual probability)
Region 4: Southwest Oregon	60 mph	70 mph	80 mph

Source: Oregon State Natural Hazard Mitigation Plan, 2020

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing a windstorm is "high",** meaning one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP.*

Vulnerabilities

Many buildings, utilities and transportation systems within Jackson County are vulnerable to wind damage. This is especially true in open areas, such as natural grasslands or farmlands. It is also true in forested areas, along tree-lined roads and electrical transmission lines and on residential parcels where trees have been planted or left for aesthetic purposes. Structures most vulnerable to high winds include insufficiently anchored manufactured homes and older buildings in need of roof repair.

Fallen trees are especially troublesome. They can block roads and rails for long periods of time, impacting emergency operations. In addition, up-rooted or shattered trees can down power and/or utility lines and effectively bring local economic activity and other essential facilities to a standstill. Much of the problem may be attributed to a shallow or weakened root system in saturated ground. In Jackson County, trees are more likely to blow over during the winter (wet season).

As such, the NHMP Steering Committee rated the county as having a **"moderate" vulnerability to windstorm hazards**, meaning that between 1-10% of the region's population or assets would be affected by a major disaster; *this rating has not changed since the previous NHMP.*

Winter Storm

Significant Changes since Previous NHMP:

Two (2) significant winter storm events have been added since the previous NHMP. No development changes affected the jurisdiction's overall vulnerability to this hazard.

Characteristics

Winter storms affecting Jackson County are generally characterized by a combination of heavy rains and high winds throughout the county, sometimes with snowfall, especially at higher elevations. Heavy rains can result in localized or widespread flooding, as well as debris slides and landslides. High winds commonly result in tree falls which primarily affect the electric power system, but which may also affect roads, buildings, and vehicles. This chapter deals primarily with the snow and ice effects of winter storms.

The winter storms that affect Jackson County typically are not local events affecting only small geographic areas. Rather, winter storms are usually large cyclonic low-pressure systems that move in from the Pacific Ocean and affect large areas of Oregon and/or the whole Pacific Northwest. These storms are most common from October through March.

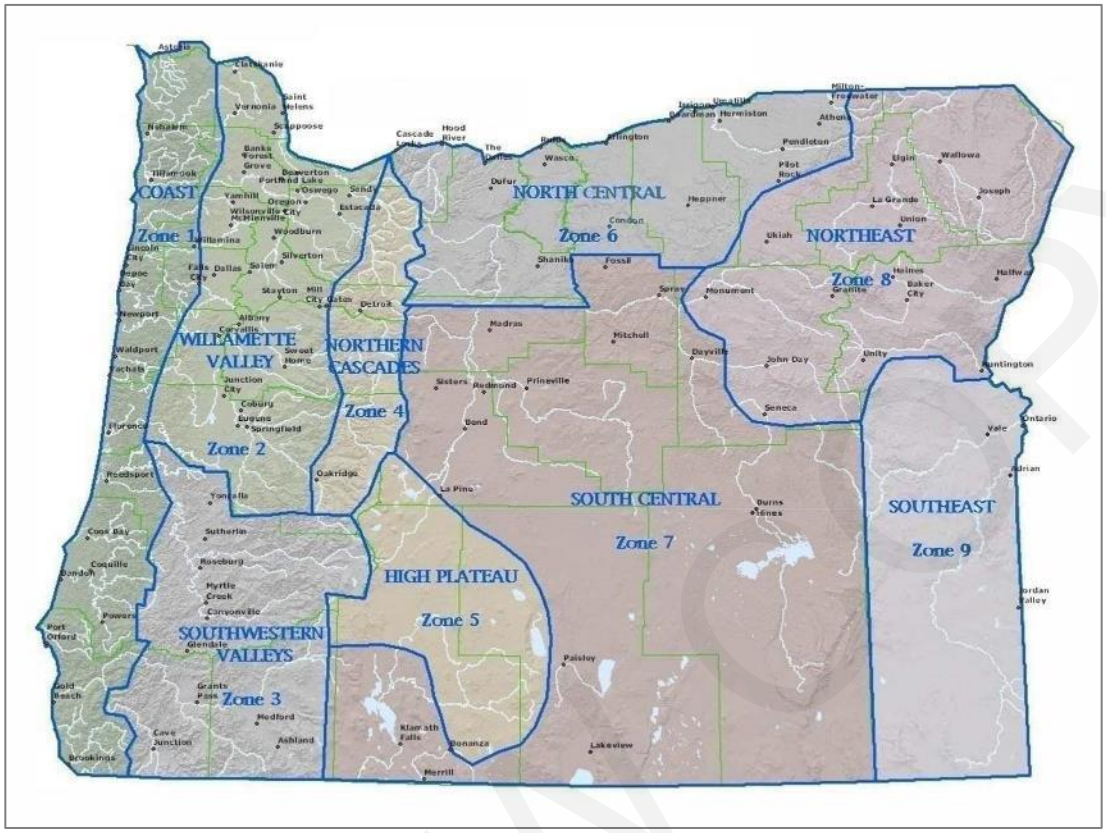
Ice storms are comprised of cold temperatures and moisture, but subtle changes can result in varying types of ice formation which may include freezing rain, sleet, and hail. Of these, freezing rain can be the most damaging of ice formations.

Outside of mountainous areas, significant snow accumulations are much less likely in western Oregon than on the east side of the Cascades. However, if a cold air mass moves northwest through the Columbia Gorge and collides with a wet Pacific storm, then a larger than average snow fall may result.

Location and Extent

The National Climatic Data Center has established climate zones in the United States for areas that have similar temperature and precipitation characteristics. Oregon's latitude, topography and proximity to the Pacific Ocean give the state diversified climates. Figure 2-16 shows that Jackson County is located within Zone 3: Southwestern Valleys.

Figure 2-16 Oregon Climate Divisions



Source: Oregon Climate Service,

The principal types of winter storms that occur include:

- Snowstorms: require three ingredients: cold air, moisture and air disturbance. The result is snow, small ice particles that fall from the sky. In Oregon, the further inland and north one moves, the more snowfall can be expected. Blizzards are included in this category.
- Ice storms: are a type of winter storm that forms when a layer of warm air is sandwiched by two layers of cold air. Frozen precipitation melts when it hits the warm layer and refreezes when hitting the cold layer below the inversion. Ice storms can include sleet (when the rain refreezes before hitting the ground) or freezing rain (when the rain freezes once hitting the ground).
- Extreme Cold: Dangerously low temperatures accompany many winter storms. This is particularly dangerous because snow and ice storms can cause power outages, leaving many people without adequate heating.

Unlike most other hazards, it is not simple to systematically map winter storm hazard zones. The entire County is susceptible to damaging severe weather. Winter storms that bring snow and ice can impact infrastructure, business and individuals. Those resources that exist at higher elevations will experience more risk of snow and ice, but the entire County can face

damage from winter storms and, for example, hail or life threateningly cold temperatures that winter storms bring.

History

Winter storms occur yearly; more destructive storms occur once or twice per decade, most recently in 2015.[42] There have been two (2) winter storm events, emergency declarations, or presidential disaster declarations since the previous NHMP (as shown in *italics* below):[43]

- 2012 (Dec 20 – Dec 21): A long lasting winter storm occurred during this interval, caused by a series of closely spaced storms. Trail and Ashland reported 6.5 inches of snow in 24 hours while Gold Hill reported 5.9 inches in 24 hours. Significant snow was reported in the mountains during this period, causing numerous highway closures including Interstate 5 through Siskiyou Summit.
- 2013 (Dec 6 – Dec 7): A long lasting winter storm occurred during this interval, caused by a series of closely spaced storms. The communities of Gold Hill, Trail, Eagle Point, Phoenix, Ashland, Rogue River, Shady Cove, Ruch, White City, Butte Falls and Prospect reported between 3.5 and 14 inches of snow within 24 hours. Multiple vehicle accidents resulting from winter conditions occurred along Old Highway 99 from Grants Pass to Gold Hill and on Highway 62 from Medford to Eagle Point.
- 2014 (Jan 11): A strong front brought strong winds and heavy snow to portions of the southern Oregon Cascades.
- 2015 (Nov 24 – Nov 25): The first big winter storm of the season brought heavy snow to some locations in southern Oregon.
- 2015 (Dec 12 – Dec 13): A series of systems brought heavy precipitation to southern Oregon. The communities of Applegate, Phoenix, Medford, Ashland, and Butte Falls reported between 3 and 9 inches of snow within 24 hours. Numerous power outages were reported around the county and area roads were closed due to snow and fallen trees.
- 2015 (Dec 21 – Dec 24): A series of storms made for a long lasting winter storm over southwest and south central Oregon. At first, the snow was limited to higher elevations but lowered with time to some of the west side valley floors.
- 2016-2017 (Dec.-Jan): A series of storms impacted the Rogue Valley including high winds, ice, freezing temperatures, and snow accumulation of 12-24 inches in parts of the valley floor.
- 2019 (February 28-March 30):Severe storms caused heavy snow and ice accumulation, high winds, flooding, landslides, and erosion at various locations throughout the state (EO 19-02)

[42] https://www.ncdc.noaa.gov/stormevents/listevents

[43] Taylor, George H. and Ray Hatton, 1999, The Oregon Weather Book; The Spatial Hazard Events and Losses Database for the United States, [Online Database]. Columbia, SC: University of South Carolina. Available at http://www.sheldus.org; U.S. Department of Commerce. National Climatic Data Center. Available at http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms; National Weather Service Forecast Office. Available at http://www.wrh.noaa.gov/pqr/paststorms/wind.php

- **2022 (December 22-January 6):** Severe storms resulted in heavy rain, high winds, flooding, ice accumulation, landslides, and erosion at various locations within these counties (EO 23-01)

Probability Assessment

The recurrence interval for a moderate to severe winter storm is about once every year; however, there can be many localized storms between these periods. Severe winter storms occur in western Oregon regularly from November through February. Jackson County experiences winter storms a couple times every year to every other year.

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing a winter storm is "high",** meaning one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP.*

Vulnerabilities

Given current available data, no quantitative assessment of the risk of winter storm was possible at the time of this NHMP update. However, assessing the risk to the County from winter storms should remain an ongoing process determined by community characteristics and physical vulnerabilities. Weather forecasting can give County resources (emergency vehicles, warming shelters) time to prepare for an impending storm, but the changing character of the County population and resources will determine the impact of winter storms on life and property in Jackson County.

The most likely impact of snow and ice events on Jackson County are road closures limiting access/egress to/from some areas, especially roads to higher elevations. Winter storms with heavy wet snow or high winds and ice storms may also result in power outages from downed transmission lines and/or poles.

Winter storms which bring snow, ice and high winds can cause significant impacts on life and property. Many severe winter storm deaths occur because of traffic accidents on icy roads, heart attacks may occur from exertion while shoveling snow and hypothermia from prolonged exposure to the cold. The temporary loss of home heating can be particularly hard on the elderly, young children, and other vulnerable individuals.

Property is at risk due to flooding and landslides that may result if there is a heavy snowmelt. Additionally, ice, wind and snow can affect the stability of trees, power and telephone lines and TV and radio antennas. Down trees and limbs can become major hazards for houses, cars, utilities, and other property. Such damage in turn can become a major obstacle to providing critical emergency response, police, fire, and other disaster recovery services.

Severe winter weather can also cause the temporary closure of key roads and highways, air and train operations, businesses, schools, government offices and other important community services. Below freezing temperatures can also lead to breaks in un-insulated water lines serving schools, businesses, industries, and individual homes. All these effects, if

lasting more than several days, can create significant economic impacts for the affected communities and the surrounding region. In the rural areas of Oregon severe winter storms can isolate small communities, farms, and ranches.

At the time of this update, sufficient data was not available to determine winter storm vulnerability in terms of explicit types and numbers of existing and future buildings, infrastructure, or critical infrastructure.

As such, the NHMP Steering Committee rated the County as having a **"moderate" vulnerability to winter storm hazards**, meaning that between 1 and 10% of the region's population or assets would be affected by a major disaster; *this rating has not changed since the previous NHMP.*

Volcanic Event

Significant Changes since Previous NHMP:

There have been no significant changes to this section since the previous NHMP. No development changes affected the jurisdiction's overall vulnerability to this hazard.

Characteristics

The Pacific Northwest lies within the "ring of fire," an area of very active volcanic activity surrounding the Pacific Basin. Volcanic eruptions occur regularly along the ring of fire, in part because of the movement of the Earth's tectonic plates. The Earth's outermost shell, the lithosphere, is broken into a series of slabs known as tectonic plates. These plates are rigid, but they float on a hotter, softer layer in the Earth's mantle. As the plates move about on the layer beneath them, they spread apart, collide, or slide past each other. Volcanoes occur most frequently at the boundaries of these plates and volcanic eruptions occur when molten material, or magma, rises to the surface.

The primary threat to lives and property from active volcanoes is from violent eruptions that unleash tremendous blast forces, generate mud and debris flows, or produce flying debris and ash clouds. The immediate danger area in a volcanic eruption generally lies within a 20-mile radius of the blast site.

Location and Extent

Volcanic eruption is not an immediate threat to the residents of Jackson County, as there are no active volcanoes within the county. Nevertheless, the secondary threats caused by volcanoes in the Cascade region must be considered. Volcanic ash can contaminate water supplies, cause electrical storms, create health problems, and collapse roofs.

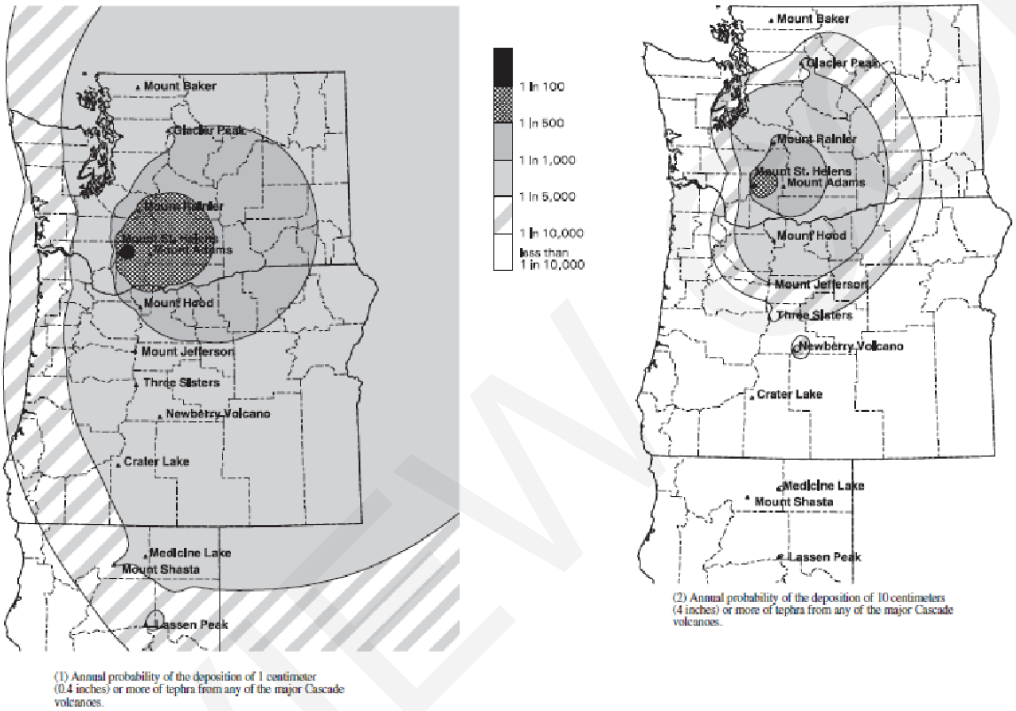
Jackson County is located on the Pacific Rim. Tectonic movement within the earth's crust can renew nearby dormant volcanoes resulting in ash fallout. Volcanic activity is possible from Mount Hood and Mount Saint Helens, Three Sisters, Mount Bachelor, and the Newberry Crater areas. Because the distance to these potentially active volcanic areas is so great, the only adverse effect that would impact areas of Jackson County is ash fallout, with perhaps some impact on water supplies. The area affected by ash fallout depends upon the height attained by the eruption column and the atmospheric conditions at the time of the eruption.

Geologic hazard maps have been created for most of the volcanoes in the Cascade Range by the USGS Volcano Program at the Cascade Volcano Observatory in Vancouver, WA and are available at http://vulcan.wr.usgs.gov/Publications/hazards_reports.html.

Scientists use wind direction to predict areas that might be affected by volcanic ash; during an eruption that emits ash, the ash fall deposition is controlled by the prevailing wind direction. The predominant wind pattern over the Cascades originates from the west and

previous eruptions seen in the geologic record have resulted in most ash fall drifting to the east of the volcanoes. Regional tephra fall shows the annual probability of ten centimeters or more of ash accumulation from Pacific Northwest volcanoes. Figure 2-17 depicts the potential and geographical extent of volcanic ash fall more than ten centimeters from a large eruption of Mt. St. Helens. Additionally, Lassen Peak and Mount Shasta are active and potentially active volcanoes, respectively located in northern California. The proximity of these volcanic features suggests that, in the rare event of an eruption, Jackson County could be affected by ash fall and other air quality impacts.

Figure 2-17 Regional Tephra-fall Maps



Source: USGS "Volcano Hazards in the Mount Jefferson Region, Oregon"

History

Mount Hood and Mount St. Helens are two active volcanoes near Jackson County. Mount Hood is several hundred miles north of the county and is more than 500,000 years old. It has had two significant eruptive periods, one about 1,500 years ago and another about 200 years ago. Mount St. Helens is in southern Washington State and has been active throughout its 50,000-year lifetime. In the past 200 years, seven of the Cascade volcanoes have erupted, including (from north to south): Mt. Baker, Glacier Peak, Mt. Rainier, Mount St. Helens (Washington), Mt. Hood (Oregon), Mt. Shasta and Mt. Lassen (California).

There has been no recent volcanic activity near the county. The 1980 explosion of Mount St. Helens in southern Washington State is the latest on record; both Mount St. Helens and Mount Hood remain listed as active volcanoes.

Probability Assessment

The United States Geological Survey-Cascades Volcano Observatory (CVO) produced volcanic hazard zonation reports for Mount St. Helens and Mount Hood in 1995 and 1997. The reports include a description of potential hazards that may occur to immediate communities. The CVO created an updated annual probability of tephra (ash) fall map for the Cascade region in 2001, which could be a rough guide for Jackson County in forecasting potential tephra hazard problems. The map identifies the location and extent of the hazard.

The CVO Volcanic tephra fall map is based on the combined likelihood of tephra-producing eruptions occurring at Cascade volcanoes. Probability zones extend farther east of the range because winds blow from westerly directions most of the time. The map shows annual probabilities for a fall of one centimeter (about 0.4 inch). The patterns on the map show the dominating influence of Mount St. Helens as a tephra producer. Because small eruptions are more numerous than large eruptions, the probability of a thick tephra fall at a given locality is lower than that of a thin tephra fall. The annual probability of a fall of one centimeter or more of tephra is about 1 in 10,000 for Jackson County. This is small when compared to other risks faced by the County. The USGS map on the previous page illustrates potential tephra fall in the region.

Based on the available data and research for Jackson County the NHMP Steering Committee determined the **probability of experiencing volcanic activity is "low",** meaning one incident is likely within the next 75 to 100-year period; *this rating has not changed since the previous NHMP*.

Vulnerabilities

Risks for Jackson County associated with regional volcanic activity would be ash fall, air quality and possible economic or social disruption due to air traffic issues due to the ash cloud.

At the time of this update, sufficient data was not available to determine volcanic eruption vulnerability in terms of explicit types and numbers of existing and future buildings, infrastructure or critical infrastructure.

Though unlikely, the impacts of a significant ash fall are substantial. Persons with respiratory problems are endangered, transportation, communications and other lifeline services are interrupted, drainage systems become overloaded/clogged, buildings can become structurally threatened and the economy takes a major hit. Any future eruption of a nearby volcano (e.g., Hood, St. Helens, or Adams) occurring during a period of easterly winds would likely have adverse consequences for the county.

As such, the NHMP Steering Committee rated the county as having a **"low" vulnerability to volcanic activity**, meaning that less than 1% of the region's population or assets would be affected by a major disaster (volcanic ash); *this rating has not changed since the previous NHMP*.

Wildfire

Significant Changes since Previous NHMP:

There have been four significant wildfire events and two wildfire threats since the previous NHMP. No development changes affected the jurisdiction's overall vulnerability to this hazard. An exposure assessment is included in Table 2-11. Jackson County is currently in the process of updating the Rogue Valley Integrated Fire Plan.

Characteristics

Wildfires occur in areas with large amounts of flammable vegetation that require a suppression response due to uncontrolled burning. Fire is an essential part of Oregon's ecosystem but can also pose a serious threat to life and property, particularly in the state's growing rural communities. Wildfire can be divided into three categories: interface, wildland, and firestorms. The increase in residential development in interface areas has resulted in greater wildfire risk. Fire has historically been a natural wildland element and can sweep through vegetation that is adjacent to a combustible home. New residents in remote locations are often surprised to learn that in moving away from built-up urban areas, they have also left behind readily available fire services providing structural protection. Recent fires in Oregon and across the western United States have increased public awareness over the potential losses to life, property, and natural and cultural resources that fire can pose.

The following three factors contribute significantly to Wildfire behavior and can be used to identify Wildfire hazard areas.

Topography: As slope increases, the rate of wildfire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridgetops may mark the end of wildfire spread, since fire spreads more slowly or may even be unable to spread downhill.

Fuel: The type and condition of vegetation plays a significant role in the occurrence and spread of wildfires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the "fuel load"). The ratio of living to dead plant matter is also important. The risk of fire is increased significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel's continuity, both horizontally and vertically, is also an important factor.

Weather: The most variable factor affecting wildfire behavior is weather. Temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildfire activity. By contrast, cooling and higher humidity often signal reduced Wildfire occurrence and easier containment.

The frequency and severity of wildfires is also dependent upon other hazards, such as lightning, drought, equipment use, railroads, recreation use, arson, and infestations. If not promptly controlled, wildfires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to affecting people, wildfires may severely affect livestock and pets. Such events may require emergency watering/feeding, evacuation, and shelter.

The indirect effects of wildfires can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, thereby enhancing flood potential, harming aquatic life and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards, as described above.

Location and Extent

Wildfire hazard areas are commonly identified in regions of the Wildland Urban Interface (WUI). The interface is the urban-rural fringe where homes and other structures are built into a densely forested or natural landscape. If left unchecked, it is likely that fires in these areas will threaten lives and property. One challenge Jackson County faces is from the increasing number of houses being built in the urban/rural fringe as compared to twenty years ago. The "interface" between urban or suburban areas and the resource lands has significantly increased the threat to life and property from fires. Responding to fires in the expanding Wildland Urban Interface area may tax existing fire protection systems beyond original design or current capability.

The ease of fire ignition further determines ranges of wildfire hazard due to natural or human conditions and the difficulty of fire suppression. The wildfire hazard is also magnified by several factors related to fire suppression/control, such as the surrounding fuel load, weather, topography, and property characteristics.

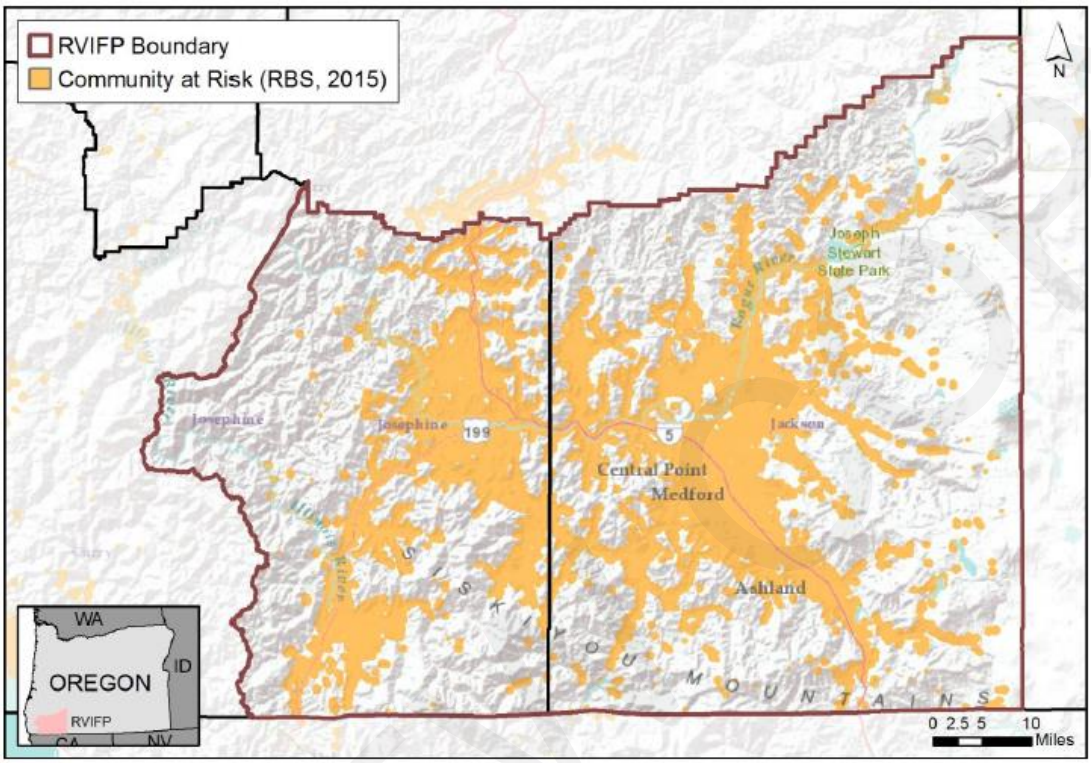
Fire susceptibility throughout the county dramatically increases in late summer and early autumn as summer thunderstorms with lightning strikes increases and vegetation dries out, decreasing plant moisture content and increasing the ratio of dead fuel to living fuel. However, various other factors, including humidity, wind speed and direction, fuel load and fuel type and topography can contribute to the intensity and spread of wildland. In addition, common causes of wildfires include arson and negligence from industrial and recreational activities.

The RVIFP defines a *Community at Risk,* utilizing the definition provided by the Health Forests Restoration Act (2003), "as a geographic area within and surrounding permanent dwellings (at least 1 home per 40 acres) with basic infrastructure and services, under a common fire protection jurisdiction, government, or tribal trust or allotment, for which there is a significant threat due to wildfire."[44] The CAR designation for the RVIFP is based on the RBS

[44] Rogue Valley Integrated Community Wildfire Protection Plan (2017)

which follows the uniform CAR framework for Oregon that is augmented with data on where people live from the Westwide Wildfire Risk Assessment and 2010 Decennial Census data (see Figure 2-18).[45]

Figure 2-18 Wildfire Risk Assessment – Communities at Risk

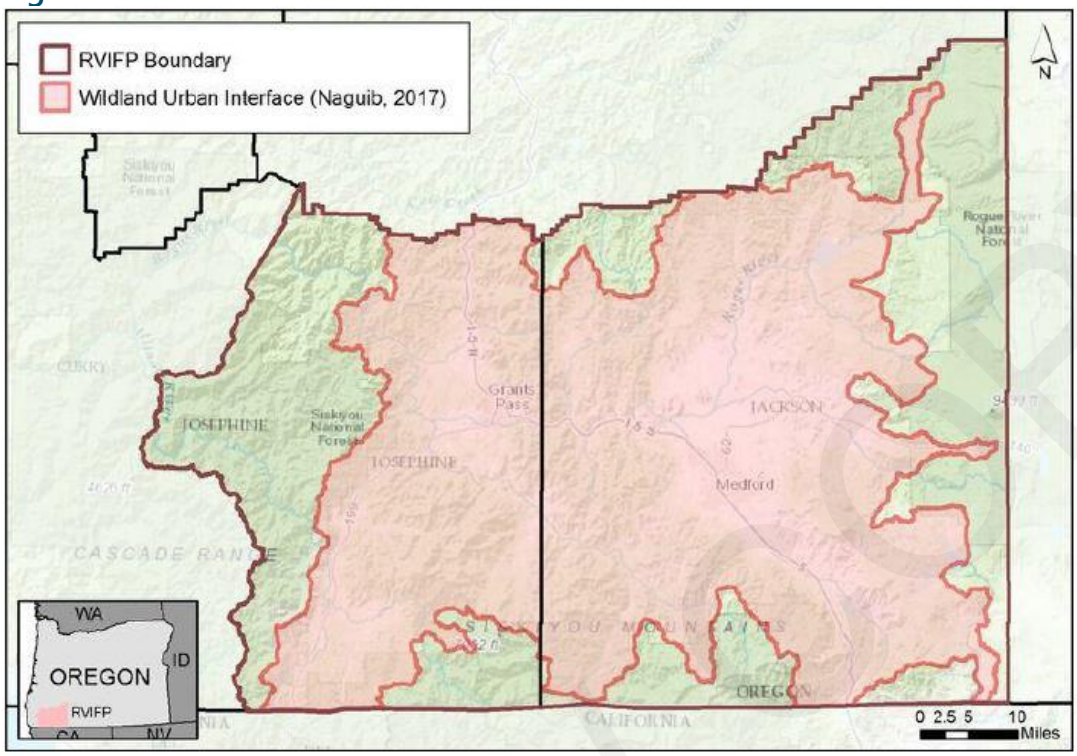


Source: Rogue Valley Integrated Community Wildfire Protection Plan (2019)

The Wildland-Urban Interface (WUI) was developed using the 2004 Southwest Oregon Interagency Fire Management Plan (SWOFMP) as a starting point due to its ability to provide strategically defensible positions for wildfire suppression at the county level.[46] The WUI boundary is based off of where people live or could live and is based on zoning rather than the arbitrary ½ and 1 ½ miles buffers used in the CAR designations which did not provide for adequate fuel treatment opportunities to protect communities from large wildfires. The WUI as delineated in the RVIFP is shown in Figure 2-19.

[45] Ibid.
[46] Ibid.

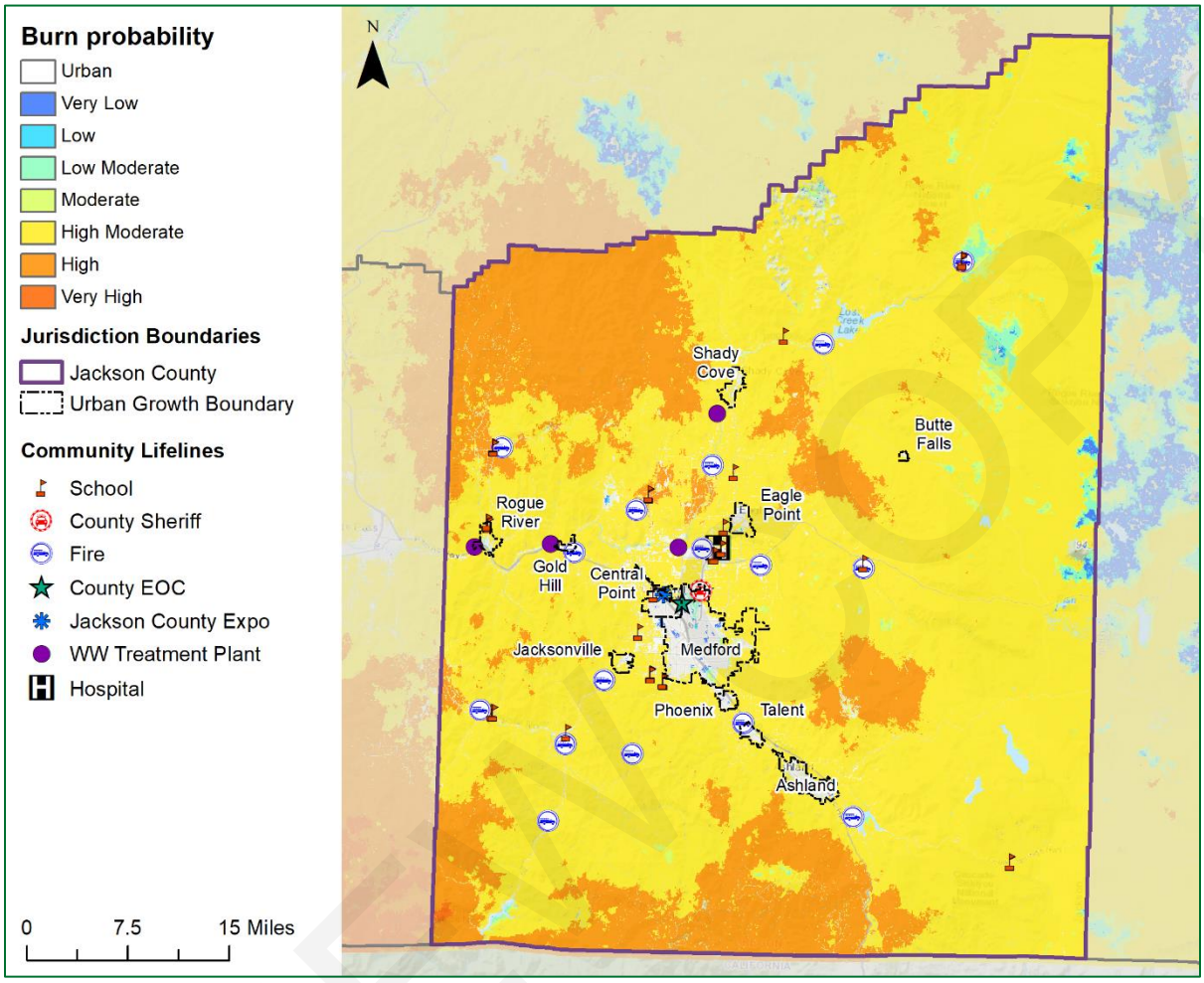
Figure 2-19 Wildland-Urban Interface



Source: Rogue Valley Integrated Community Wildfire Protection Plan (2019)

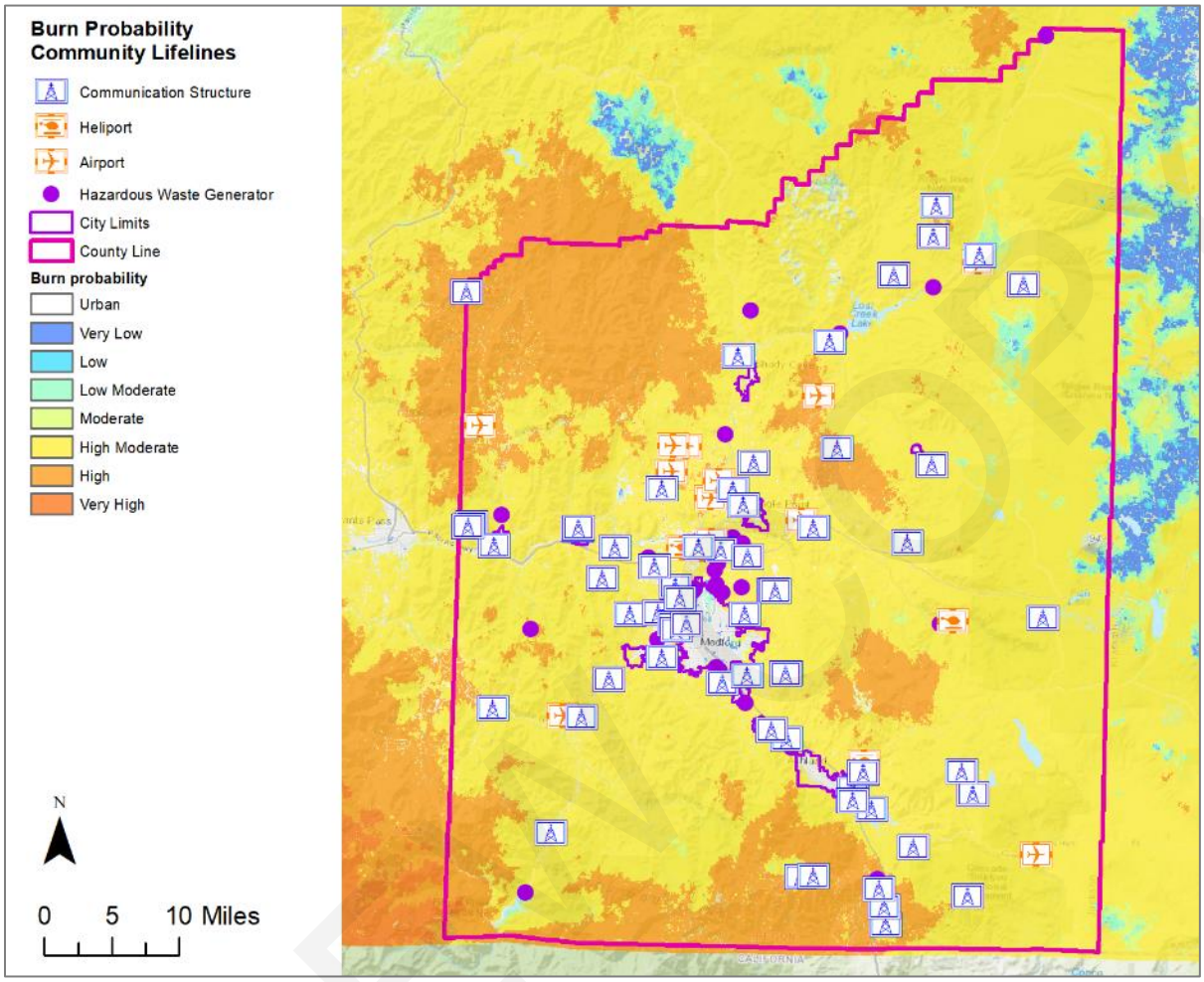
Figure 2-20 and Figure 2-21 show the burn probability of Jackson County's community lifelines. For more information about community lifelines' susceptibility to wildfire refer to Table 2-11 at the end of this chapter.

Figure 2-20 Burn Probability and Community lifelines (Safety and Security)



Source: Oregon Partnership for Disaster Resilience. USFS Pacific Northwest Region Wildfire Risk Assessment (PNRA)
Note: To view detail click this link to access Oregon Explorer's CWPP Planning Tool.

Figure 2-21 Burn Probability and Community lifelines (all others)



Source: Oregon Partnership for Disaster Resilience. USFS Pacific Northwest Region Wildfire Risk Assessment (PNRA)
Note: To view detail click this link to access Oregon Explorer's CWPP Planning Tool.

Refer to Table 2-11 for a full hazard risk exposure assessment. Community lifelines that have high to very high burn probability are:

- Oak Harbor Freight Lines
- Evans Valley Elementary School
- Firefly Ranch Airfield
- Sutton On Rogue Airport
- Mucky Flat
- Springbrook Airport
- Shady Point SDA School
- East Oregon Cattle Co.
- Communications structures located at the following coordinates:
    - 42.0318, -122.5961
    - 42.8036, -122.5491
    - 42.4923, -122.937

- 42.4453, -123.2169
- 42.446, -123.2165
- 42.5409, -122.6847
- 42.6971, -123.2293
- 42.0515, -122.5991
- 42.0701, -122.6079
- 42.4451, -123.2167
- 42.7708, -122.5528

History

Jackson County has a long history of wildfires in the county. In May of 1987, strong thunderstorms brought 60 to 70-mph winds to Jackson County, damaging buildings in Eagle Point and fanning multiple fires. In July of that same summer, intense thunderstorms brought hail, lightning, and rain.[47] Lightning started numerous fires in the Umpqua and Rogue River National Forests. One fire lasted for five days. A third round of thunderstorms struck in late August of that summer. Over 900 fires were reported in the Siskiyou and Cascade Mountains, which destroyed more than 130,000 acres of forest and continued to burn well into September. That year, tens of thousands of acres in Jackson County were blackened and 218,000 acres burned throughout Oregon.[48] Often, accurate records of wildfire history do not exist. For instance, before the early 1960's, only those fires that were especially damaging were recorded.

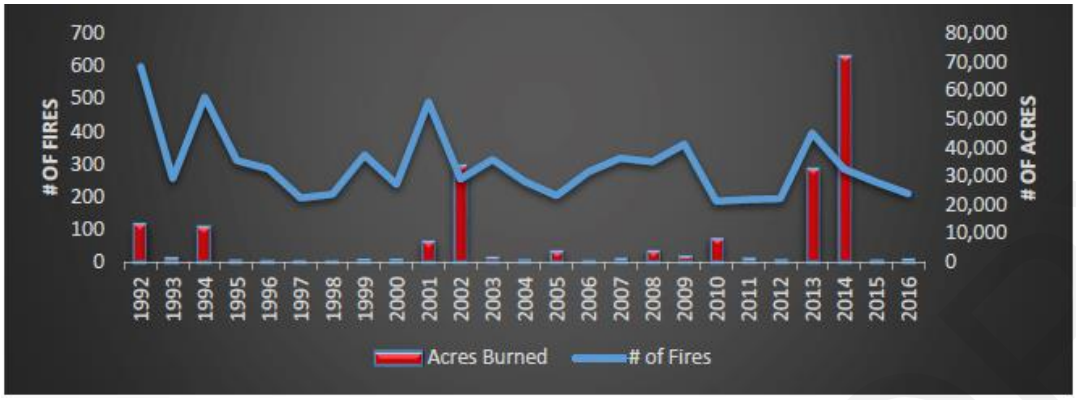
The RVIFP used United States Forest Service (USFS) and Oregon Department of Forestry (ODF) data to generate ignition history from 1992-2016 for Jackson and Josephine counties. For the period studied there were an average of 296 wildfires with an average of 7,808 acres burned.[49] The number of fire starts ranged from 186 to 598 per year, with a standard deviation of 104; from that the RVIFP deduced that the number of fires for any future year would range from 89 to 503. The number of fire ignitions reported from 1992 to 2016 and total acres burned for Jackson and Josephine counties is shown in Figure 2-22.

[47] Taylor, George and Hatton, Raymond, The Oregon Weather Book: A State of Extremes, Corvallis, Oregon: Oregon State University Press, pp. 174, (1999).

[48] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000).

[49] Rogue Valley Integrated Community Wildfire Protection Plan (2017)

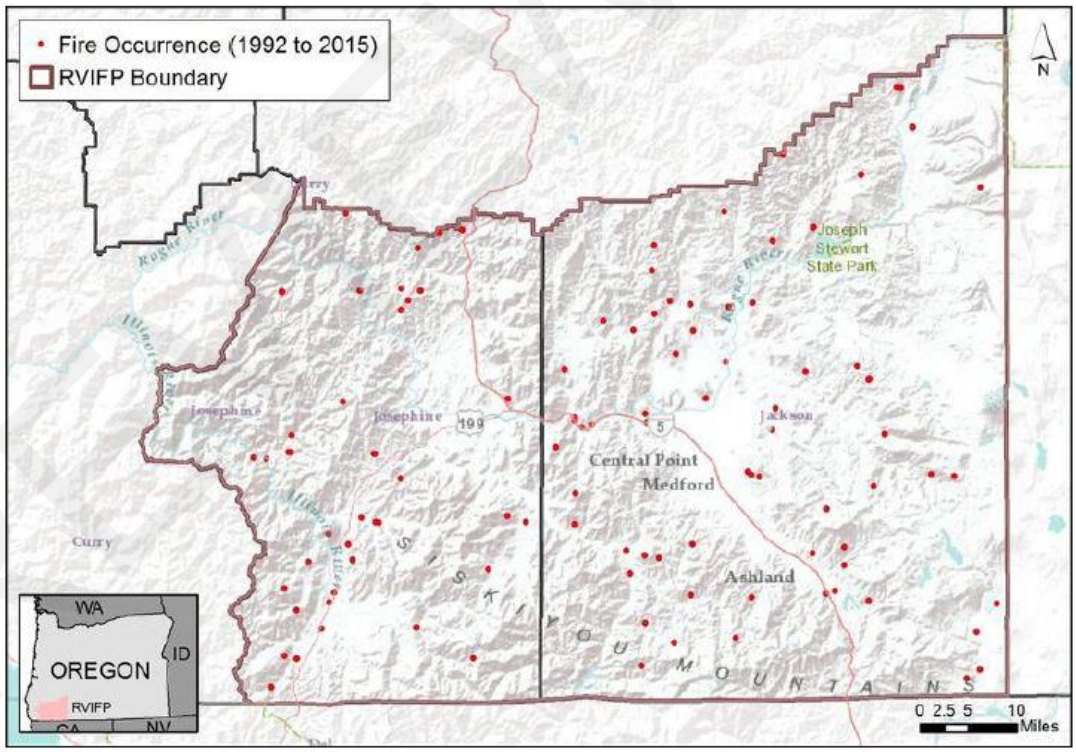
Figure 2-22 All Fire Reported in Jackson and Josephine Counties (1992-2016)



Source: Rogue Valley Integrated Community Wildfire Protection Plan (2019)

Data for fires that reached 36 acres or more (about 64 fires since 1992) show that most fires have been successfully suppressed. However, where fires have escaped the initial suppression efforts they have grown large and accounted for the majority of acres burned in the fire season.[50] While the majority of fire ignitions occurred along travel corridors and the edges of major urban areas, the fires that escape initial suppression efforts tend to be in more remote areas and are more likely to occur in some portions of the landscape than others (see Figure 2-23).

Figure 2-23 Large (>= 36 acres) Fire Occurrence (1992-2015)



Source: Rogue Valley Integrated Community Wildfire Protection Plan (2019)

[50] Ibid.

Since the creation of the previous NHMP in 2018, there have been four (4) documented wildfire events varying in impact and extent, presidential emergency declarations and statewide states of emergency Wildfire information is provided in the list below. The East Evans Creek (1992), Hull Mountain (1994) and Squires Peak (2002) fires are considered to be three of Oregon's most destructive Wildland/ Urban Interface fires; burning over 20,800 acres, costing $20.2 million and burning 54 structures.[51] The Almeda fire in 2020 burned approximately 3,000 acres including large parts of Phoenix and Talent and damaged approximately 2,500 homes and 600 businesses and over 11 miles of riparian area. It was the largest recorded fire in a primarily urban environment in Oregon's history.[52] Many residents were displaced and continue to face housing insecurity.

There have been four (4) significant wildfire events, emergency declarations, or presidential disaster declarations since the previous NHMP (as shown in *italics* below):

- 2000 (Aug 8): The Antioch fire was caused by a burning vehicle and burned 376 acres.
- 2001: The Quartz fire was caused by lightning and burned 6,162 acres.
- 2002: The east Antelope fire was started by a power line and burned 1,947 acres.
- 2002 (July 16): The Squiare Peak/Wall Creek/Lost Creek fires threatened areas east of Ruch. It was started by lightning and burned 3,125 acres.
- 2002 (July 27): The Timbered Rock fire was a fire started by lightning. It threatened North Shady Cove and burned 27,111 acres.
- 2003: The Cove Road fire was started by lightning. It burned 700 acres.
- 2005: The Wasson fire was a fire started by a traffic accident. It burned 1,500 acres.
- 2008: The Doubleday Fire was a fire started by lightning and threatened Butte Falls. It burned 1,244 acres.
- 2009 (Aug 28) The South County Complex fire was a fire with undetermined cause threatened Ashland and Medford
- 2010 (Aug 24): The Oak Knoll fire was a fire started by arson threatened Ashland. The fire burned 20 acres.
- 2011 (Aug 18): The North River Road fire was a fire with undetermined cause threatened the town of Rogue River.
- 2014 (July 30 – July 31): The Beaver Complex was made up of the Salt Creek and Oregon Gulch fires, both of which were started by lightning on the evening of 07/30/2014. Both fires were active and threatening residences. Executive Order No. 14-08 - Invocation of Emergency Conflagration Act for the Beaver Complex Fire in Jackson County. The fires covered 35,302 acres and cost $22.2 million to contain. (FEMA FMA-5066 – Oregon Gulch Fire)
- 2014 (Aug 11 – Aug 20): The Rogue River Drive Wildfire was started by lightning on 08/11/2014. The fire covered about 500 acres and cost $1.9 million dollars to contain.

[51] Jackson County BOC, Jackson County Integrated Fire Plan (2006)

[52] Rogue Valley Council of Governments. Almeda Fire Monitoring – Post Impacts on Water Quality. (2021). https://rvcog.org/almeda-fire-monitoring/

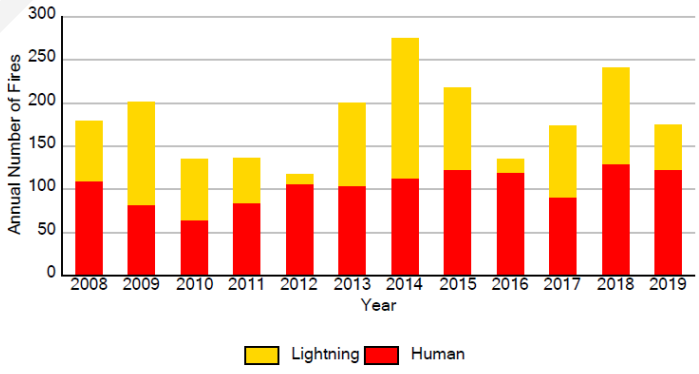
Executive Order No. 14-10 - Invocation of Emergency Conflagration Act for the Rogue River Drive Fire in Jackson County.

- **2014 (Sept 1 – Sept 26):** The 790 Wildfire was started by lightning in the Sky Lakes Wilderness Area on 07/31/2014. Since it was in a wilderness area, it was allowed to burn until it reached National Forest land. The fire covered 2,277 acres and cost $2.7 million dollars to contain.
- **2015 (June 26 – July 10):** The Bunker Hill Complex fire was initiated by lightning on 06/26/2015. The fire covered 388 acres and cost $5.0 million dollars to contain.
- **2015 (Aug 1 – Sept 23):** The National Creek Complex wildfire consisted of two fires (the National Fire and the Crescent Fire) initiated by dry lightning on 08/01/2015. The fire covered 20,945 acres and cost $20.9 million to contain.
- **2017 (Aug. 14 – current):** The Miller Complex wildfire consisted of four fires (the Abney, Burnt Peak, Creedence and Knox) initiated by dry lightning on 08/14/2017. The fire covered 39,250+ acres
- ***2018 (July 21)**: The Garner Complex Fire affected both Jackson and Josephine County. (EO 18-15)*
- ***2018 (August 22-August 24):** The Ramsey Canyon fire threatened structures near the towns of Gold Hill and Sams Valley in Jackson County. (EO 18-23)*
- ***2020 (September 8)**: Almeda Fire burned approximately 3,000 acres and damaged approximately 2,500 homes and 600 businesses in the Rogue Valley .[53](EO 20-44)*
- ***2020 (September 8):** South Obenchain Fire (EO 20-44)*

Table 2-10 shows that 43% of all fires were caused by lightning between 2008 and 2019, while 57% of fires are human caused (ranging from arson and debris burning to equipment use and fires caused along powerlines).

Table 2-10 Jackson County Fire Starts Between 2008-2019

Total Acres Burned	130,169
Total Number of Fires	2,187
Average Acres Burned Per Year	13,017
Average Fires Per Year	219
Percent Lightning Caused	42.8%
Percent Human Caused	57.2%



Source: Short, K. and Oregon Department of Forestry, 2019 via Oregon Wildfire Risk Explorer (May 31, 2022)

[53] Rogue Valley Council of Governments. Almeda Fire Monitoring – Post Impacts on Water Quality. (2021). https://rvcog.org/almeda-fire-monitoring/

Future Climate Projection

According to OCCRI report *Future Climate Projections: Jackson County* wildfire frequency, intensity, and area burned are projected to continue increasing in the Northwest. Wildfire risk is projected to increase by 13 days by the 2050s relative to the historical baseline.

Probability Assessment

Certain conditions must be present for significant interface fires to occur. The most common are hot, dry and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire has started, several conditions influence its behavior, including fuel, topography, weather, drought, and development. Many of these conditions are demonstrated across large areas within Jackson County, creating a significant collective risk.

Based on the available data and research for Jackson County, the NHMP Steering Committee determined the **probability of experiencing a Wildfire is "high",** meaning one incident is likely within the next 10 to 35-year period; *this rating has not changed since the previous NHMP.*

Vulnerability Assessment

The Rogue Valley Integrated Community Wildfire Protection Plan (2017, RVIFP) profiles communities throughout the county to determine which face the highest risk of a wildfire event. The RVIFP used the Rogue Basin Cohesive Forest Restoration Strategy: A collaborative Vision for Resilient Landscapes and Fire Adapted Communities (RBS) to assess wildfire risk with mitigation to enhance forest ecology.

Utilizing the RBS the RVIFP Risk Assessment Committee approaches the yearly wildfire risk assessment with a comprehensive review of risk assessment methods and examples from communities throughout the United States. The committee also conducts an inventory of existing data for risk, hazard, values, structural vulnerability, and protection capability.

The analysis takes into consideration a combination of factors defined below:

- Ignition Risk: Potential and frequency for wildfire ignitions (based on past occurrences);
- Hazard: Conditions that may contribute to wildfire (vegetative fuels, crown fire potential, weather/ climate, topography, insect and disease);
- Values: People, property, natural and other resources that could suffer losses in a wildfire event.; and
- Protection Capability: Ability to mitigate losses, prepare for, respond to and suppress wildland and structural fires.

In 2009, Jackson and Josephine counties collaborated on developing an updated wildfire risk assessment that was updated in 2015 with the RBS risk assessment spearheaded by the Southern Oregon Forest Restoration Collaborative:

Two-County Risk Assessment. In 2009, Jackson and Josephine County wildfire partners collaborated on an update of the joint risk assessment using the two-county fuel-mapping project data completed in 2008. With support from Jackson County GIS staff and Title III funds, updates of all the key data sets (ignition risk, hazard, protection capability and values at risk) were completed for both Jackson and Josephine Counties. Both county risk/fuels committees reviewed the data and model parameters. The primary goals of the assessment update that were accomplished in 2009 included incorporation of the new calibrated Landfire data and advanced fire modeling tools and consistent use of the assessment methodology across the two-county area. The two counties also share a Mutual Aid Agreement for fire response.

The RVIFP is updated annually and contains extensive analysis. Therefore, the current RVIFP risk assessment is incorporated herein by reference. In accordance with CFR 401.6 and as part of the 2017 NHMP update process, the NHMP Steering Committee considered fire risk using the same evaluation method as other hazards included in the NHMP to allow for a comparative analysis of hazard risk.

The update of the RVIFP includes updates to the Risk Assessment, mitigation activities, priority fuels actions and highest priority areas for mitigation. The Integrated Fire Plan development process also included an analysis of Jackson County's relative fire hazard risk. For more information on wildfire risk and fuels reduction projects see the Rogue Valley Integrated Community Wildfire Protection Plan (2017).

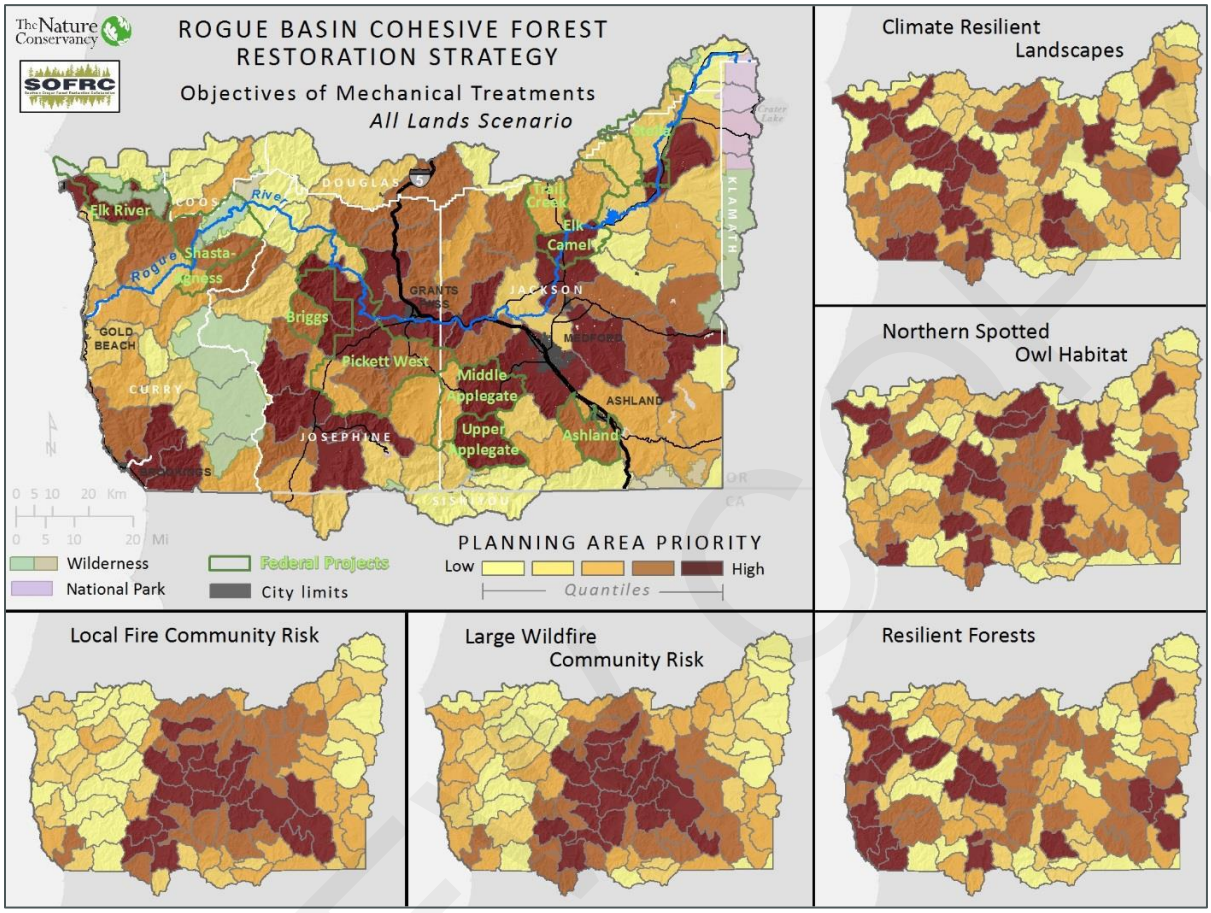
To prioritize the location of treatments the RBS modeling efforts evaluated five different landscape level objectives to optimize the resulting fuel treatment:[54]

- Local fire community risk (to prioritize fuel treatments within fire risk communities);
- Large wildfire community risk (to prioritize fuels reduction in the landscapes that deliver fires that threaten community assets with fires larger than 35 acres);
- Landscape resilience (to prioritize treatments that balance open and closed forest habitats);
- Protecting and promoting Northern Spotted Owl habitat (to prioritize to maintain existing habitat and reduce adjacent wildfire risk while promoting complex forest structure), and
- Climate resilient landscapes (to prioritize landscapes that are most climate resilient).

Using the landscape objectives priority planning areas are identified in the following maps (Figure 2-24), darker browns indicate greater priority. The larger map shows priority if all landscape objectives are combined in a single entry.

[54] Rogue Valley Integrated Community Wildfire Protection Plan (2017)

Figure 2-24 Rogue Basin Cohesive Forest Restoration Strategy Priority Planning Areas



Source: Rogue Valley Integrated Community Wildfire Protection Plan (2017)

The NHMP Steering Committee rated the county as having a **"high" vulnerability to wildfire hazards**, meaning that more than 10% of the County's population or assets would be affected by a major disaster; *this rating has increased since the previous NHMP*.

More information on this hazard can be found in the Rogue Valley Integrated Community Wildfire Protection Plan (2017).

Table 2-11 Community Lifelines Hazard Risk Exposure Assessment

Facility Name	Location	Community Lifeline Category	Lifeline Type	Earthquake-Liquefaction Hazard	Flood Hazard	Landslide Hazard	Wildfire Hazard
Communication Structure, 42.0318, -122.5961	County	communications	communication structure	none		high	high
Communication Structure, 42.0515, -122.5991	County	communications	communication structure	none		moderate	high
Communication Structure, 42.0642, -122.48	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.0644, -122.4797	County	communications	communication structure	none		moderate	low
Communication Structure, 42.0701, -122.6079	County	communications	communication structure	none		moderate	high
Communication Structure, 42.081, -122.7203	County	communications	communication structure	none		low	low
Communication Structure, 42.0822, -122.702	County	communications	communication structure	none		low	moderate
Communication Structure, 42.1158, -122.5594	County	communications	communication structure	none		low	moderate
Communication Structure, 42.1203, -123.0822	County	communications	communication structure	moderate		high	moderate
Communication Structure, 42.1558, -122.6208	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.1636, -122.6478	County	communications	communication structure	low		low	moderate
Communication Structure, 42.1643, -122.6497	County	communications	communication structure	low		low	moderate
Communication Structure, 42.1745, -122.4753	County	communications	communication structure	none		high	low
Communication Structure, 42.1764, -122.6486	County	communications	communication structure	none		low	moderate
Communication Structure, 42.1938, -122.634	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.1942, -122.6342	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.1977, -122.4926	County	communications	communication structure	none		high	low
Communication Structure, 42.198, -122.4929	County	communications	communication structure	none		high	moderate
Communication Structure, 42.2282, -122.7465	County	communications	communication structure	none		low	moderate
Communication Structure, 42.2373, -122.7687	County	communications	communication structure	low		high	low
Communication Structure, 42.2453, -123.0428	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.252, -123.1721	County	communications	communication structure	none		high	moderate
Communication Structure, 42.2867, -122.8417	County	communications	communication structure	low		low	moderate
Communication Structure, 42.2868, -123.0054	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.295, -122.8056	County	communications	communication structure	none		high	moderate
Communication Structure, 42.2952, -122.805	County	communications	communication structure	none		high	moderate
Communication Structure, 42.2982, -122.7504	County	communications	communication structure	none		moderate	low
Communication Structure, 42.2983, -122.7491	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.2984, -122.7504	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.299, -122.75	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.3117, -122.9301	County	communications	communication structure	low		moderate	moderate
Communication Structure, 42.3415, -122.9106	County	communications	communication structure	low		low	low
Communication Structure, 42.3479, -122.9147	County	communications	communication structure	low		low	low
Communication Structure, 42.3483, -122.8952	County	communications	communication structure	low		low	low
Communication Structure, 42.3498, -122.9088	County	communications	communication structure	low		low	low
Communication Structure, 42.352, -122.9075	County	communications	communication structure	low		low	low
Communication Structure, 42.3567, -122.9777	County	communications	communication structure	none		high	moderate
Communication Structure, 42.3592, -122.9372	County	communications	communication structure	low		low	moderate
Communication Structure, 42.3607, -122.812	County	communications	communication structure	none		very high	moderate
Communication Structure, 42.3645, -122.3807	County	communications	communication structure	none		low	moderate
Communication Structure, 42.3758, -122.906	County	communications	communication structure	low		moderate	low
Communication Structure, 42.3866, -122.7689	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.387, -122.7703	County	communications	communication structure	none		moderate	moderate

Facility Name	Location	Community Lifeline Category	Lifeline Type	Earthquake-Liquefaction Hazard	Flood Hazard	Landslide Hazard	Wildfire Hazard
Communication Structure, 42.3874, -122.7717	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.3878, -122.913	County	communications	communication structure	low		low	low
Communication Structure, 42.3945, -123.0196	County	communications	communication structure	none		low	moderate
Communication Structure, 42.4091, -122.9445	County	communications	communication structure	low		low	moderate
Communication Structure, 42.4226, -122.8093	County	communications	communication structure	low		low	moderate
Communication Structure, 42.4264, -123.1769	County	communications	communication structure	none		high	moderate
Communication Structure, 42.4279, -123.0022	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.4287, -122.8494	County	communications	communication structure	low		low	low
Communication Structure, 42.4308, -122.8811	County	communications	communication structure	low		low	low
Communication Structure, 42.4422, -122.579	County	communications	communication structure	moderate		very high	moderate
Communication Structure, 42.4451, -123.2167	County	communications	communication structure	none		moderate	high
Communication Structure, 42.4453, -123.2169	County	communications	communication structure	none		low	high
Communication Structure, 42.4459, -123.0573	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.446, -123.2165	County	communications	communication structure	none		low	high
Communication Structure, 42.4464, -123.0573	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.448, -123.0566	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.4494, -123.2111	County	communications	communication structure	none		high	moderate
Communication Structure, 42.4554, -122.7151	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.4558, -122.7154	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.477, -122.8184	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.4923, -122.937	County	communications	communication structure	low		low	high
Communication Structure, 42.494, -122.8337	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.5233, -122.8052	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.5236, -122.8054	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.5259, -122.5461	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.5409, -122.6847	County	communications	communication structure	none		low	high
Communication Structure, 42.6369, -122.8318	County	communications	communication structure	none		low	moderate
Communication Structure, 42.6369, -122.8315	County	communications	communication structure	none		low	moderate
Communication Structure, 42.6549, -122.6989	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.6971, -123.2293	County	communications	communication structure	none		low	high
Communication Structure, 42.7216, -122.4194	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.7277, -122.6088	County	communications	communication structure	none		moderate	moderate
Communication Structure, 42.728, -122.6088	County	communications	communication structure	none		low	moderate
Communication Structure, 42.728, -122.6091	County	communications	communication structure	none		high	moderate
Communication Structure, 42.7287, -122.6085	County	communications	communication structure	none		low	moderate
Communication Structure, 42.7517, -122.4847	County	communications	communication structure	none	100-Year	low	moderate
Communication Structure, 42.7708, -122.5528	County	communications	communication structure	none		moderate	high
Communication Structure, 42.8036, -122.5491	County	communications	communication structure	none		high	high
Jackson County Fair Grounds	County	food, water, and shelter	community center	low		low	low
Gold Hill STP	County	food, water, and shelter	wastewater treatment	low		low	moderate
Rogue River STP	County	food, water, and shelter	wastewater treatment	low	500-Year	moderate	low
Shady Cove STP	County	food, water, and shelter	wastewater treatment	moderate		moderate	moderate
Trail Christian Fellowship Church	County	food, water, and shelter	red cross shelter	none		low	low
Butler Ford Inc.	County	hazardous materials	hazardous waste producer	none	500-Year	low	low
Oak Harbor Freight Lines Spill	County	hazardous materials	hazardous waste producer	none		high	high

Facility Name	Location	Community Lifeline Category	Lifeline Type	Earthquake-Liquefaction Hazard	Flood Hazard	Landslide Hazard	Wildfire Hazard
Town & Country Chevrolet Oldsmobile	County	hazardous materials	hazardous waste producer	none		low	low
Boulton Powerboats Inc.	County	hazardous materials	hazardous waste producer	none		moderate	low
Commercial Collision & Paint Inc.	County	hazardous materials	hazardous waste producer	none		moderate	low
Erickson Air-Crane Incorporated	County	hazardous materials	hazardous waste producer	low		low	low
LTM, Incorporated	County	hazardous materials	hazardous waste producer	none	100-Year	moderate	moderate
Medford Water	County	hazardous materials	hazardous waste producer	low		low	low
Merry X Ray Co.	County	hazardous materials	hazardous waste producer	low		low	low
Superior Lumber Co.	County	hazardous materials	hazardous waste producer	low		moderate	low
UPS Ground Freight	County	hazardous materials	hazardous waste producer	low		low	low
Viking Freight Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Weast Service & Equipment Co.	County	hazardous materials	hazardous waste producer	none		moderate	low
Alumaweld Boats Inc.	County	hazardous materials	hazardous waste producer	low		low	moderate
International Wildlife Recovery Center	County	hazardous materials	hazardous waste producer	none		moderate	moderate
USACE Applegate Dam	County	hazardous materials	hazardous waste producer	none		low	low
401 Orchard	County	hazardous materials	hazardous waste producer	none		moderate	low
Allied Environmental Svcs. LLC	County	hazardous materials	hazardous waste producer	low		low	low
Bear Creek Operations Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Boise Cascade - Medford	County	hazardous materials	hazardous waste producer	low		low	low
CDS Publications, Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Commercial Documentation Services Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Csc, Inc.	County	hazardous materials	hazardous waste producer	none		high	moderate
Lumber Yard	County	hazardous materials	hazardous waste producer	low		low	low
Medite - Medford Division	County	hazardous materials	hazardous waste producer	low		low	low
Menlo Logistics	County	hazardous materials	hazardous waste producer	low		low	low
Pacific Detroit Diesel Allison	County	hazardous materials	hazardous waste producer	none		moderate	low
Penske Truck Leasing Co. LP	County	hazardous materials	hazardous waste producer	low		low	low
Rogue Transfer & Recycling, LLC	County	hazardous materials	hazardous waste producer	low		low	low
Safety-Kleen Systems, Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Willamette Valley Company	County	hazardous materials	hazardous waste producer	low		low	low
Summit Forrest Inc	County	hazardous materials	hazardous waste producer	low		low	low
Pacific Power & Light Prospect Hydro	County	hazardous materials	hazardous waste producer	none		low	moderate
School Rogue River High	County	hazardous materials	hazardous waste producer	low		moderate	moderate
ODFW Cole M Rivers Fish Hatchery	County	hazardous materials	hazardous waste producer	high		high	low
USA COE Rogue River Basin Project	County	hazardous materials	hazardous waste producer	moderate	100-Year	moderate	low
USACE TP6 Area 5 Elk Crk Proj	County	hazardous materials	hazardous waste producer	none		high	moderate
Allweather Wood Treaters	County	hazardous materials	hazardous waste producer	low		low	low
Alumaweld Boats Inc	County	hazardous materials	hazardous waste producer	low		low	low
American Appliance Recyclers	County	hazardous materials	hazardous waste producer	low		low	low
Bettendorf Enterprises, Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Boise Cascade Corporation	County	hazardous materials	hazardous waste producer	low		low	low
Cascade Wood Products, Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Chevron U.S.A.	County	hazardous materials	hazardous waste producer	low	500-Year	low	low
Croman Corporation Logging Division	County	hazardous materials	hazardous waste producer	low		low	low
Down River Forest Product	County	hazardous materials	hazardous waste producer	low		low	low
Eastman Kodak Company	County	hazardous materials	hazardous waste producer	low		moderate	low

Facility Name	Location	Community Lifeline Category	Lifeline Type	Earthquake-Liquefaction Hazard	Flood Hazard	Landslide Hazard	Wildfire Hazard
Ef Burrill Lumber Site (Former)	County	hazardous materials	hazardous waste producer	low		low	low
Extreme Paint, Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Fidelity Printed Products Inc	County	hazardous materials	hazardous waste producer	low		low	moderate
Georgiapacific Resins Inc	County	hazardous materials	hazardous waste producer	low		low	low
Imation Enterprises Corp Menlo White Cy	County	hazardous materials	hazardous waste producer	low		low	low
Jackson County Roads And Parks Svcs	County	hazardous materials	hazardous waste producer	low		low	low
Laundry Room The	County	hazardous materials	hazardous waste producer	low		low	low
Matt Garris Waste Oil Recovery, Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Medite Corp Trucking Division	County	hazardous materials	hazardous waste producer	low		low	low
Medite Corporation	County	hazardous materials	hazardous waste producer	low		low	low
Medply, Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Millennium Technology Services Inc	County	hazardous materials	hazardous waste producer	low		low	low
Millennium Technology Svcs Inc Aka Mts	County	hazardous materials	hazardous waste producer	low		low	low
Northwest Printed Circuits Inc	County	hazardous materials	hazardous waste producer	low		low	low
Ram Offset Lithographic	County	hazardous materials	hazardous waste producer	low		low	low
Rogue Technical Services Inc	County	hazardous materials	hazardous waste producer	low		low	low
The Boc Group, Inc	County	hazardous materials	hazardous waste producer	low		low	low
Thermo Fluids Inc	County	hazardous materials	hazardous waste producer	low		moderate	low
Timber Products Co. Limited Partnership	County	hazardous materials	hazardous waste producer	low		low	low
U S Dept Of Veterans Affairs Domiciliary	County	hazardous materials	hazardous waste producer	low		low	low
U.S. Forest Industries, Inc.	County	hazardous materials	hazardous waste producer	low		low	low
Vickers T-J	County	hazardous materials	hazardous waste producer	low		low	low
Wctu Railway Company	County	hazardous materials	hazardous waste producer	low		low	low
Westpac Moulding Of Oregon	County	hazardous materials	hazardous waste producer	low		low	low
Community Health Center - Upper Rogue	County	health and medical	medical facility	low	500-Year	low	low
Applegate Elementary School	County	safety and security	school	low		low	moderate
Applegate Valley RFPD 9 - HQ	County	safety and security	fire station	moderate		low	moderate
Applegate Valley RFPD 9 - HQ - Auxillary Bld	County	safety and security	fire station	moderate		high	moderate
Applegate Valley RFPD 9 - Station 1	County	safety and security	fire station	low		low	low
Applegate Valley RFPD 9 - Station 2	County	safety and security	fire station	moderate		low	low
Applegate Valley RFPD 9 - Station 5	County	safety and security	fire station	none		moderate	low
Applegate Valley RFPD 9 - Station 7	County	safety and security	fire station	none		moderate	moderate
Jackson County Fire District 5 - Station 2	County	safety and security	fire station	low		low	low
Pinehurst Elementary School	County	safety and security	school	none		low	moderate
Jackson County Fire District 3 - Sams Valley	County	safety and security	fire station	none		moderate	low
Jackson Emergency Operations Center (Primary)	County	safety and security	emergency operations	none		moderate	low
Madrone Trail Public Charter School	County	safety and security	school	low		low	low
Sams Valley Elementary School	County	safety and security	school	low		low	low
Scenic Middle School	County	safety and security	school	low		low	low
Crater Lake Charter Academy	County	safety and security	school	moderate	100-Year	moderate	moderate
Jackson County Fire District 3 - Dodge Bridge	County	safety and security	fire station	low		low	low
Lake Creek Learning Center	County	safety and security	school	low		low	moderate
Lake Creek RFD	County	safety and security	fire station	low		low	low
Shady Point SDA School	County	safety and security	school	low		moderate	high
Jackson County Fire District 3 - Gold Hill	County	safety and security	fire station	moderate	500-Year	low	low

Facility Name	Location	Community Lifeline Category	Lifeline Type	Earthquake-Liquefaction Hazard	Flood Hazard	Landslide Hazard	Wildfire Hazard
Rogue River-Siskiyou National Forest Law Enforcement - Jacksonville	County	safety and security	police station	moderate		moderate	moderate
Griffin Creek Elementary School	County	safety and security	school	low	500-Year	low	low
Jackson County Sheriffs Department	County	safety and security	police station	none		moderate	low
Jackson County Sheriffs Department - Auxillary Building	County	safety and security	police station	none		moderate	low
Jackson Emergency Operations Center (Secondary)	County	safety and security	emergency operations	low		low	low
Rogue Valley Adventist School	County	safety and security	school	none		high	moderate
Jackson County Fire District 5 - Station 1	County	safety and security	fire station	low		low	moderate
Jackson County Fire District 5 - Station 3	County	safety and security	fire station	low		low	low
Prospect Charter School	County	safety and security	school	none		low	moderate
Prospect Fire Department	County	safety and security	fire station	none		low	low
Prospect School Building	County	safety and security	school	none		low	low
Evans Valley Elementary School	County	safety and security	school	low		low	high
Evans Valley Fire District No. 6	County	safety and security	fire station	moderate		low	low
Rogue River High School	County	safety and security	school	low		low	moderate
Ruch Elementary School	County	safety and security	school	moderate		moderate	low
Jackson County Fire District 4 - Lost Creek	County	safety and security	fire station	moderate		low	moderate
Elk Trail Elementary School	County	safety and security	school	moderate	100-Year	low	moderate
Jackson County Fire District 3 - Agate Lake	County	safety and security	fire station	low		low	moderate
Jackson County Fire District 3 - White City	County	safety and security	fire station	low		low	low
Mountain View Elementary School	County	safety and security	school	low		low	low
Table Rock Elementary School	County	safety and security	school	low		low	low
White Mountain Middle School	County	safety and security	school	low		low	low
Jackson County Fire District 3 - Admin Building	County	safety and security	fire station	low		low	low
Pinehurst State Airport	County	transportation	airport	moderate		very high	low
Erickson Air-Crane Admin Offices	County	transportation	heliport	low		low	low
Light Valley Tree Farm	County	transportation	heliport	none		moderate	moderate
East Oregon Cattle Co	County	transportation	airport	low		moderate	high
Mucky Flat	County	transportation	airport	none		low	high
Oakridge Ranch Airport	County	transportation	airport	none		low	moderate
Fly By Night Airport	County	transportation	airport	none		moderate	moderate
Beagle Sky Ranch Airport	County	transportation	airport	none		moderate	moderate
Prospect State Airport	County	transportation	airport	none		low	moderate
Springbrook Airport	County	transportation	airport	none		low	high
Burrill Airport	County	transportation	airport	low		low	moderate
Croman	County	transportation	heliport			low	low
Firefly Ranch Airfield	County	transportation	airport	low		low	high
Snider Creek Airport	County	transportation	airport	none		moderate	moderate
Sutton On Rogue Airport	County	transportation	airport	low		low	high

Source: Jackson County NHMP Steering Committee; Department of Land Conservation and Development, Oregon Natural Hazard Mitigation Plan. 2020. 2020 Statewide Loss Estimates (Appendices 9.1.8 and 9.1.9). Loss estimate data aggregated at the facility level by IPRE.
Facilities without loss estimation data were not included in the analysis in the OR NHMP (2020).

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Section 3: Mitigation Strategy

This section outlines Jackson County's strategy to reduce or avoid long-term vulnerabilities to the identified hazards. Specifically, this section presents a mission and specific goals and actions thereby addressing the mitigation strategy requirements contained in 44 CFR 201.6(c). The NHMP Steering Committee reviewed and updated the mission, goals and action items documented in this NHMP. Additional planning process documentation is in Volume II, Appendix B.

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of Jackson County's NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The mission of the Jackson County NHMP is:

Protect life, property, and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

The 2023 NHMP Steering Committee (county, cities, and special districts) reviewed the previous NHMP's mission statement and agreed to retain it without modifications.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County residents and public and private partners can take while working to reduce the County's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

Stakeholder participation was a key aspect in developing the original NHMP goals in 2006. Meetings with the project Steering Committee, stakeholder interviews and public workshops all served as methods to obtain input and priorities in developing goals for reducing risk and preventing loss for natural hazards in Jackson County.

The 2023 Jackson County NHMP Steering Committee (county, cities, and special districts) reviewed the previous NHMP goals in comparison to the State Natural Hazard Mitigation Plan (2020) goals and determined that they would add one goal to emphasize the important of equity (Goal 8).

All the NHMP goals are important and are listed below in no order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider implementing first, should funding become available.

Below is a list of the NHMP goals:

GOAL 1: EMERGENCY SERVICES

Minimize life safety issues by promoting, strengthening, and coordinating emergency response plans.

GOAL 2: EDUCATION AND OUTREACH

Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

GOAL 3: PREVENTION

Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

GOAL 4: PROPERTY PROTECTION

Lessen impact from natural disasters on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards.

GOAL 5: PARTNERSHIP AND COORDINATION

Identify mitigation or risk reduction measures that address multiple areas (i.e., environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the county; and seek funding and resource partnerships for future mitigation efforts.

GOAL 6: NATURAL RESOURCE PROTECTION

Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed, and urban interface areas).

GOAL 7: STRUCTURAL PROTECTIONS

When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

GOAL 8: EQUITY

Mitigate the inequitable impacts of natural hazards by prioritizing and directing resources and investments to build resilience in the most vulnerable populations and the communities least able to respond and recover.

Action Item Development Process

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions. Action items can be developed through many sources. The figure below illustrates some of these sources.

Figure 3-1 Development of Action Items

Most of the action items were first created during the previous NHMP planning processes. During these processes, steering committees developed maps of local vulnerable populations, facilities, and infrastructure in respect to each identified hazard. Review of these maps generated discussion around potential actions to mitigate impacts to the vulnerable areas. The Oregon Partnership for Disaster Resilience (OPDR) provided guidance in the development of action items by presenting and discussing actions that were used in other communities. OPDR also took note of ideas that came up in Steering Committee meetings and drafted specific actions that met the intent of the Steering Committee. All actions were then reviewed by the Steering Committee, discussed at length, and revised as necessary before becoming a part of this document.

Action Items

Table 3-1 documents the title of each action along with, the lead organization, partners, timeline, cost, potential funding resources, and connection to community lifelines and vulnerable populations

Mitigation Successes

Jackson County has several examples of hazard mitigation including the following projects funded through FEMA Hazard Mitigation Assistance and the Oregon Infrastructure Finance Authority's Seismic Rehabilitation Grant Program[55].

FEMA Funded Mitigation Successes

- 2023: DR4562 – Rogue Valley ALERT Wildfire ($1,820,705)
- 2019: DR5195 – Anderson Creek Hazardous Fuels Mitigation – PENDING
- 2019: DR5195 – Oregon Dept of Forestry Bieber Butte Wildfire Detection Camera

Seismic Rehabilitation Grant Program Mitigation Successes

- 2023: Prospect Fire Station, Prospect Rural Fire Protection District ($1,598,820)
- 2018: Sams Valley Elementary School Gym, Central Point School District ($1,822,014)
- 2018: Sams Valley Elementary School Gym, Central Point School District ($676,381)
- 2017: Agate Lake Fire Station, Jackson County Fire District #3 ($79,340)
- 2017: Dodge Bridge Fire Station, Jackson County Fire District #3 ($113,275)
- 2017: Sams Valley Fire Station, Jackson County Fire District #3 ($124,433)
- 2017: Prospect Charters School Gym, Prospect School District ($1,497,900)
- 2017: Table Rock Elementary, Eagle Point School District 9 ($1,495,500)
- 2017: Ruch Elementary, Medford School District 549C ($1,477,100)

See city addenda for mitigation successes within each city.

Action Item Framework

Many of the NHMP's recommendations are consistent with the goals and objectives of each jurisdiction's (County, cities, special districts) existing plans and policies. Where possible, each jurisdiction will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Action Item Development and Prioritization

The action items were developed through a two-stage process. In stage one, OPDR facilitated a work session with each jurisdiction's steering committee to discuss vulnerabilities, risk profile, and to identify potential issues. In the second stage, OPDR, working with each

[55] The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools, and emergency services facilities.

jurisdiction's steering committee, developed potential actions based on the hazards and the issues identified.

During the 2023 update process each of the jurisdiction's steering committee re-evaluated their hazard mitigation strategy (Action Items), noting what accomplishments had been made, and whether the actions were still relevant; any new action items were identified at this time (see Volume II, Appendix B and Volume III for more information).

Each steering committee developed action items priorities to reflect current conditions, needs, and capacity. High priority actions are shown in bold text with orange highlights. The Jurisdictions will focus their attention and resource availability upon these achievable, high leverage activities over the next five years. Although this methodology provides a guide for the jurisdictions in terms of implementation, each jurisdiction has the option to implement any of the action items at any time. This option to consider all action items for implementation allows jurisdictions to consider mitigation strategies as new opportunities arise, such as capitalizing on funding opportunities. Mitigation actions that were not prioritized will be considered for prioritization during maintenance meetings.

See Volume III for the action items for each participating jurisdiction.

Table 3-1 Action Items: Jackson County

Action Item #	Mitigation Actions	Community Lifelines							Vulnerable Populations	Potential Funding Resources	Lead Department(s)	Partners	Timeline (S/M/L/O)	Cost (L/M/H)
		Safety and Security	Food, Water, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
Multi-hazard														
1.1	Sustain an education and outreach program for local jurisdictions about natural hazards and assist them in developing emergency operations,	X							X	Hazard Mitigation Assistance (HMA); Local Funding Resources; Department of Homeland Security; OSU Extension	Jackson County Emergency Management	ARC, CERT, RVCOG, Emergency Response Agencies, Utilities and Telecommunications Partners, OEM, FEMA, Media, HHS, NWS, ODOT, OSU, RVF	O	L
1.2	Develop and maintain a GIS inventory of all critical facilities, large employers/public assembly areas and lifelines, and use GIS to evaluate their vulnerability by comparing them with hazard-prone areas to be used in emergency planning.	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Jackson County GIS	County and City Emergency Management Agencies, County Roads, ODOT, City Public Works, RVCOG, ODF, BLM, USFS, OWRD	O	L
1.3	Integrate the Mitigation Plan findings into planning and regulatory documents and programs including the Comprehensive Plan (particularly Goal 7)	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources; DLCD Technical Assistance	Jackson County Planning	Jackson County GIS, FEMA, DLCD	O	M
1.4	Communities cannot be resilient without resilient buildings. In keeping with its mission to support the health, safety and welfare of communities and their citizens, Jackson County enforces the Oregon structural and all specialty building codes with a strong building safety focus to provide the information and tools to support achievement of whole community resilience	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Jackson County Roads, Local Planning, PP&L	Utility and Telecommunications Partners, ODOT, City Public Works, USFS, BLM, ODF, Fire	O	L

Action Item #	Mitigation Actions	Community Lifelines							Vulnerable Populations	Potential Funding Resources	Lead Department(s)	Partners	Timeline (S/M/L/O)	Cost (L/M/H)
		Safety and Security	Food, Water, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
1.5	Enhance communication between City first responders (e.g., Public Safety, Public Works), public utilities, ODOT, the Emergency Management Team, and Jackson County to ensure common understanding of priorities in response and recovery.	X				X	X			Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Emergency Management	Police, Planning, Public Works, ODOT, Jackson County	O	L
Air Quality														
2.1	Collaborate with local jurisdictions to create and adopt the Jackson County Community Response Plan regarding air quality.			X						Local Funding Resources, existing staff resources, OR DEQ	Emergency Management,	Planning, Jackson County Planning, Fire, GIS	M	L
2.2	Collaborate with local organizations to establish clean air respite/shelters in local community places in the advent of poor air quality events.		X	X					X	Local Funding Resources, existing staff resources, OR DEQ	Emergency Management,	Local Organizations, Planning, Human Resources, Community Development, Local Businesses	O	M
Drought														
3.1	Support Local Agencies Training on Water Conservation Measures and Drought Management Practices and ensure long-range Water Resources Development and adaptation strategies.		X							Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Jackson Soil and Water Conservation District, Jackson County Watermaster	County Agencies, Medford Water, OSU Extension Service, Fruit Growers, Water Districts, SWCD	O	L
Earthquake														
4.1	Implement structural and non-structural retrofits to critical and essential facilities.	X	X	X	X	X	X			Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources; Seismic Rehabilitation Grant Program	Jackson County Administration, Building Owners	Building Officials, Local Planning, Emergency Response Agencies, Builders' Association, American Red Cross, DOGAMI, OEM, IFA	O	H
Emerging Infectious Diseases														
5.1	Encourage employees to be healthy (e.g., go or stay home if sick, use hand sanitizer, wear mask).			X					X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Emergency Management	Local employers, Human resources, community development	O	L

Action Item #	Mitigation Actions	Community Lifelines							Vulnerable Populations	Potential Funding Resources	Lead Department(s)	Partners	Timeline (S/M/L/O)	Cost (L/M/H)
		Safety and Security	Food, Water, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
5.2	Set up/make sure alternative work options are available to employees, e.g., remote work program.			X						Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Emergency Management	Local employers, Human resources, community development	O	L
Flood														
6.1	Conduct workshops for realtors, lenders and private property owners that are located within the 100-year floodplain on the National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Local Planning	Local Emergency Management	O	L
6.2	Update the Flood Insurance Rate Maps (FIRM) for Jackson County as funding becomes available.	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); FEMA Risk MAP; Local Funding Resources; existing staff resources	County Planning	Local Planning, DOGAMI, County GIS, FEMA	M	L
6.3	Encourage private property owners to work with local partners with assistance in restoring natural systems within the floodplain and manage riparian areas and wetlands for flood abatement and upland function (vegetation management).	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources; DEQ	Local Planning	County Parks and Planning, FEMA, Watershed Councils, DLCD, RVCOG, Cities, USACE, DSL, DEQ, EPA, ODFW, JSWCD	L	M
6.4	Seek grant funds to acquire or elevate individual properties adjacent to/within 100-year floodplain as opportunities arise and do so, as funding allows. Grant funds for repetitive-loss structures and Community Lifelines will be prioritized, followed by primary homes.	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Local Planning	FEMA, Local Emergency Management, County Administration, OEM, DLCD, OECDD	O	L
6.5	Achieve CRS (Community Rating System) rating of 6 within 4 years by preserving open space and adopting higher regulatory standards.	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources;	Local Emergency Management, Local Planning	Watershed Councils, OEM, DLCD, OECDD, USACE, FEMA	O	L

Action Item #	Mitigation Actions	Community Lifelines							Vulnerable Populations	Potential Funding Resources	Lead Department(s)	Partners	Timeline (S/M/L/O)	Cost (L/M/H)
		Safety and Security	Food, Water, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
										existing staff resources; DLCD Technical Assistance				
6.6	Preserve water quantity and quality by using storm water best management practices, including participating in the Total Daily Maximum Load yearly analysis to monitor/test water quality of streams, including volume of run off in the Rogue Basin. Participants in TMD include Jackson County Development Services Planning and Code Enforcement Divisions along with Jackson County Roads and Parks, RVCOG and RVSS. The collaborative effort creates/provides updated material related to rural land practices that may impact water quality (livestock management) and provide residents with assistance/resources to restore riparian areas (restore/protect/plant and remove invasive species).	X	X					X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources; DEQ	Jackson County Roads, RVCOG, DEQ, County and City Planning	Watershed Councils, WRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services, JCSWD	O	M
6.7	Preserve water quantity and quality by using storm water best management practices, including onsite inspections of private property storm water management systems through verification of compliance with engineered standards and the Oregon Plumbing Specialty Code	X	X					X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources; DEQ	Jackson County Roads, RVCOG, DEQ, County and City Planning	Watershed Councils, WRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services, JCSWD	O	L
6.8	Preserve water quantity and quality by using stormwater best management practices such as Low Impact Development (LID) or Green Infrastructure. These practices promote use of natural systems for infiltration, evapotranspiration, and reuse of rainwater to mimic nature conditions	X	X					X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources; DEQ	Jackson County Roads, RVCOG, DEQ, County and City Planning	Watershed Councils, WRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services, JCSWD	O	L

Action Item #	Mitigation Actions	Community Lifelines							Vulnerable Populations	Potential Funding Resources	Lead Department(s)	Partners	Timeline (S/M/L/O)	Cost (L/M/H)
		Safety and Security	Food, Water, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
6.9	Collaborate with the owner to seek funding opportunities for repairs or mitigation efforts on Duggan Dam which the OWRD has rated as an eligible high-hazard potential dam.	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Emergency Management	Watershed Councils, OWRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services, JCSWD	L	H
6.10	Collaborate with the owner to seek funding opportunities for repairs or mitigation efforts on Osborne Dam which the OWRD has rated as an eligible high-hazard potential dam.	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Emergency Management	Watershed Councils, OWRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services, JCSWD	L	H
6.11	Collaborate with the owner to seek funding opportunities for repairs or mitigation efforts on Walch Dam which the OWRD has rated as an eligible high-hazard potential dam.	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Emergency Management	Watershed Councils, OWRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services, JCSWD	L	H
6.12	Collaborate with the owner to seek funding opportunities for repairs or mitigation efforts on Woodrat Knob Dam which the OWRD has rated as an eligible high-hazard potential dam.	X	X	X	X	X	X	X	X	Hazard Mitigation Assistance (HMA); Local Funding Resources; existing staff resources	Emergency Management	Watershed Councils, OWRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services, JCSWD	L	H
Landslide														
7.1	Utilize the regional landslide risk maps (DOGAMI O-16-02) to identify hazard areas and collaborate with the Oregon Department of Geology and Mineral Industries to work on landslide risk reduction efforts; determine areas and buildings at risk to landslides and propose Comprehensive Plan and land use policies accordingly.	X					X			Hazard Mitigation Assistance (HMA); FEMA Risk MAP; Local Funding Resources; existing staff resources	Jackson County GIS	DOGAMI, County Planning, County Emergency Management, ODF, SOU	S	M
Severe Weather (Extreme Heat, Windstorm, Winter Storm)														
8.1	Promote education and outreach to assist homeless and other vulnerable populations sensitive to extreme heat events.					X			X	Local Funding Resources, existing staff resources	Public Health	Emergency Management, Local community organizations	O	L

Action Item #	Mitigation Actions	Community Lifelines							Vulnerable Populations	Potential Funding Resources	Lead Department(s)	Partners	Timeline (S/M/L/O)	Cost (L/M/H)
		Safety and Security	Food, Water, Shelter	Health and Medical	Energy	Communications	Transportation	Hazardous Materials						
8.2	Continue support of Pacific Power removal/replacement program for trees that threaten utilities in the public right-of-way. Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.				X		X			Local Funding Resources, Pacific Power, existing staff resources	Planning	Emergency Management, Pacific Power	O	L
Volcanic Event														
9.0	No hazard specific actions identified. See Multi-hazard actions.													
Wildfire														
10.1	Coordinate fire mitigation action items through the Rogue Valley Integrated Fire Protection Plan (AKA Jackson County CWPP).	X	X	X	X	X	X	X	X	Local Funding Resources US Fire Administration (USFA): Assistance to Firefighters Grant Program; Fire Prevention and Safety Grants; Community Wildfire Defense Grant	Emergency Management	Fire, GIS, Planning, Jackson County Emergency Management, Fire Districts; Rogue Valley Fire Prevention Cooperative, ODF	O	L-H

Source: Jackson County NHMP Steering Committee, updated 2023
Cost: Low (less than $50,000), Medium ($50,000-$100,000), High (more than $100,000)
Timing: Ongoing (continuous), S-Short (1-2 years),M-Medium (3-5 years), L-Long (5 or more years)
Priority Actions: Identified with **bold** text and **orange** highlight.

Section 4: Plan Implementation and Maintenance

This section details the formal process that will ensure that the NHMP remains an active and relevant document. The plan implementation and maintenance process include a schedule for monitoring and evaluating the NHMP semi-annually, as well as producing an updated plan every five years. Finally, this section describes how the County will integrate public participation throughout the NHMP maintenance and implementation process.

Implementing the NHMP

The success of the Jackson County NHMP depends on how well the outlined action items are implemented. In an effort to ensure that the activities identified are implemented, the following steps will be taken: 1) the NHMP will be formally adopted, 2) a Steering Committee will be assigned, 3) a convener shall be designated, 4) semi-annual meetings will be held, 5) the identified activities will be prioritized and evaluated, and 6) the NHMP will be implemented through existing plans, programs and policies.

NHMP Adoption

The Jackson County NHMP was developed and will be implemented through a collaborative process. After the NHMP is locally reviewed and deemed complete, the Jackson County Emergency Manager, or their designee, shall submit it to the State Hazard Mitigation Officer (SHMO) at the Oregon Department of Emergency Management (OEM). OEM submits the NHMP to FEMA-Region X for review. This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the County will adopt the NHMP via resolution. At that point, the County will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program and Flood Mitigation Assistance program funds. Following adoption by the County, the participating jurisdictions should convene local decision makers and adopt the Jackson County Multijurisdictional NHMP.

Convener

The Jackson County Emergency Manager will take responsibility for NHMP implementation and will facilitate the Hazard Mitigation Steering Committee meetings and will assign tasks such as updating and presenting the NHMP to the rest of the members of the Steering Committee (see City Addenda for city conveners). NHMP implementation and evaluation will

be a shared responsibility among all of the assigned Steering Committee Members. The Convener's responsibilities include:

- Coordinate Steering Committee meeting dates, times, locations, agendas and member notification;
- Document the discussions and outcomes of committee meetings;
- Serve as a communication conduit between the Steering Committee and the public/stakeholders;
- Identify emergency management-related funding sources for natural hazard mitigation projects; and
- Utilize the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

Steering Committee

The Jackson County Convener will maintain a Natural Hazard Steering Committee for updating and implementing the NHMP. The Steering Committee responsibilities include:

- Attend future maintenance and NHMP update meetings (or designating a representative to serve in your place);
- Serve as the local evaluation committee for funding programs such as the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds and Flood Mitigation Assistance program funds;
- Prioritize and recommend funding for natural hazard risk reduction projects;
- Evaluate and update the NHMP in accordance with the prescribed maintenance schedule;
- Develop and coordinate ad hoc and/or standing subcommittees as needed; and
- Coordinate public involvement activities.

Members

The following jurisdictions, agencies and/or organizations were represented and served on the Steering Committee during the development of the Jackson County NHMP and may be represented during implementation and maintenance phase (for a list of individuals see *Acknowledgements*):

- Jackson County Emergency Management
- Jackson County Development Services
- Jackson County Roads and Parks
- Rogue Valley Council of Governments
- City of Ashland
- Town of Butte Falls
- City of Central Point
- City of Eagle Point
- City of Jacksonville
- City of Medford

- City of Phoenix
- City of Rogue River
- City of Talent
- Applegate Valley Fire District
- Jackson County Fire District #3
- Jackson County Fire District #4
- Medford Water
- Emergency Communications of Southern Oregon
- Jackson County Soil and Water Conservation District
- Rogue Valley Sewer Services
- Rogue Valley Transportation District
- Oregon Water Resources Department, District 13

To make the coordination and review of the Jackson County NHMP as broad and useful as possible, the Steering Committee will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as partners in the action item matrices.

Implementation through existing programs

The NHMP includes a range of action items that, when implemented, will reduce loss from hazard events in the county. Within the NHMP, FEMA requires the identification of existing programs that might be used to implement these action items. Jackson County and the participating cities currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvement plans, mandated standards and building codes. To the extent possible, Jackson County and participating cities will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the recommendations contained in the NHMP are consistent with the goals and objectives of the participating City and County's existing plans and policies. Where possible, Jackson County and participating cities should implement the recommended actions contained in the NHMP through existing plans and policies. Plans and policies already in existence often have support from residents, businesses and policy makers. Many land-use, comprehensive and strategic plans get updated regularly and can adapt easily to changing conditions and needs. Implementing the action items contained in the NHMP through such plans and policies increases their likelihood of being supported and implemented.

Examples of plans, programs or agencies that may be used to implement mitigation activities include:

- City and County Budgets
- Community Wildfire Protection Plans
- Comprehensive Land Use Plans
- Economic Development Action Plans

- Zoning Ordinances and Building Codes

For additional examples of plans, programs or agencies that may be used to implement mitigation activities refer to list of plans in Volume I, Section 2.

NHMP Maintenance

NHMP maintenance is a critical component of the NHMP. Proper maintenance of the NHMP ensures that it will maximize the County and participating Cities' efforts to reduce the risks posed by natural hazards. This section was developed by OPDR and includes a process to ensure that a regular review and update of the NHMP occurs. The Steering Committee and local staff are responsible for implementing this process, in addition to maintaining and updating the NHMP through a series of meetings outlined in the maintenance schedule below.

Meetings

The Steering Committee will meet on a semi-annual basis to complete the following tasks. During the first meeting the Steering Committee will:

- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the NHMP and mitigation in general;
- Identify issues that may not have been identified when the NHMP was developed; and
- Prioritize potential mitigation projects using the methodology described below.

During the second meeting, the Steering Committee will:

- Review existing and new risk assessment data;
- Discuss methods for continued public involvement; and
- Document successes and lessons learned during the year.

These meetings are an opportunity for the cities and special districts to report back to the County on progress that has been made towards their components of the NHMP.

The convener will be responsible for documenting the outcome of the semi-annual meetings in Volume II, Appendix B. The process the Steering Committee will use to prioritize mitigation projects is detailed in the section below. The NHMP's format allows the County and participating Cities to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a NHMP that remains current and relevant to the participating jurisdictions.

Project Prioritization Process

The Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of

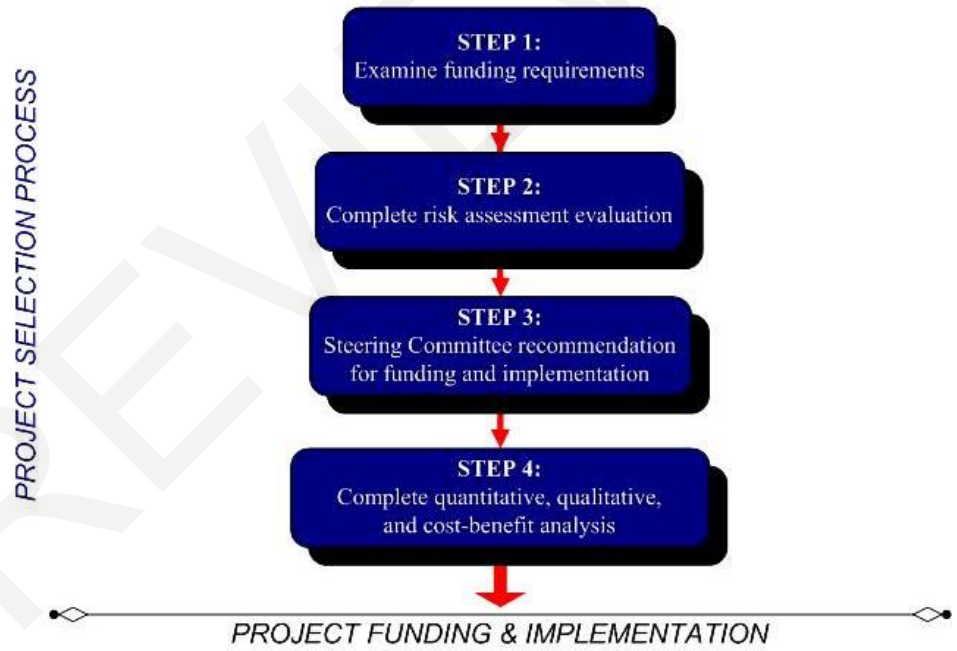
sources; therefore, the project prioritization process needs to be flexible. Committee members, local government staff, other planning documents or the risk assessment may be the source to identify projects. Figure 4-1 illustrates the project development and prioritization process.

Step 1: Examine funding requirements

The first step in prioritizing the NHMP's action items is to determine which funding sources are open for application. Several funding sources may be appropriate for the County's proposed mitigation projects. Examples of mitigation funding sources include but are not limited to: FEMA's Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds and private foundations, among others. Please see Volume II, Appendix E for a more comprehensive list of potential grant programs.

Because grant programs open and close on differing schedules, the Steering Committee will examine upcoming funding streams' requirements to determine which mitigation activities would be eligible. The Steering Committee may consult with the funding entity, Oregon Department of Emergency Management (OEM), or other appropriate state or regional organizations about project eligibility requirements. This examination of funding sources and requirements will happen during the Steering Committee's semi-annual NHMP maintenance meetings.

Figure 4-1 Action Item and Project Review Process



Source: Oregon Partnership for Disaster Resilience, 2008.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the NHMP's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The Steering Committee will determine whether the NHMP's risk assessment supports the implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas and whether community assets are at risk. The Steering Committee will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future or are likely to result in severe/catastrophic damages.

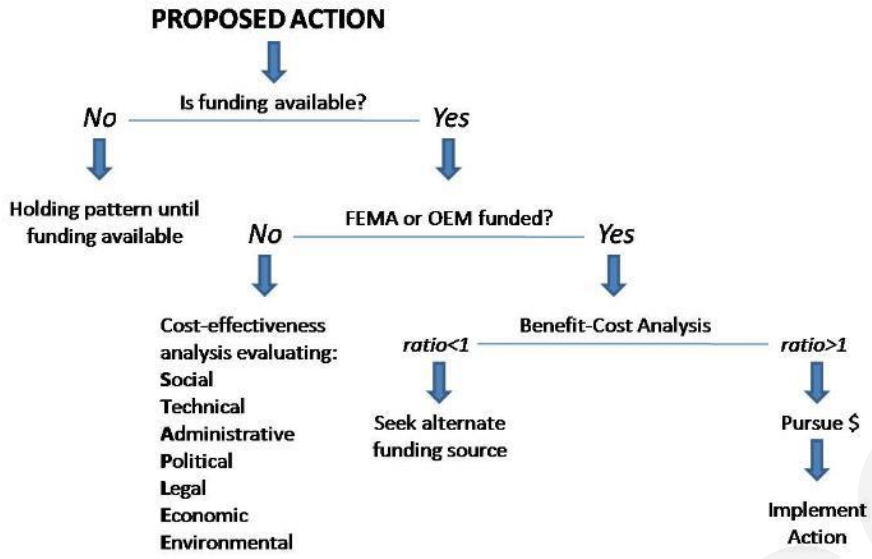
Step 3: Steering Committee Recommendation

Based on the steps above, the Steering Committee will recommend which mitigation activities should be moved forward. If the Steering Committee decides to move forward with an action, the coordinating organization designated in the matrix will be responsible for taking further action and, if applicable, documenting success upon project completion. The Steering Committee will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

Step 4: Complete quantitative and qualitative assessment and economic analysis

The fourth step is to identify the costs and benefits associated with the selected natural hazard mitigation strategies, measures, or projects. Two categories of analysis that are used in this step are: (1) cost-benefit analysis and (2) cost-effectiveness analysis. Conducting cost-benefit analysis for a mitigation activity assists in determining whether a project is worth undertaking now, to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards 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. Figure 4-2 shows decision criteria for selecting the appropriate method of analysis.

Figure 4-2 Benefit Cost Decision Criteria



Source: Oregon Partnership for Disaster Resilience, 2010.

If the activity requires federal funding for a structural project, the Steering Committee will use a FEMA-approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a cost-benefit ratio of greater than one in order to be eligible for FEMA grant funding.

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The Steering Committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness. OPDR at the University of Oregon's Community Service Center has tailored the STAPLE/E technique for use in natural hazard action item prioritization.

Continued Public Involvement and Participation

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Jackson County NHMP. To ensure that these opportunities will continue, the County and participating jurisdictions will:

- Post copies of their plan on corresponding websites;
- Place articles in the local newspaper directing the public where to view and provide feedback; and
- Use existing newsletters such as schools and utility bills to inform the public where to view and provide feedback.

In addition to the involvement activities listed above, Jackson County, cities, and special districts will ensure continued public involvement by posting a link to the Jackson County NHMP on their websites.

Five-Year Review of NHMP

This NHMP will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. The Jackson County NHMP is due to be updated by [month day], 2028. The Convener will be responsible for organizing the Steering Committee to address NHMP update needs. The Steering Committee will be responsible for updating any deficiencies found in the NHMP and for ultimately meeting the Disaster Mitigation Act of 2000's NHMP update requirements.

The following 'toolkit' can assist the Convener in determining which NHMP update activities can be discussed during regularly scheduled NHMP maintenance meetings and which activities require additional meeting time and/or the formation of sub-committees.

Table 4-1 Natural Hazard Mitigation Plan Update Toolkit

Question	Yes	No	Plan Update Action
Is the planning process description still relevant?			Modify this section to include a description of the plan update process. Document how the planning team reviewed and analyzed each section of the plan, and whether each section was revised as part of the update process. (This toolkit will help you do that).
Do you have a public involvement strategy for the plan update process?			Decide how the public will be involved in the plan update process. Allow the public an opportunity to comment on the plan process and prior to plan approval.
Have public involvement activities taken place since the plan was adopted?			Document activities in the "planning process" section of the plan update
Are there new hazards that should be addressed?			Add new hazards to the risk assessment section
Have there been hazard events in the community since the plan was adopted?			Document hazard history in the risk assessment section
Have new studies or previous events identified changes in any hazard's location or extent?			Document changes in location and extent in the risk assessment section
Has vulnerability to any hazard changed?			Document changes in vulnerability in the risk assessment section
Have development patterns changed? Is there more development in hazard prone areas?			Document changes in vulnerability in the risk assessment section
Do future annexations include hazard prone areas?			Document changes in vulnerability in the risk assessment section
Are there new high risk populations?			Document changes in vulnerability in the risk assessment section
Are there completed mitigation actions that have decreased overall vulnerability?			Document changes in vulnerability in the risk assessment section
Did the plan document and/or address National Flood Insurance Program repetitive flood loss properties?			Document any changes to flood loss property status

Source: Oregon Partnership for Disaster Resilience, 2010.

Table 4-1 Natural Hazard Mitigation Plan Update Toolkit (continued)

Question	Yes	No	Plan Update Action
Did the plan identify the number and type of existing and future buildings, infrastructure, and critical facilities in hazards areas?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Did the plan identify data limitations?			If yes, the plan update must address them: either state how deficiencies were overcome or why they couldn't be addressed
Did the plan identify potential dollar losses for vulnerable structures?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Are the plan goals still relevant?			Document any updates in the plan goal section
What is the status of each mitigation action?			Document whether each action is completed or pending. For those that remain pending explain why. For completed actions, provide a 'success' story.
Are there new actions that should be added?			Add new actions to the plan. Make sure that the mitigation plan includes actions that reduce the effects of hazards on both new and existing buildings.
Is there an action dealing with continued compliance with the National Flood Insurance Program?			If not, add this action to meet minimum NFIP planning requirements
Are changes to the action item prioritization, implementation, and/or administration processes needed?			Document these changes in the plan implementation and maintenance section
Do you need to make any changes to the plan maintenance schedule?			Document these changes in the plan implementation and maintenance section
Is mitigation being implemented through existing planning mechanisms (such as comprehensive plans, or capital improvement plans)?			If the community has not made progress on process of implementing mitigation into existing mechanisms, further refine the process and document in the plan.

Source: Oregon Partnership for Disaster Resilience, 2010.

Appendix A: Glossary and Acronyms

Glossary

100-year flood means a flooding condition which has a one percent chance of occurring each year. The 100-year flood level is used as the base planning level for floodplain management in the National Flood Insurance Program. https://www.fema.gov/flood-zones

Cascadia Subduction Zone (CSZ) is the area where the seafloor plate (the Juan de Fuca and Gorda) is sliding down and below the North American plate. https://pnsn.org/outreach/earthquakesources/csz

Community Wildfire Protection Plan (CWPP) In 2003, Congress passed the federal Healthy Forests Restoration Act (HFRA), which encourages local communities to collaborate with federal land managers to develop comprehensive fuels reduction strategies. This is accomplished through the creation of a Community Wildfire Protection Plan (CWPP). https://www.fs.usda.gov/managing-land/fire

Disaster Mitigation Act of 2000 (DMA2K) amended the Stafford Act, including: establishing a national program for pre-disaster mitigation; streamlining the administration of disaster relief; changing FEMA's post-disaster programs for individuals and families, including creating the Individuals and Households Program; establishing minimum standards for public and private structures; requiring local and state natural hazards mitigation plans that meet a FEMA standard (Section 322); revising - in part - FEMA funding for the repair, restoration and replacement of damaged facilities (Section 406); revising FEMA's participation in the costs of WUI fire suppression through an expanded and renamed Fire Management Assistance Grant Program (Section 420); removing the requirement for post-disaster IHMT or HMST meetings and reports; and other amendments. https://www.fema.gov/sites/default/files/2020-11/fema_disaster-mitigation-act-of-2000_10-30-2000.pd f

El Niño-Southern Oscillation is a cycle in the Pacific Basin involving water and air temperatures that has a profound effect on weather patterns around the world, events typically last 6-18 months. https://www.climate.gov/news-features/blogs/enso/what-el-ni%C3%B1o%E2%80%93southern-oscillation-enso-nutshell

Firewise is a program developed by the National Fire Protection Association (NFPA) featuring templates to help communities reduce risk and protect property form the dangers of wildland fires, an interactive resource-rich website and training programs throughout the nation. http://www.firewise.org

Floodplain is a land area adjacent to a river, stream, lake, estuary or other water body that is subject to flooding. These areas, if left undisturbed, act to store excess flood water. https://www.fema.gov/flood-zones

Floodplain Administrator/Manager is the person designated by the governing body in a flood-prone community who is responsible for making floodplain determinations for construction sites, issuing building permits for floodplain construction, ensuring compliance and other floodplain management activities. https://www.fema.gov/floodplain-managers

Floodway is the channel of a river and the portion of the floodplain that carries most of the flood flow. Floodways are usually the area where water velocities and forces are the greatest and most destructive. The National Flood Insurance Program (NFIP) definition of floodway is the channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot. NFIP regulations, adopted in local ordinances, require that floodway be kept open so that flood flows are not obstructed or diverted onto other properties. https://www.fema.gov/flood-zones

Goal 7 of the statewide land use planning program calls for local comprehensive plans to include inventories, policies and implementing measures to guide development in hazard areas thereby reducing losses from flooding, landslides, earthquakes, tsunamis, coastal erosion and wildfires. https://www.oregon.gov/lcd/OP/Pages/Goal-7.aspx

Hazard is any situation that has the potential of causing damage to people, property or the environment.

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. (44 CFR 201.2) https://www.fema.gov/hazard-mitigation-planning

Hazard Mitigation Grant Program is the program authorized under Section 404 of the Stafford Act and implemented at 44 CFR Part 206, Subpart N, which authorizes funding for certain mitigation measures identified through the evaluation of natural hazards conducted under Section 322 of the Stafford Act (44 CFR 201.2). https://www.fema.gov/hazard-mitigation-grant-program

Hazus-MH (HAZards United States Multi-Hazard) is a standardized loss estimation methodology that is also a FEMA software program using mathematical formulas and Geographical Information Systems (GIS) data about building stock, local geology, etc. and the location and size of potential hazards (earthquakes, floods and hurricanes) to estimate physical, economic and social impacts of disaster. https://www.fema.gov/hazus

Landslide is any detached mass of soil, rock or debris that moves down a slope or a stream channel. https://www.oregongeology.org/Landslide/landslidehome.htm

LiDAR (Light Detection and Ranging) is an optical remote sensing technology that can measure the distance to and other properties of a target, by illuminating the target with light, often using pulses from a laser. http://www.oregongeology.org/lidar/

Major disaster is any natural catastrophe including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm or drought, or, regardless of cause, any fire, flood, or explosion in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance to supplement the efforts and available resources of states, local governments and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby (44 CFR 206.2). https://www.fema.gov/disasters

National Fire Plan is a federal program that helps manage the impact of wildfires on communities, it has five main components: (1) firefighting, (2) rehabilitation and restoration, (3) hazardous fuel reduction, (4) community assistance and (5) accountability. https://www.hsdl.org/?abstract&did=480165

National Flood Insurance Program is the program run by the federal government to improve floodplain management, to reduce flood-related disaster costs and to provide low cost flood insurance for residents of flood-prone communities. https://www.fema.gov/national-flood-insurance-program

Natural Hazard Mitigation Plan is a plan resulting from a risk assessment of the nature and extent of vulnerability to the effects of natural hazards present in a geographic area and actions needed to minimize future vulnerability to those hazards, especially a plan developed and adopted which meets the requirements of 44 CFR Part 201.4/5/6. https://www.fema.gov/hazard-mitigation-planning

Public Assistance is the part of the disaster assistance program in which the federal government supplements the efforts and available resources of state and local governments to restore certain public facilities or services. Public Assistance includes emergency assistance, debris removal, community disaster loans and the permanent repair, restoration or replacement of public and designated private nonprofit facilities damaged or destroyed by a major disaster and is further described under Section 406 of the Stafford Act. https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit

Rogue Valley Integrated Community Wildfire Protection Plan is the CWPP for Jackson and Josephine counties. https://jacksoncountyor.org/emergency/County-Plans/Fire-Plan

Senate Bill 762 in 2021 directed the Oregon Department of Consumer and Business Services and the Oregon State Fire Marshal to update building codes and defensible space requirements for structures located in the Wildland Urban Interface (WUI) rated in high and extreme risk areas. As regulations are put in place to implement this legislation, Clackamas County should implement these updated requirements through their building and land use codes. https://www.oregon.gov/odf/pages/sb762.aspx

Special Flood Hazard Area is the land area covered by the floodwaters of the base flood and is where the NFIP's floodplain management regulations must be enforced; also the area where the mandatory purchase of flood insurance applies. https://www.fema.gov/flood-zones

Stafford Act is the Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 100-707, which amended PL 91-606 and PL 93-288; then was further amended by PL 106-390, the Disaster Mitigation Act of 2000; and PL 109-295, the Post-Katrina Emergency Reform Act). https://www.fema.gov/robert-t-stafford-disaster-relief-and-emergency-assistance-act-public-law-93-288-amended

State Hazard Mitigation Officer is the official representative of state government who is the primary point of contact with FEMA, other federal agencies and local governments in mitigation planning and implementation of mitigation programs and activities required under the Stafford Act. In Oregon, this person is on the staff of Oregon Emergency Management. https://www.fema.gov/state-hazard-mitigation-officers

State Interagency Hazard Mitigation Team is a team of state agency officials who, in 1997, Governor Kitzhaber directed Oregon Emergency Management to make a permanent body and establish regular meeting dates to understand losses arising from natural hazards and coordinate recommended strategies to mitigate loss of life, property and natural resources. http://www.oregon.gov/oem/Councils-and-Committees/Pages/IHMT.aspx

Subduction zone is the area between two converging plates, one of which is sliding down and below the other. http://www.oregongeology.org/sub/publications/ims/ims-028/unit20.htm

Subduction zone earthquake is an earthquake along the subduction zone. In Oregon, this refers to the Cascadia Subduction Zone (CSZ), which lies offshore of the Oregon, California, and Washington Coasts. https://www.oregongeology.org/pubs/ims/ims-028/unit20.htm

Vulnerability is the susceptibility of life, property, or the environment to damage if a hazard manifests to potential.

Wildfire hazard zone (OAR Chapter 629, Division 44) is the portion of a local government jurisdiction that has been determined to be at risk of a catastrophic wildfire. https://secure.sos.state.or.us/oard/displayChapterRules.action?selectedChapter=82

Wildland-urban interface (WUI) is an area where structures are adjacent to or are intermingled with natural vegetation fuels which is prone to the occurrence of wildland fires. https://www.usfa.fema.gov/wui/

Acronyms

ASFPM – Association of State Floodplain Managers

BLM – Bureau of Land Management

CSZ – Cascadia Subduction Zone

CWPP – Community Wildfire Protection Plan

DEQ – Department of Environmental Quality

DLCD – Oregon Department of Land Conservation and Development

DOGAMI – Oregon Department of Geology and Mineral Industries

FEMA – Federal Emergency Management Agency

FMA – Flood Mitigation Assistance

HMA – Hazard Mitigation Assistance

HMGP – Hazard Mitigation Grant Program

NFPA – National Fire Protection Association

OEM- Oregon Office of Emergency Management

OPRD – Oregon Parks and Recreation Department

OWRD – Oregon Water Resourced Department

PDM – Pre-Disaster Mitigation Grant Program

RVCOG – Rogue Valley Council of Governments

RVIFP – Rogue Valley Integrated Community Wildfire Protection Plan

SFHA – Special Flood Hazard Area

SRGP – Seismic Rehabilitation Grant Program

USFS – United States Forest Service

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Appendix B: Planning and Public Process

This appendix describes the changes made to the 2017 Jackson County Natural Hazard Mitigation Plan (NHMP) during the 2023 NHMP update process.

Project Background

Jackson County and the cities of Ashland, (Town of) Butte Falls, Eagle Point, Jacksonville, Phoenix, Rogue River, Shady Cove, and Talent partnered with the Oregon Partnership for Disaster Resilience (OPDR) to update the multi-jurisdictional 2018 Jackson County 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. A Federal Emergency Management Pre-Disaster Mitigation grant funded the plan update with non-federal match provided by the Oregon Legislature.

OPDR and the committees made several changes to update and consolidate the previous NHMP. The cities of Central Point and Gold Hill, as well as Jackson County Fire District #3, Jackson County Fire District #5, and Medford Water, were added to the NHMP with this update. Major changes are documented and summarized in this memo.

2023 NHMP Update Changes

The sections below only discuss *major* changes made to the NHMPs during the 2023 NHMP update process. Major changes include the replacement or deletion of large portions of text, changes to the NHMP's organization, new mitigation action items, and the addition of city and special district addenda to the NHMP. If a section is not addressed in this memo, then it can be assumed that no significant changes occurred.

The NHMP's format and organization have been altered to fit within OPDR's NHMP templates. Table B-1 lists the 2018 Jackson County NHMP section names and the corresponding 2023 section names, as updated (major Volumes are highlighted). This memo will use the 2023 NHMP update section names to reference any changes, additions, or deletions within the NHMP.

Table B-1 Changes to NHMP Organization

2018 Jackson County MNHMP	2023 Jackson County MNHMP
Acknowledgements	Acknowledgements
Table of Contents	Table of Contents
Approval Letters and Resolutions	Approval Letters and Resolutions
FEMA Review Tool	FEMA Review Tool
Volume I: Basic Plan	Volume I: Basic Plan
Plan Summary of the NHMP	Plan Summary of the NHMP
Section 1: Introduction	Section 1: Introduction
Section 2: Community Profile	-
Section 3: Hazard Identification and Risk Assessment	Section 2: Hazard Identification and Risk Assessment
Section 4: Mitigation Strategy	Section 3: Mitigation Strategy
Section 5: Plan Implementation and Maintenance	Section 4: Plan Implementation and Maintenance
Volume III: City Addenda	Volume III: Jurisdictional Addenda
Ashland	Ashland
Butte Falls	Butte Falls
-	Central Point
Eagle Point	Eagle Point
-	Gold Hill
Jacksonville	Jacksonville
Phoenix	Phoenix
Rogue River	Rogue River
Shady Cove	Shady Cove
Talent	Talent
-	Jackson Fire District #3
-	Jackson Fire District #5
-	Medford Water
Volume II: Appendices	Volume II: Appendices
Appendix A: Glossary and Acronyms	Appendix A: Glossary and Acronyms
Appendix B: Planning and Public Process	Appendix B: Planning and Public Process
Section 2: Community Profile	Appendix C: Community Profile
Appendix C: Hazard Analysis	-
Appendix D: Economic Analysis	Appendix D: Economic Analysis
Appendix E: Grant Programs	Appendix E: Grant Programs
Appendix F: Community Survey	Appendix F: Community Survey
Appendix G: Ashland LID	-

As the table indicates the structure of the NHMP has changed slightly including the addition of several additional addenda. Content and changes are described below.

Front Pages

- The NHMP's cover has been updated.
- Acknowledgements have been updated to include the 2023 project partners and planning participants.
- The FEMA approval letter, review tool, and county, city , and special district documents of adoption are included.

Volume I: Basic Plan

Volume I provides the overall NHMP framework for the 2023 Multi-jurisdictional NHMP update. Volume I includes the following sections:

Plan Summary
The 2023 NHMP includes an updated NHMP summary that provides information about the purpose of Natural Hazard Mitigation planning and describes how the NHMP will be implemented.

Section 1: Introduction
Section 1 introduces the concept of Natural Hazard Mitigation planning and answers the question, "Why develop a mitigation plan?" Additionally, Section 1 summarizes the 2023 NHMP update process, and provides an overview of how the NHMP is organized. Major changes to Section 1 include the following:

- Section 1 of the 2023 update, outlines the entire layout of the NHMP update, which has been altered as described herein.

Section 2: Hazard Identification and Risk Assessment
This section consists of three phases: hazard identification, vulnerability assessment, and risk analysis. Hazard identification involves the identification of hazard geographic extent, its intensity, and probability of occurrence. The second phase attempts to predict how different types of property and population groups will be affected by the hazard. The third phase involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period. Changes include:

- Hazard identification, characteristics, history, probability, vulnerability, and hazard specific mitigation activities were updated. Outdated and extraneous information was removed and links to technical reports were added as a replacement.
- Links to specific hazard studies and data are embedded directly into the NHMP where relevant and available.
- NFIP information was updated.
- The hazard vulnerability analysis has been updated for the county. City and special district hazard vulnerability is included with more detail within Volume III.

Section 3: Mitigation Strategy
This section provides the basis and justification for the mission, goals, and mitigation actions identified in the NHMP. Major changes to Section 4 include the following:

- The mission and goals were reviewed in relation to the State NHMP. The County and cities agreed to retain the existing mission and goals and add Goal 8 to center equity in their mitigation work.
- Action items were reviewed, revised, and prioritized (indicated in **bold** text). Major changes are indicated below:
    - MH #1: This action is ongoing.
    - MH #2: This action is ongoing and was reworded for clarity.
    - **MH #3**: This action is ongoing and was prioritized.
    - **MH #4**: This action is ongoing, was reworded for clarity, and was prioritized.
    - DR #1: This action is ongoing.
    - EQ #1: This action is ongoing.
    - FL #1: This action is ongoing and was reworded for clarity.
    - FL #2: This action is ongoing.
    - FL #3: This action is ongoing and was reworded for clarity.
    - FL #4: This action is ongoing and was reworded for clarity.
    - FL #5: This action is ongoing and was reworded for specificity around the County's Community Rating System goal.
    - FL #6: This action is ongoing and was reworded for clarity.
    - NEW FL: This action is new and was numbered as FL #7.
    - NEW FL: This action is new and was numbered as FL #8.
    - WF #1: This action is ongoing.
    - Additional action item changes to be added

Section 4: Plan Implementation and Maintenance
Jackson County Emergency Management will continue to convene and coordinate the County Steering Committee (documentation for the city and special district Steering Committees is contained within Volume III).

Volume II: Appendices

Below is a summary of the appendices included in the 2023 NHMP:

Appendix A: Glossary and Acronyms
This appendix was updated with this version of the NHMP and includes common words and their acronyms found throughout the NHMP.

Appendix B: Planning and Public Process
This planning and public process appendix reflects changes made to the Jackson County NHMP and documents the 2023 planning and public process.

Appendix C: Community Profile
The community profile has been updated.

Appendix D: Economic Analysis of Natural Hazard Mitigation Projects
Updates are provided for the economic analysis of natural hazard mitigation projects.

Appendix E: Grant Programs and Resources
Updates were made to grant programs and resources.

Appendix F: Community Survey
This survey was administered during the development of the NHMP as part of a related Smoke Management Community Response Plan. This survey was utilized to inform the development of mitigation strategies and identification of community vulnerabilities. It is provided herein as documentation and to serve as a resource for future planning efforts.

Volume III: Jurisdictional Addenda

The cities of Ashland, (Town of) Butte Falls, Eagle Point, Jacksonville, Phoenix, Rogue River, Shady Cove, and Talent opted to participate again and include addenda in the Jackson NHMP. Additionally, the cities of Central Point and Gold Hill, Jackson County Fire District #3, Jackson County Fire District #5, and the Medford Water.

Where appropriate, information has been consolidated and a reference is provided within the addenda to the appropriate NHMP section. New data and hazard information was included for the participating cities and actions were reviewed, revised, and prioritized as described in the addenda. Other changes to the addenda are documented in this appendix and Volume III.

Ashland
Action items were reviewed, revised, and prioritized (indicated in **bold** text). Major changes are indicated below:

- MH #1: this action is ongoing. The City hired a new coordinator and continues to train new CERT members.
- MH #2: this action is ongoing. The wording was changed to focus on providing emergency kits to the school district and maintaining the emergency kits provided to City staff since the 2017 plan.
- MH #3: this action is ongoing, but was clarified to address the issue with interoperability of the audio alert system.
- **EQ #1**: this action is ongoing and language has been expanded on for clarity and to note a new partnership for Emergency Operations Center operation between the City, school district, and Southern Oregon University.
- **EQ #2**: action is retained as 2023 action EQ #2. The action item was reworded to identify that City Hall is the priority for structural retrofits.
- EQ #3: this action is ongoing.
- EQ #4: this action is ongoing.
- FL #1: this action is ongoing.
- FL #2: this action is ongoing.

- LS #1: this action is ongoing. The wording was updated to reflect that the relocation assessment is complete and the City's next steps are to finish design and seek funding.
- WF #1: this action is ongoing. City has completed over 200 defensible space projects.
- WF #2: this action is ongoing. The bulk of this project has been completed, but City has 500 acres where fuel reduction will occur remaining.
- WF #3: this action is ongoing, though the City plans to maintain Firewise communities and shift leadership to community members.
- WF #4: this action is complete.

New Actions (2023):

- WF #4: this action is new.

Butte Falls

Action items were reviewed, revised and prioritized (indicated in **bold** text). Major changes are indicated below:

- MH #1: this action is ongoing.
- MH #2: this action is ongoing. Wording updated to reflect that City Hall, the city's school, and the Fire Department are the priorities.
- MH #3: this action is ongoing.
- MH #4: this action is ongoing. Wording updated to reflect that the city's elementary school is the priority.
- MH #5: this action is ongoing.
- MH #6: this action is discontinued.
- MH #7: this action is ongoing, but has been renumbered as MH #6.
- MH #8: this action is ongoing, but has been renumbered as MH #7.
- DR #1: this action is ongoing.
- EQ #1: this action is ongoing. Wording updated to reflect that the community hall and City Hall are the priorities.
- EQ #2: this action is ongoing, but the wording has been clarified.
- SW #1: this action is ongoing.
- WF #1: this action is ongoing. Wording updated to reflect that the Oregon Department of Forestry is the lead.
- WF #2: this action is ongoing, but has been removed from the priority actions and placed in the action item pool.
- WF #3: this action is ongoing.

Central Point

This city addendum is new with this version of the NHMP. The previous Central Point NHMP was a stand-alone NHMP. Content has been updated.

Action item changes to be added

Eagle Point
Action items were reviewed, revised, and prioritized (indicated in **bold** text). Major changes are indicated below:

- **DR #1**: this action is ongoing.
- EQ #1: this action is ongoing. It was renumbered to EQ #2.
- EQ #2: this action was discontinued, as this work is more appropriate for the City to support another partner as the lead agency.
- EQ #3: this action was discontinued, as this work is more appropriate for the City to support another partner as the lead agency.
- **EQ #4**: this action is ongoing, was reworded for specificity, and was renumbered to EQ #1. It was also moved to the priority action items.
- **FL #1**: this action is ongoing.
- FL #2: this action was discontinued as the city has no critical facilities in the floodplain.
- **FL #3**: this action is ongoing and was renumbered to FL #2.
- FL #4: this action was discontinued as it does not apply to the city.
- FL #5: this action is ongoing and was renumbered to FL #3.
- FL #6: this action was discontinued due to NFIP's high demand on staff capacity.
- FL #7: this action is ongoing, was reworded for clarity, and was renumbered to FL #4.
- FL #8: this action is ongoing, was reworded for clarity, and was renumbered to FL #5.
- FL #9: this action is ongoing.
- MH #1: this action is ongoing.
- MH #2: this action was discontinued, as the City does not plan to update the Comprehensive Plan in the next five years and will rely on this NHMP for updated natural hazard information.
- MH #3: this action was discontinued, as the City does not plan to update the Comprehensive Plan in the next five years and will rely on this NHMP for updated natural hazard information.
- MH #4: this action is ongoing and was reworded for clarity.
- SW #1: this action is ongoing and was reworded for clarity.
- WF #1: this action is ongoing.
- WF #2: this action is ongoing and was reworded to specify that the City plans to lead fuel reduction programs, whether Firewise is deemed a good fit or not.

Gold Hill
This city addendum is new with this version of the NHMP.

Jacksonville
Action items were reviewed, revised and prioritized (indicated in **bold** text). Major changes are indicated below:

- LS #1: This action is ongoing and was moved from the priority actions to the action item pool.

- FL #1: This action is ongoing.
- FL #2: This action is discontinued.
- MH #1: This action is ongoing and was moved from the priority actions to the action item pool.
- MH #2: This action is ongoing. Wording was changed to reflect that the program has been established and the goal is to continue to sustain it.
- MH #3: This action was reworded to focus on working with utility partners to underground power lines, moved to the priority actions, and renumbered as MH #1. The funding sources was changed to local funding resources.
- SW #1: This action was moved to the priority actions.
- WF #1: This action is ongoing.
- WF #2: This action is new.

Phoenix

Action items were reviewed, revised, and prioritized (indicated in **bold** text). Major changes are indicated below:

- MH #1: This action is discontinued but integrated into the new MH #3.
- MH #1: This action is ongoing and was reworded for clarity. This action item was mistakenly also listed as MH #1 in the previous plan and has been updated to MH #2.
- MH #2: This action is ongoing and was reworded for clarity. It has been renumbered as MH #3.
- MH #3: This action is ongoing and was reworded to reflect that it is the primary responsibility of utility partners to accomplish this action. It has been renumbered as MH #4.
- EQ #1: This action is ongoing but was reworded to specifically name facilities that the City seeks to retrofit.
- EQ #2: This action is ongoing and was reworded for clarity.
- FL #1: This action is ongoing.
- FL #2: This action is ongoing.
- LS #1: This action is discontinued.
- LS #2: This action is discontinued.
- SW #1: This action is ongoing and was reworded for clarity.
- SW #2: This action is ongoing and was reworded for clarity.
- SW #3: This action is new.
- WF #1: This action is ongoing and was reworded for clarity.
- WF #2: This action is new.
- WF #3: This action is new.

Rogue River

Action items were reviewed, revised, and prioritized (indicated in **bold** text). Major changes are indicated below:

- MH #1: This action is discontinued.

- MH #2: This action is ongoing, was renumbered as MH #1, and was reworded to include an update to the City's Stormwater Master Plan.
- MH #3: This action is ongoing, was renumbered as MH #2, and was reworded for clarity.
- MH #4: This action is ongoing and was renumbered as MH #3.
- MH #5: This action is ongoing, was renumbered as MH #4, and was reworded for clarity.
- NEW MH: This action is new numbered as MH #5.
- NEW MH: This action is new numbered as MH #6.
- DR #1: This action is ongoing and was reworded for specificity around a new 1-million-gallon reservoir.
- EQ #1: This action is discontinued.
- EQ #2: This action is ongoing, was reworded for clarity, and was renumbered as EQ #1.
- EQ #3: This action is ongoing, was reworded for clarity, and was renumbered as EQ #2.
- FL #1: This action is discontinued.
- FL #2: This action is ongoing and was renumbered as FL #1.
- FL #3: This action is discontinued.
- FL #4: This action is ongoing, was reworded for clarity, and was renumbered as FL #2.
- FL #5: This action is ongoing, was reworded for specificity, and was renumbered as FL #3.
- FL #6: This action is ongoing, was reworded for specificity, and was renumbered as FL #4.
- FL #7: This action is ongoing, was reworded for specificity, and was renumbered as FL #5.
- FL #8: This action is ongoing and was renumbered as FL #6.
- SW #1: This action is ongoing and was reworded for clarity.
- SW #2: This action is ongoing and was reworded for clarity.
- WF #1: This action is ongoing.
- **NEW WF:** This action is new and numbered as WF #2.
- **NEW WF:** This action is new and numbered as WF #3.
- WF #2: This action is ongoing, was reworded for clarity, and was renumbered as WF #4.
- WF #3: This action is ongoing, was reworded for clarity, and was renumbered as WF #5.

Shady Cove

Action items were reviewed, revised, and prioritized (indicated in **bold** text). Major changes are indicated below:

- MH #1: This action is ongoing.
- MH #2: This action is ongoing.

- NEW AQ: This action is new and was numbered as AQ #1.
- NEW EH: This action is new and was renumbered as EH #1.
- EQ #1: This action is ongoing.
- FL #1: This action is ongoing.
- FL #2: This action is ongoing.
- FL# 3: This action is ongoing.
- FL #4: This action is ongoing.
- FL #5: This action is ongoing and was reworded for clarity.
- FL #6: This action is ongoing.
- SW #1: This action is ongoing and was reworded for specificity.
- SW #2: This action is ongoing and was reworded for clarity.
- WF #1: This action is ongoing and was reworded for clarity.
- WF #2: This action is ongoing.
- WF #3: This action is ongoing.
- WF #4: This action is ongoing.
- WF #5: This action is ongoing.

Talent

Action items were reviewed, revised, and prioritized (indicated in **bold** text). Major changes are indicated below:

- MH #1: This action is ongoing and was reworded to focus attention on the Belmont Reservoir.
- MH #2: This action is ongoing.
- MH #3: This action is ongoing.
- MH #4: This action is ongoing.
- MH #5: This action is ongoing.
- MH #6: This action is ongoing and was reworded for clarity.
- MH #7: This action is ongoing.
- EQ #1: This action is ongoing.
- EQ #2: This action is discontinued and was reworded for clarity.
- FL #1: This action is ongoing.
- FL #2: This action is discontinued.
- LS #1: This action is ongoing and was reworded for clarity.
- SW #1: This action is ongoing and was reworded for clarity.
- SW #2: This action is ongoing and was reworded for clarity.
- WF #1: This action is ongoing.
- NEW WF: This action is new and numbered as WF #2.

Jackson County Fire District #3

This district addendum is new with this version of the NHMP.

Jackson County Fire District #5

This district addendum is new with this version of the NHMP.

Medford Water
This district addendum is new with this version of the NHMP.

Public Participation Process

Jackson 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 Jackson County, Ashland, Butte Falls, Central Point, Eagle Point, Gold Hill, Jacksonville, Phoenix, Rogue River, Shady Cove, Talent, Jackson County Fire District #3, Jackson County Fire District #5, and Medford Water were provided the opportunity to provide feedback about the NHMP. The NHMP will undergo review by the County NHMP steering committee on a semiannual basis and by the city and special district steering committees on an annual basis.

Jackson County made the NHMP available via their website throughout the update process and the updated NHMP was made available for public review and comment through the FEMA review period. The participating cities and special districts were included within the press release that was provided (see following page).

Public Involvement Summary

A survey was provided to the public during the early stages of the update cycle (Volume II, Appendix F). Information from this survey was used by the steering committee to help inform their risk assessment and mitigation strategies.

During the public review period (see next page) there was [number of comments]. Include response to received comments.

Members of the steering committee provided edits and updates to the NHMP prior to the public review period as reflected in the final document.

Work Session: Jackson County Board of Commissioners
On [date] Jackson County staff briefed the Jackson County Board of Commissioners on the updates to the Multi-Jurisdictional Jackson County Natural Hazard Mitigation Plan.

Press Release

To be provided

Jackson County Board of Commissioners: Work Session

Agenda to be included.

Jackson County Steering Committee

Steering committee members possessed familiarity with the Jackson 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 NHMP and to make the NHMP as comprehensive as possible. The steering committee met formally on the following dates:

Meeting #1: Kickoff, October 28, 2022
During this meeting, the steering committee reviewed the previous NHMP, and were provided updates on hazard mitigation planning, the NHMP update process, and project timeline. They also reviewed and revised the NHMP's mission and goals and discussed the public outreach strategy.

Meeting #2: November 30, 2022
During this meeting, the steering committee reviewed changes they made to their mission and goals, discussed community profile updates, reviewed hazard profile and history, and discussed their mitigation strategy (action items).

Meeting #3: February 3, 2023
During this meeting, the steering committee reviewed the existing risk assessment including community vulnerabilities and hazard information. Information attained during this meeting was used to inform the update of the hazard analysis. Community Lifelines were discussed, and jurisdictions were prepared for jurisdiction specific meetings.

Meeting #4: March 15, 2023
During this meeting, the steering committee reviewed development changes and community lifelines, providing information on known community lifeline risks to natural hazards. The County Hazard Vulnerability Assessment was updated utilizing the Oregon Department of Emergency Management's template. The steering committee provided more review and update towards their mitigation strategy (action items).

Meeting #5: April 11, 2023
The previous NHMP's implementation and maintenance program was reviewed and any changes that were necessary were made as indicated in this appendix and Volume I, Section 5. Action Items were discussed, and the committee considered prioritization.

In addition to the meetings listed above, there were numerous informal meetings and email exchanges between steering committee members, OPDR, and other state agencies. For city and special district specific meeting see the applicable addendum in Volume III.

The following pages includes copies of meeting agendas and sign-in sheets.

Agenda

Meeting: **Jackson County NHMP Update - Kickoff**
Date: October 28, 2022
Time: 10:00 am – 11:30 PM (1.5 hours)
Location: Zoom

I. Welcome and Background
- a. Introductions
- b. Kickoff meeting goals
- c. Review agenda

II. Natural Hazard Mitigation Planning (NHMP) Overview
- a. What is mitigation?
- b. Benefits of natural hazard mitigation planning
- c. Components of NHMP

III. NHMP Update Project Overview
- a. Project Timeline

IV. Mission and Goals review
- a. Examples
- b. Feedback

V. Public Outreach Strategy
- a. Examples of outreach
- b. Document your outreach!

VI. Wrap Up and Next Steps
- a. Second Steering Committee meeting will be in November
- b. Homework
- c. Questions?

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UNIVERSITY OF OREGON

Agenda

Meeting: **Jackson County NHMP Update**
Date: November 30, 2022
Time: 3:00PM-4:30PM
Location: Zoom

I. **Welcome**
   a. Progress since last meeting
   b. Action Items Progress spreadsheet

II. **Mission and Goals**
   a. Review Draft Mission and Goals
   b. Finalize for 2023 NHMP

III. **Community Profile**
   a. Note new development
   b. Community lifelines

IV. **New Hazards to Include**
   a. Ideas: Add extreme heat? Add air quality? Keep Emerging Infectious Disease? Other ideas?

V. **Hazard History since 2018**
   a. Review recent hazards

VI. **New Action Item Themes**
   a. Discuss themes from action item ideas brainstormed on the Action Items Progress spreadsheet

VII. **Wrap Up and Next Steps**
   a. Our next whole-group meeting will be in January 2023, details to come!
      i. We'll focus on the hazard assessment and action items
      ii. Our fourth and likely last whole-group meeting will likely be in February/March 2023 and we'll finish discussing action items then
   b. We will also schedule meetings early in the new year with each jurisdiction/special district to work on the addenda

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Agenda

Meeting: Jackson County NHMP Update Steering Committee Meeting #3
Date: February 3, 2022
Time: 2:00PM-3:00PM
Location: Zoom (click here)

I. **Welcome**
   a. Meeting goals:
      i. Discuss the Risk Assessment
      ii. Discuss lessons learned from recent wildfires and droughts that we will not find in other plans
      iii. Prepare for 1:1 Meetings with jurisdictions (the County, cities, and special districts)
   b. Progress since last meeting
   c. Project information now available on Jackson County Emergency Management Website (linked here)

II. **Risk Assessment**
   a. Hazard Vulnerability Assessment methodology
   b. Hazard Vulnerability Assessment for updated 2023 plan
   c. Community Lifelines facilities

III. **Hazard History Lessons for Action Items**
   a. What are lessons learned from recent natural hazard events that we will not find in written plans?

IV. **Looking Ahead to 1:1 Meetings**
   a. Roles and responsibilities for 1:1 Meetings

V. **Wrap Up and Next Steps**
   a. 1:1 Meetings will be scheduled throughout February/March
      i. Schedule your jurisdiction's 1:1 Meeting ASAP after this Feb. 3rd Meeting
      ii. Provide OPDR with necessary information (County and cities only)
   b. Our last whole-group Steering Committee meeting will be in March, when we will finalize action items and discuss plan implementation and maintenance
      i. Details on meeting date/time to come soon!

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AGENDA

Meeting: **Jackson County NHMP Update: Jackson County HVA & Action Items**
Date: **3/15/23**
Time: 3:00pm – 4:00pm
Location: Zoom

Meeting Goals:

- To share information that the student team needs to draft Volumes I & II of the Natural Hazard Mitigation Plan (NHMP), namely:
  - To review and update Jackson County's hazard vulnerability assessment
  - To review and update Jackson County's action items

I. **Welcome and Introductions**

II. **Development Information and Community Lifelines**
   a. Development information (if not already provided)
   b. Review Community Lifelines for any missed facilities
   c. Additional plans to include in the NHMP?
   d. County org chart

III. **Jurisdiction-Specific Risk Assessment**
   a. Review Jackson County-specific Hazard Vulnerability Assessment (HVA)

IV. **Jurisdiction-specific Mitigation Strategy**
   a. Update action items
   b. Prioritize action items

V. **Next Steps**
   a. We will draft the updated NHMP and send that to you for your review and give you two weeks for that review
   b. One more Steering Committee meeting (Wednesday, April 5th at 3:30pm-4:30pm)

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AGENDA

Meeting: **Jackson County NHMP Update Steering Committee Meeting #4**
Date: April 11, 2023
Time: 2:00pm – 3:00pm
Location: Zoom (click here)

Meeting Goals:

- Discuss Plan Implementation and Maintenance section of NHMP
- Conclude NHMP Update Steering Committee business

I. **Welcome and Meeting Goals**
   a. Welcome
   b. Meeting Goals
   c. Progress since last meeting

II. **Plan Implementation and Maintenance**
   a. Committee membership
   b. Meeting schedule

III. **Approving the Plan**
   a. Public comment and communication
   b. Approval process

IV. **Priority Actions**

V. **Wrap-Up**
   a. NHMP Update Schedule

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Appendix C: Community Profile

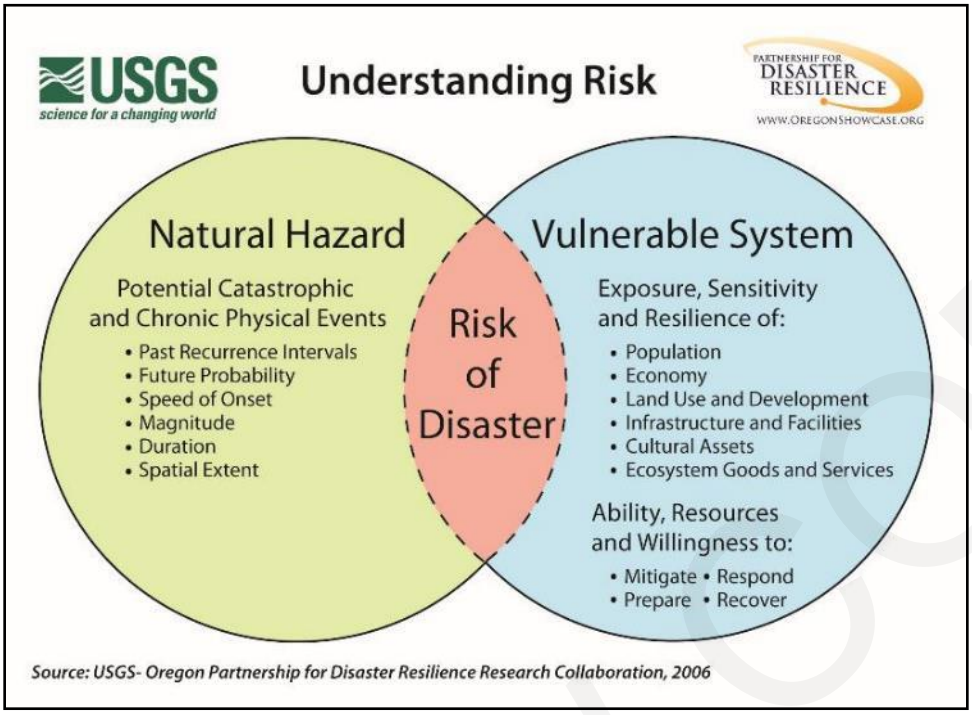
The following section describes the county from several perspectives to help define and understand the county's sensitivity and resilience to natural hazards. Sensitivity and resilience indicators are identified through the examination of community capitals which include natural environment, social/demographic capacity, economic, physical infrastructure, community connectivity, and political capital. These community capitals can be defined as resources or assets that represent all aspects of community life. When combined, community capitals can influence the decision-making process to ensure that the needs of the community are being met.[56]

Sensitivity factors can be defined as those community assets and characteristics that may be impacted by natural hazards, (e.g., special populations, economic factors, and historic and cultural resources). Community resilience factors can be defined as the community's ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs).

The Community Profile describes Jackson County's sensitivity and resilience to natural hazards 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 Volume I, Section 2 should be used as the local-level rationale for the risk reduction actions identified in Volume I, Section 3. 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 shown in Figure C-1.

[56] Mary Emery and others, "Using Community Capitals to Develop Assets for Positive Community Change," *CD Practice* 13 (2006): 2

Figure C-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience

The U.S. Census delineates areas of settled population concentrations that are identifiable by name but are not legally incorporated as Census Designated Places (CDPs). There are six CDPs in Jackson County as shown in Table C-1. In addition, the Cow Creek Band of Umpqua Tribe of Indians has ancestral lands within Jackson County, though the tribal government is headquartered in Roseburg (the county seat of neighboring Douglas County).

The American Community Survey data that is used for this analysis has varying levels of reliability depending on geographic area, demographic group, and types of data. County level data is relatively reliable, but it should be noted that some city and unincorporated community (CDP) level data is less reliable. It is mainly used for estimation and getting an idea of the demographics of a location and should not be mistaken for precise numbers.

Table C-1 Jackson County, Cities, and Census Designated Places

Incorporated Cities		Unincorporated Census Designated Places
Ashland	Medford	Foots Creek
Butte Falls	Phoenix	Prospect
Central Point	Rogue River	Ruch
Eagle Point	Shady Cove	Trail
Gold Hill	Talent	White City
Jacksonville		Wimer

Source: U.S. Census Bureau Tiger Lines Files

The remainder of this section will provide detailed information for the unincorporated communities and summarized data for the incorporated cities. Detailed information for each incorporated city participating in this NHMP is provided within each city's addendum (Volume III).

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.[57] Resilient political capital seeks to involve various stakeholders in hazard planning and works towards integrating the Natural Hazard Mitigation Plan with other community plans, so that all planning approaches are consistent.

Government Structure

A three-member Board of Commissioners governs Jackson County. The Commissioners serve as the Executive Branch and perform legislative and quasi-judicial functions of the County. Commissioners are responsible for the planning, formation, and implementation of the annual budget. In addition, Commissioners serve on other federal, state, and local mandated governmental panels, boards and commissions with fiscal duties and authority over public monies.[58] A County Administrator is staff to the Board of Commissioners and is responsible for County management, policy implementation, and financial planning.

[57] Mileti, D. 1999. Disaster by Design: a Reassessment of Natural Hazards in the United States. Washington D.C.: Joseph Henry Press.

[58] Jackson County. http://www.co.jackson.or.us/Departments.asp.

Beyond Emergency Management, all the departments within the County governance structure have some degree of responsibility in building overall community resilience. Each plays a role in ensuring that County functions and normal operations resume after an incident and the needs of the population are met.

County departments and divisions that are most involved with natural hazard mitigation include the following:

- Sheriff's Office: The mission of the Jackson County Sheriff's Office is "Serving our Community through values-oriented law enforcement: character, competence, courage, compassion." The Sheriff's Office interacts with the vulnerable aspects of the community on a day-to-day basis and can help identify areas for focused mitigation.
- Emergency Management: The Jackson County Emergency Management division is responsible for emergency management planning and operations for that portion of the county outside the limits of the incorporated municipalities of the county. The Jackson County Emergency Operations Plan provides detail on the organization and operations of emergency management.
- Development Services - Planning: The Development Services Department, Planning Division administers both short and long-range plans that determine much of the built, physical community. Through the County Comprehensive Plan and subsequent policies, this department guides decisions about growth, development, and conservation of natural resources. The Planning Division can be partners in mitigation by developing, implementing, and monitoring policies that incorporate hazard mitigation principles such as ensuring homes, businesses and other buildings are built to current seismic code and out of the flood zones.
- Development Services - Building: The Development Services Department Building Division assists residents with permitting and building code applications. This department could collaborate to do outreach to the owners of structures that were not built up to modern, resilient code. Professionals from this division could also even be called on to help survey buildings after an incident.
- Fairgrounds/Expo: The Expo serves as an entertainment venue but can be considered a staging site for response efforts. Mitigation could include specific actions to ensure the facilities could be used during response, such as providing extra power should it need to be used as a shelter.
- Geographic Information Systems: The Geographic Information Systems division develops and maintains a Geographic Information System (GIS) for Jackson County. The GIS is composed of computer maps and associated databases. In all phases of the disaster cycle, information is key. Building robust data that catalogues not only the County's risk and vulnerability, but also resources and response capability, can ensure that efficient and effective mitigation activities.
- Information Technology: The Jackson County Information Technology department focuses on providing the various other County departments with the information systems and telecommunications technology necessary to conduct daily business.

Without this critical component, the County could not effectively serve its residents. Mitigation efforts from this department would not likely involve residents but would go a long way to ensuring uninterrupted services during hazard incidents.

- Health and Human Services: Jackson County Health and Human Services provides quality public health services consistent with laws, available resources, and community support, through the prevention of disease, health education and promotion and protection of the community and the environment. As an inherently mitigation-focused department, Public Health can be an ally in preparing the community for natural hazards. Public Health has a distribution network established for information and supplies; these connections to the community can be used to encourage personal preparedness and during incident response.
- Jackson County Roads and Parks: The Roads Department addresses the transportation needs and policies of the County to assure that roads, bridges, traffic signs and rights-of-way are designed, built, and maintained to provide users with the safest possible transportation system. This department can help to prioritize projects for mitigation and will be a key partner in implementation.

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 residents, businesses, and policy makers. Many land-use, comprehensive and strategic plans get updated regularly and can adapt easily to changing conditions and needs.[59]

The Jackson County Natural Hazard 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 Hazard 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.

Jackson County's current plans and policies include the following:

[59] Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.

Table C-2 Existing Plans

Name	Author/ Owner	Description	Relation to Natural Hazard Mitigation
Jackson County Land Development Ordinance (updated in 2022)	Jackson County Development Services Planning Division	Administer Development Code and zoning ordinance governing land uses in Jackson County	Land use ordinances may be used or developed to direct future development away from known hazard areas.
Jackson County Comprehensive Land Use Plan (updated in 2015)	Jackson County Development Services Planning Division	To anticipate and plan for future land use within Jackson County in accordance with Statewide Land Use Planning Program	Section 17 (the Natural Hazards Element) outlines limitations and regulations regarding flooding, earthquakes, erosion and deposition (landslides), wildfires, and the exposure of hazardous soils and soil conditions. It concludes with the statement that developments shall not be planned in areas known to be subject to these threats without appropriate safeguards. The identification and prioritization of specific areas subject to each hazard can help in creating action items.
Rogue Valley Integrated Wildfire Protection Plan (updated in 2019)	Prepared by Jackson County, Josephine County, the Oregon Department of Forestry and Wildland Fire Associates	Assists Jackson County and neighboring Josephine County clarify and refine priorities for protection of life, property, and critical infrastructure in the wildland-urban interface on public and private lands.	Enhances the NHMP risk assessment, identification of hazard zones, and includes mitigation actions to reduce risk to wildfire.

Name	Author/ Owner	Description	Relation to Natural Hazard Mitigation
Jackson County Wildfire Smoke Community Response Plan (2023)	Jackson County Emergency Management, Medford Emergency Management, Jackson County HHS	Identifies and improves methods of communication and notification of smoke events within Jackson County and provides strategies for helping members of the community, especially those that are most vulnerable, avoid smoke from wildfire and prescribed burning.	Identifies Jackson County's plans and goals for wildfire and prescribed fire smoke response and includes actions that the County plans to take to mitigate negative effects of smoke.
Jackson County Transportation System Plan (2017)	Prepared by Jackson County and Kittelson & Associates, Inc.	The Jackson County Transportation System Plan (TSP) addresses the County's anticipated transportation needs. It has been prepared to meet state and federal regulations that require urban areas to conduct long-range planning. The long-range planning is intended to serve as a guide for Jackson County in managing their existing transportation facilities and developing future transportation facilities.	The Transportation Plan may be a resource to identify which roads and transportation systems are most vulnerable to natural disasters. Likewise, the TSP can be utilized to implement mitigation measures aimed at protecting "transportation disadvantaged" populations in emergency situations. When updated, the TSP can also include mitigation elements in its implementation considerations.

Source: Jackson County

Other plans are available via the County website or by contacting staff.

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.[60] 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

Jackson County occupies the upper Rogue River Valley in southwestern Oregon, covering about 2,800 square miles. The area is rich in natural resources: forests, mountains, rivers, and lakes dominate the landscape. Three major mountain ranges characterize Jackson County boundaries: the Klamath Mountains to the west and south, Western Cascades in the north and the High Cascades to the east with the Bear Creek Valley within the central lowlands. The Rogue River and its tributaries cut through each of these regions on its journey towards the Pacific Ocean. This river corridor through the mountains provides an avenue for westerly winds and Pacific Storms to travel into Jackson County with relative ease.

Slopes are generally steep and topsoil, unique to the Northwest in structure and chemistry, is susceptible to landslides, torrential flooding, and sheet erosion. Those mountains subjected to extensive weathering, large-scale faulting, or consisting of softer parent rock have gentler slopes, in which earthflow (debris flow) and slump (creep) are common natural hazards.[61]

The Klamath Mountains encompass approximately 12,000 square miles and consist of several north-south-trending belts of rock that formed in an ocean setting (terrain) and subsequently collided with the North American crustal plate about 150 million years ago. The area is rugged with narrow canyons. Mt. Ashland, at 7,530 feet, is the county's second highest peak.

Cascade Mountains

The geologic story of the Cascades begins around 40 million years ago when the Pacific [Juan de Fuca] plate began moving beneath the North American crustal plate. Convergence of these crustal plates has slowed considerably, from an estimated 3 inches per year 35 million years ago to only ½ inch at present; less subduction means less volcanic activity.

The tallest point in Jackson County, Mt. McLoughlin, a young and dormant volcano, rises to 9,499 feet. It lies just within the county's eastern boundary in the High Cascades and although it is the tallest volcanic peak between Crater Lake and Mt. Shasta, it is dwarfed by their bulk. The entire northwest slope of the mountain is the catchment area for Big Butte Springs. These large-volume

[60] Mayunga, J. 2007. Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building.
[61] Beaulieu, John D. and Paul W. Hughes, Land Use Geology of Central Jackson County, Department of Geology and Mineral Industries, Oregon, (1977).

springs gush from the end of the lava flows and are the domestic water source for Medford and other towns in the Bear Creek Valley.[62]

Nearby volcanic neighbors include Mt. Bailey, Mt. Thielsen, and the remnants of Mt. Mazama (Crater Lake) to the north. While dramatic eruptions have been absent during the last century, continued subduction and presence of numerous faults indicate that a significant seismic or volcanic event could occur at any time. Seismic activity can also trigger landslides and cause flashflood events due to breached dams, jeopardizing the safety of downstream communities.

Bear Creek Valley
This broad valley separates the older Klamath Mountains from the Cascade Range. Bear Creek, along with the Rogue River and other river valleys in the county, contain soft sediments over bedrock. Hazards include ponding, high ground water, flooding, and stream bank erosion.[63] Much of the development in Jackson County has occurred in the Bear Creek Valley and the I-5 corridor, which includes the cities of Ashland, Central Point, Medford, Phoenix and Talent.

Potential impacts of global climate changes

Climate refers to the temperatures, weather patterns, and precipitation in Jackson County. 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.) Jackson County receives high levels of precipitation during winter months. It does not receive much snow, except for high peaks, and the temperature is moderate around the county. These climate patterns could see changes in the future due to climate change, affecting the overall geological and natural processes of the coast range ecosystems, topography, and habitats of the coast range ecoregion. Future climate projections indicate that the temperature is estimated warm 0.5 degrees Fahrenheit per decade. The Pacific Northwest is projected to have greater warming during summer than in the winter. Precipitation in the Pacific Northwest is expected to increase but to remain within historical ranges for rainfall. Winter precipitation is projected to increase, while summers will be longer and even drier than at present. Scientific data and research also anticipate an increase in intense precipitation events.[64]

There is a consensus among the scientific community that global climate change is occurring and will have important ecological, social, and economic consequences over the next decades and beyond.[65] Extensive research shows that Oregon and other Western states already have

[62] United States Geological Survey, Cascades Volcano Observatory, http://vulcan.wr.usgs.gov/home.html.
[63] Ibid.
[64] Oregon Wetlands Explorer. (2009). Coastal Climate Effects. Retrieved from http://oregonexplorer.info/wetlands/ClimateChange/CoastalClimateEffects
[65] Karl, T.R., J.M. Melillo, and T.C. Peterson, eds. 2009. *Global Climate Change Impacts in the United States.* U.S. Global Change Research Program. June. Retrieved June 16, 2009, from www.globalchange.gov/usimpacts; and Pachauri, R.K. and A. Reisinger, eds. 2007. *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.*

experienced noticeable changes in climate and predicts that more change will occur in the future.[66]

In the Pacific Northwest, climate change is likely to (1) increase average annual temperatures, (2) increase the number and duration of heat waves, (3) increase the amount of precipitation falling as rain during the year, (4) increase the intensity of rainfall events, and 5) increase sea level. These changes are also likely to reduce winter snowpack and shift the timing of spring runoff earlier in the year. [67]

These anticipated changes point toward some of the ways that climate change is likely to impact ecological systems and the goods and services they provide. There is considerable uncertainty about how long it would take for some of the impacts to materialize, and the magnitude of the associated economic consequences. Assuming climate change proceeds as today's models predict, however, some of the potential economic impacts of climate change in the Pacific Northwest will likely include: [68]

Potential impact on agriculture and forestry

Climate change may impact Oregon's agriculture through changes in: growing season, temperature ranges, and water availability.[69] Climate change may impact Oregon's forestry through increase in wildfires, decrease in the rate of tree growth, change in mix of tree species, and increases in disease and pests that damage trees. [70]

[66] Doppelt, B., R. Hamilton, C. Deacon Williams, et al. 2009. *Preparing for Climate Change in the Upper Willamette River Basin of Western Oregon.* Climate Leadership Initiative, Institute for a Sustainable Environment, University of Oregon. March. Retrieved June 16, 2009, from http://climlead.uoregon.edu/pdfs/willamette_report3.11FINAL.pdf and Doppelt, B., R. Hamilton, C. Deacon Williams, et al. 2009. *Preparing for Climate Change in the Rogue River Basin of Southwest Oregon.* Climate Leadership Initiative, Institute for a Sustainable Environment, University of Oregon. March. Retrieved June 16, 2009 from http://climlead.uoregon.edu/pdfs/ROGUE percent20WS_FINAL.pdf

[67] Mote, P., E. Salathe, V. Duliere, and E. Jump. 2008. Scenarios of Future Climate for the Pacific Northwest. Climate Impacts Group, University of Washington. March. Retrieved June 16, 2009, from http://cses.washington.edu/db/pdf/moteetal2008scenarios628.pdf; Littell, J.S., M. McGuire Elsner, L.C. Whitely Binder, and A.K. Snover (eds). 2009. "The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate - Executive Summary." In The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate, Climate Impacts Group, University of Washington. Retrieved June 16, 2009, from www.cses.washington.edu/db/pdf/wacciaexecsummary638.pdf; Madsen, T. and E. Figdor. 2007. When it Rains, it Pours: Global Warming and the Rising Frequency of Extreme Precipitation in the United States. Environment America Research & Policy Center and Frontier Group.; and Mote, P.W. 2006. "Climate-driven variability and trends in mountain snowpack in western North America." Journal of Climate 19(23): 6209-6220.

[68] The issue of global climate change is complex and there is a substantial amount of uncertainty about climate change. This discussion is not intended to describe all potential impacts of climate change but to present a few ways that climate change may impact the economy of cities in Oregon and the Pacific Northwest.

[69] "The Economic Impacts of Climate Change in Oregon: A preliminary Assessment," Climate Leadership Initiative, Institute for Sustainable Environment, University of Oregon, October 2005.

[70] "Economic Impacts of Climate Change on Forest Resources in Oregon: A Preliminary Analysis," Climate Leadership Initiative, Institute for Sustainable Environment, University of Oregon, May 2007.

Potential impact on tourism and recreation

Impacts on tourism and recreation may range from: (1) decreases in snow-based recreation if snow-pack in the Cascades decreases, (2) negative impacts to tourism along the Oregon Coast as a result of damage and beach erosion from rising sea levels[71], (3) negative impacts on availability of water summer river recreation (e.g., river rafting or sports fishing) as a result of lower summer river flows, and (4) negative impacts on the availability of water for domestic and business uses.

Temperature and Precipitation

Climate models project that the annual average temperatures in Jackson County are likely to increase by between 3.2°F to 7.4°F between 2050 and 2074 (over historical average temperatures recorded between 1981 and 2010).[72] Table C-3 and Figure C-2 describe the typical average temperatures during winter and summer with a mean annual rainfall amount for each sub-ecoregion in Jackson County (see Figure C-3 for a map of the ecoregions). Temperatures generally increase inland to the east.

Table C-3 Mean Precipitation and Temperature

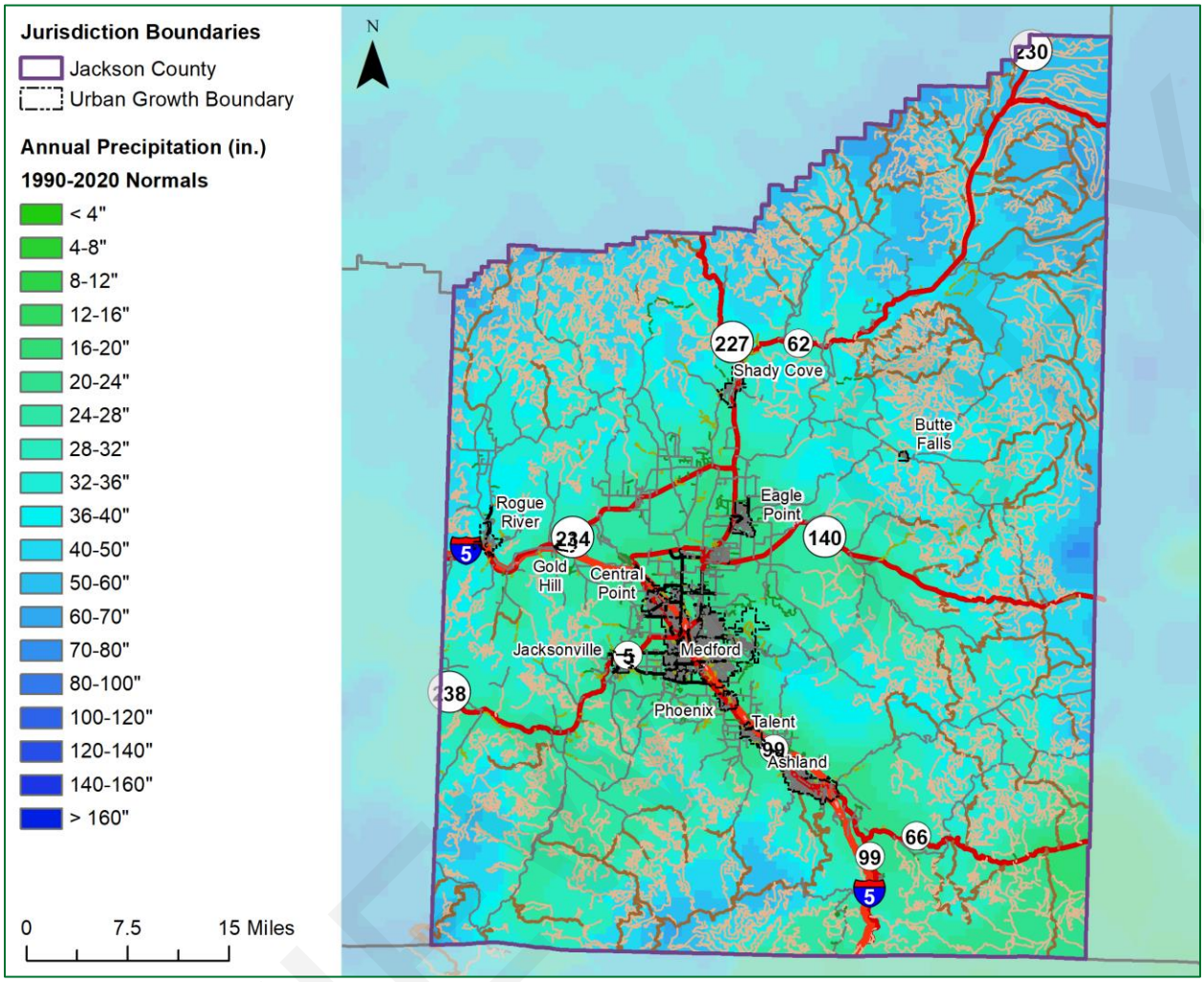
Ecoregion	Mean Annual Rainfall Range (inches)	Mean Temperature Range (°F) January min/max	Mean Temperature Range (°F) July min/max
Cascade Subalpine/Alpine	75-140	16/31	38/65
High Southern Cascades Montane Forest	45-70	23/37	44/74
Southern Cascades	45-80	30/45	49/85
Southern Cascades Slope	25-40	20/34	47/82
Rogue/Illinois Valleys	20-60	31/47	51/89
Oak Savanna Foothills	25-45	28/45	50/87
Serpentine Siskiyous	45-120	32/44	49/82
Inland Siskiyous	35-70	29/44	50/86
Klamath River Ridges	25-35	24/42	49/88

Source: US EPA. Ecoregions of Oregon: https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-state

[71] "The Economic Impacts of Climate Change in Oregon: A preliminary Assessment," Climate Leadership Initiative, Institute for Sustainable Environment, University of Oregon, October 2005.

[72] National Climate Change Viewer, https://apps.usgs.gov/nccv/maca2/maca2_counties.html

Figure C-2 Jackson County 30-yr Normal Precipitation: Annual (1991-2020)



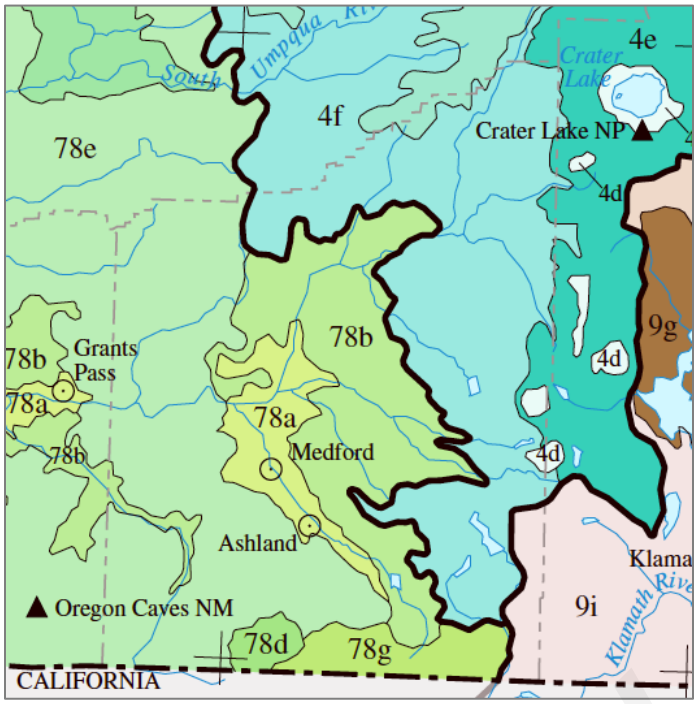
Source: OPDR, data PRISM Climate Group

Land Cover

Due to the topography and climate described above, land is used most intensively by people in the Bear Creek, middle Rogue and to a lesser extent, the Applegate Valley. Development has followed the land use patterns of the early settlers; farmers located on the rich valley floors and miners and woodsmen claimed the foothill areas.[73] Agriculture, rural, suburban, urban, industrial, and rural service center land uses are concentrated in these fertile valleys, whereas forest and open space and pockets of agriculture occur in surrounding mountainous regions of the county. Consequently, intense valley development is subject to increased risk from associated flood hazards. Forested mountains and steep slopes surrounding these valleys pose a significant risk to the entire region from wildfire and landslide events.

[73] Jackson County Comprehensive Plan. 1989. Section 5-1.

Figure C-3 Ecoregions of Jackson County



Source: Thorson, Thor D. "Ecoregions of Oregon." Map. Ecoregions of Oregon. Reston, VA: U.S. Dept. of the Interior, U.S. Geological Survey, 2004. 1-2. Print. Note: For more information on the Ecoregion ID (e.g., 78a, 4f, etc.) see Table 2-1.

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 Southern Oregon indicate the potential for increased effects of hazards due to the unique terrain and climate of the region. These factors combined with a growing population 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.

Precipitation, like across much of the state, falls most commonly around the winter months and most sparsely in the summer months. Despite being drier than counties further north, Jackson County also experiences periods of heavy rain, sometimes in conjunction with high winds or with winter storm-conditions, that can cause flooding, landslides, and other risks to safety and property, particularly infrastructure. When severe windstorms strike a community, downed trees, powerlines, and damaged property are major hindrances to response and recovery.[74] Winter storms can cause similar issues, as well as causing water pipes to freeze, which cuts off water supply and can result in pipes that burst and lead to flooding.

[74] Oregon Natural Hazards Mitigation Plan (NHMP).

Jackson County's dry summer months are also getting drier. Like many other communities across the western United States, Jackson County is increasingly threatened by drought. That trend, which challenges authorities' ability to continually meet demand for water,[75] has the Oregon Governor to declare states of emergency due to drought in Jackson County in 2020, 2021, and 2022.[76] The increasing threat of drought in the region further intensifies Jackson County's wildfire risk.

In broad terms, climate in the Pacific Northwest is characterized by variability, and that variability is largely dominated by the interaction between the atmosphere and ocean in the tropical Pacific Ocean that is responsible for El Niño and La Niña. Human activities are changing the climate, particularly temperature, beyond natural variability. Climate change is already affecting Oregon communities and resources and needs to be recognized in various planning efforts as an important stressor that significantly influences the incidence—and in some cases the location—of natural hazards and hazard events. Climate change is anticipated to affect the frequency and/or magnitude of some kinds of natural hazards in Oregon. On the coast, increasing deep-water wave heights in recent decades are likely to have increased the frequency of coastal flooding and erosion. In Oregon's forested areas, large areas have been impacted by disturbances that include wildfire in recent years, and climate change is probably one major factor. Closer to home for some Oregonians, a three-fold increase in heat-related illness has been documented in Oregon with each 10 ˚F rise in daily maximum temperature. (Dalton et al 2013, OCCRI 2010).[77]

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.

Population

Jackson County is composed of eleven incorporated municipalities and six census designated places. According to the Population Research Center at Portland State University Jackson County experienced modest population growth (5.6%) between 2016 and 2021 (Table C-4).

Approximately two-thirds of Jackson County's population is located within incorporated cities and has seen a 9.6% increase in population between 2016 and 2021. Medford accounts for about 37% of the county's population (87,350), followed by Ashland (10%, 21,550) and Central

[75] Ibid.
[76] Executive Order 20-23 (2020); Executive Order 21-08 (2021); Executive Order 22-06 (2022).
[77] Ibid.

Point (9%, 19,700). About one-third of the population is in unincorporated areas of the county (including White City, 10,150) and has seen a 1.6% population decline between 2016 and 2021.

Table C-4 Population Estimates and Change (2016 and 2021)

Jurisdiction	2016		2021		Change (2016-2021)		AAGR
	Number	Percent	Number	Percent	Number	Percent	
Jackson County	210,975	100%	223,827	100%	12,852	5.7%	1.1%
Incorporated	146,170	69.3%	158,717	70.9%	12,547	8.6%	1.7%
Ashland	20,620	9.8%	21,554	9.6%	934	4.5%	0.9%
Butte Falls	430	0.2%	451	0.2%	21	4.9%	1.0%
Central Point	17,585	8.3%	19,702	8.8%	2,117	12.0%	2.4%
Eagle Point	8,765	4.2%	9,854	4.4%	1,089	12.4%	2.5%
Gold Hill	1,220	0.6%	1,360	0.6%	140	11.5%	2.3%
Jacksonville	2,920	1.4%	3,080	1.4%	160	5.5%	1.1%
Medford	78,500	37.2%	87,353	39.0%	8,853	11.3%	2.3%
Phoenix	4,585	2.2%	4,096	1.8%	-489	-10.7%	-2.1%
Rogue River	2,200	1.0%	2,435	1.1%	235	10.7%	2.1%
Shady Cove	3,040	1.4%	3,095	1.4%	55	1.8%	0.4%
Talent	6,305	3.0%	5,737	2.6%	-568	-9.0%	-1.8%
Unincorporated	67,595	32.0%	65,110	29.1%	-2,485	-3.7%	-0.7%
Foots Creek CDP*	589	0.3%	923	0.4%	334	56.7%	11.3%
Prospect CDP*	482	0.2%	558	0.2%	76	15.8%	3.2%
Ruch CDP*	683	0.3%	1,184	0.5%	501	73.4%	14.7%
Trail CDP*	543	0.3%	632	0.3%	89	16.4%	3.3%
White City CDP*	8,709	4.1%	10,151	4.5%	1,442	16.6%	3.3%
Wimer CDP*	433	0.2%	441	0.2%	8	1.8%	0.4%

Source: Portland State University, Population Research Center, "Annual Population Estimates", 2016 and 2021.
* - U.S. Census Bureau, 2016 and 2021 American Community Survey 5-Year Estimates.
Note: Data for 2021 for Phoenix and Talent indicates a decline in population. This may be due to the Almeda Fire in 2020, which also burned through northern parts of Ashland.

The county's coordinated population forecast projects that, by 2040, Jackson County's population will increase to 264,909, an 18% increase from the 2021 estimate (29% of the increase is expected to be within incorporated cities while unincorporated areas are expected to decrease by 8%).[78]

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.

[78] Portland State University, Population Research Center, "Oregon Population Forecast Program – Region 1 ", 2017.

Tourists

Tourists are not counted in population statistics; and are therefore considered separately in this analysis. Table C-5 shows the estimated number of person-nights in private homes, hotels and motels, and other types of accommodations. The table shows that, between 2018-2020, approximately half of all visitors to Jackson County lodged in private homes, with about one-third staying in hotels/motels and the remaining visitors staying on other accommodations (vacation homes/campgrounds). For hazard preparedness and mitigation purposes, outreach to residents in Jackson County will likely be transferred to these visitors in some capacity. Visitors staying at hotel/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 useful when developing outreach efforts.[79]

Table C-5 Annual Visitor Estimates in Person Nights

	2018 Person-Nights (000's)	2018 Percent	2019 Person-Nights (000's)	2019 Percent	2020 Person-Nights (000's)	2020 Percent
All Overnight	5,476	100%	5,533	100%	3,989	100%
Hotel/Motel	1,834	33%	1,846	33%	1,724	43%
Private Home	2,801	51%	2,825	51%	1,693	42%
Other	842	15%	862	16%	572	14%

Source: Oregon Tourism Commission, Oregon Travel Impacts: 2020p, Dean Runyan Associates
Note: Decline in tourism in 2020 is likely due to COVID-19 restrictions and wildfires across the state in September. Visitor volume rebounded in 2021 to 5,512,240 person-nights, however a further breakdown of person-nights by type of accomodation is not available at the time of writing.

Vulnerable Populations

Vulnerable populations include those with access and functional needs and may include seniors, people with disabilities, and children, as well those people living in poverty, who often experience the impacts of natural hazards and disasters more acutely. Vulnerability exists for migrant short-term workers for the agricultural industry in Jackson County. Hazard mitigation that targets the specific needs of these groups has the potential to greatly reduce their vulnerability. Examining the reach of hazard mitigation policies to special needs populations may assist in increasing access to services and programs. FEMA's Office of Equal Rights addresses this need by suggesting that agencies and organizations planning for natural hazards identify special needs populations, make recovery centers more accessible, and review practices and procedures to remedy any discrimination in relief application or assistance.

[79] MDC Consultants (n.d.). When Disaster Strikes – Promising Practices.

Additional information on vulnerable populations is available via Jackson County Health and Human Service's Climate and Health Action Plan.

Language Barriers

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 public, and it is less likely they will be prepared if special attention is not given to language and culturally appropriate outreach techniques.

There are various languages spoken across Jackson County; the primary language is English. However, 4% (6,991 people) of the total population in Jackson County is not proficient in English (Table C-6). Medford (3,775 people, or 5%) has the largest number of residents who have limited or no English proficiency while Talent has the largest percentage (6%, or 340 people).

Table C-6 Jackson County Language Spoken at Home

Jurisdiction	Population 5 years and over	English Only		Multiple Languages		Limited or No English	
		Number	Percent	Number	Percent	Number	Percent
Jackson County	206,943	186,424	90%	14,132	7%	6,387	3%
Incorporated	143,029	128,692	90%	10,342	7%	3,995	3%
Ashland	20,407	18,714	92%	1,281	6%	412	2%
Butte Falls	407	384	94%	16	4%	7	2%
Central Point	17,340	15,516	89%	1,551	9%	273	2%
Eagle Point	8,753	8,579	98%	174	2%	0	0%
Gold Hill	1,158	1,123	97%	19	2%	16	1%
Jacksonville	2,810	2,600	93%	154	5%	56	2%
Medford	76,905	67,979	88%	6,117	8%	2,809	4%
Phoenix	4,345	4,128	95%	155	4%	62	1%
Rogue River	1,711	1,646	96%	33	2%	32	2%
Shady Cove	2,920	2,858	98%	61	2%	1	0%
Talent	6,273	5,165	82%	781	12%	327	5%
Unincorporated	63,914	57,732	90%	3,790	6%	2,392	4%
Foots Creek	796	796	100%	0	0%	0	0%
Prospect	473	464	98%	7	1%	2	0%
Ruch	1,187	1,119	94%	68	6%	0	0%
Trail	941	941	100%	0	0%	0	0%
White City	8,581	6,275	73%	1,292	15%	1,014	12%
Wimer	506	494	98%	12	2%	0	0%
Other Unincorporated	51,430	47,643	93%	2,411	5%	1,376	3%

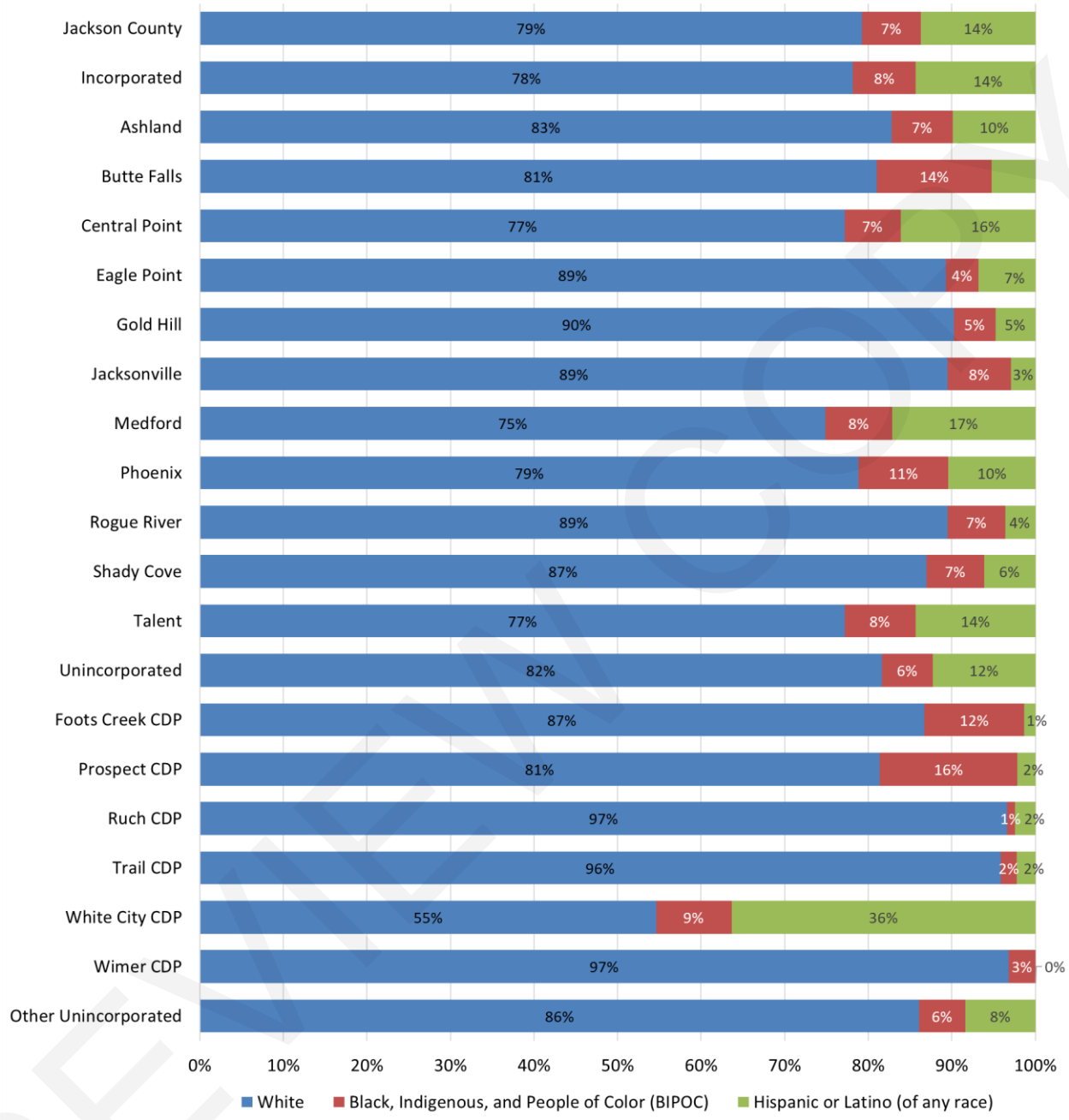
Source: Social Explorer, U.S. Census Bureau, 2017-2021 American Community Survey Estimates, Table 16001.

Race and Ethnicity

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. Figure C-4 displays Jackson County's population by race and Hispanic or Latino ethnicity.

Most of the population in Jackson County is racially white (79%). Prospect CDP has the largest percentage of Black, Indigenous, or people of color population (16%), followed by Butte Falls (14%). Approximately 14% of the county population is Hispanic or Latino, with the largest Hispanic or Latino populations located in Medford (14,561 people, or 17% of population) and Central Point (3,049 people, or 16% of population).

Figure C-4 White, BIPOC, and Hispanic or Latino Populations



Source: Social Explorer, Table T14, U.S. Census Bureau, 2017-2021 American Community Survey Estimates.

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.

Age

Of the factors influencing socio demographic capacity, the most significant indicator in Jackson County may be the age of the population. Depicted in Table C-7, as of 2021, 22% of the county population is over the age of 64. The county age dependency ratio[80] is 74.1 (Eagle Point and Rogue River have the largest age dependency ratios at 104.3 and 96.2 respectively). The age dependency ratio indicates a higher percentage of dependent aged people to that of working age.

Table C-7 Vulnerable Age Groups in Jackson County, 2021

Jurisdiction	Total	< 18 Years Old		> 64 Years Old		18 to 64 Years Old	Age Dependency Ratio
		Number	Percent	Number	Percent		
Jackson County	221,662	45,809	21%	48,534	22%	127,319	74.1
Incorporated	154,914	32,679	21%	31,744	20%	87,967	73.2
Ashland	21,348	2,757	13%	5,740	27%	10,327	82.3
Butte Falls	475	118	25%	78	16%	279	70.3
Central Point	18,948	4,433	23%	2,958	16%	11,557	64.0
Eagle Point	9,600	2,595	27%	2,113	22%	4,892	96.2
Gold Hill	1,171	235	20%	250	21%	686	70.7
Jacksonville	2,984	231	8%	1,036	35%	1,717	73.8
Medford	84,894	19,908	23%	15,251	18%	49,735	70.7
Phoenix	4,452	518	12%	1,485	33%	2,449	81.8
Rogue River	1,714	274	16%	601	35%	839	104.3
Shady Cove	3,072	385	13%	926	30%	1,761	74.4
Talent	6,256	1,225	20%	1,306	21%	3,725	67.9
Unincorporated	66,748	13,130	20%	16,790	25%	39,352	76.0
Foots Creek CDP	923	152	16%	371	40%	400	130.8
Prospect CDP	558	89	16%	226	41%	243	129.6
Ruch CDP	1,184	220	19%	238	20%	726	63.1
Trail CDP	632	73	12%	159	25%	400	58.0
White City CDP	10,151	2,982	29%	1,191	12%	5,978	69.8
Wimer CDP	441	19	4%	179	41%	243	81.5

Source: Social Explorer, U.S. Census Bureau, 2017-2021 American Community Survey Estimates Table A01001.

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

[80] The age dependency ratio is derived by dividing the combined under 18 and 65-and-over populations by the 18-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. 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.

Gender

Jackson County has slightly more females than males (Female 50.9%, Male: 49.1%). Rogue River (59%), Jacksonville (57.5%), and Gold Hill (56.4%) have the highest female to male ratios comprising their populations.[81] It is important to recognize that women tend to have more institutionalized obstacles during recovery than men due to sector-specific employment, lower wages, and family care responsibilities.

Families and Living Arrangements

Two ways the Census defines households are by type of living arrangement and family structure. A householder may live in a "family household" (a group related to one another by birth, marriage, or adoption living together), in a "nonfamily household" (a group of unrelated people living together), or alone. As shown in Table C-8 Jackson County is predominately comprised of family households (63%). Of all occupied households, 29% are one-person, non-family households (householder living alone). Rogue River (43%) and Talent (42%) have the highest percentage of householders living alone while Medford (10,105) has the highest number.

[81] Social Explorer, U.S. Census Bureau, 2017-2021 American Community Survey Estimates Table A02001.

Table C-8 Household by Type, Including Living Alone

Jurisdiction	Occupied Households Estimate	Family Households Estimate	Family Households Percent	Householder Living Alone Estimate	Householder Living Alone Percent	Householder Living Alone (age 65+) Estimate	Householder Living Alone (age 65+) Percent
Jackson County	89,467	56,509	63%	25,695	29%	13,566	15%
Incorporated	63,566	38,260	60%	19,606	31%	10,303	16%
Ashland	10,052	4,965	49%	3,672	37%	1,810	18%
Butte Falls	167	113	68%	40	24%	30	18%
Central Point	7,096	4,738	67%	1,843	26%	1,012	14%
Eagle Point	3,620	2,777	77%	701	19%	544	15%
Gold Hill	482	347	72%	110	23%	78	16%
Jacksonville	1,532	825	54%	494	32%	356	23%
Medford	33,645	20,673	61%	10,105	30%	4,771	14%
Phoenix	1,948	1,074	55%	719	37%	560	29%
Rogue River	876	461	53%	373	43%	245	28%
Shady Cove	1,317	936	71%	369	28%	256	19%
Talent	2,831	1,351	48%	1,180	42%	641	23%
Unincorporated	25,901	18,249	70%	6,089	24%	3,263	13%
Foots Creek CDP	387	285	74%	79	20%	63	16%
Prospect CDP	235	164	70%	68	29%	47	20%
Ruch CDP	421	407	97%	7	2%	0	0%
Trail CDP	287	172	60%	82	29%	0	0%
White City CDP	3,219	2,355	73%	724	22%	297	9%
Wimer CDP	182	104	57%	63	35%	10	5%
Other Unincorporated	21,170	14,762	70%	5,066	24%	2,846	13%

Source: Social Explorer, Table 165, U.S. Census Bureau, 2017-2021 American Community Survey Estimates.

Table C-9 shows household structures for families with children. About 17% of all households within the county are married couples that have children. Eagle Point (22%) has the highest percentage of single-parent households. These populations will likely require additional support during a disaster and will inflict strain on the system if improperly managed.

Table C-9 Married-Couple and Single Parent Families with Children

Jurisdiction	Occupied Households Estimate	Married-Couple with Children Estimate	Married-Couple with Children Percent	Single Parent with Children Estimate	Single Parent with Children Percent
Jacskon County	89,467	15,610	17%	8,442	9%
Incorporated	63,566	11,004	17%	6,689	11%
Ashland	10,052	1,023	10%	582	6%
Butte Falls	167	27	16%	16	10%
Central Point	7,096	1,687	24%	783	11%
Eagle Point	3,620	695	19%	780	22%
Gold Hill	482	46	10%	92	19%
Jacksonville	1,532	56	4%	68	4%
Medford	33,645	6,528	19%	3,887	12%
Phoenix	1,948	272	14%	106	5%
Rogue River	876	115	13%	36	4%
Shady Cove	1,317	142	11%	73	6%
Talent	2,831	413	15%	266	9%
Unincorporated	25,901	4,606	18%	1,753	7%
Foots Creek CDP	387	12	3%	45	12%
Prospect CDP	235	28	12%	20	9%
Ruch CDP	421	69	16%	41	10%
Trail CDP	287	66	23%	15	5%
White City CDP	3,219	951	30%	524	16%
Wimer CDP	182	8	4%	0	0%
Other Unincorporated	21,170	3,472	16%	0	0%

Source: U.S. Census Bureau, 2017-2021 American Community Survey Estimates, Table DP02.

Income

Household income and poverty status are indicators of socio demographic capacity and the stability of the local economy. Household income can be used to compare economic areas but does not reflect how the income is divided among the area residents. Between 2016 and 2021, the share of households making more than $200,000 a year increased more than other income cohorts; the only other income cohorts to see a gain of 1% or more are those earning $75,000-$99,999 a year (1.5%) and those earning $100,000-$199,999 a year (1.6%). Table C-10 shows the distribution of household income for 2016 and 2021.

Table C-10 Household Income

Household Income	2016^		2021		Change in Share	
	Households	Percent	Households	Percent	Households	Percent
Less than $15,000	8,386	10%	8,386	9%	0	-0.9%
$15,000-$29,999	13,388	16%	13,181	15%	-207	-1.7%
$30,000-$44,999	12,087	15%	12,087	14%	0	-1.3%
$45,000-$59,999	10,812	13%	10,464	12%	-348	-1.6%
$60,000-$74,999	8,644	11%	10,005	11%	1,361	0.6%
$75,000-$99,999	10,110	12%	12,472	14%	2,362	1.5%
$100,000-$199,999	14,685	18%	17,616	20%	2,931	1.6%
$200,000 or more	3,269	4%	5,256	6%	1,987	1.9%

Source: Social Explorer, Table 56, U.S. Census Bureau, 2012-2016 American Community Survey and 2017-2021 American Community Survey.
Note: ^ - 2016 dollars adjusted for 2021 via Social Explorer's Inflation Calculator

The 2021 median household income across Jackson County was $61,020; this is higher than the inflation-adjusted 2016 figure, representing a 17% increase in real incomes. Jacksonville has the highest median household income ($91,094), while Prospect ($33,036), Rogue River ($33,704), and Butte Falls ($38,958) have the lowest median household incomes. Table C- 11 shows decreases in real incomes in Foots Creek (-13%), Rogue River (-8%), and Gold Hill (-5%).

Table C- 11 Median Household Income

Jurisdiction	Median Household Income 2016^	Median Household Income 2021	Percent Change
Jackson County	$52,323	$61,020	17%
Incorporated			
Ashland	$53,419	$63,641	19%
Butte Falls	$35,026	$38,958	11%
Central Point	$55,111	$73,534	33%
Eagle Point	$66,844	$73,159	9%
Gold Hill	$53,629	$50,750	-5%
Jacksonville	$60,934	$91,094	49%
Medford	$49,824	$57,424	15%
Phoenix	$40,287	$40,324	0%
Rogue River	$36,528	$33,704	-8%
Shady Cove	$35,006	$56,114	60%
Talent	$40,266	$41,337	3%
Unincorporated			
Foots Creek CDP	$72,028	$63,007	-13%
Prospect CDP	$30,265	$33,036	9%
Ruch CDP	$76,238	$90,288	18%
White City CDP	$50,739	$57,869	14%

Source: Social Explorer, Table 57, U.S. Census Bureau, 2012-2016 American Community Survey Estimates and 2017-2021 American Community Survey Estimates.
Note: ^ - 2016 dollars adjusted for 2021 via Social Explorer's Inflation Calculator; Data was unavailable for one or both years for Trail CDP and Wimer CDP and so has been excluded from the table.

Table C-12 identifies the percentage of individuals and cohort groups that are below the poverty level. It is estimated that about 14% of individuals, including 18% of children under 18 and 8% of seniors live below the poverty level across the county. Butte Falls (28%) and the unincorporated communities of Wimer (32%), Prospect (24%), and White City (23%) have the highest poverty rates. Overall, 6% of Jackson County residents live in "deep poverty" (having incomes below half the federal poverty level). The percent is greatest in Wimer (17%), Butte Falls (12%), and Talent (11%).[82]

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.[83]

[82] Social Explorer, Table 117, U.S. Census Bureau, 2017-2021 American Community Survey Estimates

[83] Statewide Supplemental Nutrition Assistance Program Activity - Nov. 2014 (SSP, APD, and AAA combined); P. 3 of report. Temporary Assistance for Needy Families One and two Parent Families Combined; P. 3 of report. http://www.oregon.gov/dhs/assistance/Pages/data/main.aspx

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 rebound more quickly 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.[84]

Table C-12 Poverty Rates

	Total Population in Poverty		Children Under 18 in Poverty		18 to 64 in Poverty		65 or over in Poverty	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Jackson County	29,652	14%	7,894	18%	17,948	14%	3,810	8%
Incorporated	21,177	14%	5,570	18%	12,801	15%	2,806	9%
Ashland	3,824	19%	796	28%	2,695	22%	333	7%
Butte Falls	121	28%	39	39%	67	27%	15	17%
Central Point	2,072	11%	696	16%	1,147	10%	229	8%
Eagle Point	776	8%	255	11%	316	6%	205	10%
Gold Hill	184	16%	56	22%	113	16%	15	7%
Jacksonville	211	7%	47	21%	45	3%	119	11%
Medford	11,883	15%	3,358	17%	7,186	15%	1,339	9%
Phoenix	434	9%	0	0%	222	10%	212	12%
Rogue River	229	13%	9	3%	155	18%	65	10%
Shady Cove	334	11%	136	29%	103	6%	95	10%
Talent	1,109	17%	178	15%	752	20%	179	12%
Unincorporated	8,475	13%	2,324	19%	5,147	14%	1,004	6%
Foots Creek CDP	83	10%	27	40%	47	15%	9	2%
Prospect CDP	114	24%	34	49%	52	26%	28	14%
Ruch CDP	1	< 1%	0	0%	1	< 1%	0	0%
Trail CDP	137	14%	0	0%	137	19%	0	0%
White City CDP	2,217	23%	845	31%	1,159	21%	213	17%
Wimer CDP	163	32%	15	47%	120	45%	28	14%
Other Unincorporated	5,760	11%	1,403	15%	3,631	12%	726	5%

Source: Social Explorer Tables 114, 115, 116, U.S. Census Bureau, 2017-2021 American Community Survey Estimates.

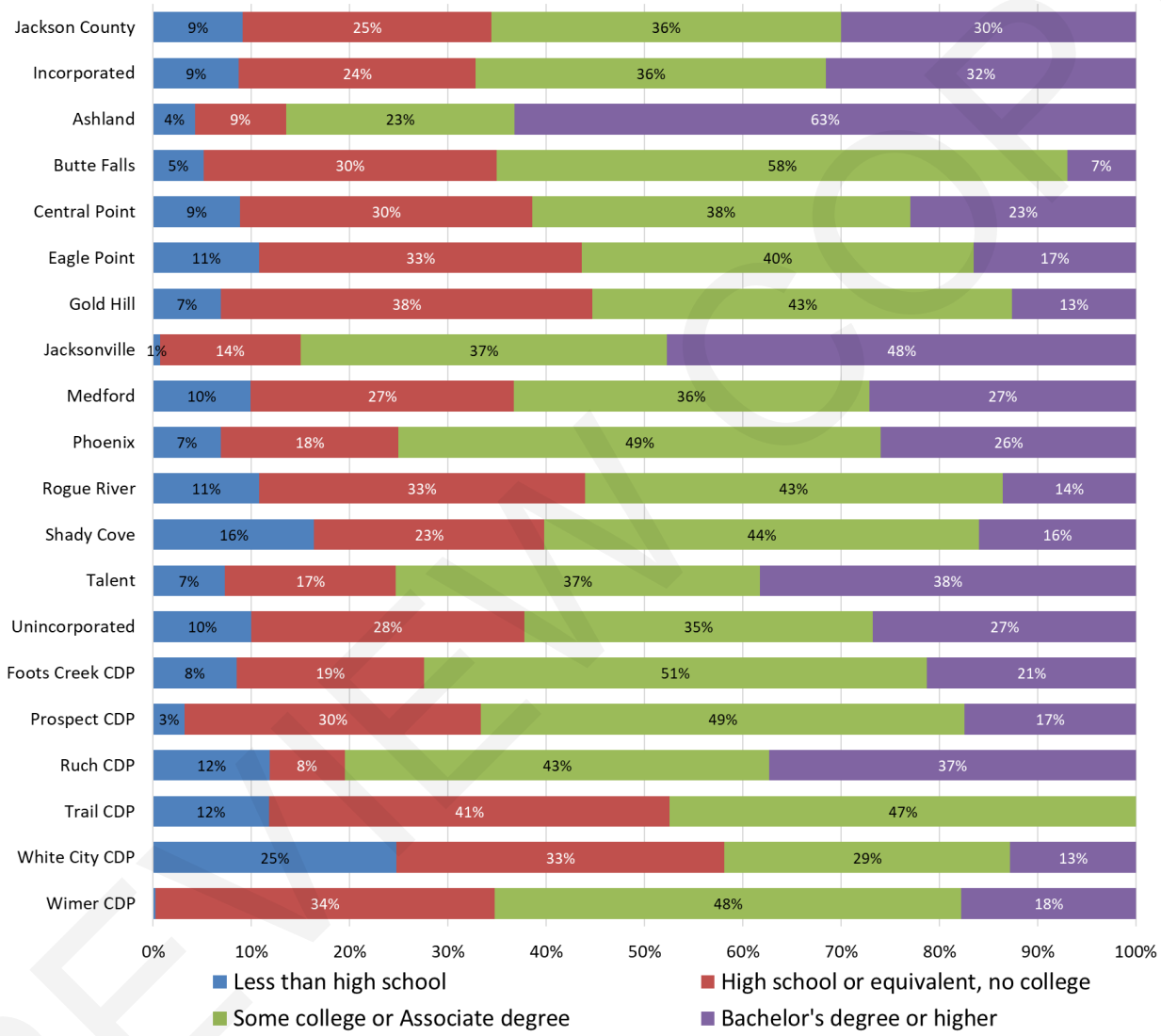
Education

Educational attainment of community residents is also identified as an influencing factor in sociodemographic 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.

[84] Cutter, S. L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*.

About 91% of the Jackson County population over 25 years of age has graduated from high school or received a high school equivalency, with 30% going on to earn a Bachelor's or higher degree (Figure C 5). Jacksonville (99%) has the highest percentage of high school graduates. White City (25%) and Shady Cove (16%) have the highest percentage of people without a high school degree.

Figure C 5 Educational Attainment



Source: Social Explorer, Table 25, U.S. Census Bureau, 2017-2021 American Community Survey Estimates

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 that 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. Jackson County has 7% of its population without health insurance; Ruch CDP (15%), Jacksonville (11%), and Butte Falls (10%) have the highest percentages (Table C-13). The percentage of uninsured changes with age. The highest rates of uninsured are within the 18 to 64-year cohort; Ruch CDP has about 15% of this age cohort that is uninsured. The ability to provide services to the uninsured populations may burden local providers following a natural disaster.

Table C-13 Health Insurance Coverage

Jurisdiction	Total Population	Without Health Insurance							
		Total		Under 18 years		18 to 64 years		65+	
		Number	Percent	Number	Percent **	Number	Percent **	Number	Percent **
Jackson County	220,476	15,346	7%	1,940	1%	13,210	6%	196	0%
Incorporated	153,866	10,647	7%	1,556	1%	9,076	6%	15	< 1%
Ashland	21,227	1,640	8%	303	1%	1,337	6%	0	0%
Butte Falls	475	47	10%	2	< 1%	45	9%	0	0%
Central Point	18,932	1,243	7%	177	1%	1,066	6%	0	0%
Eagle Point	9,600	340	4%	89	1%	251	3%	0	0%
Gold Hill	1,171	61	5%	0	0%	61	5%	0	0%
Jacksonville	2,984	319	11%	23	1%	296	10%	0	0%
Medford	83,983	6,361	8%	884	1%	5,462	7%	15	< 1%
Phoenix	4,452	299	7%	34	1%	265	6%	0	0%
Rogue River	1,714	50	3%	0	0%	50	3%	0	0%
Shady Cove	3,072	71	2%	0	0%	71	2%	0	0%
Talent	6,256	216	3%	44	1%	172	3%	0	0%
Unincorporated	66,610	4,699	7%	384	1%	4,134	6%	181	< 1%
Foots Creek CDP	923	61	7%	0	0%	61	7%	0	0%
Prospect CDP	558	50	9%	0	0%	50	9%	0	0%
Ruch CDP	1,184	172	15%	0	0%	172	15%	0	0%
Trail CDP	632	0	0%	0	0%	0	0%	0	0%
White City CDP	10,151	672	7%	68	1%	583	6%	21	< 1%
Wimer CDP	441	35	8%	0	0%	16	4%	19	4%

Source: Social Explorer, Table 146, U.S. Census Bureau, 2017-2021 American Community Survey Estimates.
** Percent of age group

Table C-14 describes disability status of the population. Approximately 15% of the Jackson County civilian, non-institutionalized population identify with one or more disabilities. Rogue River (27%), Wimer CDP (27%), and Shady Cove (25%) have the highest percentage of their total population with a disability.

Table C-14 Disability Status by Age Group

Jurisdiction	Population Estimate^	With a disability		Under 18 years with a disability		65 years and over with a disability	
		Estimate	Percent	Estimate	Percent**	Estimate	Percent**
Jackson County	220,476	33,699	15%	2,764	6%	15,218	32%
Incorporated	153,866	22,550	15%	1,671	5%	10,311	33%
Ashland	21,227	2,032	10%	42	2%	1,082	19%
Butte Falls	475	95	20%	17	14%	27	35%
Central Point	18,932	2,118	11%	223	5%	845	29%
Eagle Point	9,600	1,442	15%	123	5%	677	32%
Gold Hill	1,171	219	19%	23	10%	98	39%
Jacksonville	2,984	452	15%	0	0%	332	32%
Medford	83,983	13,074	16%	944	5%	5,659	38%
Phoenix	4,452	989	22%	0	0%	590	40%
Rogue River	1,714	468	27%	18	7%	233	39%
Shady Cove	3,072	754	25%	171	44%	344	37%
Talent	6,256	907	14%	110	9%	424	32%
Unincorporated	66,610	11,149	17%	1,093	8%	4,907	29%
Foots Creek CDP	923	133	14%	68	45%	25	7%
Prospect CDP	558	129	23%	0	0%	106	47%
Ruch CDP	1,184	262	22%	0	0%	93	39%
Trail CDP	632	141	22%	0	0%	0	0%
White City CDP	10,151	2,127	21%	420	14%	578	49%
Wimer CDP	441	117	27%	9	47%	52	29%

Source: U.S. Census Bureau, 2017-2021 American Community Survey Estimates, Table B18101.
Notes: ^ Non-institutionalized civilian population, ** Percent of age group

Table C-15 displays disability status of the population by type and age. Older populations tend to have more disabilities than younger populations in Jackson County. Approximately 19% of the population 65 and over has an ambulatory disability, 15% have a hearing disability, and 10% have an independent living disability. Depending on the type of disability, outreach, mitigation, and response efforts may need to be adjusted.

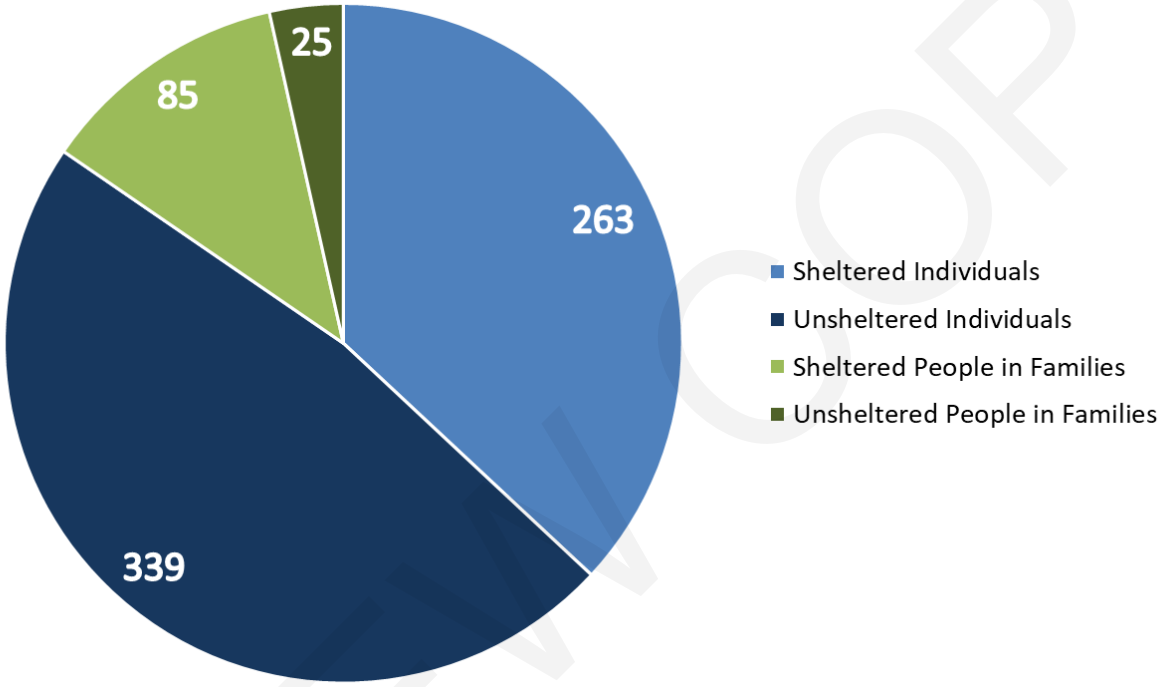
Table C-15 Disability Type by Age Group – Jackson County

	Hearing Disability	Vision Disability	Cognitive Disability	Ambulatory Disability	Self-Care Disability	Independent Living Disability
Total Population^	7%	2%	7%	7%	3%	7%
Under 18*	1%	1%	6%	1%	1%	—
18 to 64*	2%	2%	6%	5%	2%	5%
65 and over*	15%	5%	8%	19%	7%	10%

Source: Social Explorer, U.S. Census Bureau, 2017-2021 American Community Survey Estimates, Tables B18102 through B18106.
Notes: ^ Non-institutionalized civilian population age 5 years and older, except for Independent Living Disability which is age 18 years and older., * Percent of age group

In 2019, Oregon Housing and Community Services (OHCS) conducted a point-in-time homeless count to identify the number of homeless, their age and their family type. As Figure C-6 displays, the OHCS study found that 712 individuals and persons in families in Jackson County identify as homeless, 348 people were sheltered (263 individuals and 85 persons in families), and 364 people were unsheltered (339 individuals and 25 persons in families).

Figure C-6 Jackson County PIT Homeless Count (2019)



Source: Oregon Housing and Community Services, 2019 Point-in-Time Homeless Count

The homeless have little resources to rely on, especially during an emergency. It will likely be the responsibility of the county, cities, 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 these populations, since traditional means of communication may not be appropriate or available.

Household Characteristics – Vehicles Available

Countywide, 6% of all occupied households, and 11% of renter-occupied households, have no vehicle available (Table C-16). The percentage of all households without a vehicle available is greatest in Wimer CDP (29%); for renter-occupied households the percentage is greatest in Wimer (100%) and Shady Cove (26%). Household access to a vehicle is key to evacuating quickly and safely. Households that have no access to a vehicle or limited vehicles available may face delays, or need assistance, to evacuate. Rogue Valley Transportation District provides service to communities throughout Jackson County.

Table C-16 Vehicles Available (All Households and Renter Occupied)

Jurisdiction	Occupied Housing			Renter Occupied Housing		
	Housing Units	No Vehicle (Percent)	One Vehicle (Percent)	Housing Units	No Vehicle (Percent)	One Vehicle (Percent)
Jackson County	89,467	6%	41%	31,652	11%	43%
Incorporated	63,566	7%	34%	24,061	14%	50%
Ashland	10,052	5%	35%	4,436	10%	54%
Butte Falls	167	2%	28%	48	6%	65%
Central Point	7,096	6%	21%	2,161	12%	36%
Eagle Point	3,620	4%	41%	1,177	8%	17%
Gold Hill	482	2%	31%	119	<1%	39%
Jacksonville	1,532	11%	35%	699	15%	27%
Medford	33,645	7%	39%	15,421	13%	47%
Phoenix	1,948	8%	29%	744	9%	46%
Rogue River	876	7%	6%	379	13%	52%
Shady Cove	1,317	10%	38%	381	26%	15%
Talent	2,831	10%	3%	1,438	15%	42%
Unincorporated	25,901	1%	5%	7,591	1%	4%
Foots Creek CDP	387	0%	2%	68	0%	24%
Prospect CDP	235	7%	7%	52	17%	65%
Ruch CDP	421	5%	10%	123	18%	18%
Trail CDP	287	0%	4%	25	0%	36%
White City CDP	3,219	4%	29%	547	5%	37%
Wimer CDP	182	29%	6%	53	100%	0%

Source: Social Explorer, Tables 182 and 199, U.S. Census Bureau, 2017-2021 American Community Survey Estimates

Synthesis

Socio-demographic capacity is a significant indicator of county hazard resiliency. Jackson County is the largest county in southern Oregon, in terms of population, with 223,827 residents spread across a geographically large area. Due to the population and geographic dispersion resiliency and hazard mitigation efforts can be harder to manage. The characteristics and qualities of the population such as age, race, education, income, and health and safety are significant factors that can influence the county's ability to cope, adapt to, and recover from natural disasters. The status of socio-demographic capacity indicators can have long term impacts on the economy and stability, ultimately affecting future resiliency of Jackson County.

One important thing to consider is that there are residents who are not proficient in English. Language barriers will often make it difficult to reach populations of residents who do not speak English. Resiliency efforts need to focus on targeting these populations as they will be most vulnerable and may have trouble knowing what to do in the event of a disaster.

It is also important to think about the county's population in terms of its age groups; it is important to tailor information towards each of these population segments individually, as it is necessary to be able to reach out to all age groups. In 2021, the percentage of residents age 65 and older was 22%; by 2040, that percentage is expected to increase to 28%. While disasters do

not affect certain age groups more than others, information can be dispersed and tailored depending on who may be the most vulnerable.

Jackson County socio-economic factors to consider include:

- The median household income across the county has increased to $61,020. “Real” median household incomes are increasing in most communities with the exceptions of Gold Hill, Jacksonville, and Talent.
- In Jackson County, 12% of the population is considered in poverty; the rates are highest in Wimer CDP and White City CDP.
- The number of children in poverty is greatest in White City CDP and Eagle Point.
- In Jackson County, 15% of the general population has a disability and 32% of the population 65 years or older has a disability.

Highlighting the above socio-economic factors and looking at the socio-demographic capacity of the county is important as they affect the resiliency of the county and help determine target areas and potential vulnerable populations for increased notification on mitigation and resiliency efforts.

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 act 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 for example 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. Table C-17 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).[85]

Table C-17 shows that the countywide income inequality coefficient is 0.46. The areas of greatest income inequality are Wimer CDP (0.64) and Ashland (0.52). The areas of greatest income equality are Ruch CDP (0.34), Butte Falls (0.35), and Eagle Point (0.35). 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.[86]

[85]University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. http://brr.berkeley.edu/rci/.

[86] 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-17 Regional Income Inequality

Jurisdiction	Income Inequality Coefficient
Jackson County	0.46
Ruch CDP	0.34
Butte Falls	0.35
Eagle Point	0.35
Foots Creek CDP	0.36
White City CDP	0.36
Shady Cove	0.39
Prospect CDP	0.39
Medford	0.42
Rogue River	0.42
Phoenix	0.43
Talent	0.43
Central Point	0.44
Gold Hill	0.44
Jacksonville	0.44
Trail CDP	0.45
Ashland	0.52
Wimer CDP	0.64

Source: Social Explorer, Table 157, U.S. Census Bureau, 2017-2021 American Community Survey Estimates

Housing Affordability

Housing affordability is a measure of economic security gauged by the percentage of an area's households paying less than 30% of their income on housing.[87] Households spending more than 30% are considered housing cost burdened. Table C-18 displays the percentage of homeowners and renters reflecting housing cost burden across the region.

Countywide, roughly 46% of homeowners with a mortgage have a housing cost burden, compared to over 49% of renters. The communities of Prospect CDP (100%), Rogue River (80%), and Talent (78%) have the highest rates of owners with a mortgage with a housing cost burden. Amongst renters, Butte Falls, Central Point, Gold Hill, Medford, Phoenix, Shady Cove, Talent, Prospect CDP and Trail CDP have more than 50% with a housing cost burden. 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.[88] This disparity imposes challenges for a community recovering from a disaster as housing costs may exceed the ability of residents to repair or move to a new location. These populations may live paycheck to paycheck and are

[87] University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. http://brr.berkeley.edu/rci/.
[88] Ibid.

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-18 Households Spending > 30% of Income on Housing

Jurisdiction	Owners		Renters
	With Mortgage	Without Mortgage	
Jackson County	46%	23%	49%
Incorporated	44%	32%	52%
Ashland	42%	28%	49%
Butte Falls	54%	35%	58%
Central Point	38%	12%	51%
Eagle Point	43%	7%	46%
Gold Hill	45%	46%	75%
Jacksonville	39%	38%	42%
Medford	44%	23%	52%
Phoenix	41%	53%	54%
Rogue River	80%	24%	49%
Shady Cove	17%	3%	56%
Talent	78%	23%	61%
Unincorporated	49%	23%	36%
Foots Creek CDP	45%	46%	0%
Prospect CDP	100%	28%	63%
Ruch CDP	38%	0%	30%
Trail CDP	0%	56%	100%
White City CDP	45%	29%	33%
Wimer CDP	0%	100%	0%

Source: Social Explorer, Tables 103 and 109, U.S. Census Bureau, 2017-2021 American Community Survey Estimates.

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 Herfindahl Index, a formula that compares the composition of county and regional economies with those of states or the nation. Using the Herfindahl Index, a diversity ranking of 1 indicates the county with the most diverse economic activity compared to the state, while a ranking of 36 corresponds with the least diverse county economy.

Table C-19 describes the Herfindahl Index Scores for counties in the region and shows that Jackson County has an economic diversity rank of 6th as of 2021. This is on a scale between all 36 counties in the state where 1 is the most diverse economic county in Oregon and 36 is the least diverse. The county's ranking has risen from 8th since 2016.

Table C-19 Regional Herfindahl Index Scores

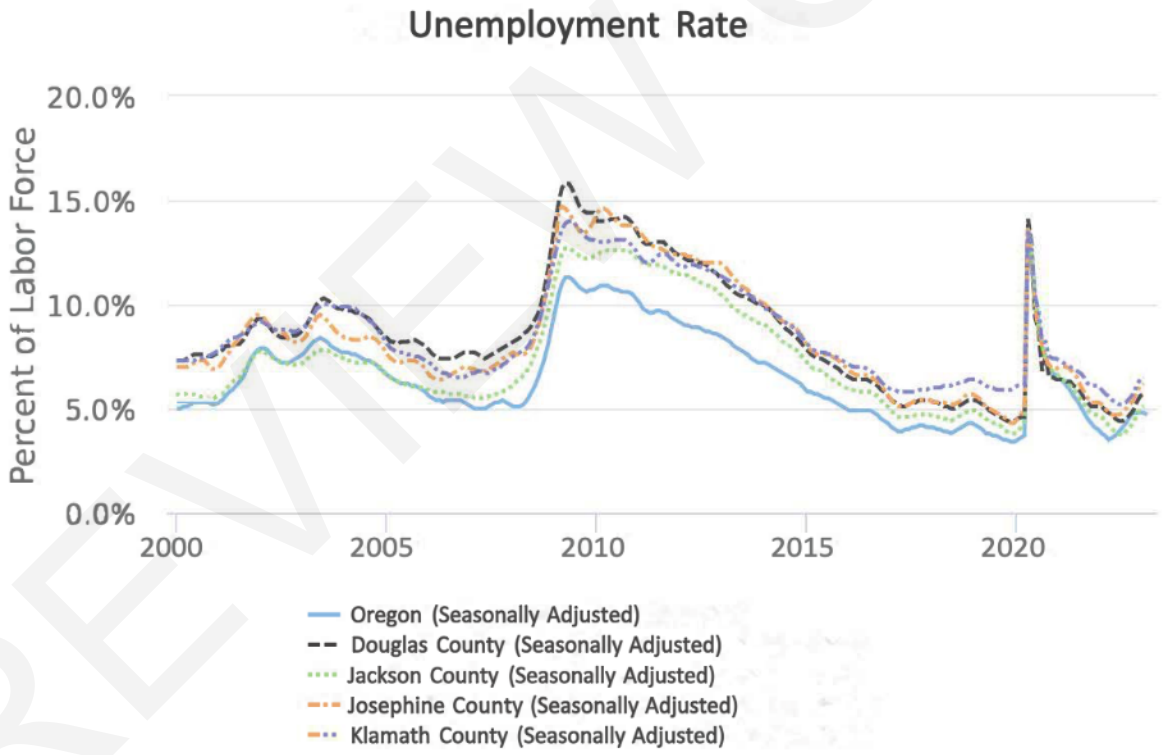
County	2016 Employment	2016 Number of Industries	2016 State Rank	2021 Employment	2021 Number of Industries	2021 State Rank
Jackson	73,845	243	8	77,951	243	6
Douglas	29,674	207	10	30,696	207	10
Josephine	22,300	199	9	25,776	204	20
Klamath	17,734	187	16	17,987	192	14

Source: Oregon Employment Department

Employment and Wages

According to the Oregon Employment Department (Figure C-7), unemployment in Jackson County has declined since 2020 but remains at a rate like but still slightly higher than the State of Oregon and other counties in the region. Note: there has been a spike in unemployment related to the COVID-19 pandemic.

Figure C-7 Unemployment Rate



Source: Oregon Employment Department, "Unemployment Rate", Qualityinfo.org.

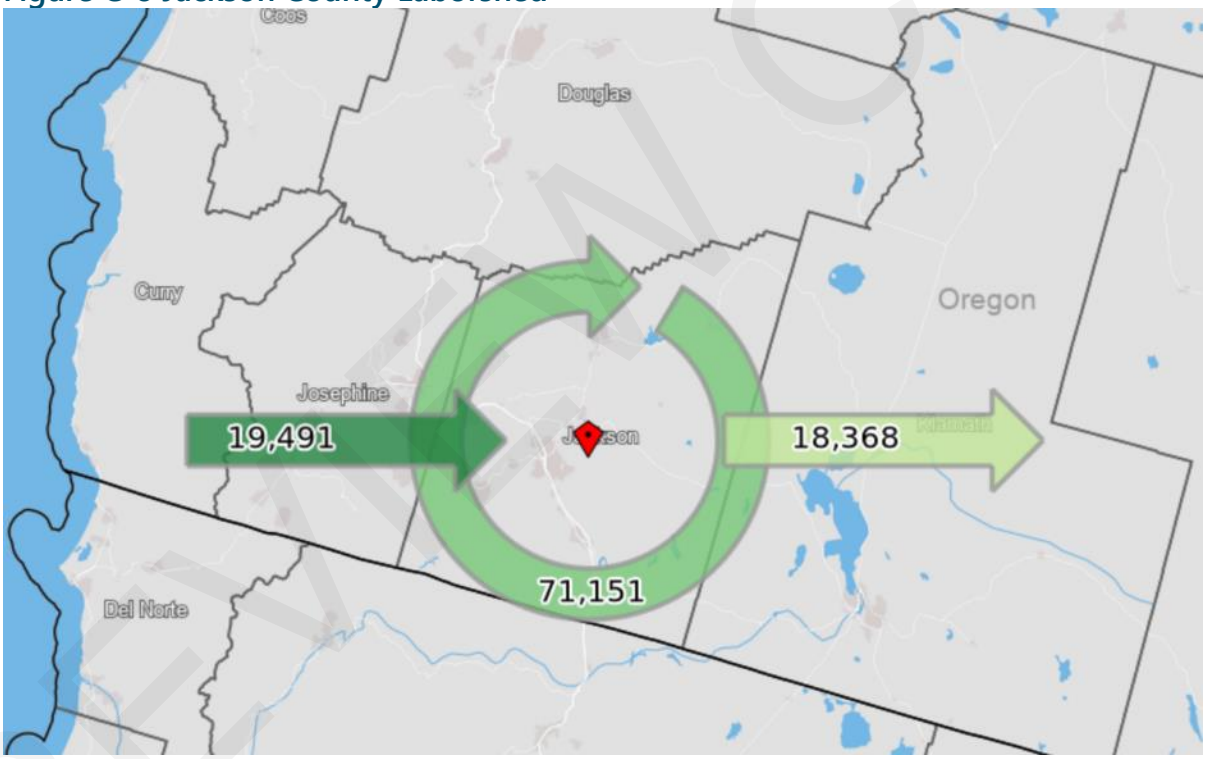
Labor and Commute Shed

Most hazards can happen at any time during the day or night. It may be possible to give advance warning to residents and first responders who can take immediate preparedness and protection

measures, but the variability of hazards is one part of why they can have such varied impact. A snowstorm during the workday will have different impacts than one that comes during the night. During the day, a hazard has the potential to segregate the population by age or type of employment (e.g., school children at school, office workers in downtown areas). This may complicate some aspects of initial response such as transportation or the identification of wounded or missing. Conversely, a hazard at midnight may occur when most people are asleep and unable to receive an advance warning through typical communication channels. The following labor shed and commute shed analysis is intended to document where county residents work and where people who work in Jackson County reside.

Jackson County employers draw in more than 19,400 workers from outside the county. The Jackson County economy is a cornerstone of regional economic vitality. Figure C-8 shows the county's laborshed; the map shows that about 78.5% of workers live and work in the county (71,151), 21.5% of workers come from outside the county (19,491), and about 20.5% of residents work outside of the county (18,368).

Figure C-8 Jackson County Laborshed



Source: U.S. Bureau of the Census, On The Map.

Table C-20 shows where workers commute to, who reside in Jackson County. Of 89,519 jobs, approximately one-fifth of Jackson County employed residents work inside of the county; 5.3% work in neighboring Josephine County, 2% in Lane County, and 2% work in Multnomah County.

Table C-20 Commute Shed (Where Workers are Employed who Live in Jackson County), 2019

Jurisdiction	Number of Jobs	Share
All Jurisdictions	89,519	100%
Jackson County, OR	75,151	79.5%
Josephine County, OR	4,735	5.3%
Lane County, OR	1,828	2.0%
Multnomah County, OR	1789	2.0%
Marion County, OR	1322	1.5%
Douglas County, OR	1229	1.4%
Washington County, OR	1152	1.3%
Klamath County, WA	770	0.9%
Clackamas County, OR	689	0.8%
Deschutes County, OR	649	0.7%
All Other Locations	4,205	4.7%

Source: U.S. Bureau of the Census, On The Map.

Table C-21 shows where workers live who work in Jackson County. Approximately 79.5% of Jackson County workers live inside of the county; 6.7% live in neighboring Josephine County, 2.1% in neighboring Douglas County, and 1.5% live in neighboring Klamath County.

Table C-21 Labor Shed (Where Workers Live who are Employed in Jackson County), 2019

Jurisdiction	Number of Jobs	Share
All Jurisdictions	90,642	100%
Jackson County, OR	71,151	78.5%
Josephine County, OR	6,091	6.7%
Douglas County, OR	1,879	2.1%
Klamath County, OR	1331	1.5%
Lane County, OR	971	1.1%
Coos County, OR	779	0.9%
Multnomah County, OR	717	0.8%
Washington County, WA	679	0.7%
Deschutes County, OR	640	0.7%
Marion County, OR	599	0.7%
All Other Locations	5,805	6.4%

Source: U.S. Bureau of the Census, On The Map.

Workers can be impacted during a disaster to varying levels based upon their means of transportation to work. Commuters who use motorized vehicles and public transportation that rely upon maintained roads, bridges, and other infrastructure may be delayed or unable to travel

if infrastructure is impacted during an event (for example, earthquakes or heavy winter storms). Table C-22 shows that 84% of Jackson County commuters utilized motorized vehicles (cars, trucks, vans, or motorcycles) and an additional 1% use public transportation. Of all Jackson County workers, 4% of commuters bike or walk to work, and 10% work from home. Shady Cove (20%), Wimer CDP (20%), Ashland (18%), and Ruch CDP (17%) have the highest percentage of workers who work from home.

Table C-22 Means of Transportation to Work

Jurisdiction	Workers (16 and older)	Motorized Vehicle^ (Percent)	Public Transportation (Percent)	Bike/Walked (Percent)	Other (Percent)	Worked at Home (Percent)
Jackson County	96,392	84%	1%	4%	1%	10%
Incorporated	69,622	85%	1%	4%	1%	10%
Ashland	10,224	65%	2%	14%	1%	18%
Butte Falls	167	88%	0%	5%	0%	7%
Central Point	9,827	91%	<1%	1%	1%	7%
Eagle Point	3,676	96%	0%	0%	0%	4%
Gold Hill	487	91%	0%	1%	0%	8%
Jacksonville	1,537	91%	0%	0%	0%	9%
Medford	37,463	87%	0%	3%	1%	9%
Phoenix	1,860	87%	6%	1%	0%	7%
Rogue River	537	87%	0%	1%	0%	13%
Shady Cove	1,105	74%	2%	4%	0%	20%
Talent	2,739	86%	1%	4%	0%	8%
Unincorporated	26,770	84%	<1%	2%	1%	12%
Foots Creek CDP	261	95%	0%	0%	0%	5%
Prospect CDP	174	82%	0%	7%	0%	11%
Ruch CDP	598	78%	0%	5%	0%	17%
Trail CDP	314	94%	0%	6%	0%	0%
White City CDP	4,141	93%	1%	1%	<1%	6%
Wimer CDP	193	80%	0%	0%	0%	20%
Other Unincorporated	21,089	82%	<1%	0%	1%	14%

^ - includes car, truck, van, or motorcycle

Source: Social Explorer, Table 128, U.S. Census Bureau, 2017-2021 American Community Survey Estimates
Notes: ^ - includes car, truck, van, or motorcycle

Mitigation activities are needed at the business level to ensure the health and safety of workers and limit damage to industrial infrastructure. Employees are highly mobile, commuting from all over the surrounding area to industrial and business centers. As daily transit rises, there is an increased risk that a natural hazard event will disrupt the travel plans of residents across the region and seriously hinder the ability of the economy to meet the needs of Jackson County residents and businesses.

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 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.

Table C-23 identifies Employment by industry. The industry sectors in Jackson County with the highest percentage of the workforce are Trade, Transportation & Utilities (22%); Education and Health Services (20%); and Leisure and Hospitality (20%).

Table C-23 Total Non-Farm Employment by Industry 2021, Expected Growth 2031

Employment Sector	2021				Percent Change in Employment (2016-2021)	Employment Forecast* (2021-2031)
	Firms	Employees	Percent Workforce	Average Wage		
Total Payroll Employment	8,134	88,466	100%	$ 51,907	4%	11%
Total Private	7,896	78,045	88%	$ 50,643	6%	12%
Natural Resources and Mining	300	3,441	4%	$ 45,250	42%	6%
Construction	842	4,881	6%	$ 56,523	24%	14%
Manufacturing	337	7,643	9%	$ 57,729	0%	7%
Trade, Transportation & Utilities	1,337	19,788	22%	$ 44,836	3%	6%
Wholesale Trade	322	2,399	3%	$ 59,133	-2%	6%
Retail Trade	786	14,066	16%	$ 38,788	4%	5%
Information	166	963	1%	$ 60,116	-23%	-1%
Financial Activities	692	3,365	4%	$ 76,221	3%	3%
Professional and Business Services	1,142	7,889	9%	$ 68,353	15%	15%
Education and Health Services	1,385	17,864	20%	$ 63,246	20%	16%
Leisure and Hospitality	1,385	17,864	20%	$ 59,234	66%	24%
Other Services	652	2,700	3%	$ 59,234	-25%	13%
Unclassified	288	132	<1%	$ 51,164	474%	-
Government	238	10,421	12%	$ 61,374	-8%	4%
Federal	44	1,863	2%	$ 79,598	4%	0%
State	34	1,040	1%	$ 66,649	-39%	5%
Local	159	7,518	8%	$ 56,129	-4%	5%

Source: Oregon Employment Department, "2016 and 2021 Covered Employment and Wages Summary Reports" and "Rogue Valley Industry Employment Projections 2021-2031". http://www.qualityinfo.org.
*Includes employment forecast data for both Jackson County and neighboring Josephine County.

Basic industries encourage growth in non-basic industries and bring wealth into communities from outside markets. However, a high dependence on basic industries can lead to severe difficulties when recovering from a natural disaster if vital infrastructure or primary resource concentrations have been greatly damaged. While Jackson County has some basic industries, such as Trade and Leisure Hospitality, five out of the six largest industrial sectors are of the non-basic nature and thus they rely on local sales and services. Trending towards basic industries can lead to higher community resilience.

High Revenue Sectors

Table C-24 shows the revenue generated by each reported economic sector (not all sectors are reported). In 2017, the two sectors with the highest revenue, each with revenues over $2 billion, were Retail Trade and Manufacturing. All the reported sectors combined generated more than $11 billion in revenue for the county in 2017.

Table C-24 Revenue of Top Sectors in Jackson County 2012 and 2017

Sector Meaning (NAICS code)	Firms		Sector Revenue		Percent Change in Revenue (2012 to 2017)
	2012	2017	2012^ ($1,000)	2017 ($1,000)	
Wholesale trade	308	230	$828,368	$1,280,193	55%
Manufacturing	12	306	$1,624,646	$2,200,185	35%
Retail trade	206	889	$3,202,715	$3,796,179	19%
Health care and social assistance	506	758	$1,443,797	$1,901,976	32%
Professional, scientific, and technical services	107	558	D	$294,101	-
Accommodation and food services	55	620	$382,194	$535,708	40%
Administrative and support and waste management and remediation services	349	315	$177,572	$290,270	63%
Transportation and warehousing(104)	-	198	$530,570	$679,253	28%
Real estate and rental and leasing	193	377	$164,113	$244,548	49%
Arts, entertainment, and recreation	283	110	$98,347	$116,373	18%
Educational services	306	61	$16,550	$19,690	19%
Utilities	-	11	Q	Q	-
Information	865	114	N	N	-
Finance and insurance	-	337	N	N	-
Other services (except public administration)	674	328	$157,310	$216,741	38%
Total	3,864	5,212	$8,626,182	$11,575,217	34%

Source: U.S. Census Bureau, 2012 and 2017 Economic Census, Table EC1200A1.
^ 2012 dollars are inflation-adjusted for 2017.

Jackson 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.

If any of these primary sectors are impacted by a disaster, Jackson County may experience a significant disruption of economic productivity.

Future Employment in Industry

Table C-23 shows that between 2016 and 2021, the sectors that experienced the largest percent growth were Leisure and Hospitality (66.4%) and Natural Resources and Mining (42.5%). Some of these sectors require more training and education, while others require less education and have lower wages.

Sectors that are anticipated to be major employers in the future also warrant special attention in the hazard mitigation planning process. Table C-23 shows that, between 2021 and 2031, the largest employment growth in the region is anticipated within Leisure and Hospitality (24%), Education and Health Services (16%), Professional and Business Services (15%), and Construction (14%). Mitigation activities that respond to the needs of these sectors may help to ensure the resilience of the economy and help the community stay open for business following a disaster.

Synthesis

Regional economic capacity refers to the present financial resources and revenue generated in the community to achieve a higher quality of life. Forms of economic capital include income equality, housing affordability, economic diversification, employment, and industry. 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 county to absorb disaster impacts for a quick recovery.

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. The county's economy is expected to grow by 2031. It is important to consider what might happen to the county economy if the largest revenue generators and employers are impacted by a disaster. Strategies and actions to reduce vulnerability from an economic focus are imperative and should focus on risk management for the county's dominant industries.

Several industries, including Leisure and Hospitality and Natural Resources and Mining, saw significant increases in employment from 2016 to 2021. While relying heavily on its top revenue-producing industries, Retail Trade and Manufacturing, it is important for the county to consider the economic impacts that affect its residents in the event of a disaster. Strategies and actions to reduce vulnerability from an economic focus are imperative and should focus on risk management for the county's dominant industries.

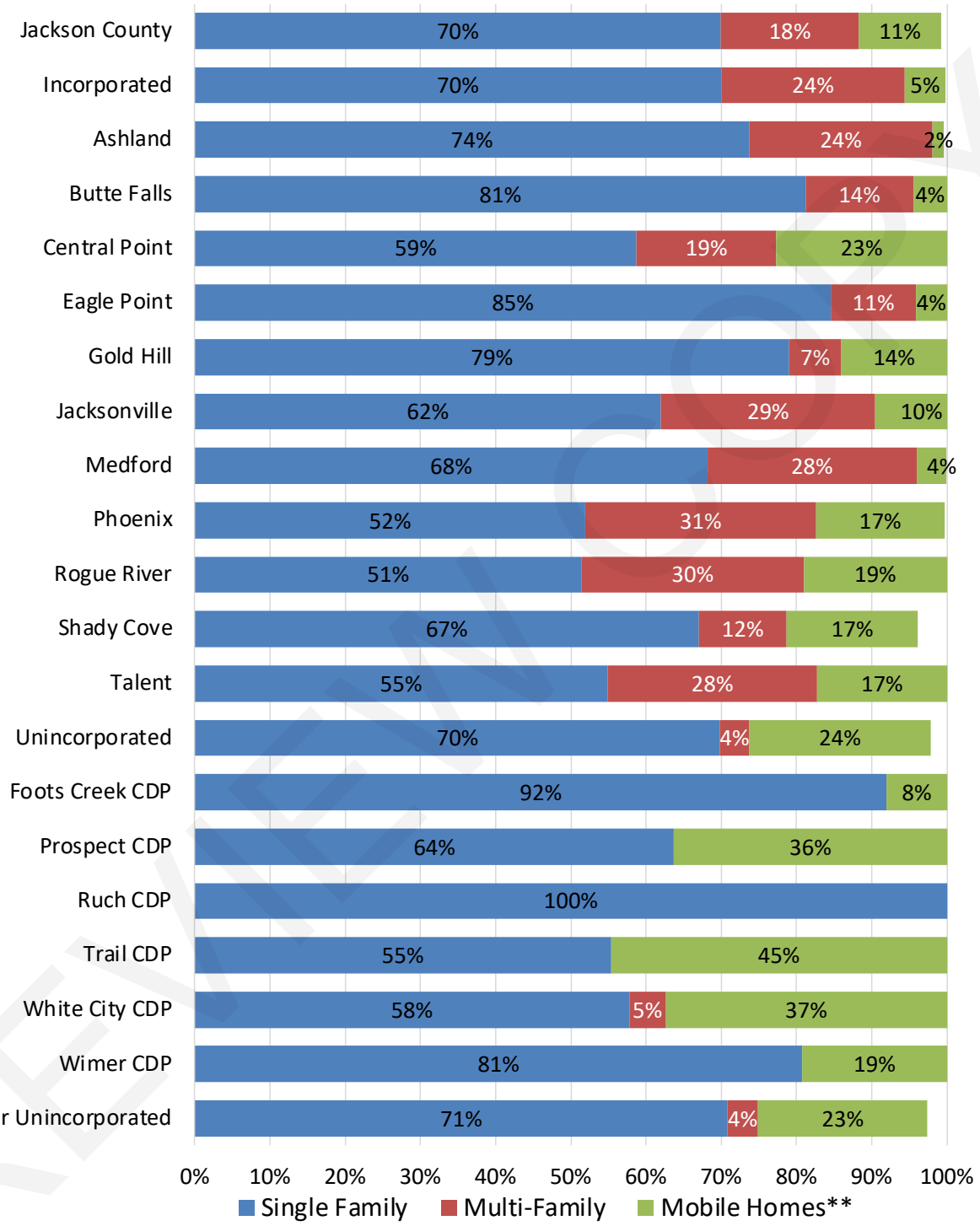
Physical Infrastructure Capacity

Physical infrastructure 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.

Housing

Figure C-9 identifies the types of housing most common throughout the county. Of interest are mobile homes, which account for about 11% of the housing countywide, and up to 45% in Trail CDP, 37% in White City CDP, and 37% in Prospect CDP. 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. 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.

Figure C-9 Housing Profile



Source: Social Explorer, Table 97, U.S. Census Bureau, 2017-2021 American Community Survey

Aside from location and type of housing, the year structures were built has implications. 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. Housing within the floodplain is generally less vulnerable to flood if it was built after the implementation of floodplain development ordinances.

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 minimized. For more information about the flood hazard, NFIP, and FIRMs, please refer to Flood Hazard section of the Risk Assessment.

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.[89] Therefore, homes built before 1993 are more vulnerable to seismic events. DOGAMI's interpretation of state building code histories and evolution as described by Judson (2012), Oregon Building Codes Division (2002, 2010) and Business Oregon (2015) is shown in Table C-25.

Table C-25 Oregon's Seismic Design Level Benchmark Years

Building Type	Year Built	Design Level	Basis
Single Family Dwelling (including Duplexes)	prior to 1976	Pre Code	Interpretation of Judson (2012)
	1976-1991	Low Code	
	1992-2003	Moderate Code	
	2004-present	High Code	
Manufactured Housing	prior to 2003	Pre Code	Interpretation of Oregon Manufactured Dwelling Special Codes (Oregon Building Codes Division, 2002)
	2003-2010	Low Code	
	2011-present	Moderate Code	Interpretation of Oregon Manufactured Dwelling Special Codes Update (Oregon Building Codes Division, 2010)
All other buildings	prior to 1976	Pre Code	Business Oregon 2014-0311 Oregon Benefit-Cost Analysis Tool, p. 24 (Business Oregon, 2015)
	1976-190	Low Code	
	1991-present	Moderate Code	

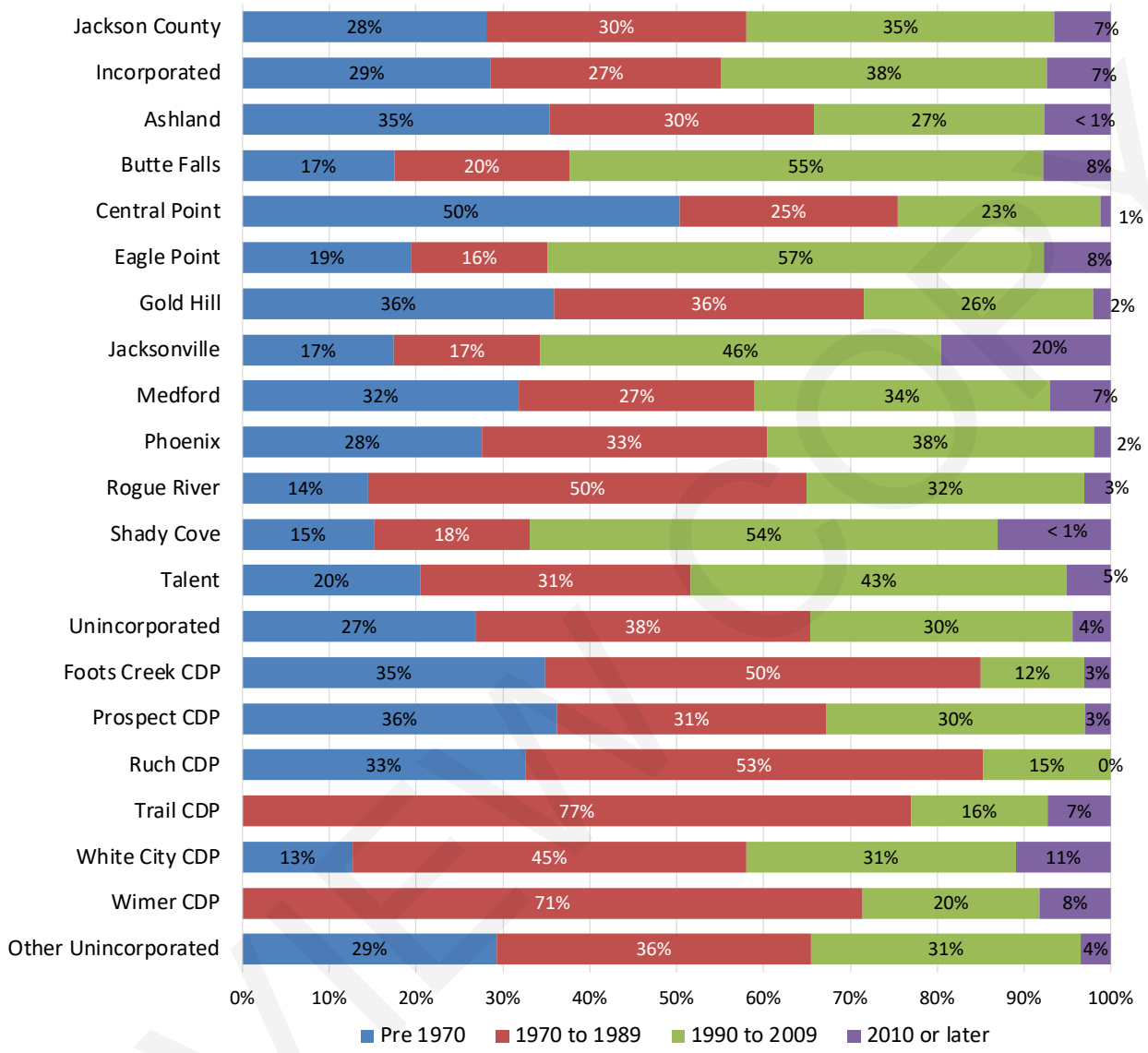
Source: DOGAMI, Open-File Report O-23-01. Multi-Hazard Risk Report for Tillamook County, Oregon: Appendix C – Hazus MH Methodology.

Figure C-10 shows that, countywide, 28% of the housing stock was built prior to 1970, before the implementation of floodplain management ordinances; Central Point has one-half of its housing units built prior to 1970.

Countywide, 58% of the housing stock was built before 1990 and the codification of stricter seismic building standards (Table C-25).

[89] 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/osspac/docs/history_seismic_codes_or.pdf

Figure C-10 Year Structure Built



Source: U.S. Census Bureau, 2017-2021 American Community Survey Estimates, Table B25034

Infrastructure Profile

Physical infrastructure such as dams, roads, bridges, railways, and airports support Jackson County communities and economies. Critical facilities are those facilities that are vital in government response and recovery activities and are important to consider as there can be serious secondary impacts to such facilities when disrupted. Critical facilities and infrastructure can be a wide range of things depending on the social, environmental, economic, and physical makeup of the area under consideration. Such facilities can include emergency services, communication services, transportation systems, government facilities, healthcare and public health facilities, information technology, water services, and energy generation and transmission. Due to the fundamental role that infrastructure plays both pre- and post-disaster, special attention in the context of creating more resilient communities is important. The

information provided in this section will outline important infrastructures throughout the county which will help provide a basis for informed decisions about how to reduce the county's infrastructural vulnerabilities to natural hazards.

Utility Lifelines

Utility lifelines are the resources 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.

The network of transmission lines running through the county may be vulnerable to severe, but infrequent natural hazards, such as windstorms, winter storms, and earthquakes.

Electric Power Systems

The Bonneville Power Administration is the region's wholesale electricity distributor. Pacific Power (PacifiCorp) is the primary investor-owned utility company serving Jackson County (including the cities of Butte Falls, Central Point, Eagle Point, Jacksonville, Medford, Phoenix, Rogue River, Shady Cove, Talent, and the unincorporated community of White City). Other utilities include Ashland Municipal Electric Utility which serves the City of Ashland,

Most of the electrical power in the region is generated through hydropower. Dams operated by the Bonneville Power Administration (BPA) and Pacific Power (PacifiCorp) provide hydro-generated electricity, including from dams situated on the Applegate River and Rogue River. There is one additional power plant located in White City, which uses biomass as its energy source.[90]

The electric power system is central to community function. The impacts of loss of electric power are large: residential, commercial, and public customers are all heavily dependent on electric power for normal functioning. Furthermore, other utility systems, especially water and wastewater systems, are heavily dependent on electric power for normal operations. Loss of electric power may have large impacts on affected communities, especially if outages are prolonged.

Natural Gas Systems

Jackson County's primary natural gas provider is investor owned Avista Utilities. Natural gas transmission and distribution pipes are not usually affected by flooding, because the pipes are pressurized. However, compressor stations may be subject to inundation damage or loss of electrical power to run electrical and mechanical equipment.

Transmission and distribution pipes are also subject to rupture in slide areas and in earthquakes. Buried utility pipes are very subject to failure in small ground movements. Movements as small as an inch or two are often sufficient to break the pipes, especially for older cast-iron pipe which

[90] Loy, W. G., ed. 2001. Atlas of Oregon, 2nd Edition. Eugene, OR: University of Oregon Press

is more brittle than welded steel or polyethylene pipe. Possible mitigation actions include pipe upgrades for a few critical locations and nonstructural seismic mitigation for control equipment.

Telecommunications Systems

Telephone (land lines and cellular) systems, broadcast radio and TV systems and cable TV systems may all be vulnerable to damages and services outages from hazards. However, in general, such systems have proved to be somewhat less vulnerable to service outages than other utility systems. System nodes (broadcast studios, switching offices and such) are subject to flooding if located in flood-prone areas. However, because of the importance of such facilities, few are in highly flood-prone sites.

Similarly, few such facilities are likely to be in landslide prone areas. Cellular towers in hilly areas, however, may be more subject to landslide hazards.

Buried communications (copper and fiber optic) and cable television cables are usually flexible enough to accommodate several feet of ground movement before failure. While major landslides may rupture such cables, minor settlements or small slides are not nearly as likely to impact such cables as they are to break buried gas or water pipes. Such lines typically perform relatively well in earthquakes.

Above ground communications and cable television cables are subject to wind- induced failures from tree falls and pole failures. However, such failures are less common than failures of electric power lines. The better performance of communications cables arises in part because the electrical cables are always highest on the poles, thus a falling branch is usually first resisted by the power cables. Also, because the voltage levels in communications cables are much lower than those in power cables, the communication cables are not subject to “burn down” or shorting if wind-swayed cables touch each other or get too close.

Some telecommunications facilities are subject to failure because of loss of electric power. However, key facilities almost always have backup battery power and/or generators. Therefore, telecommunications facilities are generally much less vulnerable to outages from loss of electric power than are water or wastewater systems.

Potable Water

Water treatment plants are often located in flood prone areas and are subject to inundation when untreated water enters the filters, sedimentation, or flocculation basins, resulting in loss of capability to treat incoming untreated water properly. Water system control buildings and pump stations may also be subject to flood damage. Public or private water systems with wells as the water source are subject to outages when flood waters contaminate well heads; this is a common problem for smaller water systems.

Water transmission or distribution pipes are rarely damaged by flood waters, unless there are soil settlements or major erosion, because the lines are sufficiently pressurized (for water quality) to prevent intrusion of flood waters. Water transmission or distribution pipes are, however, subject to breakage when they cross landslide areas or in earthquakes. Water treatment plants are also subject to earthquake damage to the building and to process and control equipment.

Water systems are also highly vulnerable to electric power outages. Many water systems include pumped storage systems where water is pumped to storage tanks which are typically located 60 to 200 feet above the elevation of water system customers. Such tanks generally contain no more than 1 or 2 days of storage beyond typical daily usage (for reasons of water quality). Thus, electric power outages of more than 1 or 2 days may result in loss of potable water due to the inability of pumping plants to pump water. The most logical mitigation projects to minimize such outages are to provide back-up generators at key pumping plants or to provide quick connects so that portable generators (if available) can be quickly installed. Water treatment plants are also subject to outages due to loss of electric power.

Wastewater Systems

Wastewater systems are often highly vulnerable to flood impacts. Rising water may cause collection pipes to back up and overflow. Intrusion of storm water into collection systems may result in flows that exceed treatment plant capacities, resulting in release of untreated or only partially treated flows. Treatment plants are often located in floodplains, at low elevations, to facilitate gravity flow. However, such locations also facilitate flood damage.

Lift stations and treatment plants are also subject to loss of function due to electric power outages, with resulting overflows or releases. Collection pipes are also subject to breakage due to landslides. However, such impacts are not particularly common since most wastewater collection systems are in more urbanized areas with only selected areas subject to slides. Wastewater pipes are, however, subject to breakage in earthquakes. Wastewater treatment plants are also subject to earthquake damage to the building and to process and control equipment.

Dams

Dams are manmade structures built to impound water. Dams are built for many purposes including water storage for potable water supply, livestock water supply, irrigation, or fire suppression. Other dams are built for flood control, recreation, navigation, hydroelectric power or to contain mine tailings. Dams may also be multifunction, serving two or more of these purposes.

These critical infrastructure pieces not only protect water resources that are used for drinking, agriculture, and recreation, but they protect downstream development from inundation. Dams may also be multifunction, serving two or more of these purposes.

The National Inventory of Dams (Figure C-11 and Table C-26), NID, which is maintained by the United States Army Corps of Engineers, is a database of approximately 91,750 dams in the United States. The NID does not include all dams in the United States. Rather, the NID includes dams that are deemed to have a high or significant hazard potential and dams deemed to pose a low hazard if they meet inclusion criteria based on dam height and storage volume. Low hazard potential dams are included only if they meet either of the following selection criteria:

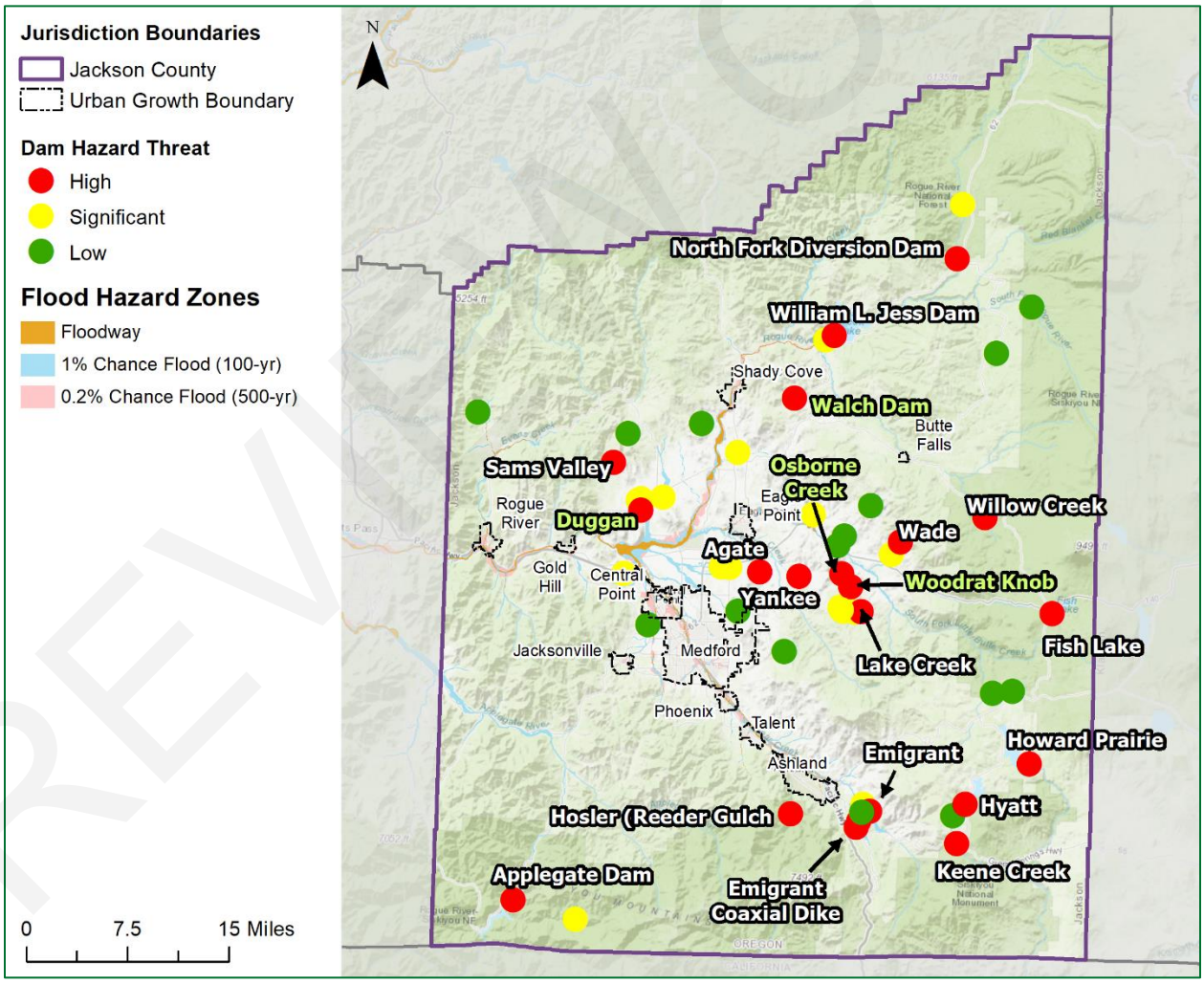
- exceed 25 feet in height and 15 acre-feet of storage, or
- exceed 6 feet in height and 50-acre feet of storage.

There are many thousands of dams too small to meet the NID selection criteria. However, these small dams are generally too small to have significant impacts if they fail and thus are generally not considered for purposes of risk assessment or mitigation planning.

This NID potential hazard classification is solely a measure of the probable impacts if a dam fails. Thus, a dam classified as High Potential Hazard does not mean that the dam is unsafe or likely to fail. The level of risk (probability of failure) of a given dam is not even considered in this classification scheme. Rather, the High Potential Hazard classification simply means that there are people at risk downstream from the dam in the inundation area if the dam were to fail.

Dams assigned to the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life. Failure of dams in the high classification will generally also result in economic, environmental or lifeline losses, but the classification is based solely on probable loss of life. There are 21 High Hazard dams in Jackson County (Figure C-11 and Table C-26).

Figure C-11 Jackson County Dams and Hazard Threat



Source: OPDR, data National Inventory of Dams - Link. Note: Text in red indicates HHDP eligible as of 6/1/2022.

Dams assigned to the significant hazard potential classification are those where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities. Significant hazard potential dams are often located in predominantly rural or agricultural areas. There are 20 Significant Hazard dams in Jackson County.

Dams assigned the low hazard potential classification are those where failure or mis- operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the dam owner's property. There are 15 Low Hazard dams in Jackson County.

Table C-26 Jackson County Dam Inventory

NID ID	Dam Name	Condition Assessment	Primary Purpose	Owner Type	Daytime PAR	Nightime PAR
OR00395	Lake Creek	Fair	Irrigation	Private	-	-
OR00379	Wade	Fair	Irrigation	Private	-	-
OR00222	Yankee	Fair	Irrigation	Private	-	-
OR00560	North Fork Diversion Dam	Not Available	Hydroelectric	Private	-	-
OR00246	**Walch Dam**	**Poor**	**Irrigation**	**Private**	**20**	**57**
OR00475	**Duggan**	**Poor**	**Recreation**	**Private**	**6**	**11**
OR00401	**Osborne Creek**	**Poor**	**Irrigation**	**Private**	**227**	**500**
OR00357	**Woodrat Knob**	**Unsatisfactory**	**Irrigation**	**Private**	**123**	**229**
OR00400	Sams Valley	Fair	Irrigation	Local Government	-	-
OR00110	Hosler (Reeder Gulch)	Not Available	Water Supply	Local Government	-	-
OR00212	Willow Creek	Satisfactory	Water Supply	Local Government	-	-
OR00031	Keene Creek	Not Available	Hydroelectric	Federal	-	-
OR00580	Howard Prairie	Not Available	Hydroelectric	Federal	-	-
OR00581	Emigrant Coaxial Dike	Not Available	Flood Risk Reduction	Federal	-	-
OR00422	Agate	Not Available	Irrigation	Federal	-	-
OR00581	Emigrant Highway Dike	Not Available	Flood Risk Reduction	Federal	-	-
OR00581	Emigrant	Not Available	Flood Risk Reduction	Federal	-	-
OR00021	Fish Lake	Not Available	Flood Risk Reduction	Federal	-	-
OR00591	Hyatt	Not Available	Hydroelectric	Federal	-	-
OR00624	Applegate Dam	Not Available	Flood Risk Reduction	Federal	-	-
OR00612	William L. Jess Dam	Not Available	Flood Risk Reduction	Federal	-	-

Source: National Inventory of Dams - Link. Oregon Water Resources Department Inquiry on HHPD Eligibility (6/9/2022.
PAR = Population at Risk, **Bold**=Dam that is elgigible for the FEMA HHPD Grant Program.

Dam failures can occur at any time in a dam's life; however, failures are most common when water storage for the dam is at or near design capacity. At high water levels, the water force on the dam is higher and several of the most common failure modes are more likely to occur. Correspondingly, for any dam, the probability of failure is much lower when water levels are substantially below the design capacity for the reservoir.

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.

Railroads

Railroads are major providers of regional and national cargo trade flows. The Central Oregon & Pacific and the White City Terminal Railroad run through Jackson County.[91] The Central Oregon & Pacific Line follows I-5 through the Jackson County; it then runs west through Lane County and loops back into Douglas County through Reedsport. The White City Terminal Railroad is a short spur off the Central Oregon & Pacific Line in Jackson County.

Rails are sensitive to icing from winter storms that can occur in the Southwest 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

Jackson County has one commercial service airport, three other public airports and 17 private airports.[92] The Rogue Valley International Airport in Medford is the only commercial service airport in surrounding Douglas, Josephine, and Klamath Counties. Access to these airports face the potential for closure from several natural hazards, including wind and winter storms common to the region. 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. Common runway surface types in Jackson County are turf, dirt, asphalt, concrete and gravel.

Roads

The region's major expressway is Interstate 5. It runs north/south through Jackson County and is the main passage for automobiles and trucks traveling along the west coast. Other major highways that service this region include:

- US Highway 66 connects Ashland Municipal Airport with Ashland and Klamath Falls.
- US Highway 62 connects Medford to Central Oregon.
- Highway 227 joins Highway 62 near Shady Cove and eventually merges with I-5north near Roseburg.
- US Highway 199 intersects with I-5 in Grants Pass, just outside of Jackson County and runs south to the North Coast of California.
- Highway 238 connects the Applegate Valley including the communities of Jacksonville, Ruch, Applegate, and Provolt to Medford and Grants Pass.
- Highway 140 connects Medford to Klamath Falls.

[91] Oregon Department of Transportation, State of Oregon, Oregon Railways. http://www.oregon.gov/ODOT/TD/TDATA/gis/docs/statemaps/railroads.pdf?ga=t

[92] FAA Airport Master Record. 2011. http://www.faa.gov/airports/airport_safety/airportdata_5010/menu/index.cfm.

- Highway 99 runs parallel to Interstate 5 and provides a secondary transportation route for cities within Rogue Valley.

Daily, transportation infrastructure capacity in the Southwest Oregon region is stressed by maintenance, congestion, and oversized loads. Natural hazards can further disrupt automobile traffic and create gridlock this is of specific concern in periods of evacuation.[93]

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 network of streets, highways, and bridges to facilitate emergency services response after a disaster.[94]

System connectivity and key geographical features were used to identify a three-tiered seismic lifeline system. Routes identified as Tier 1 are 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 Lifeline Routes in the SouthI-5 and Cascades Regions affecting Jackson County consist of the following:

- Tier I: Interstate 5
- Tier II: Oregon Route 140

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

Table C-27 shows the structural condition of bridges in the region. A distressed bridge 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 is a federal performance measure used for non-ODOT bridges; the ratings do not imply that a bridge is unsafe.[95] The table shows that the county has a lower percentage of bridges that are

[93] State of Oregon Natural Hazard Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

[94] CH2MHILL, Prepared for Oregon Department of Transportation. Oregon Seismic Lifeline Routes Identification Project, *Lifeline Selection Summary Report,* May 15 2012.

[95] Oregon. Bridge Engineering Section (2012). 2012 Bridge Condition Report. Salem, Oregon: Bridge Section, Oregon Department. of Transportation.

distressed and/ or deficient (11%), than does the state (21%). About 36% of the total county and city owned bridges are distressed, compared to 21% of State owned (ODOT) bridges.

Table C-27 Bridge Inventory

		Oregon	Region 4	Jackson
State Owned	Distressed	610	64	24
	Sub-total	2,718	362	128
	Percent Distressed	22%	18%	21%
County Owned	Deficient	633	81	16
	Sub-total	3,420	508	152
	Percent Distressed	19%	16%	11%
City Owned	Deficient	160	14	8
	Sub-total	614	56	32
	Percent Deficient	26%	25%	25%
Other Owned	Deficient	40	4	0
	Sub-total	115	10	0
	Percent Deficient	35%	40%	-
Area Total	Deficient	1,443	163	48
	Sub-total	6,769	905	300
	Percent Deficient	21%	18%	16%
Historic Covered		334	11	4

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

The bridges in Jackson County require ongoing management and maintenance due to the age and types of bridges. Modern bridges, which require minimum maintenance and are designed to withstand earthquakes, consist of pre-stressed reinforced concrete structures set on deep steel piling foundations.

The County's bridge maintenance and engineering divisions work in coordination to inspect and maintain the bridges within the county. Bridges within Jackson County are inspected at two-year intervals or more frequently if special conditions exist. Bridges that are found to be in critical condition during an inspection are prioritized for immediate replacement.

Synthesis

Built capacity refers to the built environment and infrastructure that support a community. The various forms of built capital mentioned above will play significant roles in the event of a disaster. Physical infrastructures, along with utility and transportation lifelines are critical during a disaster and are essential for proper functioning and response. Community resilience is directly affected by the quality and quantity of built capital and lack of, or poor condition of, infrastructure can negatively affect a community's ability to cope, respond, and recover from a natural disaster. Initially following a disaster, communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions will force

communities to rely on local and immediate resources, so it is important to identify critical infrastructures throughout the county as they may play crucial roles in the mitigation and recovery stages of a disaster.

It is important for the county to consider these numbers when producing mitigation and educational outreach materials as it is important to reach all populations, especially the ones who face a higher risk of damage. There are 21 dams throughout the county classified with a high threat potential. There are a variety of critical facilities located throughout county limits that in the event of a disaster can make communication efforts challenging. Several major highways run throughout the county, giving residents several alternative routes that may provide service access, or serve as evacuation routes, yet if these roads are destroyed it can isolate communities and make rescue efforts more challenging.

Community Connectivity Capacity

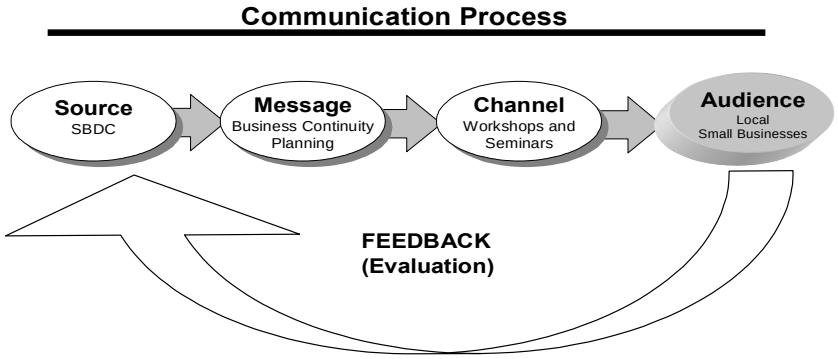
Community connectivity capacity places strong emphasis on social structure, trust, norms, and cultural resources within a community. In terms of community resilience, these emerging elements of social and cultural capital will be drawn upon to stabilize the recovery of the community. Social and cultural 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 several issues, one of which could be natural hazard preparedness and mitigation. The presence of these services is more predominantly located in urbanized areas of the county, this is synonymous with the general urbanizing trend of residents.

Figure C-12 displays the NHMP's communication process. It is followed by 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.

Figure C-12 Communication Process



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

- 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.

The following list highlights organizations that are active within the community and may be potential partners for implementing mitigation actions. The three involvement methods 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 coordinator or partner organization to implement mitigation actions.

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 79.5% voter turnout in the county.[96] These results are slightly above voter participation reported across

[96] Official Summary Report, November 3, 2020, Jackson County Clerk. https://jacksoncountyor.org/clerk/Elections/Election-Archives.

the State (78.5%) for the 2020 election.[97] Other indicators such as volunteerism, participation in formal community networks and community charitable contributions are examples of other civic engagement that may increase community connectivity.

Cultural Resources

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. Jackson County Library Services has 15 branches across the county, including those in the communities of Ashland, Butte Falls, Central Point, Eagle Point, Gold Hill, Jacksonville, Medford, Phoenix, Prospect CDP, Rogue River, Ruch CDP, Shady Cove, Talent, and White City CDP. There are several museums in Jackson County, including the Science Works Hands-On Museum in Ashland, Crater Rock Museum in Central Point, and Kid Time Children's Museum and the Southern Oregon Historical Society, both located in Medford.

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 Oregon Shakespeare Festival, which draws hundreds of thousands of visitors to Ashland every year between April and December. Not only do events like these bring revenue into the community, they have potential to 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.

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."[98] If a structure does not meet these criteria, it is considered to be non-contributing.

[97] Voter Turnout History for General Elections, Oregon Secretary of State. https://sos.oregon.gov/elections/Documents/Voter_Turnout_History_General_Election.pdf.

[98] U.S. Department of the Interior, National Park Service, Cultural Resources, National Register Bulletin 16A: "How to Complete the National Register Registration Form".

Table C-28 identifies the number of eligible/significant (ES), eligible/contributing (EC) historical sites, and non-eligible historic sites in unincorporated Jackson County. Overall, there are a total of 536 historically registered places in Jackson County.

Table C-28 Jackson County Historic Places

Eligible Sites	Total Sites	Percent Total
Eligible Significant	78	15%
Eligible Contributing	369	69%
Not Eligible / Non-Contributing	44	8%
Not Eligible / Out of Period	16	3%
Undetermined	29	5%
	536	

Source: Oregon Historic Sites Database

Community Stability

Community stability is a measure of rootedness in place. It is hypothesized that resilience to a disaster stem 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.[99]

Residential Geographic Stability

Table C-29 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. Jackson 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). Foots Creek CDP (100%), Trail CDP (100%), Butte Falls (99%), and Shady Cove (99%) the highest geographic stability while Jacksonville has the lowest (81%).

[99] Cutter, Susan, Christopher Burton, Christopher Emrich. "Disaster Resilience Indicators for Benchmarking Baseline Conditions". Journal of Homeland Security and Emergency Management.

Table C-29 Regional Residential Stability

Jurisdiction	Population	Geographic Stability	Same House	Moved Within Same County
Jackson County	219,491	94%	84%	11%
Incorporated	137,791	94%	82%	12%
Ashland	21,235	88%	78%	9%
Butte Falls	475	99%	85%	13%
Central Point	18,851	97%	85%	12%
Eagle Point	9,452	98%	79%	19%
Gold Hill	1,164	98%	87%	11%
Jacksonville	2,975	81%	69%	11%
Medford	83,639	95%	82%	13%
Phoenix	4,403	97%	84%	12%
Rogue River	1,695	89%	83%	6%
Shady Cove	3,006	99%	95%	4%
Talent	6,256	96%	84%	12%
Unincorporated	81,700	77%	72%	5%
Foots Creek CDP	923	100%	86%	14%
Prospect CDP	555	97%	89%	8%
Ruch CDP	1,184	85%	77%	8%
Trail CDP	632	100%	91%	9%
White City CDP	10,023	96%	85%	11%
Wimer CDP	441	91%	91%	0%
Other Unincorporated	67,942	73%	69%	4%

Source: Social Explorer, Table 130, U.S. Census Bureau, 2017-2021 American Community Survey Estimates

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, about 60% of the occupied housing units in Jackson County are owner-occupied; about 33% are renter occupied (Table C-30). Foots Creek CDP (82%) and White City CDP (81%) have the highest rate of owner-occupied units. Seasonal or recreational housing accounts for a portion of housing units in Jackson County. Approximately two-percent (2%) of the county's housing stock is considered "seasonal" housing, these are homes that are either occupied by the owner part of the year or are used as vacation rentals.[100] Trail CDP (24%) has the highest seasonal housing percentage while Ashland (518) has the highest number of units.

[100] U.S. Census Bureau, 2013-2017 American Community Survey Estimates, Table B25004.

Table C-30 Housing Tenure and Vacancy

Jurisdiction	Housing Units	Owner-occupied		Renter-occupied		Seasonal^		Vacant^^	
		Estimate	Percent	Estimate	Percent	Estimate	Percent	Estimate	Percent
Jackson County	95,599	57,815	60%	31,652	33%	1,867	2%	4,265	4%
Incorporated	67,355	36,563	54%	27,003	40%	868	1%	2,921	4%
Ashland	11,273	5,616	50%	4,436	39%	518	5%	703	6%
Butte Falls	194	119	61%	48	25%	5	3%	22	11%
Central Point	7,264	4,935	68%	2,161	30%	0	0%	168	2%
Eagle Point	3,686	2,443	66%	1,177	32%	0	0%	66	2%
Gold Hill	505	363	72%	119	24%	0	0%	23	5%
Jacksonville	1,691	833	49%	699	41%	53	3%	106	6%
Medford	35,337	18,224	52%	15,421	44%	156	0%	1,536	4%
Phoenix	1,968	1,204	61%	744	38%	0	0%	20	1%
Rogue River	1,003	497	50%	379	38%	6	1%	121	12%
Shady Cove	1,482	936	63%	381	26%	81	5%	84	6%
Talent	2,952	1,393	47%	1,438	49%	49	2%	72	2%
Unincorporated	28,244	21,252	75%	4,649	16%	999	4%	1,344	5%
Foots Creek CDP	387	319	82%	68	18%	0	0%	0	0%
Prospect CDP	259	183	71%	52	20%	11	4%	13	5%
Ruch CDP	421	298	71%	123	29%	0	0%	0	0%
Trail CDP	376	262	70%	25	7%	89	24%	0	0%
White City CDP	3,300	2,672	81%	547	17%	0	0%	81	2%
Wimer CDP	213	129	61%	53	25%	0	0%	31	15%
Other Unincorporated	23,288	17,389	75%	3,781	16%	899	4%	1,219	5%

Source: Social Explorer, Tables 94, and 95, U.S. Census Bureau, 2017-2021 American Community Survey Estimates, Table B25004
^ = Seasonal, recreational, or occasional housing units. ^^ = 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.[101] In the most extreme cases, renters lack enough shelter options when lodging becomes uninhabitable or unaffordable post-disaster.

Synthesis

Jackson 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.

[101] Cutter, S. L. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly*.

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 Community Service Center. 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 Department 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 Department of Emergency Management (OEM), the Federal Emergency Management Agency, 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, in order 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.

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 on the basis of 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 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 in light of 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.

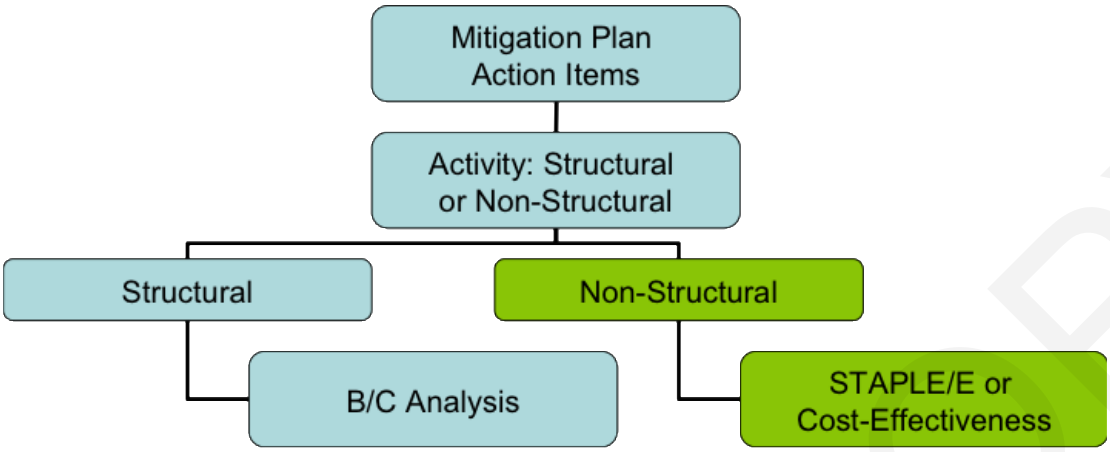
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

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. Figure D-1 is to serve as a guideline for when to use the various approaches.

Figure D-1 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 on the basis of 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 as a result 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 a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result 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 in order 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, and small business development, 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. Eidinger, 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, Ocbober 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 Department 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.

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

Non-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 non-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 Department of Emergency Management (OEM) grant guidance on Federal Hazard Mitigation Assistance, visit:
https://www.oregon.gov/OEM/emresources/Grants/Pages/HMA.aspx

Contact: 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

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

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/

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

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

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-HCFPGrants.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-nonprofit

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

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/

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Appendix F: Survey

Purpose

This survey was administered during the development of the NHMP as part of a related Smoke Management Community Response Plan.

To gather input from the Jackson County community, the Oregon Partnership for Disaster Resilience (OPDR) team designed a survey to measure community perspectives on smoke events, cleaner air sites (CAS), and smoke notification methods. The survey was designed to get a better understanding of the community's understanding and needs relating to prescribed burning and wildfire smoke throughout the county.

Key Takeaways

The following key takeaways from the 2022 Jackson County Community Survey provide a high-level overview of information provided by survey participants.

- Most respondents indicated they would opt-in to receive notifications about smoke events from Citizen Alert.
- Most of the community understands air quality index; this is a useful metric for conveying air quality information to the community.
- Most of the community is very concerned to extremely concerned about how smoke is impacting their health
- Most people protect themselves during smoke events by sheltering in place, and most respondents would not use CAS. They would prefer to stay at home, but 30% indicate they do not have an effective way to filter air at home.
- Most respondents would not attend public presentations in person to learn how to protect themselves from smoke but would use an informational website or attend virtual events.
- Respondents indicated they want better information and assistance purchasing air purifiers and maintaining clean air inside their homes.
- Those who would use CAS would prefer that they be in libraries and community centers and offer wireless internet and opportunities for privacy.
- Some respondents indicated they distrusted Jackson County's Emergency Response Notifications because people did not feel they were notified during the Almeda Fire
- Most respondents (94%) had a method for transportation to CAS. Those that did not would prefer using public transportation or non-emergency medical transport.
- Respondents' preferred methods of communication for smoke notifications are text, email, and websites and social media.

Methodology

The OPDR administered the survey online using the Qualtrics digital survey platform. The survey was open for responses from September 7, 2022, to October 15, 2022. The OPDR Team and Jackson County CRP Leadership team promoted the survey through press releases, social media promotion, email list serves, verbally and through appearances on the local news. Press releases and social media promotion was conducted in both English and Spanish.

The survey received 2,202 responses. Of these, 124 were removed due to evidence of fraudulence or completion by an online bot. This leaves 2,078 legitimate responses. Of these, 1,907 respondents said they live in Jackson County. 1,295 respondents finished the entire survey.

The survey questions were developed with the goal to learn more from residents of Jackson County about their knowledge and experience with smoke events, their preferences for methods of protection from smoke, and notifications about smoke events. It consisted of thirty-two questions and was distributed in English with Spanish translation available.

The survey included questions from five themes:

1. Introduction – The purpose of this section was to get consent from the respondent about voluntarily participating in the survey and understanding whether they live in Jackson County, and where in the county they live. If respondents did not live in Jackson County, they were taken to the end of the survey.
2. Local Perspectives of Smoke Events – The purpose of this section was to understand respondents' concerns, preparations, and needs during smoke events.
3. Cleaner Air Sites – The purpose of this section was to understand community interest and needs for CAS during smoke events.
4. Preferred communication methods – This purpose of this section was to understand respondents' preferred methods of communication for notification about smoke events.
5. Demographic information – The purpose of this section was to help in understand the characteristics of people who completed the survey.

The survey also included space for respondents to add any additional comments of what they would like to see or tell us. They were also given the opportunity to enter a raffle to win one of two $25 gift cards.

Survey Limitations

The main limitations of the survey affected its reach. The survey was only distributed in a digital format, which limited respondents to those with a computer or smartphone and access to the internet. It was also only available in English and Spanish so speakers of other languages may not have been able to respond to the survey. Also, the size of Jackson County and the remoteness of certain parts of the county made it difficult to distribute it evenly throughout the county, and there was more representation of some cities and towns than others.

Because of the substantial number of methods of advertisement and the online format of the survey, it is difficult to understand how many people it was distributed to and how many people who saw it did not respond to it. Not being able to measure non-response bias made it difficult to understand if the results only represent certain opinions of the community or the opinions of a cross section of the entire county.

We also did not ask questions about how the Jackson County Community views the use of prescribed fire to mitigate future smoke events from wildfire. Future surveys should attempt to measure the community's perspective about the use and importance of prescribed fire operations.

Survey Results

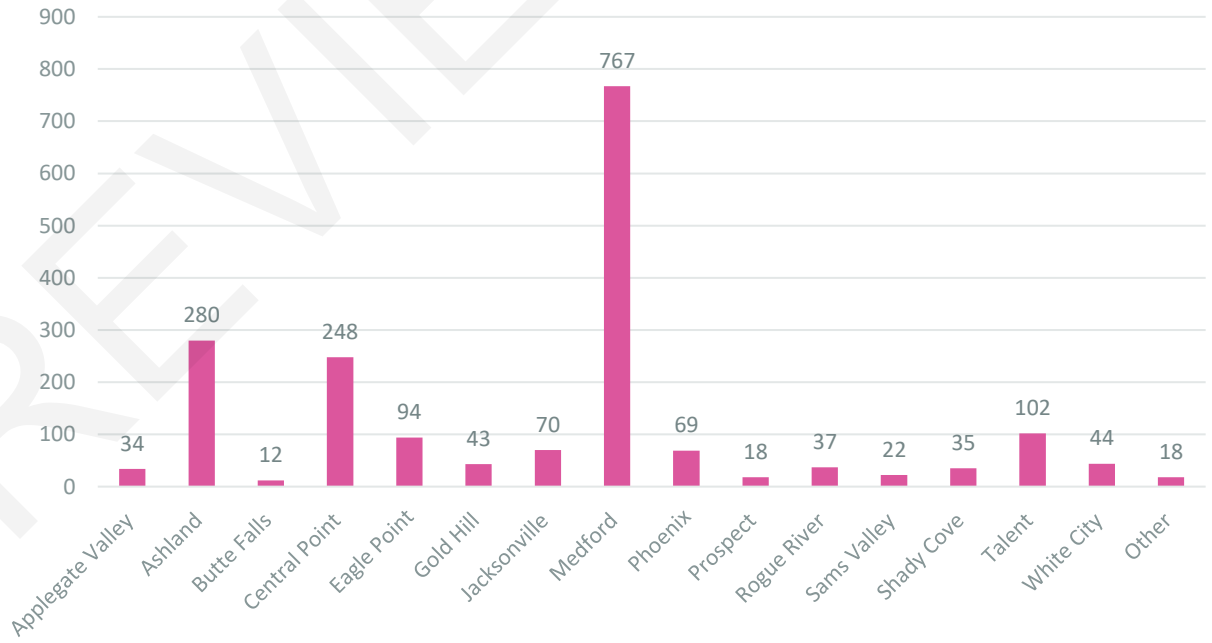
The results of the survey are organized into the sections of the survey that were listed in the methodology section. Each table and figure include a source showing which question it refers to.

Introduction

The introduction section of the survey allowed respondents to opt into the survey. It then asked if the respondent lived in Jackson County. If they did not, then they were sent to the end of the survey. About 2% of people who started the survey were not from Jackson County.

Respondents were then asked what city or town in Jackson County they lived in. The greatest number of respondents were from Medford (767) followed by Ashland (280) and Central Point (248). See Figure F-1 for the distribution of responses.

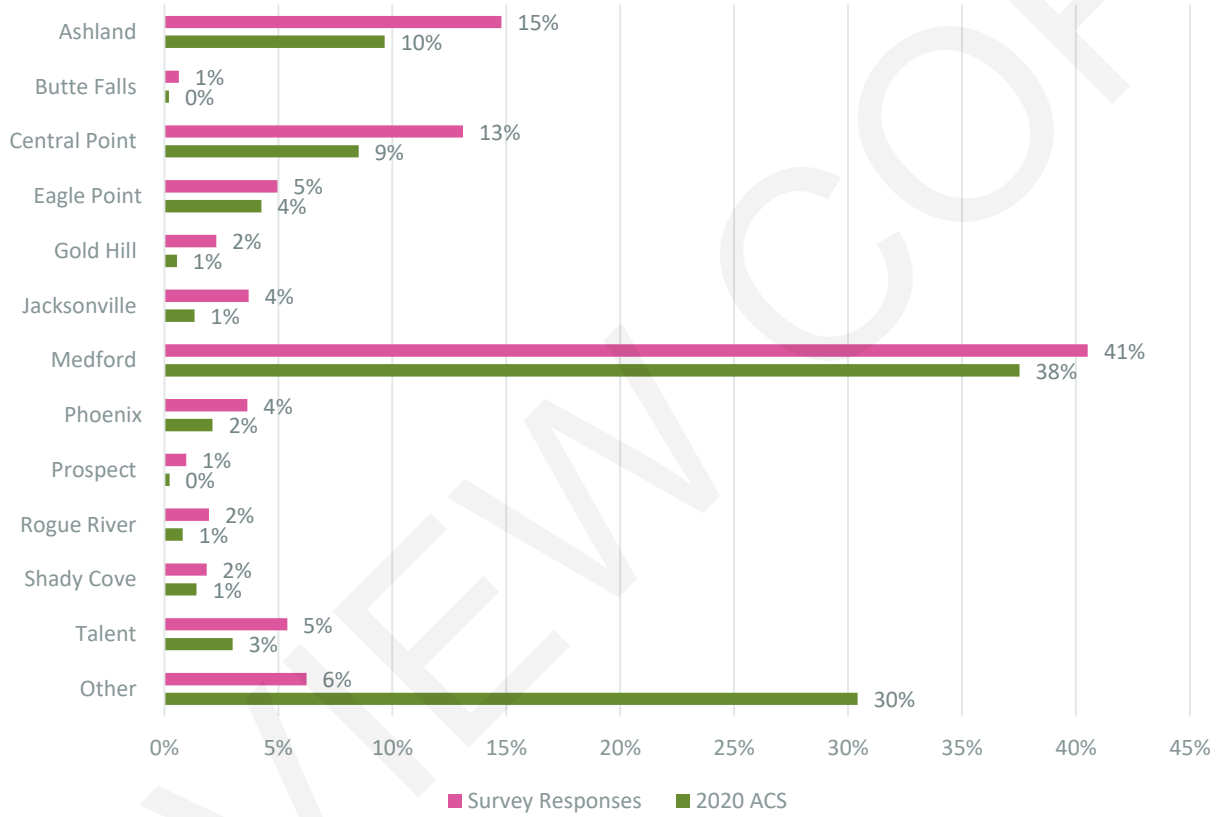
Figure F-1 Location of respondents who live within Jackson County(n=1,893)



Source: Jackson County Community Survey, 2022, Q3: What city or town do you live in, or is closest to your home? Analysis by OPDR.

compares the number of survey responses to the populations of these areas from the 2020 ACS (5-year estimates, 2016-2020). Responses are mostly proportional to the population, with most of the cities and towns being overrepresented, and the incorporated areas (under other) being less represented.

Figure F-2 Location of respondents who live within Jackson County vs population distribution (n=1,893), (note that Applegate, Sam's Valley, and White City were included in the other category because the ACS does not have population data for those areas)

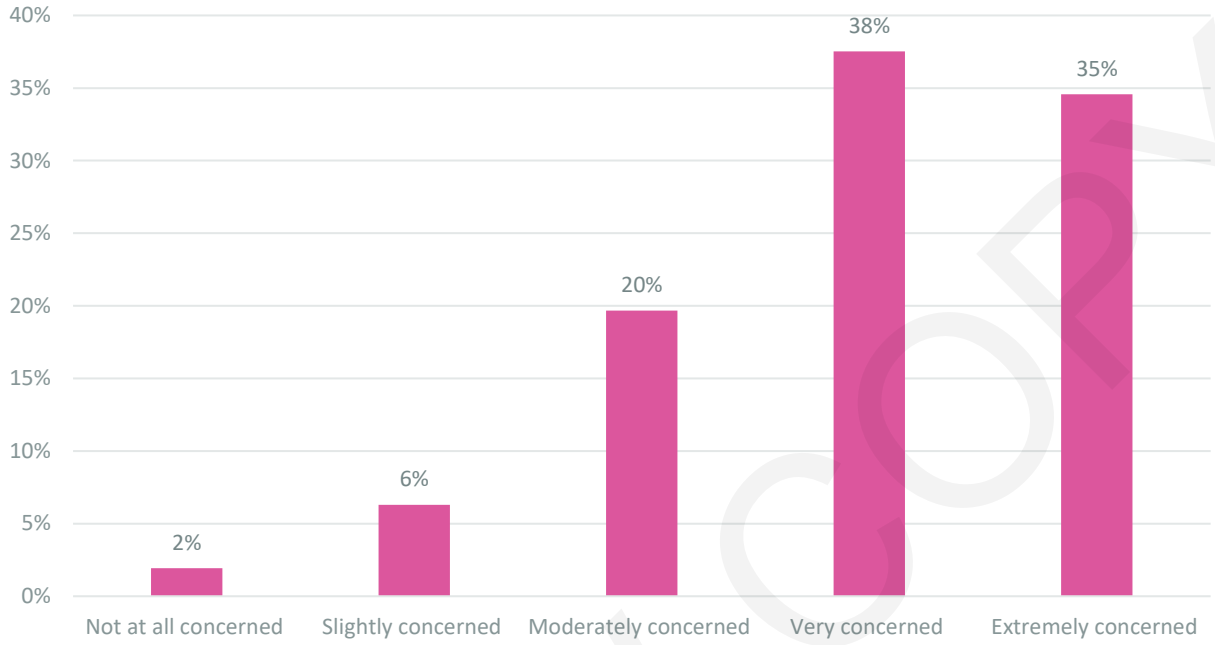


Source: Jackson County Community Survey, 2022, Q3: What city of town do you live in or is closest to your home?; U.S. Census Bureau. American Community Survey 2016-2020 5-year estimates. Social Explorer Table A00001: Total Population. Analysis by OPDR

Local Perspectives of Smoke Events

This section asked respondents questions relating to their understanding of, and concerns about, smoke events. The first question asked if residents are familiar with the Air Quality Index and what the numbers mean. Ninety-three percent of respondents said yes, and 7% said no. They were then asked their level of concern about the impact of wildfire smoke on their health during smoke events. The majority answered either very concerned (38%) or extremely concerned (35%). See Figure F-3 for the distribution of level of concern responses.

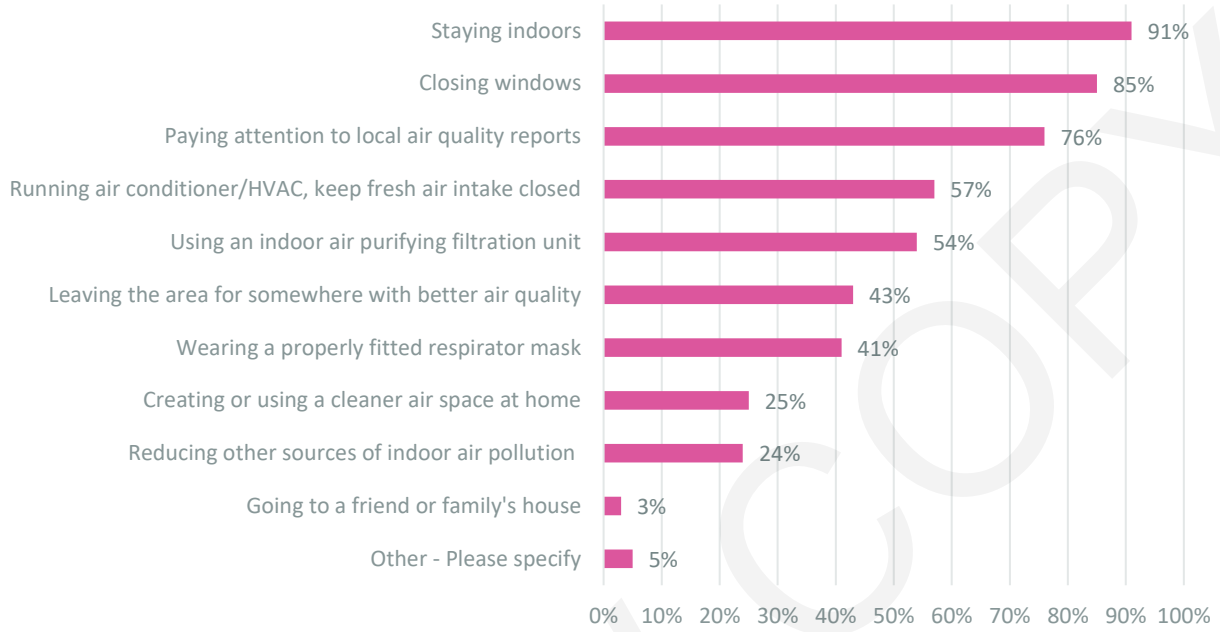
Figure F-3 Respondents' level of concern about the impact of wildfire smoke on health (n=1,860)



Source: Jackson County Community Survey, 2022, Q5: Please indicate your level of concern about the impact of wildfire smoke on your health during smoke events. Analysis by OPDR

Respondents were then asked about how they protect themselves and their homes from wildfire smoke. Figure F-4 shows the percentage of people who chose each option. Note that respondents could choose all answers that apply, and this graph is a measurement of the percentage of respondents that chose each option.

Figure F-4 How respondents protect themselves and their households from wildfire smoke(n=1,865)



Source: Jackson County Community Survey, 2022, Q6: How does your household protect itself from a smoke event?, Analysis by OPDR

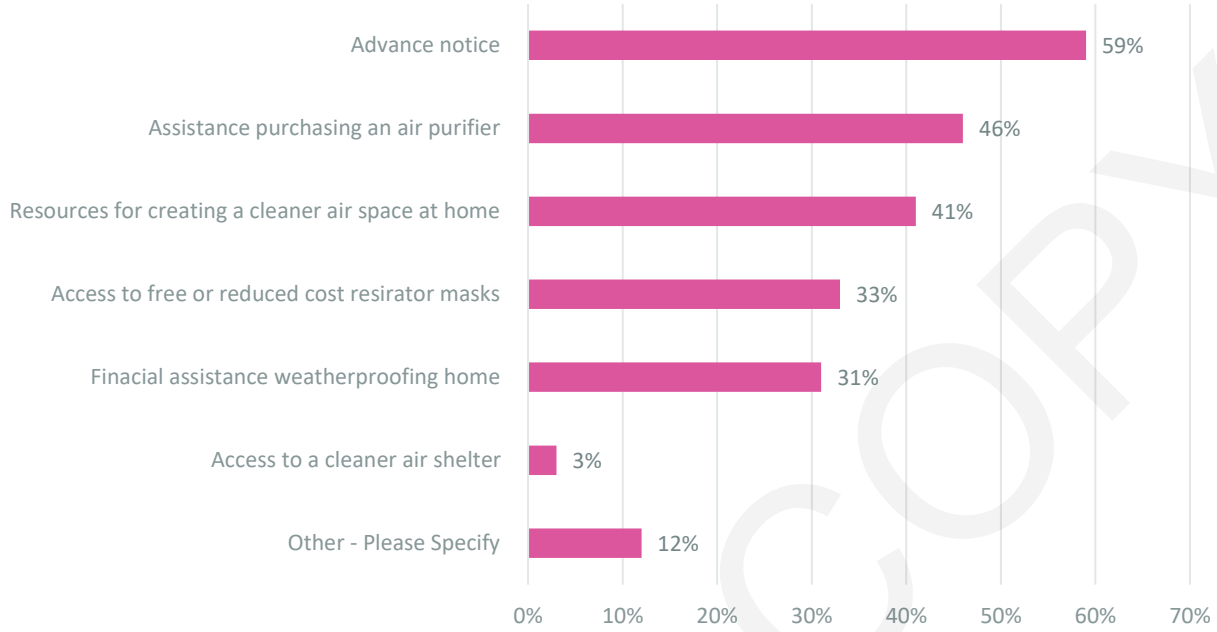
The most chosen answers included staying indoors (91%), closing windows (85%), and paying attention to local air quality reports. The most chosen answers mostly pertained to sheltering in place at home. Additional representative answers by those who chose the "other" option include:

- *None – the smoke doesn't bother us*
- *Using a nebulizer with albuterol*
- *Considering leaving the state*
- *Sealing up drafty spots*
- *Reduce exercise*
- *Have oxygen tanks*
- *Changing air filters in my home*
- *Spend more time at work where they have good air filtration.*

Sixty percent of respondents said they do have a way to clean or purify the air in their house, which left 31% that did not and 9% that were unsure.

Figure F-5 shows what respondents selected for what would help them prepare for a smoke event. Note that respondents could choose up to three answers and the table shows the percentage of respondents who chose each answer.

Figure F-5 What would help you to prepare for a smoke event? (n=1,757)



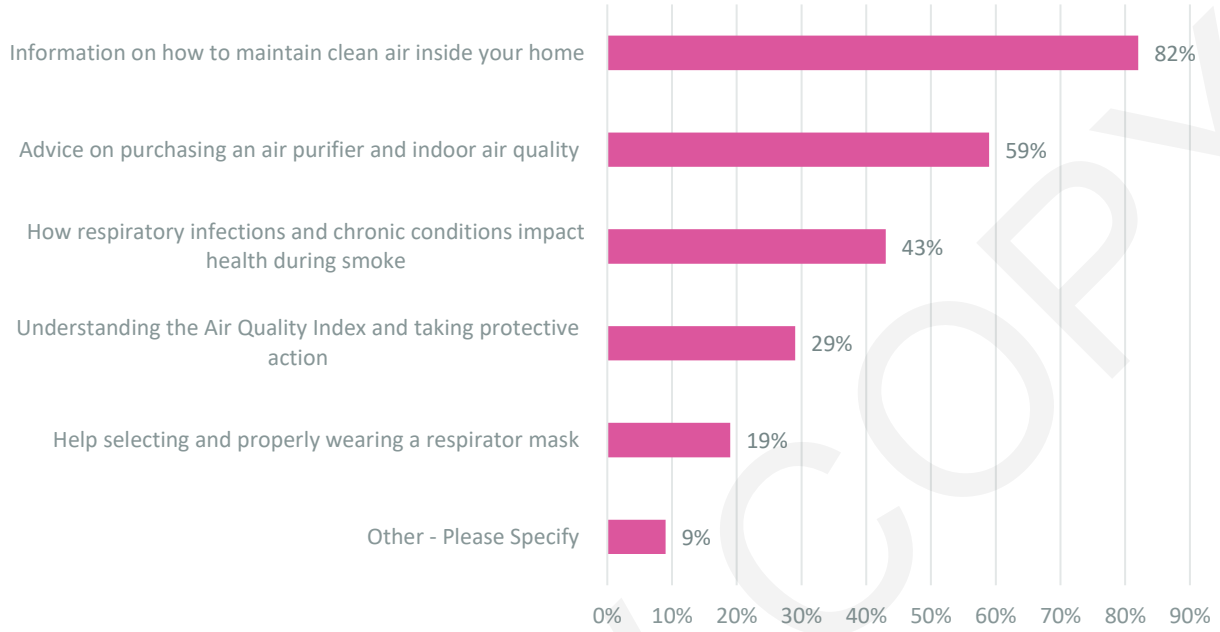
Source: Jackson County Community Survey, 2022, Q8: What would help you to prepare for a smoke event? Please select up to three choices, Analysis by OPDR

The most chosen answers included advance notice (59%), assistance purchasing an air purifier (46%) and resources for creating a cleaner air space at home (41%). Very few (3%) respondents chose cleaner air sites. Additional representative answers by those who chose the "other" option include:

- *Information, like fliers, designed to provide others the information above*
- *Air purifier…can't afford one*
- *Support to upgrade HVAC*
- *Financial assistance with HVAC filters*
- *It would be nice if my landlord replaced the windows we have – they are single paned and very old so the let a lot of pollution in.*
- *Partnering with businesses that have indoor activities for children so they can still play and socialize.*
- *Open the mall earlier to provide residents a place to walk safely*
- *Start taking care of the forests so we don't have as many fires*
- *Need better website for one stop visits to see smoke predictions. Present sites are scattered.*

Respondents were then asked if they would attend public presentations on ways to protect themselves from smoke. Thirty seven percent of respondents said yes. Those that selected yes were then prompted to answer further questions about potential public presentations. Figure F-6 shows responses to the question of what topics respondents would be most interested in seeing at these presentations. Note that respondents could choose all answers that apply, and this graph is a measurement of the percentage of respondents that chose each option.

Figure F-6 What respondents would be most interested in learning about at public presentations (n=662)



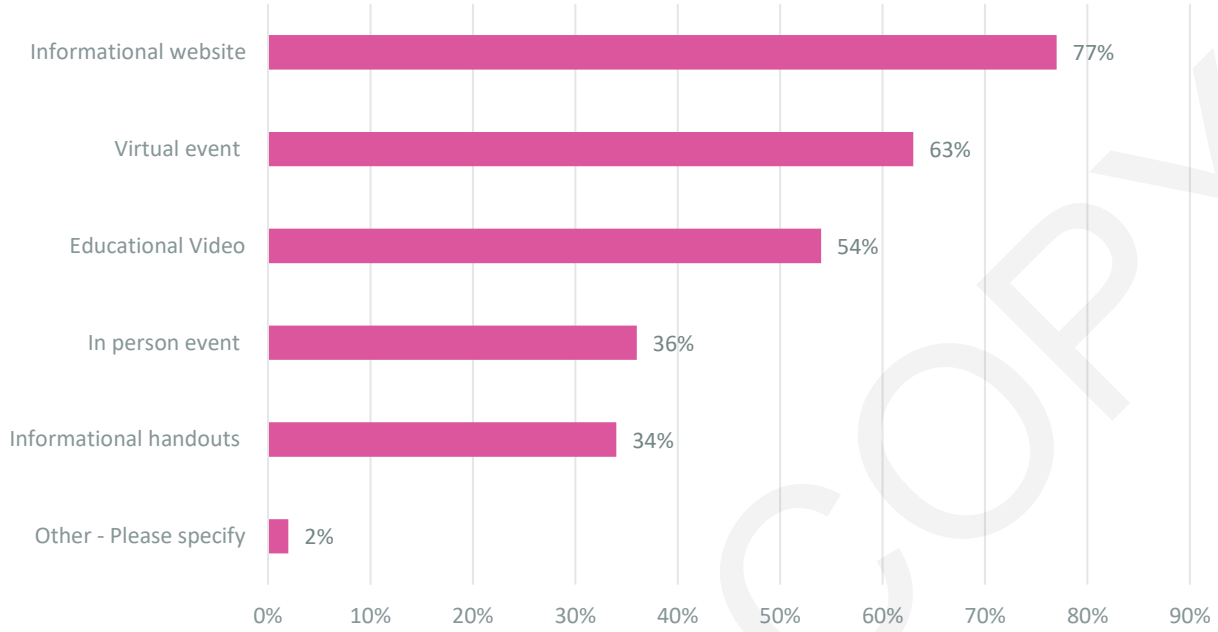
Source: Jackson County Community Survey, 2022, Q10: What topics are you most interested in learning about? Please select all that apply. Analysis by OPDR

The most chosen responses related to learning how to maintain clean air inside your home, with 82% choosing "Information on how to maintain clean air inside your home" and 59% choosing "advice on purchasing an air purifier and indoor air quality". Additional representative answers by those who chose the "other" option include:

- *If you going to explain this knowledge deaf hard of hearing often show up when they ask for an interpreter asl interpreter never provided for!*
- *The interaction of topography and weather (and other factors) on the smoke we get in JC*
- *What is being done to promote healthy fire resilient forests?*
- *Information on other resources could help low-income folks weatherproof their homes and help them financially*
- *Ways to get involved. Being part of the solution, not only mitigating the side effects of wildfire*
- *How smoke events impact our individual and community mental health*
- *How counties are working with land management agencies on wildfire and smoke impacts*

Respondents were asked about their preferred format for public presentations. The majority preferred virtual options such as an informational website (77%), virtual events (63%), and educational videos (54%). Figure F-7 shows these responses. Note that respondents were asked to choose up to three options, so the graph shows percentage of respondents that chose each option.

Figure F-7 Preferred format for presentations (n=676)

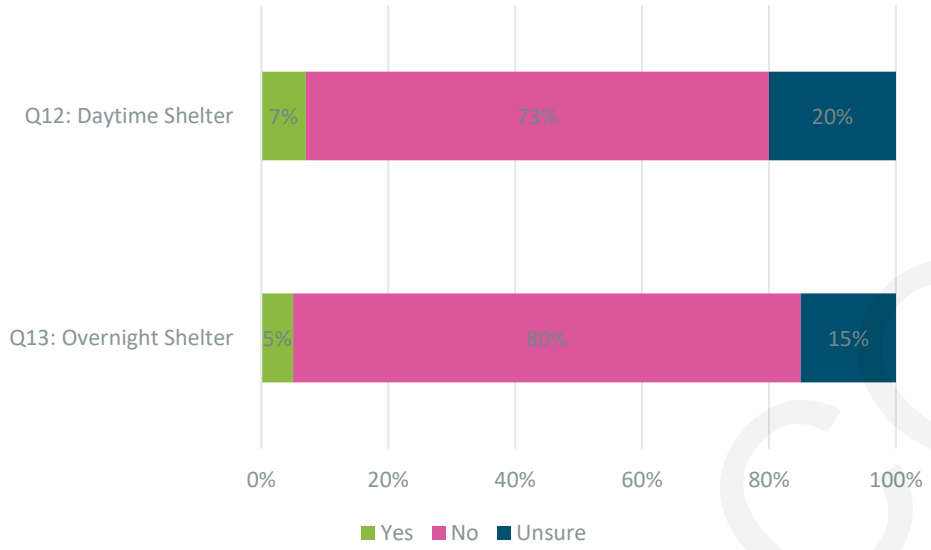


Source: Jackson County Community Survey, 2022, Q11: What format for public presentations would you find most helpful? Please select up to three choices., Analysis by OPDR

Cleaner Air Sites and Spaces

This section asked respondents in depth questions about cleaner air sites to understand whether members of the community would use them and what services and amenities would be most helpful. Respondents were asked both if they would use cleaner air sites during the day and whether they would use them for overnight accommodation. The majority said they would not use them, but a small percentage (7% during the day and 5% overnight) said they would. Figure F-8 shows the distribution of responses.

Figure F-8 Would you use a publicly offered cleaner air site during smoke events during the day (top) (n=1,813) and Would you use publicly offered cleaner air sites for overnight accommodations (bottom)(n=1,802)



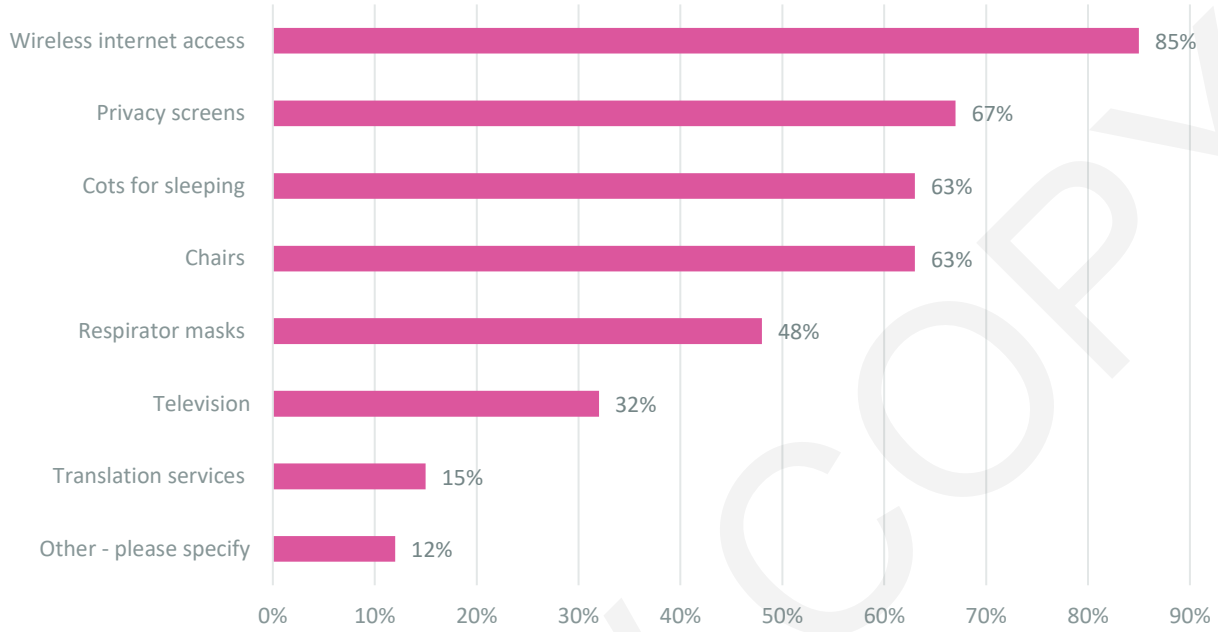
Source: Jackson County Community Survey, 2022, Q12: Would you use a publicly offered cleaner air site during smoke events during the day?; Q13: Would you use a publicly offered cleaner air site during smoke events for overnight accommodations?; Analysis by OPDR

Respondents that answered no to these questions were directed to an open-ended question asking why they would not use sites. Some responses included:

- *I have an air purifier*
- *I wouldn't want to be around other people*
- *I have health problems and some physical limitations…*
- *I don't want to be exposed to communicable disease/illness*
- *Won't leave pets at home alone during fire season*
- *I am not able to close my business and leave. I would like my business to be a cleaner air space.*
- *I have an air purifier at home. Plus, I'd have no transportation.*
- *My medical needs require special devices and equipment that a shelter could not accommodate*
- *I have friends and family driving distance away that I can go stay with if needed*

Respondents that answered yes or unsure to these questions were directed to questions asking for further detail about their preferences for cleaner air sites. The next question asked what characteristic of a cleaner air site respondents would find useful. Figure F-9 shows the percentage of respondents that chose each answer.

Figure F-9 Amenities that respondents would find most useful in cleaner air sites (n=496)



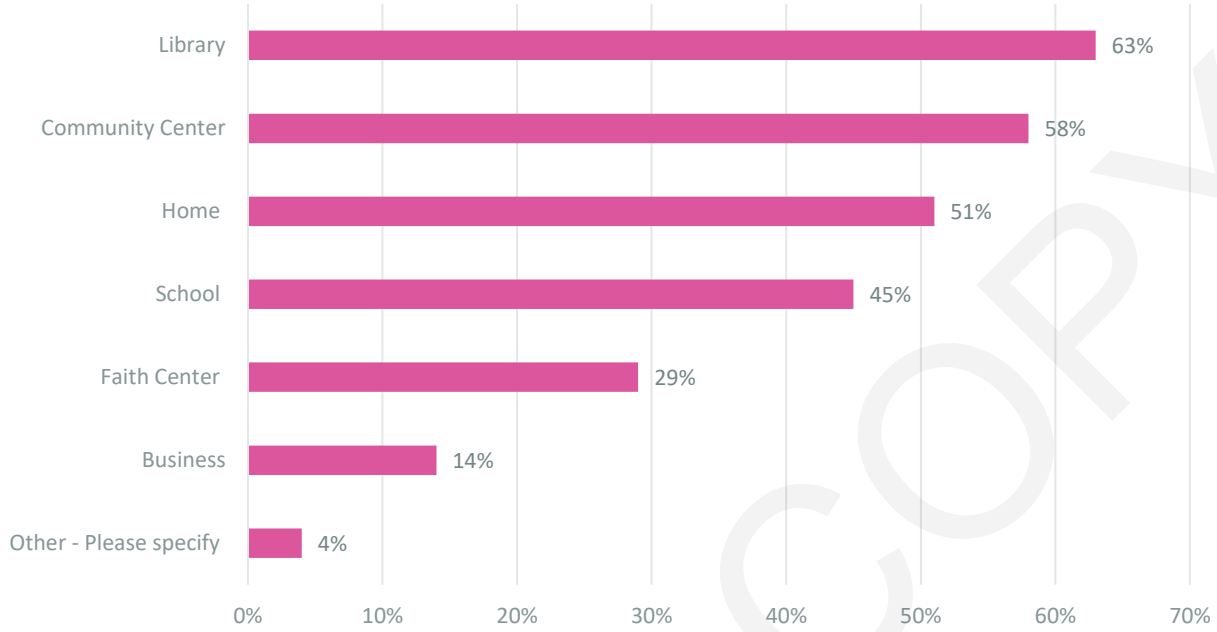
Source: Jackson County Community Survey, 2022, Q14: What characteristics of a cleaner air site would you find most useful? Please select all that apply. Analysis by OPDR

The most chosen responses were wireless internet access (85%), privacy screens (67%), cots for sleeping (63%), and chairs (63%). Additional representative answers by those who chose the "other" option include:

- *Food and water*
- *Coffee*
- *Pet friendly*
- *Covid concerns*
- *AC during the summer, heating during the winter, safe area for children*
- *On site medical, social workers, and mental health professionals*
- *Electricity to run my oxygen machine*
- *Things to do, games to play or interact with the community*

Respondents were then asked what types of venues they would prefer cleaner air sites be located. Figure F-10 shows the responses to this question. Note that respondents were asked to choose up to three responses, so the chart shows the percent of respondents that chose each option.

Figure F-10 Preferred locations for cleaner air sites (n=531)



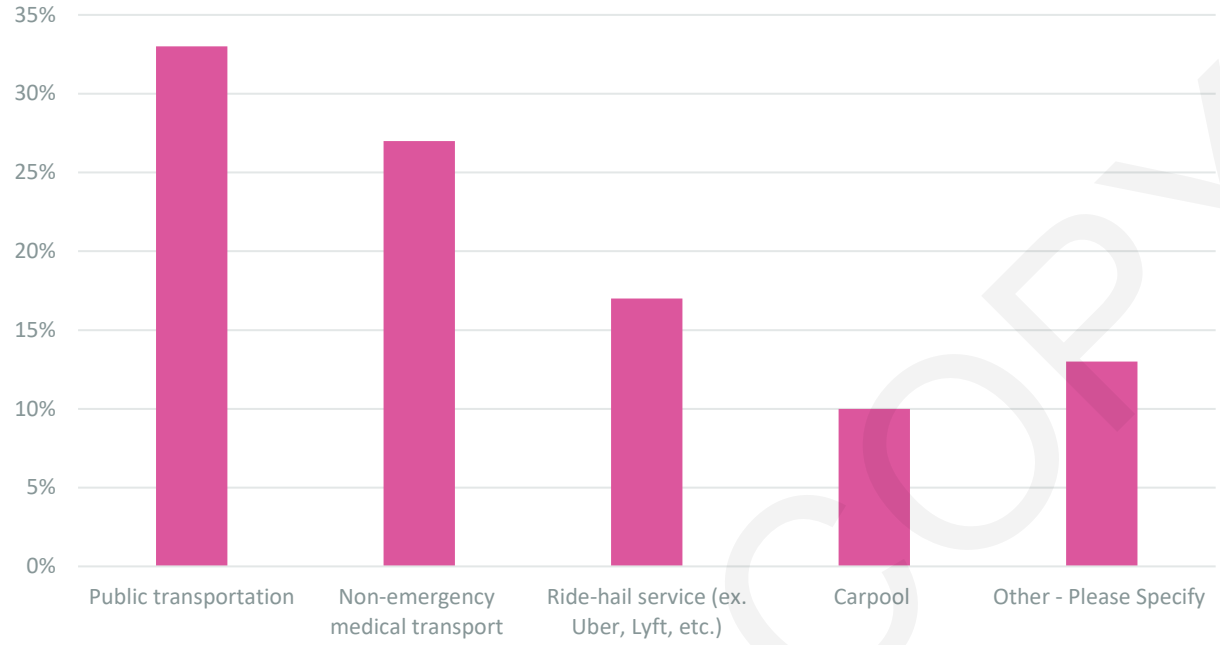
Source: Jackson County Community Survey, 2022, Q15: What type of location for a cleaner air space would you feel most comfortable in? Please select up to three choices. Analysis by OPDR.

The most chosen locations were library (63%) and community center (58%). This was followed by 51% of choices preferring home as a cleaner air site. Additional answers by those who chose the "other" option include:

- *Café*
- *Hotel*
- *The mall earlier than the current 10 am*
- *Places to do things and meet people*

Respondents were then asked if they have a way to travel to and from cleaner air sites (Figure F-11). The majority (94%) said yes, 6% said no. Those who said no were directed to a question asking what type of transportation they would find most helpful to get to or from cleaner air sites.

Figure F-11 Preferred transportation to cleaner air sites (n=30)



Source: Jackson County Community Survey, 2022, Q17: What type of transportation would you find most helpful to get to and from a cleaner air site? Analysis by OPDR.

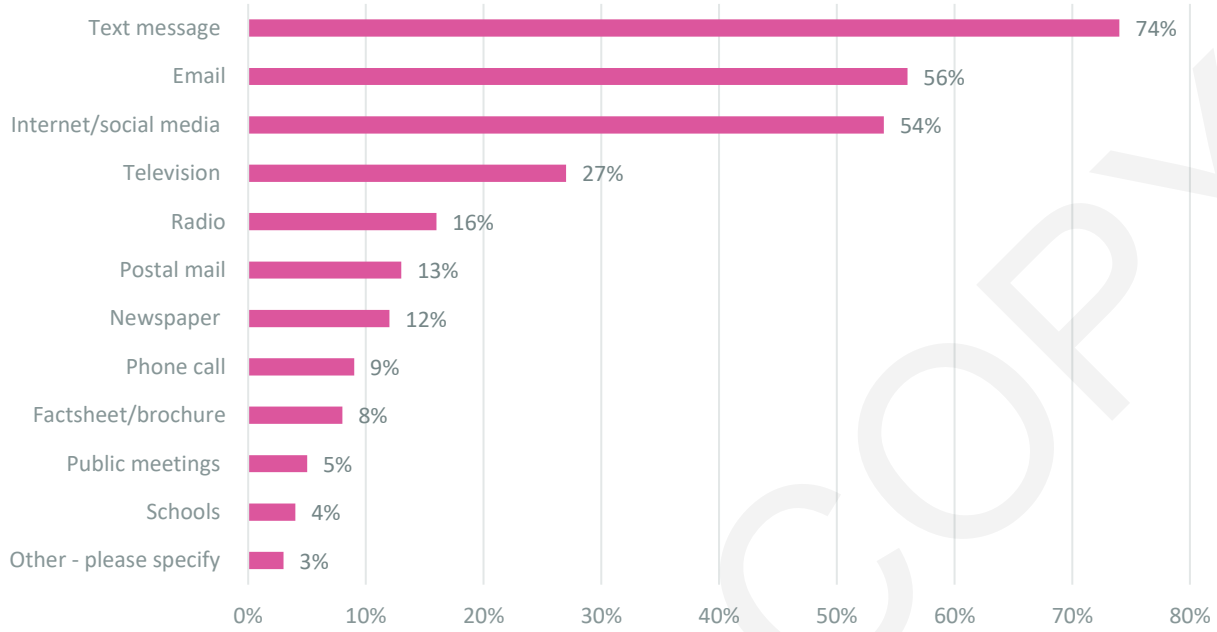
Participants were then asked if they need assistance with transportation to and from site. Thirty people responded to this question, and nineteen of these thirty said that they do need assistance.

Preferred Communication Methods

In this section, the survey asked respondents about their preferences for communication and how they would like to be alerted about smoke events. The first question asked if they are signed up for Jackson County's "Citizen Alert" emergency communication system. Eighty-five percent of respondents said yes (n=1776). They were then asked if they would opt-in to receive notifications about smoke events from the "Citizen Alert" system. Eighty-eight percent of respondents said they would (n=1776). They were then asked if they would like to receive notifications about prescribed burning. Eighty percent of respondents said that they would (n=1775).

Respondents were then asked what their preferred method were for receiving news. Figure F-12 shows the responses to question 23. Note that respondents were prompted to select all that apply so the graph shows the percentage of respondents that chose each option.

Figure F-12 Preferred method of receiving news (n=1,771)



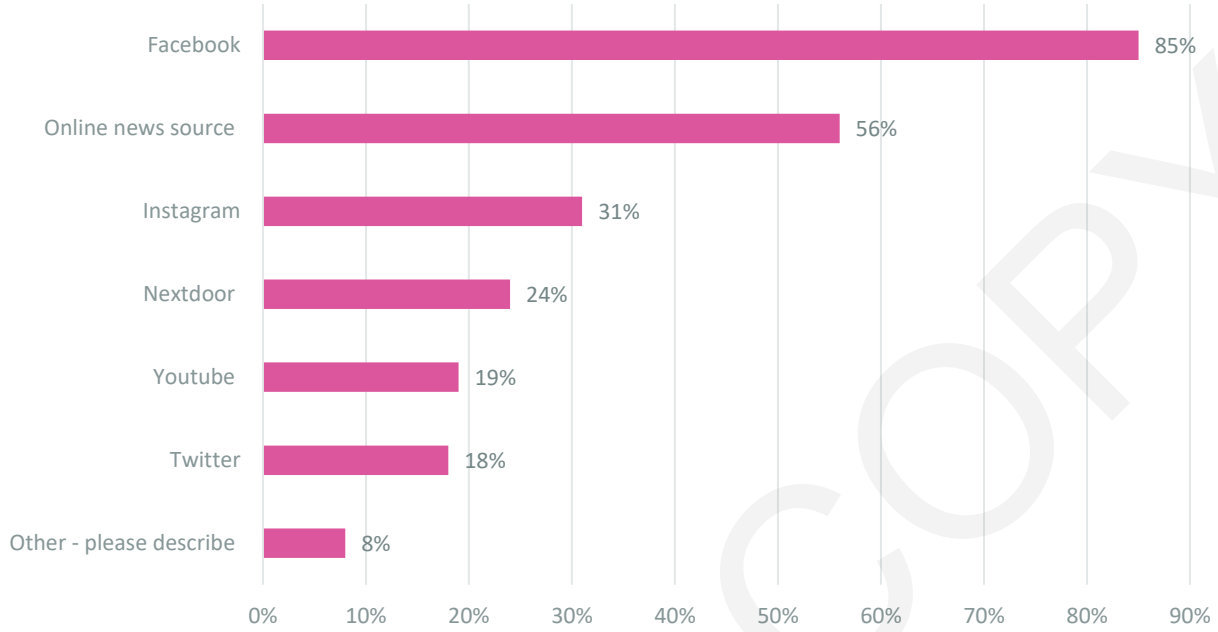
Source: Jackson County Community Survey, 2022, Q23: What is your preferred method for receiving news about community information? Please select all that apply. Analysis by OPDR.

The options that were chosen most were text message (74%), email (56%), and internet/social media (54%). Additional representative answers by those who chose the "other" option include:

- *iPhone app*
- *Citizen alert. Ashland uses Nixle this way and it is very helpful*
- *To be honest, all these things need to be covered. We can never be sure how all people consume important information*
- *Podcasts*
- *Please do videos of presentations that can be watched at a later date*
- *Lots of us are out of cell range*
- *I literally ask Alexa to provide me with an air quality alert in the morning*
- *Electronic billboards*
- *There needs to be an old-fashioned siren system, along with all other mediums*

In addition to overall communication method, respondents were asked which online platforms they get their information from. Only respondents who indicated that they preferred internet and social media in question 23 were displayed question 24. Figure F-13 shows the answers. Note that respondents were prompted to select all that apply so the graph shows the percentage of respondents that chose each option.

Figure F-13 Preferred online platforms for receiving news (n=955)



Source: Jackson County Community Survey, 2022, Q24: Which online platforms do you get your information from? Please select all that apply. Analysis by OPDR

The options that most respondents chose were Facebook (85%), online news sources (56%), and Instagram (31%). Additional answers by those who chose the "other" option include:

- *Oregon OSHA for my work*
- *TikTok, Reddit*
- *Weather Channel (online); Active Wildfire Map; Air Quality*
- *Website: MedfordAlert.com*
- *Specific government agency websites*
- *Ashland town website*
- *MSN*
- *K12 News App*
- *Scanner Group*
- *PulsePoint*
- *Rogue Weather*
- *Websites for local news stations*
- *PurpleAir*

What else do you want to tell us?

This section consists of an open-ended question where the respondents were asked if there was anything else they wanted to tell us. Below are representative responses to this question:

- *We need a local info site like inciweb that is updated and maintained in real time but should include all fire events and not just large ones. Better smoke forecast predictions that are available for more than 24 hrs. would also be helpful.*
- *I'd appreciate clearer location information for wildfires.*
- *I strongly support the establishment of shelters and taking Steps to assure individuals with health issues have purifiers or easy access to shelters.*
- *Have caption on for hard of hearing get an asl certified or qualified interpreter I willing to work with you on names to hire asl interpreter caption and asl interpreter both big must!!!*
- *maybe contact a local company that is an expert on air purification for the home or any commercial building and have them do presentations for the city and communities?*
- *The more communication via Nixle, the better. Our community has severe distrust because of prior lack of communication re fires. This needs to be rebuilt.*
- *I mentioned this before but I think landlords in Jackson County need to be held accountable for making sure their units are smoke proof.*
- *For comparison, look at the way OHA has handled getting COVID information out to us. Their emails contain good, approachable writing, Q&A, charts and graphs, and so on. If the county adopted similar email newsletters for wildfires and smoke, that'd be great.*
- *Grants to help people get their homes to become a clean air space would be extremely helpful.*
- *To please remember to have information in Spanish.*
- *To communicate with the Hispanic community. I recommend using the local radio in Spanish. La Gran D. Making Community Announcements in Spanish on the television channel: Telemundo? (translated from Spanish using Google Translate)*
- *I am concerned this survey will not get an adequate representation from people who don't have homes. Clearly, they are more likely to need the clean air shelters. I hope the county will continue to offer these even if the survey does not indicate they are needed.*
- *It also affects mental health, and trauma survivors. County funded Grief support services or groups are also needed.*
- *I think clean air shelters would be way more utilized if it was a place where I was already going, or already familiar with.*
- *One thing I noticed when I participated in the program for being given an air purifier (in a local program), was that there seemed to be some unintended classism in the system. I think most of us found out about it from email, social media, etc. And we had to travel (I think to one of the schools, if I remember right) to get the purifiers.*
- *I'm concerned about outdoor workers especially those in agriculture not being provided masks.*

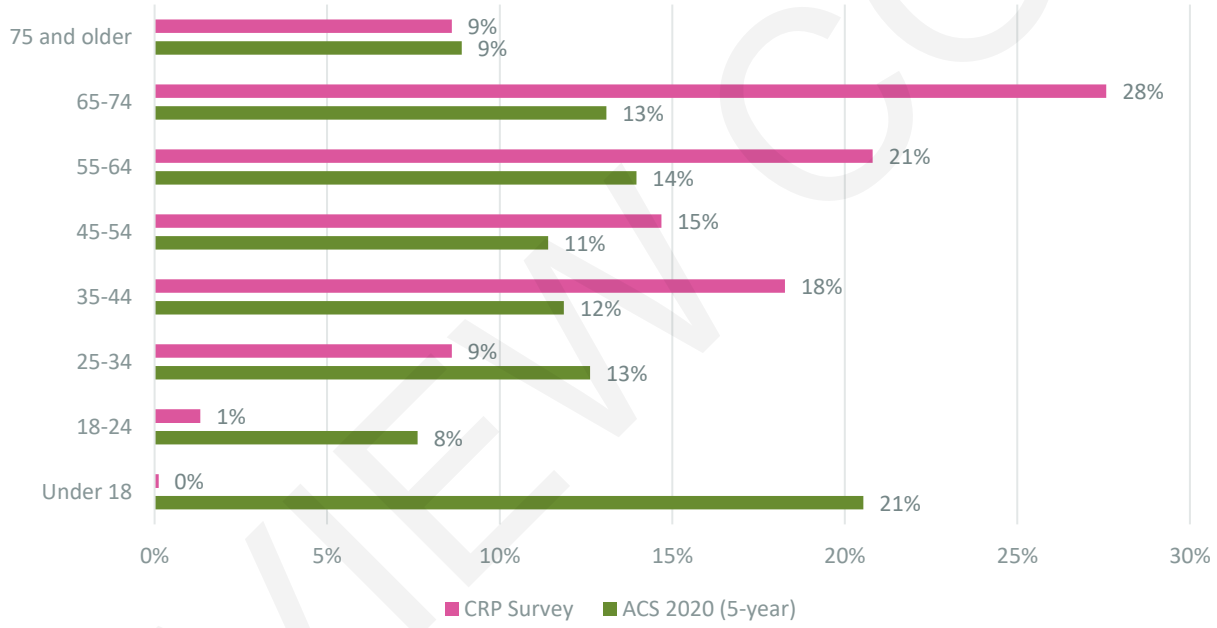
Demographic Information

Survey respondents were asked questions about their age, vulnerability to smoke, preferred language, ethnicity, income, and gender in the demographic section. Responses in this section allowed us to better understand who responded to the survey, what demographic groups we were able to reach, and which ones were not represented in our survey. We compared the

distribution of demographic groups in our survey responses to those from the 2016-2020 American Community Survey (ACS) Five-Year Estimates to understand how representative of the whole community the survey responses were.

Age of respondents are shown in Figure F-14. Most survey respondents were between the ages of 65 and 74 years old (28%), with the next largest groups being ages 55 to 64 (21%) and ages 35-44 (18%). There was some disconnect between the age distribution in Jackson County when compared to ACS data, and the demographic distribution of the survey. The survey responses are overly representative of residents between the ages of 35 and 74, and under representative of residents below 35 years old. This is not surprising because older residents tend to get more involved in community processes, and the methods of advertisement for the survey probably reached more older residents.

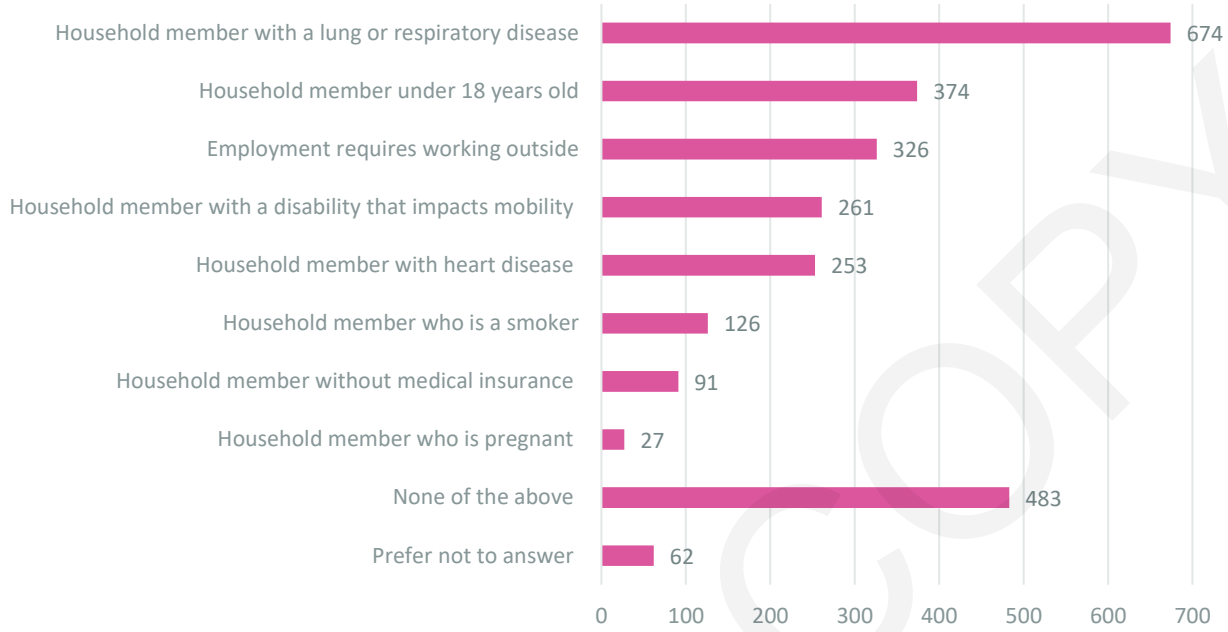
Figure F-14 Age of Respondents (n=1,730)



Source: Jackson County Community Survey, 2022, Q26: Which best describes your age group; U.S. Census Bureau. American Community Survey 2016-2020 5-year estimates. Social Explorer Table A10001: Age. Analysis by OPDR

Respondents were asked to identify vulnerabilities to smoke that existed in their households. Because respondents were able to choose multiple answers, we used number of responses rather than percentages in Figure F-15. The most respondents (674) indicated that a member of their household had a lung or respiratory disease such as Chronic Obstructive Pulmonary Disease (COPD) or asthma. The next most selected choices were 374 households with someone under age 18 and 326 households with outdoor workers. Four hundred and eighty-three respondents said, “none of the above”.

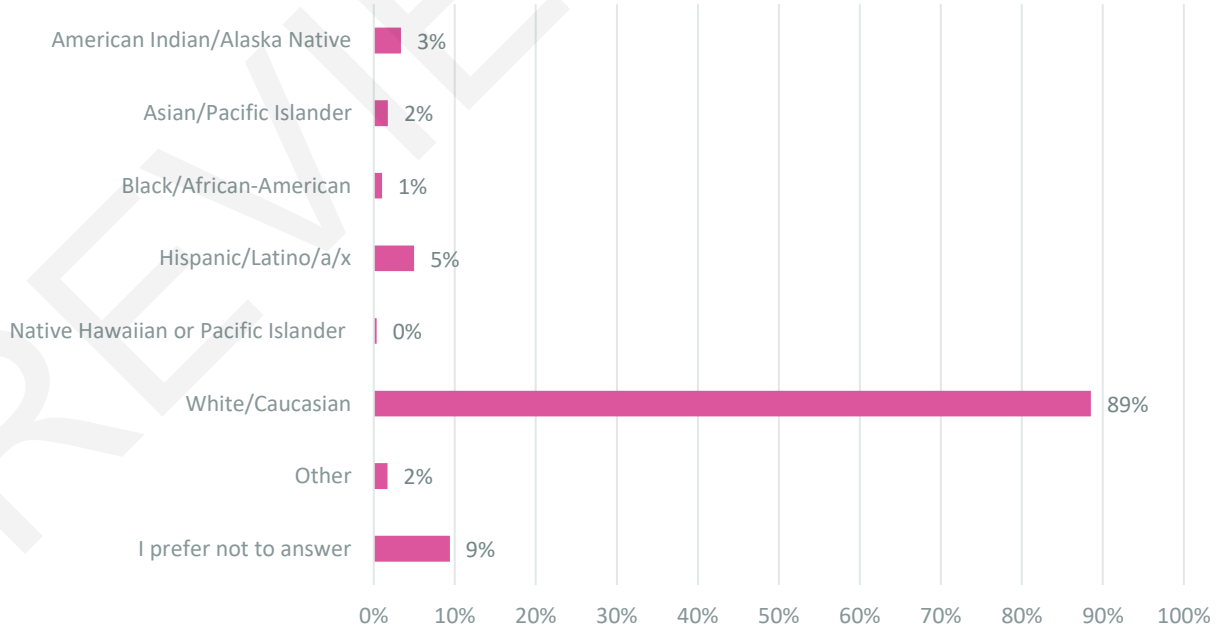
Figure F-15 Vulnerabilities of household members (chose all that applied) (n=2,132)



Source: Jackson County Community Survey, 2022, Q27: Do any of the following describe members of your household (including yourself)? Please select all that apply. Analysis by OPDR.

Respondents were then asked to identify their race and ethnicity. They were prompted to choose all that apply so some respondents chose multiple ethnicities. Figure F-16 shows the percentage of respondents that chose each option.

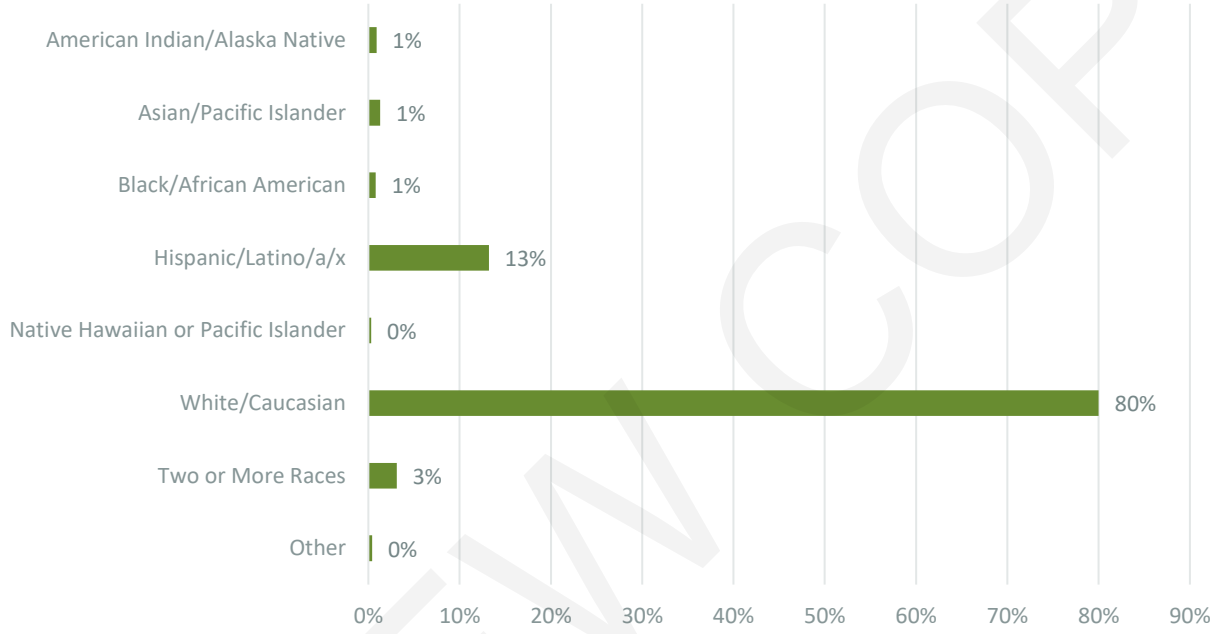
Figure F-16 Race and ethnicity of survey respondents (n=1,736)



Source: Jackson County Community Survey, 2022, Q30: Which best describes your race or ethnic background? Please select all that apply. Analysis by OPDR.

Most respondents (89%) were white, 5% were Hispanic/Latino/a. For comparison, Figure F-17 shows race and ethnicity of Jackson County from the 2020 ACS. ACS estimates shows that 80% of the Jackson County population was white and 13% of the population was Hispanic/Latino from 2016 to 2020. ACS estimates show that the survey did not reach a proportionate portion of the Hispanic and Latino/a community and disproportionately represented white residents.

Figure F-17 Race and ethnicity of Jackson County from the 2020 ACS 5-Year Estimates, Jackson County, OR, 2020



Source: U.S. Census Bureau. American Community Survey 2016-2020 5-year estimates. Social Explorer Table A04001: Hispanic or Latino by Race.

Respondents were asked whether they, or members of their households, have difficulty speaking or understanding English. Two percent of respondents indicated they had difficulty speaking English for day-to-day activities like shopping or taking the bus (Table F-1).

Table F-1 Respondents' difficulty speaking English for day-to-day activities (n=1,746)

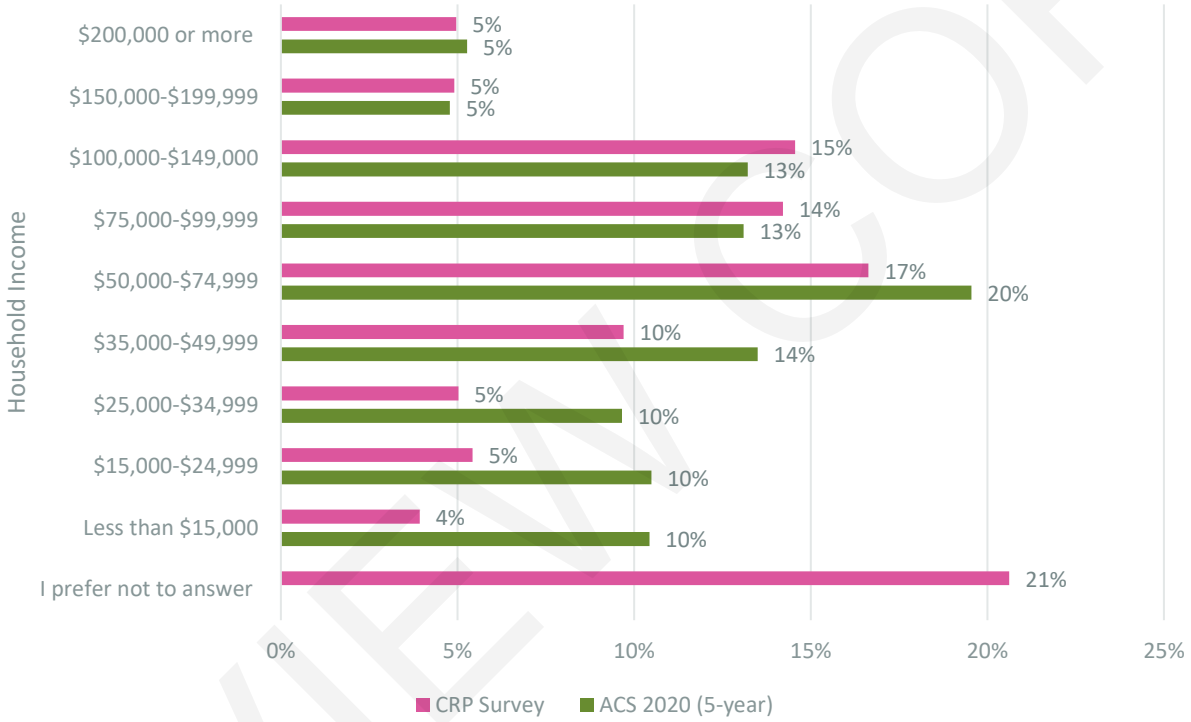
Response	Number of Respondents	Percent of Respondents
Yes	28	2%
No	1,701	97%
Prefer not to say	17	1%

Source: Jackson County Community Survey, 2022, Q28: Do you, or others in your household, have any difficulty speaking or understanding English for day-to-day activities such as shopping or taking the bus? Analysis by OPDR.

Those who answered yes to that question, they were then asked what their preferred language or method for communicating was. Respondents indicated both Spanish and American sign language.

Respondents were then asked to identify their annual household income. The greatest number of respondents (20%) had a combined household annual income of between $50,000 and $75,000 (Figure F-18). The responses to household income mostly followed the demographic income trends for Jackson County when compared to 2020 ACS estimates. However, more higher income households (over $50,000 in annual income), and fewer low-income households (less than $50,000) responded to the survey. This means that the survey is over-representative of higher income people and may not reflect all the concerns of the lower income people of the county.

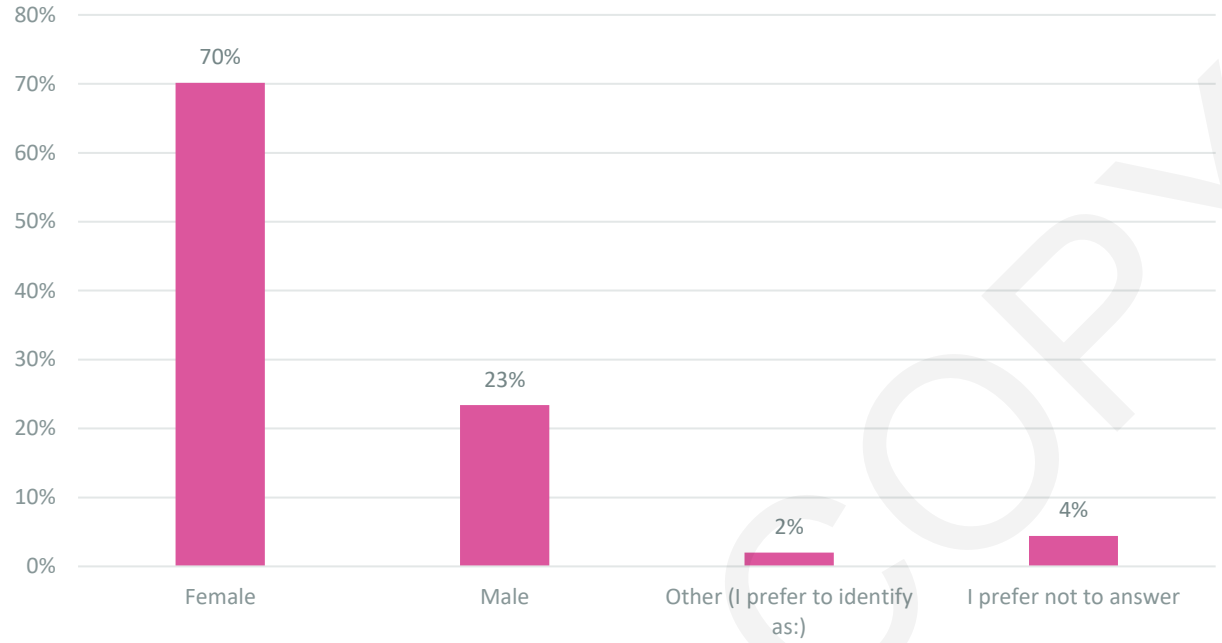
Figure F-18 Respondents' household income and 2016-2020 ACS estimates (n=1,731)



Source: Jackson County Community Survey, 2022, Q31: Which best describes the combined annual income of all members of your household?; U.S. Census Bureau. American Community Survey 2016-2020 5-year estimates. Social Explorer Table A14001: Household Income.

Respondents were then asked to identify their gender. Seventy percent of respondents identified as female. Figure F-19 shows the distribution of the gender identity of respondents.

Figure F-19 Respondents' gender identity (n=1,735)



Source: Jackson County Community Survey, 2022, Q32: How do you describe your gender? Analysis by OPDR.

Discussion

Responses to the survey mostly reflected populations within Jackson County. The greatest number of respondents (41%) were from Medford, but this is close to the 38% of Jackson County population that lives in Medford. People who live in unincorporated areas of the county were underrepresented. About 6% of respondents chose "other" but about 30% of Jackson County residents live in unincorporated areas according to the American Community Survey (ACS).

The age of respondents skewed older than the population of Jackson County. The greatest number of respondents (28%) were adults aged 65-74, followed by adults aged 55-64 (21%) and adults aged 35-44 (18%). The number of respondents ages thirty-five and over were all a greater than their percentage of the Jackson County population when compared to ACS estimates, and the percentage under thirty-five was less than their share of the population.

The race and ethnicity of respondents was not entirely representative of the racial and ethnic composition of Jackson County. Most respondents were white/Caucasian (89%). However, the percentage of Jackson County that identifies as white or Caucasian is 80%. The survey respondents were under representative of the Hispanic and Latino/a population. Five percent of survey respondents identified as Hispanic and/or Latino/a, which, when compared to ACS estimates, represent 13% of the population.

Survey responses were also under representative of lower income residents of Jackson County. There were more survey respondents than the percentage of the population for all income brackets over $75,000 per year and less survey respondents from households that made less than $75,000 per year.

When asked if members of their household had certain vulnerabilities to smoke, the most respondents indicated they had household member with lung or respiratory disease, followed by households with children, and outdoor employment.

Most respondents were either very concerned (38%) or extremely concerned (35%) about the impact of wildfire smoke on their health. Many respondents are already doing what they can to protect themselves and their households from smoke events. The most indicated choices were staying indoors (91%), closing windows (85%), and paying attention to local air quality repots (76%). It should also be noted that only 3% of respondents chose "going to a friend or family's house" showing that more respondents remain at home during a smoke event.

When asked what would help them prepare for a smoke event, most respondents (59%) chose advance notice. This was followed by assistance purchasing an air purifier (46%) and resources for creating a cleaner air space at home (41%). It should also be noted that only 3% of respondents chose access to a cleaner air site. This shows that people would appreciate advanced notice and notifications of potential smoke intrusions and that many would prefer to shelter in place at home. Also, while only 3% chose cleaner air sites, it should be noted that this survey probably did not reach most unhoused residents, and many lower income residents of the community. Additional open-ended responses to this question included requests for spaces for people to recreate that are safe from smoke including partnering with businesses that have indoor activities for children and opening the mall for residents to walk safely. There were also requests for a better, more consolidated website.

Respondents were asked if they would attend public presentations about ways to protect themselves from smoke. Thirty seven percent of respondents said they would. The majority preferred an informational website (77%), and virtual event (63%) or an educational video (54%). This shows that most people would rather be able to access information from home than attend an event in person. The most popular topics chosen for public presentations were information on how to maintain clean air inside your home (82%), advice on purchasing an air purifier and indoor air quality (59%), and how respiratory infections and chronic conditions impact health during smoke (43%). Additional requested topics included more specific information about how and why smoke accumulates and what the county and state are doing about smoke, ways to get involved, and impacts to community mental health.

When asked if they would use publicly offered cleaner air sites, 7% said they would use them for accommodations and 5% said they would use them for overnight accommodation. When asked why they wouldn't, many responded that they would rather stay at home and not be around other people, they have pets that they do not want to leave at home, they have an air purifier at home, they do not want to be exposed to covid or another communicable disease, or they have medical needs or physical limitations that would prevent them from leaving home.

When asked the types of locations they would prefer for cleaner air sites, the majority said they preferred libraries (63%) and community centers (58%). Fifty-one percent of respondents preferred home, showing that attention needs to be paid to those who will be sheltering in place as well as those who will use cleaner air sites. Most people also said they had transportation but those who did not would prefer public transportation or non-emergency medical transport.

When asked their preferred methods for receiving news, the greatest number of respondents chose text message, email, and internet and/or social media. Several said that a citizen alert or NIXL alert would be helpful. It should also be noted that several respondents said they were out of cell phone range so multiple methods of notification should be used. When asked which online platforms they use for news most said Facebook (85%) and online news source (56%).

Recommendations

Survey results were under-representative of certain demographics: These include Hispanic and Latino/a, unhoused, and low-income members of the community. These groups are representative of smoke vulnerable groups within the community and additional outreach is needed to better understand their needs.

> ***Recommend*** *further outreach to partners that serve these demographics.*

Most respondents prefer to shelter in place than leave the house for a shelter during a smoke event: The community response plan should reflect this preference. A portion of the community would use CAS and they are important for those who cannot shelter at home. However, a much larger portion of the community would not use CAS, so we should plan for ways to help these members of the community make their homes safer spaces during smoke events. Also, those who said they would not use cleaner air spaces may think that they would need to travel a long distance to use them in Medford, so dispersed shelters throughout the county may get more use by the community.

> ***Recommend*** *further education on how to create clean air sites/rooms within their home (Develop a 1-page flyer on steps to create clean air rooms).*

Most of the community would prefer text messages, email, and internet social media to receive information: However, some said that they are outside of cell service range which This highlights the need for multiple methods of communication.

> ***Recommend*** *evaluating potential cost and management of a "key word" opt-in notification.*
>
> ***Key obstacle*** *I s annual cost and current staffing and resources limitation*

Long term goals for notifications should include a notification system and a consolidated website These would make it simpler for community members to find information on smoke.

> ***Recommend*** *evaluating potential cost and management of a "key word" opt-in notification.*
>
> ***Key obstacle*** *is annual cost and current staffing and resource limitations*
>
> ***Recommend*** *evaluating potential cost and management of consolidated website.*
>
> ***Recommend*** *a standing resources page comprised of links to all entities that may implement prescribed burns and the ODF website*

Many respondents said that it would be helpful to get advance notice of smoke events to help them prepare. This highlights the need to not only notify community members when there is already smoke in the air but also have a notification system in place in case there is a heightened possibility of smoke from prescribed burns in their area.

> ***Recommend*** *evaluating potential cost and management of a "key word" opt-in notification.*
>
> ***Key obstacle*** *is annual cost and current staffing and resource limitations*