

# **JEFFERSON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN**

## **Report for:**

Jefferson County  
Culver  
Lake Chinook Fire District  
Madras  
Metolius

## **Prepared by:**

**Central Oregon Intergovernmental Council**

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**August 2022**

# **COIC**

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## SPECIAL THANKS & ACKNOWLEDGEMENTS

Jefferson County developed this Multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) through a regional partnership funded by the Federal Emergency Management Agency's Fire Management Assistance Grant (Hazard Mitigation Grant Program #5195). FEMA awarded the Jefferson County grant to support the update of the natural hazards mitigation plan. The county's planning process utilized a four-phased planning process, plan templates provided by the Oregon Partnership for Disaster Resilience (OPDR) and plan development support provided by the Community and Economic Development Department of Central Oregon Intergovernmental Council (COIC). This project would not have been possible without technical and in-kind staff support provided by Jefferson County and the cities of Culver, Madras, and Metolius.

### Partners include:

Jefferson County	FEMA Region X
City of Madras	City of Culver
City of Metolius	
Unincorporated Communities of Jefferson County	
Oregon Military Department – Office of Emergency Management	
Central Oregon Intergovernmental Council	

### Project Steering Committee:

#### Jefferson County

Representatives from the following organizations served as steering committee members for the Jefferson County natural hazards mitigation planning process.

Convener, David Pond	Emergency Services Manager, Jefferson County Sheriff's Office
Marc Austin	Warning Coordination Meteorologist, National Oceanic and Atmospheric Administration, National Weather Service
Don Colfels	Fire Chief, Lake Chinook Fire & Rescue
Ariel Cowan	Regional Fire Specialist, Oregon State University-Extension
Pat Hanenkrat	Supervisor, City of Metolius Public Works
Jeff Hurd	Director, City of Madras Public Works
Roger Johnson	Fire Chief, Sisters-Camp Sherman Fire District
Frank Jones	Fire Supervisor, Oregon Department of Forestry Prineville Unit
Judy LaPora	Ranch Manager, Crooked River Ranch
Jeff McCaulou	GIS Coordinator/Cadastral Cartographer, Jefferson County GIS
Donna McCormack	City Recorder, City of Culver

Mandy O'Hara	Dam Safety Liaison, Portland General Electric
Matt Powlison	Director, Jefferson County Public Works
Kasey Skaar	Fire Chief, Jefferson County Fire District #1
Nicholas Snead	Director, City of Madras Community Development
Phil Stenbeck	Director, Jefferson County Community Development
Sam VanLaningham	Assistant Watermaster, Oregon Department of Water Resources
Harry Ward	Fire Chief, Crooked River Ranch Fire & Rescue

## City of Culver

Convener, Donna McCormack	City Recorder
David Pond	Emergency Services Manager, Jefferson County Sheriff's Office
Phil Stenbeck	Jefferson County Community Development Director
Sam Vanlaningham	Assistant Watermaster, Oregon Department of Water Resources

## City of Madras

Convener, Nicholas Snead	Community Development Director
Gus Burrell	City Administrator
Ariel Cowan	Regional Fire Specialist, Oregon State University-Extension
Frank Jones	Fire Supervisor, Oregon Department of Forestry
David Pond	Emergency Services Manager, Jefferson County Sheriff's Office
Kasey Skaar	Fire Chief, Jefferson County Fire District #1
Sam VanLaningham	Assistant Watermaster, Oregon Department of Water Resources

## City of Metolius

Convener, Patrick Hanenkrat	Public Works Supervisor
Tasha Alegre	City recorder
David Pond	Emergency Services Manager, Jefferson County Sheriff's Office
Phil Stenbeck	Jefferson County Community Development Director
Sam VanLaningham	Assistant Watermaster, Oregon Department of Water Resources



## **Lake Chinook Fire District**

Convener, Don Colfels	Fire Chief, Lake Chinook Fire & Rescue
Steve Bifano	Park Ranger Supervisor, Cove Palisades State Park
Thad Fitzhenry	Wildlife Biologist, PGE
Steve Memminger	North Central District Manager, Oregon Parks and Recreation Department
David Pond	Emergency Services Manager, Jefferson County Sheriff's Office
Laurel Zivosky	Community Member

## **Project Managers:**

David Pond, Emergency Services Manager, Jefferson County Sheriff's Office

Shelby Knight, Resilience Planner, Central Oregon Intergovernmental Council

## **Project Support Staff:**

Sienna Fitzpatrick, Program Assistant, Central Oregon Intergovernmental Council

## About Central Oregon Intergovernmental Council

*“COIC supports the region as a trusted leader and partner, helping communities identify and address their unique and common needs through collaboration, shared service delivery, technical assistance, information sharing, and resource development.”*

In 1972, COIC was designated a Council of Governments organized under ORS 190. We provide services to the counties of Crook, Deschutes and Jefferson, the cities of Bend, Culver, La Pine, Madras, Metolius, Prineville, Redmond and Sisters, as well as the Confederated Tribes of Warm Springs. Our offices are located throughout Central Oregon. COIC employs more than 100 people and services in the following areas: employment and training, alternative high school education, business loans, transportation, and community and economic development. The majority of the COIC Board is comprised of elected officials appointed by each of these member governments. Other appointed members of the Board represent timber and wood products, business and industry, under and unemployed, agribusiness and agriculture, and tourism and recreation.

For more information on COIC, visit [www.coic.org](http://www.coic.org)

## Plan Template Disclaimer

This Natural Hazards Mitigation Plan 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 44 CFR 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 natural hazards mitigation plans. OPDR hereby authorizes the use of all content and language provided to Jefferson County in the plan template.

# JEFFERSON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

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# EXECUTIVE SUMMARY

Jefferson County developed this Multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) in an effort to prepare for the long-term effects resulting from natural 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 citizens 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, 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, such as 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.

*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?

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved NHMP in order to receive federal funds for mitigation projects. Local and federal approval of this plan ensures that the county and listed jurisdictions will remain eligible for pre- and post-disaster mitigation project grants.

*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. . . .*

## Who Participated in Developing the Plan?

The Jefferson County Multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) is the result of a collaborative effort between the county, cities, special districts, citizens, public agencies, non-profit organizations, the private sector and regional organizations. County and city steering committees guided the plan development process. Surrounding counties were provided regular updates and opportunities for input.

The county steering committee included representatives from the following organizations:

- City of Culver - Administration
- City of Madras - Community Development
- City of Madras - Public Works
- City of Metolius - Administration
- City of Metolius - Public Works
- Crooked River Ranch - Administration
- Crooked River Ranch - Fire & Rescue
- Jefferson County - Administration
- Jefferson County - Community Development
- Jefferson County - Emergency Management and Sheriff's Office
- Jefferson County - GIS
- Jefferson County - Public Works
- Jefferson County Fire District #1
- Lake Chinook Fire & Rescue
- Oregon Department of Forestry
- Oregon Water Resources Department
- Oregon State University-Extension
- Portland General Electric
- Sister-Camp Sherman Fire District

*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 Jefferson County Sheriff's Office Emergency Management Program convened the planning process and will take the lead in implementing, maintaining and updating the plan. Jefferson County is dedicated to directly involving the public in the continual reviewing and updating of the natural hazards mitigation plan. Although members of the steering committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the plan throughout the implementation and maintenance period.

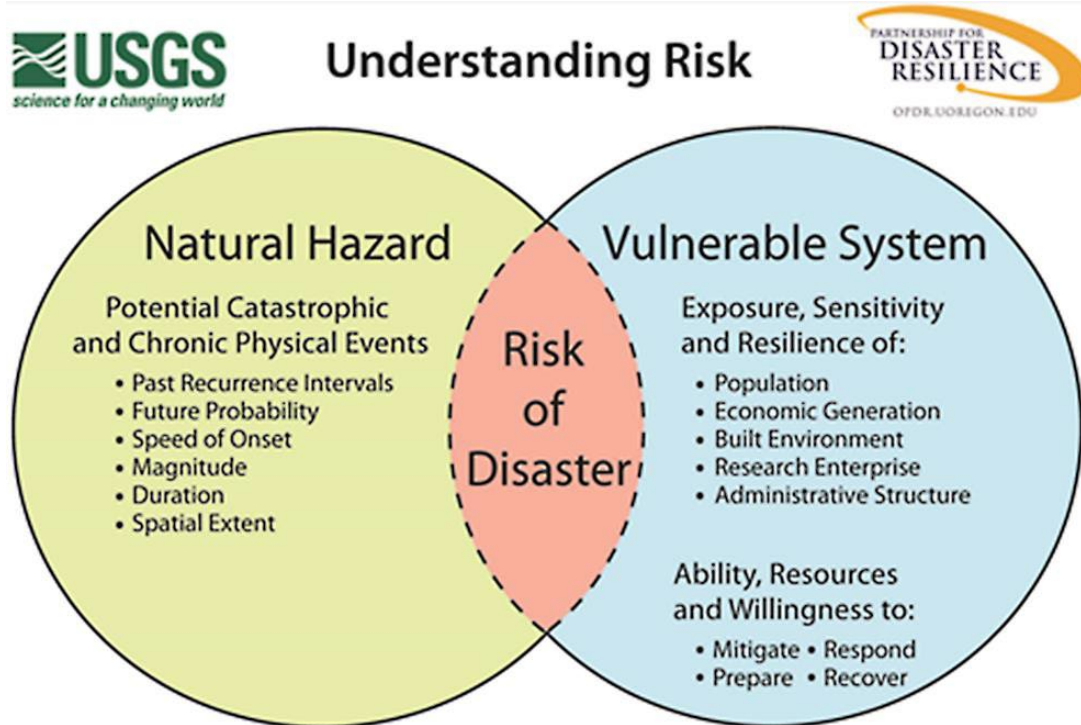
The County will ensure continued public involvement by posting the NHMP on the county website, as well as on Central Oregon Intergovernmental Council's project webpage here: <https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/jefferson-county-nhmp/>

## How Does this Mitigation Plan Reduce Risk?

The natural hazards mitigation plan is intended to assist Jefferson County reduce the risk from natural 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.

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

**Figure ES-1 Understanding Risk**



Source: Oregon Partnership for Disaster Resilience.

By identifying and understanding the relationship between natural hazards, vulnerable systems, and existing capacity, Jefferson County is better equipped to identify and implement actions aimed at reducing the overall risk to natural hazards.

## What is the County’s Overall Risk to Hazards?

Jefferson County reviewed and updated their risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. In addition, the steering committees for the City of Culver, the City of Madras and the City of Metolius reviewed the recently updated Jefferson County risk assessment to compare risk and vulnerability particular to their jurisdiction (see addenda for more information). Table ES-1 below summarizes hazard vulnerability and probability as determined by the county steering committee.

**Table ES-1 Risk Assessment Summary**

Hazard	Probability	Vulnerability
Drought	High	High
Earthquake	Low	Moderate
Flood	High	Moderate
Landslide/Debris Flow	Low	Low
Volcanic Event	Low	High
Wildfire	High	High
Windstorm	Moderate	Moderate
Winter Storm	High	High

Source: Jefferson County NHMP Steering Committee, 2021.

## What is the Plan’s Mission?

The mission of the Jefferson County NHMP is to:

***To create a disaster-resilient Jefferson County.***

This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more disaster resistant community.

*44 CFR 201.6(c)(3)(i) – A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

## What are the Plan Goals?

The plan goals describe the overall direction that the participating jurisdiction’s agencies, organizations, and citizens can take toward mitigating risk from natural hazards. Below is a list of the plan goals (Note: although numbered the goals are not prioritized):

**Goal 1:** *Save lives and reduce injuries*

**Goal 2:** *Minimize and prevent damage to public and private buildings, infrastructure, and services.*

**Goal 3:** *Increase cooperation and coordination among private partners with local, state, tribal and federal entities.*

**Goal 4:** *Increase education, outreach and awareness.*

**Goal 5:** *Protect natural and cultural resources.*

**Goal 6:** *Ensure the plan has direct linkages to efficient and effective recovery strategies.*

**Goal 7:** *Reduce economic impacts of natural disasters.*

## How are the Action Items Organized?

The action items are organized within an action matrix included within Section 3, Mitigation Strategy (full

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



descriptions are provided in Appendix A, *Action Item Forms*).

Data collection, research and the public participation processes resulted in the development of the action items. The Action Item Matrix portrays the overall Plan framework and identifies linkages between the plan goals and actions. The matrix documents the title of each action along with the coordinating organization, timeline, and priority action items. Action items particular to each of the participating cities are included at the end of the action item matrix in Section 3, Mitigation Strategy and in the addenda.

## How will the plan be implemented?

The plan maintenance section of this Plan details the formal process that will ensure that the Jefferson County NHMP remains an active and relevant document. The Plan will be implemented, maintained, and updated by a designated convener. The Jefferson County Emergency Services Manager is the designated convener (Plan Convener) and is responsible for overseeing the review and implementation processes. The plan maintenance process includes a schedule for monitoring and evaluating the Plan semi-annually and producing a plan revision every five years. This section also describes how the communities will integrate public participation throughout the plan maintenance process.

*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 . . .*

## Plan Adoption

Once the plan is locally reviewed and deemed complete the Plan Convener submits it to the State Hazard Mitigation Officer at the Oregon Military Department – Office of Emergency Management (OEM). OEM reviews the plan 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 plan is pre-approved by FEMA, the county and cities formally adopt the plan via resolution. The Jefferson County NHMP convener will be responsible for ensuring local adoption of the Jefferson County NHMP and providing the support necessary to ensure plan implementation. Once the resolution is executed at the local level and documentation is provided to FEMA, the plan is formally acknowledged by FEMA and the county (and participating cities) will re-establish eligibility for the Hazard Mitigation Assistance (HMA) Grant Program and the Flood Mitigation Assistance program funds.

*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] . . .*

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 plan 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. Jefferson County and the cities of Culver, Madras and Metolius will review the plan semi-annually as described in Section 4, Plan Implementation and Maintenance.

The steering committees for Jefferson County, Culver, Madras, and Metolius each met to review the plan update process and their governing bodies adopted the NHMP as shown below:

Jefferson County adopted the plan on **October** 26, 2022

The City of Culver adopted the plan on **October** 17, 2022

The Lake Chinook Fire District adopted the plan on **November** 10, 2022

The City of Madras adopted the plan on **November** 08, 2022

The City of Metolius adopted the plan on **November** 07, 2022

FEMA Region X approved the Jefferson County Multi-jurisdictional NHMP on **January** 19, 2023 With approval of this plan, 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 **January 18, 2028**.

# SECTION I: INTRODUCTION

Section I: Introduction provides a general introduction to natural hazard mitigation planning in Jefferson 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 plan 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.”<sup>1</sup> 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, such as 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 with a number of 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?

Jefferson County developed this Natural Hazards Mitigation Plan (NHMP) in an effort 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 citizens within the community, it is possible to minimize the losses that can result from natural hazards.

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved NHMP in order to receive federal funds for mitigation projects. Local and federal approval of this plan ensures that the county and listed cities will remain eligible for pre- and post-disaster mitigation project grants.

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<sup>1</sup> FEMA, *What is Mitigation?* <http://www.fema.gov/what-mitigation>

## What Federal Requirements Does This Plan Address?

DMA2K is the latest federal legislation addressing mitigation planning. It 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 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 in order 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.

Chapter 44 Code of Federal Regulations (CFR), section 201.6, also requires a local government to have an approved mitigation plan in order to receive HMGP project grants.<sup>2</sup> Pursuant of Chapter 44 CFR, the Natural Hazard Mitigation Plan planning processes shall include opportunity for the public to comment on the plan during review, and the updated Natural Hazard Mitigation Plan shall include documentation of the public planning process used to develop the plan.<sup>3</sup> The Natural Hazard Mitigation Plan update must also contain a risk assessment, mitigation strategy and a plan maintenance process that has been formally adopted by the governing body of the jurisdiction.<sup>4</sup> Lastly, the Natural Hazard Mitigation Plan must be submitted to Oregon Military Department – Office of Emergency Management (OEM) for initial plan review, and then federal approval.<sup>5</sup> Additionally, OEM administers the Emergency Management Performance Grant (EMPG), which helps fund local emergency management programs and requires a FEMA-approved NHMP.

## What is the Policy Framework for Natural Hazards 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 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 plan aligns with the goals of the jurisdiction's Comprehensive Plan, and helps each jurisdiction meet the requirements of statewide land use planning Goal 7.

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<sup>2</sup> Code of Federal Regulations, Chapter 44. Section 201.6, subsection (a), 2015

<sup>3</sup> *ibid*, subsection (b). 2015

<sup>4</sup> *ibid*, subsection (c). 2015

<sup>5</sup> *ibid*, subsection (d). 2015

The primary responsibility for the development and implementation of risk reduction strategies and policies lies with local jurisdictions. However, resources exist at the state and federal levels. Some of the key agencies in this area include Oregon Military Department – Office 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 Plan Developed?

The plan was developed by the Jefferson County Natural Hazard Mitigation Plan steering committee and the steering committees for the cities of Culver, Madras and Metolius. The Jefferson County steering committee formally convened on four occasions to discuss and revise the plan. Each of the participating city steering committees met at least once formally. Steering committee members contributed data and maps, and 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 plan. In order 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 Plan during review.<sup>6</sup> Central Oregon Intergovernmental Council (COIC) provided a publicly accessible project webpage for the general public in order to make meeting materials, the draft plan and contact information available throughout the update process. Additionally, COIC and Jefferson County hosted a virtual public input meeting on September 30<sup>th</sup>, 2021.

COIC and Jefferson County also administered a public opinion survey to obtain additional input from the public regarding the county’s risks, vulnerabilities, hazards history, and mitigation strategies. See Appendix F for more information.

Finally, COIC sent quarterly updates to Emergency Services staff in the following neighboring communities with opportunities to participate and comment throughout the review process:

- Confederated Tribes of Warm Springs
- Crook County
- Deschutes County
- Wheeler County
- Wasco County
- Marion County
- Linn County

For more details and documentation of the public processes described above, see Appendix B.

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<sup>6</sup> Code of Federal Regulations, Chapter 44. Section 201.6, subsection (b). 2015

## How is the Plan Organized?

Each volume of the mitigation plan 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 plan structure enables stakeholders to use the section(s) of interest to them.

### Volume I: Basic Plan

#### Executive Summary

The executive summary provides an overview of the FEMA requirements plans 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 Plan.

#### Section 2: Risk Assessment

Section 2 provides the factual basis for the mitigation strategies contained in Section 3. (Additional information is included within Appendix C, which contains an overall description of Jefferson County and the cities of Culver, Madras and Metolius). This section includes a brief description of community sensitivities and vulnerabilities and an overview of the hazards addressed in Volume II of this plan. The Risk Assessment allows readers to gain an understanding of the county's, and other jurisdictions', sensitivities – those community assets and characteristics that may be impacted by natural hazards, as well as the county's, and other jurisdictions', resilience – the ability to manage risk and adapt to hazard event impacts. Additionally, this section provides information on the jurisdictions' participation in the National Flood Insurance Program (NFIP).

#### Section 3: Mitigation Strategy

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

#### Section 4: Plan Implementation and Maintenance

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

## **Volume II: Hazard Annexes**

The hazard annexes describe the risk assessment process and summarize the best available local hazard data. A hazard summary is provided for each of the hazards addressed in the Plan. The summary includes hazard history, location, extent, vulnerability, impacts, and probability.

The hazard specific annexes included with this Plan are the following:

- Drought
- Earthquake
- Flood
- Landslide
- Volcanic Event
- Wildfire
- Windstorm, and
- Winter Storm

## **Volume III: Jurisdictional Addenda**

Volume III of the plan is reserved for any city or special district addenda developed through this multi-jurisdictional planning process. Each of the cities and special districts with a FEMA approved addendum went through an update to coincide with the county's update. As such, the five-year update cycle will be the same for all of the cities and the county. The City of Culver and Lake Chinook Fire District added their first addenda to the Plan in 2021 & 2022.

The Plan includes city and special district addenda updates for the following jurisdictions:

- City of Culver
- Lake Chinook Fire District
- City of Madras
- City of Metolius

## **Volume IV: Mitigation Resources**

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

### **Appendix A: Action Item Forms**

This appendix contains the detailed action item forms for each of the mitigation strategies identified in Section 3 of this Plan.

### **Appendix B: Planning and Public Process**

This appendix includes documentation of all the countywide public processes utilized to develop the Plan. 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 a number of perspectives in order 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. 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).

## **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. The Oregon Partnership for Disaster Resilience developed this appendix. It has been reviewed and accepted by FEMA 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.

## **Appendix E: Grant Programs and Resources**

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

## **Appendix F: Jefferson County Natural Hazards Community Survey (2021)**

Appendix F includes the survey instrument and results from the preparedness survey implemented by COIC and Jefferson County. The survey aims to gauge household knowledge of mitigation tools and techniques to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness.



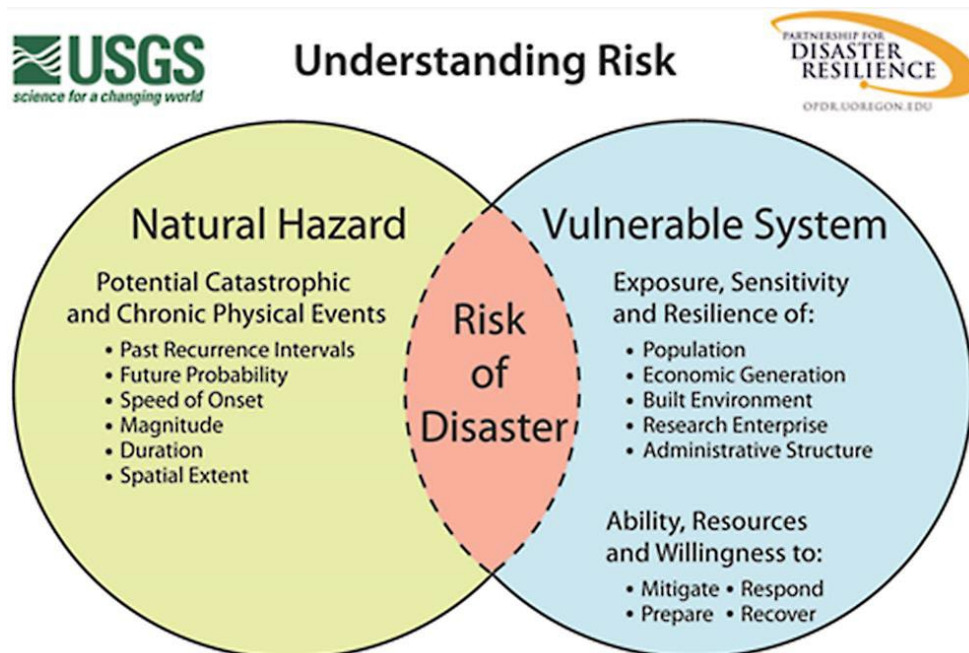
## SECTION 2: RISK ASSESSMENT

This section of the NHMP addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact 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 information presented below, along with hazard specific information presented in the Hazard Annexes and community characteristics presented in the Community Profile Appendix, will be used as the local level rationale for the risk reduction actions identified in Section 3 – Mitigation Strategy. The risk assessment process is graphically depicted in Figure 2-1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.

Figure 2-1 Understanding Risk

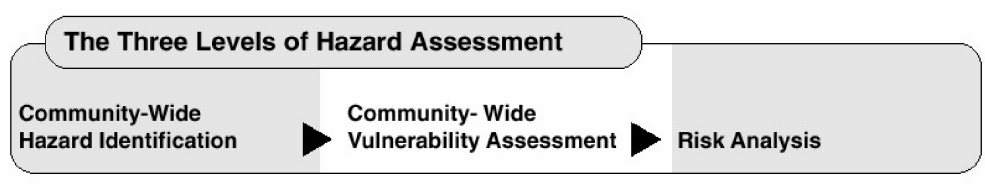


Source: Oregon Partnership for Disaster Resilience

# What is a Risk Assessment?

A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

**Figure 2-2 Three Phases of a Risk Assessment**



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

The first phase, **hazard identification**, involves the identification of the geographic extent of a hazard, its intensity, and its probability of occurrence. This level of assessment typically involves producing a map. The outputs from this phase can also be used for land use planning, management, and regulation; public awareness; defining areas for further study; and identifying properties or structures appropriate for acquisition or relocation.<sup>1</sup>

The second phase, **vulnerability assessment**, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by the hazard. This step can also assist in justifying changes to building codes or development regulations, property acquisition programs, policies concerning critical and public facilities, taxation strategies for mitigating risk, and informational programs for members of the public who are at risk.<sup>2</sup>

The third phase, **risk analysis**, involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Risk has two measurable components: (1) the magnitude of the harm that may result, defined through the vulnerability assessment, and (2) the likelihood or probability of the harm occurring. An example of a product that can assist communities in completing the risk analysis phase is HAZUS, a risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes. In Hazards U.S. – Multi-Hazard (HAZUS-MH) current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after a disaster occurs.

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.

<sup>1</sup> Burby, *Cooperating with Nature* (Washington, DC: Joseph Henry Press, 1998), 126.

<sup>2</sup> Ibid, 133.

# Hazard Analysis Methodology

This NHMP utilizes a hazard analysis methodology that was first developed by FEMA circa 1983, and gradually refined by the Oregon Military Department's Office of Emergency Management 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 endeavors to reflect 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%.

This method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular 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.

In this analysis, severity ratings, and weight factors, are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario), and probability as demonstrated below.

## History

*Weight factor for category = 2*

History is the record of previous occurrences. Events to include in assessing history of a hazard in your jurisdiction are events for which the following types of activities were required:

- The Emergency Operations Center (EOC) or alternate EOC was activated;
- Three or more Emergency Operations Planning (EOP) functions were implemented, e.g., alert & warning, evacuation, shelter, etc.;
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

**LOW** = 0 to 1 event in the past 100 years, scores between 1 and 3 points

**MODERATE** = 2 to 3 events in the past 100 years, scores between 4 and 7 points

**HIGH** = 4+ events in the past 100 years, scores between 8 and 10 points

## Probability

*Weight factor for category = 7*

Probability is the likelihood of future occurrence within a specified period of time.

**LOW** = one incident likely within 75 to 100 years, scores between 1 and 3 points

**MODERATE** = one incident likely within 35 to 75 years, scores between 4 and 7 points

**HIGH** = one incident likely within 10 to 35 years, scores between 8 and 10 points

## Vulnerability

Weight factor for category = 5

Vulnerability is the percentage of population and property likely to be affected under an “average” occurrence of the hazard.

**LOW** = < 1% affected, scores between 1 and 3 points

**MODERATE** = 1 - 10% affected, scores between 4 and 7 points

**HIGH** = > 10% affected, scores between 8 and 10 points

## Maximum Threat

Weight factor for category = 10

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

**LOW** = < 5% affected, scores between 1 and 3 points

**MODERATE** = 5 - 25% affected, scores between 4 and 7 points

**HIGH** = > 25% affected, scores between 8 and 10 points

## Hazard Identification

Jefferson County identifies eight natural hazards that could have an impact on the county (as shown in Table 2-1). For specific information pertaining to individual hazards, including location information, reference the Hazard Annexes (Volume II). Table 2-1 shows the hazards identified in the county in comparison to the hazards identified in the State of Oregon NHMP for Central Oregon (Region 6), which includes Jefferson County.

**Table 2-1 Jefferson County Hazard Identification**

Jefferson County	State of Oregon NHMP Region 6 Central Oregon
Drought	Drought
Earthquake	Earthquake
N/A	Extreme Heat
Flood	Flood
Landslide/Debris Flow	Landslide
Volcanic Event	Volcano
Wildfire	Wildfire
Windstorm	Windstorm
Winter Storm	Winter Storm

Source: Jefferson County NHMP Steering Committee (2021);  
State of Oregon NHMP, Region 6: Central Oregon (2020)

The Extreme heat hazard is the only hazard identified in the state profile that is not perceived as a threat by the Jefferson County NHMP steering committee. While Central Oregon is no stranger to hot days in the warm season (May – September), with temperatures frequently climbing to or exceeding 95 to 100 degrees (Table 2-2), these

temperatures normally do not represent a major threat to the public. One consideration is the apparent temperature, or how the temperature actually feels when combined with humidity. Given the high desert climate of the region, humidity is often quite low (15% or less), leading the apparent temperature to be lower than the actual temperature. In such cases, the temperature actually feels cooler than it is due to the very low humidity. This lessens the danger of heat in these regions in the absence of higher humidity. In addition to low humidity leading to lower apparent temperatures, they also lend to rapidly cooling conditions during the overnight hours. It is not uncommon for some of the hottest days in Central Oregon to be coupled with cool nights where lows fall into the 50s and even 40s. This shortens the potential duration of heat events and related human exposure, making extreme heat a rather low risk in this region. This is not to say it cannot happen, but it is a rare occurrence. Figure 2-3 below illustrates danger levels associated with varying heat indices. The humidity is frequently too low to warrant extreme heat in Jefferson County.

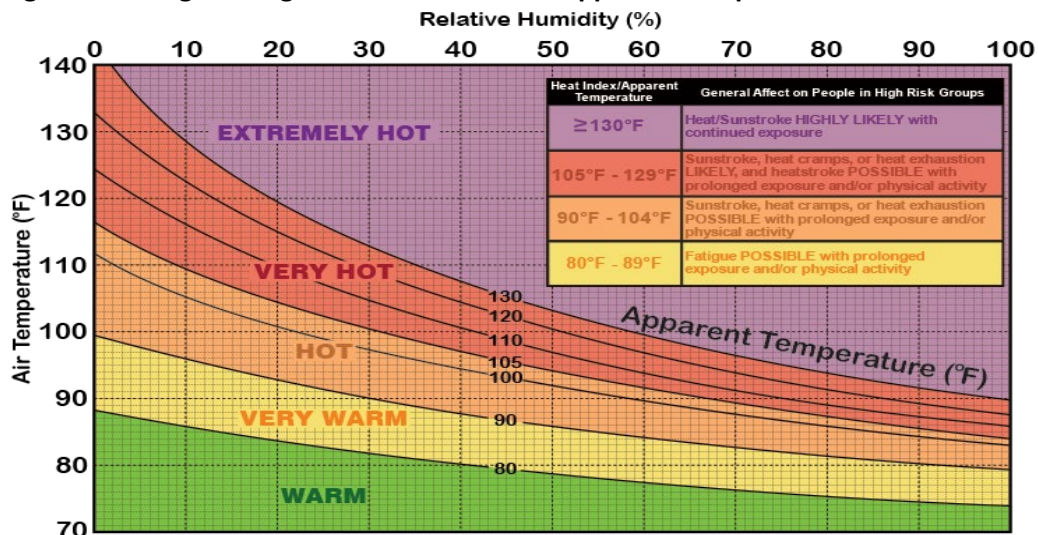
**Table 2-2 Average Extreme Heat Days Per Year**

Location	Average 95+ degree days per year	Average 100+ degree days per year
Madras	8	1.2
Antelope 6 SSW	12.5	3
Pelton Dam	36	16.5

Source: XMACIS 2000-2020

Figure 2-3 below illustrates danger levels associated with varying heat indices. The humidity is frequently too low to warrant extreme heat in Jefferson County.

**Figure 2-3 Danger Categories Associated with Apparent Temperature**



Source: Marcus Austin, NOAA (2021)

## Drought

A drought is a period of drier than normal conditions that results in water-related problems. 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.

The incidence of drought in Oregon is between three and six years, as can be seen in Figure DR-1 within the *Volume II Drought Annex*. Jefferson County is susceptible to droughts because of its location east of the Cascades and within the high desert. The region experiences dry conditions annually during the summer months from June to September.

*For more information on the Drought Hazard in Jefferson County see the Drought Annex in Volume II.*

## Earthquake

Oregon and the Pacific Northwest in general are susceptible to earthquakes from four sources: 1) the off-shore Cascadia Fault Zone; 2) deep intra-plate events within the subducting Juan de Fuca Plate; 3) shallow crustal events within the North American Plate; and 4) earthquakes associated with volcanic activity.

The areas most susceptible to ground amplification and liquefaction have young, soft alluvial sediments, found along river and stream channels. The extent of the damage to structures and injury and death to people will depend upon the type of earthquake, proximity to the epicenter and the magnitude and duration of the event.

*For more information on the Earthquake Hazard in Jefferson County see the Earthquake Annex in Volume II.*

## Flood

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.<sup>3</sup> Flooding can be aggravated when rain is accompanied by snowmelt and frozen ground; the spring cycle of melting snow is the most common source of flood in the region. The principal types of flood that occur in Jefferson County include: riverine, flash, shallow area, urban, and snow-melt. Major flooding events occur in Jefferson County approximately every ten years. Riverine and snow-melt are the most common types of flooding; however, major flash flooding events have also occurred in Jefferson County's history.

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<sup>3</sup> Taylor, George H. and Chris Hannan. *The Oregon Weather Book*. Corvallis, OR: Oregon State University Press. 1999

The most significant of the FEMA-determined floodplains and floodways either surround the Willow Creek near the City of Madras, an unnamed creek north of Culver, and Muddy Creek in eastern Jefferson County. There are a number of County facilities that are vulnerable to damage in a flood. The County Courthouse and the County offices are located in a floodway in Madras. This includes Community Development, the Annex Buildings, Old City Hall, the Old Courthouse, the Jefferson County Library District building, and Public Works. A number of facilities in the City of Madras are also located in the Willow Creek floodplain. These include Madras schools, including Madras Primary and Madras High School.

*For more information on the Flood Hazard in Jefferson County see the Flood Annex in Volume II.*

## **Landslide**

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. Avalanches also occur in the mountainous west portion of the county; avalanches are similar to landslides except they involve snow and ice with some movement of rock or other debris.

In Oregon, a significant number of locations are at risk to dangerous landslides. While not all landslides result in private property damage, many landslides impact transportation corridors, fuel and energy conduits, and communication facilities. They can also pose a serious threat to human life.

*For more information on the Landslide Hazard in Jefferson County see the Landslide Annex in Volume II.*

## **Volcanic Event**

Jefferson County and the Pacific Northwest lies within the “ring of fire,” an area of frequent volcanic activity surrounding the Pacific Basin. Volcanic events occur regularly along the ring of fire, in part because of the movement of the Earth’s tectonic plates. Volcanic events have the potential to coincide with numerous other hazards including ash fall, earthquakes, lava flows, pyroclastic flows, lahars, and debris flows, and landslides.

*For more information on the Volcanic Event Hazard in Jefferson County see the Volcanic Event Annex in Volume II.*

## **Wildfire**

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 that provide structural protection.

In Central Oregon, large costly fires have become regular events, disrupted communities, cost millions of dollars in suppression and recovery costs, and increased the risk to private property owners. According to the Oregon Department of Forestry, “large fires that threaten dwellings are 48% more expensive to fight, and the likelihood of human-caused fires exponentially increases with the addition of each new home. Throughout Oregon’s wildland-urban interfaces historically normal fires have become economically and socially unacceptable due to the scale of damage they cause.”<sup>4</sup>

*For more information on the Wildfire Hazard in Jefferson County see the Wildfire Annex in Volume II.*

## **Windstorm**

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph. Although windstorms can affect the entirety of Jefferson 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.

*For more information on the Windstorm Hazard in Jefferson County see the Windstorm Annex in Volume II.*

## **Winter Storm**

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting Jefferson County typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Like snow, ice storms are comprised of cold temperatures and moisture, but subtle changes can result in varying types of ice formation, including freezing rain, sleet, and hail. Freezing rain can be the most damaging of ice formations. While sleet and hail can create hazards for motorists when it accumulates, freezing rain can cause the most dangerous conditions within a community. Ice buildup can bring down trees, communication towers, and wires creating hazards for property owners, motorists, and pedestrians alike.

All of Jefferson County is vulnerable to winter storms and impacts typically extend region-wide. The magnitude or severity of severe winter storms is determined by a number of meteorological factors including the amount and extent of snow or ice, air temperature, wind speed, and event duration. Areas within the county that are particularly vulnerable to winter storms include unsanded, flat stretches of road (both rural and highway); farms and

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<sup>4</sup> Oregon Department of Forestry, *Oregon Forests Report*, 2007-2009.



agricultural lands; subdivisions near Lake Billy Chinook (due to accessibility); and the Burlington Northern Santa Fe (BNSF) rail lines.

*For more information on the Winter Storm Hazard in Jefferson County see the Winter Storm Annex in Volume II.*

## **Federal Disaster and Emergency Declarations**

Looking at the past events that have occurred in the county 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 as a result of natural hazard related events. As of April 2021, FEMA has approved a total of 133 disaster declarations in Oregon.<sup>5</sup> 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 for Jefferson County, since 1964. The table shows that all of the major disaster declarations for the county have been weather related, with the exception of the COVID-19 pandemic.

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. There have been three emergency declarations that have affected Deschutes County.

Fire Management Assistance Grants (FMAG) may be provided after a State submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" exists. There have been seven fire management assistance declarations for the county.

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<sup>5</sup> FEMA, *Declared Disasters by Year or State*, [http://www.fema.gov/news/disaster\\_totals\\_annual.fema#marks](http://www.fema.gov/news/disaster_totals_annual.fema#marks). Accessed April 5, 2021.

**Table 2-3 FEMA Major Disaster, Emergency, and Fire Management Declarations for Jefferson County**

Declaration Number	Declaration Date	Incident(s) Period	Incident(s)	Individual Assistance	Public Assistance Categories
DR 4499	28-Mar-20	20-Jan-20 and cont.	COVID-19 Pandemic	Yes	B
DR 4432	2-May-19	23-Feb-19 to 26-Feb-19	Sever Winter Storms, Flooding, Landslides, and Mudslides	None	-
DR-1632	20-Mar-06	18-Dec-05 to 21-Jan-06	Severe Storms, Flooding, Landslides and Mudslides	None	A, B, C, D, E, F, G
DR-1510	19-Feb-04	26-Dec-03 to 14-Jan-04	Severe Winter Storms	None	A, B, C, D, E, F, G
DR-1099	9-Feb-96	4-Feb-96 to 21-Feb-96	Severe Storms/Flooding	Yes	A, B, C, D, E, F, G
DR-184	24-Dec-64	24-Dec-64 to 24-Dec-64	Heavy Rains & Flooding	Yes	A, B, C, D, E, F, G
FM 5356	8-Sep-20	7-Sep-20 to 15-Oct-20	Beachie Creek Lionshead Complex	None	B, H
FM 5243	22-Jun-18	21-Jun-18 to 25-Jun-18	Graham Fire	None	-
FM 5126	8-Jun-16	7-Jun-16 to 11-Jun-16	Akawana Fire	None	-
FM-2493	20-Aug-03	20-Aug-03 to 22-Oct-03	Booth Fire	None	B, H
FM-2455	29-Jul-02	28-Jul-02 to 1-Aug-02	Cache Mountain Fire	None	B
FM-2443	16-Jul-02	13-Jul-02 to 18-Jul-02	Eyerly Fire	None	B
FM-2081	9-Jun-92	9-Jun-92	Sage Flats Fire	None	-
EM 3542	10-Sep-20	8-Sep-20 to 15-Sep-20	Oregon Wildfires	None	B
EM 3429	13-Mar-20	20-Jan-20 and cont.	COVID-19 Pandemic	None	B
EM-3039	29-Apr-77	29-Apr-77 to 29-Apr-77	Drought	None	A, B

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

# Vulnerability Assessment

Community vulnerabilities are an important supplement to the NHMP risk assessment. For more in-depth information regarding specific community vulnerabilities, reference *Appendix C: Community Profile*.

## 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.<sup>6</sup> 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. For planning purposes, it is essential Jefferson County and the cities of Madras and Metolius consider both immediate and long-term socio-demographic implications of hazard resilience.

### Population Vulnerabilities

- As of 2010, 15.3% of Jefferson County's population is over the age of 64, a number that is projected to rise to 21.5% by 2040. The county has a higher percent of its population over the age of 64 compared to Oregon as a whole which has currently 13.9% of its population over the age of 64, with a projection of 20.2% by 2040.
- The Jefferson County age dependency ratio<sup>7</sup> is 56.8%, which is higher than that of the State of Oregon (48.9%); the age dependency figure for the county is expected to increase to 71.9% by the year 2040.
- Even though the vast majority of the county population is reported as proficient in English, 52.8% of Spanish speakers are not proficient in English. These populations would stand to benefit from mitigation outreach, with special attention to cultural, visual and technology sensitive materials.

## 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. It is imperative that Jefferson County and the cities of Madras and Metolius recognize that economic

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<sup>6</sup> Hazards Workshop Session Summary #16, *Disasters, Diversity, and Equity*, University of Colorado, Boulder (2000).

<sup>7</sup> Dependency Ratio: the ratio of population typically not in the work force

diversification is a long-term issue; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.

## Economic Vulnerabilities

- According to the Oregon Employment Department, Jefferson County unemployment has increased since 2007 when it was at 6.8% to 12.2% in 2012. In the event of a large—scale disaster, unemployment has the potential to rise when businesses and companies are unable to overcome the ramifications of the hazard event.
- The largest sectors of employment in Jefferson County are Government (43.6%, including the 1,170 people who work for the Confederated Tribes of Warm Springs), Manufacturing (14%), and Trade, Transportation, and Utilities (13.5%)<sup>8</sup>.
- The largest revenue sectors in Jefferson County are manufacturing (36.4% of total revenue), wholesale trade (28.9%) and retail trade (24.8%). Manufacturing, the largest revenue sector generated \$2.43 billion in 2007, making it the largest sector in the region. However, this sector experienced the most significant loss of employment between 2001 and 2011 at 46.5% decrease. In the event of a natural disaster, manufacturing and government sectors may not be as vulnerable in the short term as other sectors; however, other large industries such as retail and wholesale trade may be significantly affected by a disaster as these basic industries tend to rely on a stable disposable income, which may decline following a disaster.
- It is imperative that Jefferson County recognizes that economic diversification is a long-term issue; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.

## 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.<sup>9</sup> 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

- Dynamic weather and relatively flat, arid land across eastern Jefferson County are indicators of hazard vulnerability when combined with the changing climate and severe weather-related events. Both wet and dry cycles are likely to last longer and be more extreme, leading to periods of deeper drought and more frequent flash flooding. Less precipitation in the summers and subsequently lower soil moisture

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<sup>8</sup> Oregon Employment Department, "2001 and 2011 Covered Employment and Wages Summary Reports," <http://www.qualityinfo.org/olmisj/labforce>. Accessed January 2013.

<sup>9</sup> Mayunga, J. "Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building," (2007).

with hotter temperatures will likely increase the amount of vegetation consumed by wildfire.

- Extended drought periods affect snowpack and agricultural irrigation.
- The combination of a growing population and development intensification can lead to the increasing risk of hazards, threatening loss of life, property and long-term economic disruption if land management is inadequate; such as floodplain development along Willow Creek in the City of Madras.

## **Built Environment, Critical Facilities and Infrastructure**

Critical facilities (i.e. police, fire, and government facilities), housing supply and physical infrastructure are critical during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

### **Critical Facilities and Infrastructure Vulnerabilities**

- It is critical to maintain the quality of built capacity (transportation networks, critical facilities, utility transmission, etc.) throughout the area, as poor infrastructure can negatively affect Jefferson County's ability to cope, respond and recover from a natural disaster.
- Mobile home and other non-permanent residential structures account for 22% of the housing in Jefferson County. In Culver and Madras, mobile homes account for nearly 16% and 14% respectively. In Metolius, the percent of mobile homes is nearly 33%. These structures are particularly vulnerable to certain natural hazards, such as windstorms and heavy flooding events. Examples of these vulnerable mobile homes include the Mountain View RV Park in Metolius and the City Trailer Court in Madras.
- Based on U.S. Census data, 53.6% of the residential housing throughout Jefferson County was built prior to current seismic building standards of 1990 and 23% were constructed prior to the local implementation of the flood elevation requirements of the 1970's (county FIRMs were not completed until 1980).<sup>10</sup> The City of Culver has the greatest number of their housing units built prior to the flood mapping of the 1970s at 31%. The City of Metolius has the greatest number of housing stock built prior to earthquake standards of the 1990s at 61%.
- The county has 31.5% of the housing units occupied by renters, versus 68.5% homeowners.<sup>11</sup> The City of Madras has the greatest renter population with 52.7% of the housing stock renter occupied. Studies have shown that renters are less likely than homeowners to prepare for hazardous events.
- Some roads and bridges in the county are highly vulnerable to hazards, specifically earthquakes. Because bridges vary in size, materials, siting, and design, any given

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<sup>10</sup> U.S. Census Bureau, 2006-2010 American Community Survey, Table B25044 "Year Structure Built", <http://factfinder2.census.gov>

<sup>11</sup> U.S. Census Bureau, Table DP-1 "Profile of General Population and Housing Characteristics: 2010", <http://factfinder2.census.gov>

hazard will affect them differently. The county and cities should also pay considerable attention to roads and bridges that may become obstructed that serve as primary interstate travel routes (Highway 97), as this will likely have significant impacts on access in and out of the county and region. ODOT has jurisdiction over Highway 97, but the cities and county may control maintenance in and around the communities. Jefferson County has several “one-way out” communities with a single access route, most notably Three Rivers and subdivisions near Lake Billy Chinook. Should a natural disaster negatively affect these limited access routes these communities will be greatly impacted. Vulnerable bridges noted by the county steering committee include: Mill Street Bridge, Jordan Road Bridge, and the Camp Sherman Bridge over the Metolius River.

- According to the county steering committee, communication towers (especially those on Grey Butte and Grizzly Mountain) are vulnerable to winter storms, wildfire, and lightning events. Wastewater treatment plants along the Deschutes River and Shitike Creek are vulnerable to floods and earthquakes.

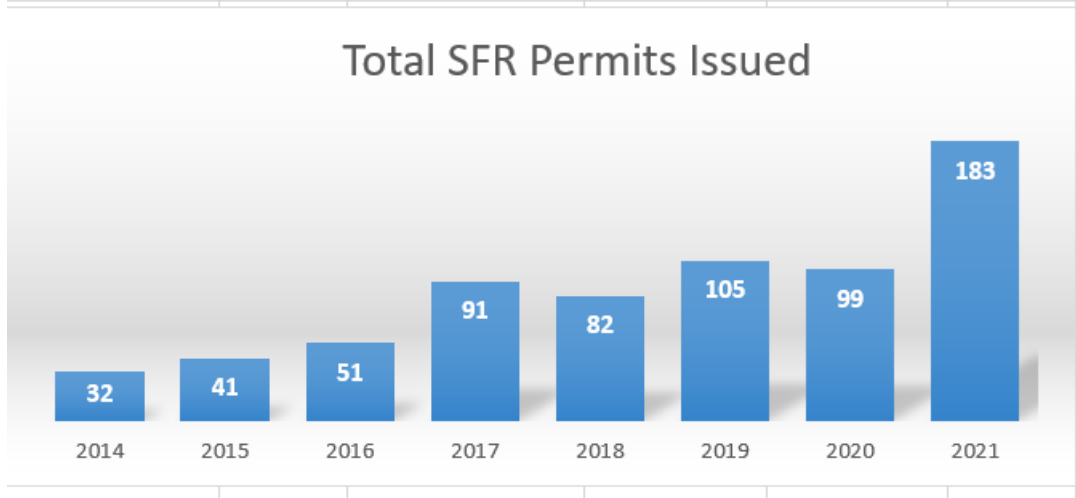
## Development

- Single-family development trends are generally stable or increasing across the jurisdictions since 2014 (Figure 2-4 below). Notably, the City of Madras has seen significant and steady growth in single-family development over the past 5 years.
- There was no multi-family development for the period of 2014-2021 for the unincorporated County, and the cities of Metolius and Culver. The City of Madras’ multi-family development is included in Table 2-4 below. Madras generally saw little to no multi-family development until 2019 and 2021.
- Non-residential development, which includes commercial, government, industrial, and churches/community centers is captured in Table 2-5 below.
- Jefferson County approved three planning permits in the floodplain since 2014. One in 2015 for driveway improvements, and two bridge permits in 2017 and 2018.

Figure 2-4 Single Family residence Permits for Jefferson County 2014-2021

### Single Family Residence Permits Issued in Jefferson County

	Total	Unincorporated County	City of Madras	City of Metolius	City of Culver
<b>2014</b>	32	29	0	3	N/A
<b>2015</b>	41	35	6	0	N/A
<b>2016</b>	51	45	6	0	N/A
<b>2017</b>	91	67	18	6	N/A
<b>2018</b>	82	53	12	17	N/A
<b>2019</b>	105	51	25	29	N/A
<b>2020</b>	99	48	44	1	6
<b>2021</b>	183	56	121	2	4



Source: Jefferson County Planning Department, 2022

**Table 2-4 City of Madras Multi-Family Development 2014-2021**

Year	Multi-Family (Subsidized)	Multi-Family (Unsubsidized)
2014	0	0
2015	0	0
2016	0	0
2017	0	0
2018	0	0
2019	30	23
2020	0	2
2021	0	48

\*2009-2019 values determined by 2021 AV

Source: City of Madras Planning Department, 2022

**Table 2-5 Non-Residential Development for Jefferson County 2014-2021**

Year	Jefferson County (unincorporated)	City of Madras	City of Metolius	City of Culver
2014	2	2	0	0
2015	8	4	0	0
2016	3	2	0	0
2017	3	4	0	0
2018	9	3	0	1
2019	4	2	0	0
2020	4	2	0	0
2021	6	3	0	0

Source: Jefferson County Planning Department and City of Madras Planning Department, 2022

## National Flood Insurance Program (NFIP)

The Jefferson County Flood Insurance Rate Maps (FIRMs), like much of eastern Oregon are not modernized. Table 2-6 shows that as of June 2021, Jefferson County (including the cities of Culver and Madras) has 92 National Flood Insurance Program (NFIP) policies in force and 15 paid claims. The last Community Assistance Visit (CAV) for Jefferson County and the City of Culver was on September 14, 1994. The most recent CAV was in Madras on November 14, 2019. The county and cities are not members of the Community Rating System (CRS). The table displays the number of policies by building type and shows that the majority of residential structures that have flood insurance policies are single-family homes; there are 21 non-residential structures with flood insurance policies.



The Community Repetitive Loss record for Jefferson County identifies zero repetitive loss building and zero total repetitive loss claims. There are no repetitive loss buildings within the city of Madras.

**Table 2-6 Flood Insurance Detail**

Jurisdiction	Current FIRM Map	Policies	Pre-FIRM	Policies by Building Type			
				Single Family	2 to 4 Family	Other Residential	Non-Residential
Jefferson County	-	82	59	58	3	0	21
Jefferson County*	7/17/1989	10	6	10	0	0	0
Culver	9/4/1987	23	15	21	1	0	1
Madras	7/17/1989	47	37	26	2	0	19
Metolius**	NA	NA	NA	NA	NA	NA	NA
Warm Springs	4/15/2002	2	1	1	0	0	1

Jurisdiction	Insurance in Force	Total Paid Claims	Substantial Damage Claims	Repetitive Loss Buildings	Total Paid Amount	CRS Class Rating	LAST CAV
Jefferson County	\$16,595,700	9	1	0	\$133,356	NA	-
Jefferson County*	\$2,970,000	6	1	0	\$130,863	NA	9/14/1994
Culver	\$3,585,800	0	0	0	\$-	NA	9/14/1994
Madras	\$8,829,900	3	0	0	\$2,493	NA	11/14/2019
Metolius**	NA	NA	NA	NA	NA	NA	NA
Warm Springs	1,210,000	0	0	0	0	NA	NA

\* Portion of entire county under Jefferson County jurisdiction

\*\* Metolius is not included within the database.

NP = Not Participating NA = Information Not Available

Source: Adair, Celinda. NFIP Coordinator at the Oregon Department of Land Conservation and Development. "Re: Updated NFIP Data". Message to Shelby Knight. June 17, 2021. Email.

## Vulnerability Summary

Vulnerability is a measure of the exposure of the built environment to hazards. The exposure of community assets to hazards is critical in the assessment of the degree of risk a community has to each hazard. Identifying the facilities and infrastructure at risk from various hazards can assist the county in prioritizing resources for mitigation, and can assist in directing damage assessment efforts after a hazard event has occurred. The exposure of county and city assets to each hazard and potential implications are explained in each hazard section.

Vulnerability includes the percentage of population and property likely to be affected under an "average" occurrence of the hazard. Jefferson County and the cities of Culver, Madras, and Metolius evaluated the best available vulnerability data to develop the vulnerability scores presented below. For the purposes of this Plan, the county and cities utilized the Oregon Military Department – Office of Emergency Management (OEM) Hazard Analysis methodology vulnerability definitions to determine hazard probability.

The table below presents the vulnerability scores for each of the natural hazards present in Jefferson County and for participating cities. As shown in the table with **bold text**, several hazards are rated with high vulnerabilities.

**Table 2-7 Community Vulnerability Assessment Summary**

Hazard	Jefferson County	Culver	Madras	Metolius
Drought	<b>High</b>	Moderate	<b>High</b>	Low
Earthquake	Moderate	Moderate	Moderate	Moderate
Flood	<b>High</b>	<b>High</b>	<b>High</b>	Moderate
Landslide/Debris Flow	Low	Low	Low	Low
Volcanic Event	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>
Wildfire	<b>High</b>	Moderate	<b>High</b>	Moderate
Windstorm	Moderate	<b>High</b>	Moderate	<b>High</b>
Winter Storm	<b>High</b>	<b>High</b>	<b>High</b>	Moderate

Source: Jefferson County, Madras and Metolius NHMP Steering Committees, 2021.

## Risk Analysis

The risk analysis involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Risk has two measurable components: (1) the magnitude of the harm that may result, defined through the vulnerability assessment (assessed in the previous section), and (2) the likelihood or probability of the harm occurring. The table below presents the probability scores for each of the natural hazards present in Jefferson County and for the participating cities. As shown in the table with **bold text**, several hazards are rated with high probabilities.

**Table 2-8 Natural Hazard Probability Assessment Summary**

Hazard	Jefferson County	Culver	Madras	Metolius
Drought	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>
Earthquake	Low	Low	Low	Low
Flood	Moderate	<b>High</b>	<b>High</b>	Low
Landslide/Debris Flow	Low	Low	Moderate	Low
Volcanic Event	Low	Low	Low	Low
Wildfire	<b>High</b>	Low	<b>High</b>	Low
Windstorm	Moderate	Low	<b>High</b>	<b>High</b>
Winter Storm	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>

Source: Jefferson County, Madras, and Metolius NHMP Steering Committees, 2021.

The table below presents the entire updated hazard analysis matrix for Jefferson 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 particular hazard event occurring, the vulnerability to the community, and the maximum threat or worst-case scenario, wildfire, drought, and winter storm events rank as the top hazard threats to the county. Windstorm, volcanic

events, and flood rank in the middle. Earthquake and landslide comprise the lowest ranked hazards in the county.

**Table 2-9 Hazard Analysis Matrix – Jefferson County**

Hazard	Maximum				Total Threat Score	Hazard Rank
	History	Probability	Vulnerability	Threat		
Wildfire	20	50	90	70	230	#1
Drought	18	45	90	63	216	#2
Winter Storm	6	45	90	63	204	#3
Windstorm	4	35	90	49	178	#4
Flood	8	40	80	49	177	#5
Volcanic Event	2	45	90	7	144	#6
Earthquake	2	20	100	7	129	#7
Landslide/Debris Flow	2	5	10	7	24	#8

Source: Jefferson County NHMP Steering Committee, 2021.

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.

## Multi-Jurisdictional 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 three participating cities in Jefferson County: Culver, Madras, and Metolius, and the Lake Chinook Fire District each held local Steering Committee meetings and completed a jurisdiction specific hazard analysis. The multi-jurisdictional risk assessment information is located within the Risk Assessment section of each addendum, which is located in Volume III of this NHMP.

## SECTION 3: MITIGATION STRATEGY

Section 3 outlines Jefferson 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 Natural Hazard Mitigation Plan (NHMP) steering committee reviewed and updated the mission, goals and action items documented in this plan. Additional planning process documentation is in Appendix B.

### Mitigation Plan Mission

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

The mission of the Jefferson County NHMP is to:

***To create a disaster-resilient Jefferson County.***

The 2021 Steering Committee reviewed the 2013 plan mission statement and agreed it accurately describes the overall purpose and intent of this plan. This is the exact wording that was present in the 2013 and 2008 plans. The Steering Committee believes the concise nature of the mission statement allows for a comprehensive approach to mitigation planning.

### Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jefferson County citizens, 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 particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

Public participation was a key aspect in developing the plan goals initially in 2008. 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 Jefferson County.

The 2021 Jefferson County NHMP Steering Committee reviewed the 2013 plan goals and determined they would keep the same goals for the 2021 update, with minor alterations, and with the exception of one new goal. All the plan goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available. During the steering committee meetings for the participating jurisdictions (Madras, Metolius, and

Culver) the Jefferson County NHMP mission statement and goal statements were reviewed and agreed upon by each community. Below is a list of the re-confirmed plan goals (the first, second and third listed goals were modified slightly as documented in Appendix B; the seventh goal is a new addition):

**Goal 1:** *Save lives and reduce injuries*

**Goal 2:** *Minimize and prevent damage to public and private buildings, infrastructure, and services.*

**Goal 3:** *Increase cooperation and coordination among private partners with local, state, tribal and federal entities.*

**Goal 4:** *Increase education, outreach and awareness.*

**Goal 5:** *Protect natural and cultural resources.*

**Goal 6:** *Ensure the plan has direct linkages to efficient and effective recovery strategies.*

**Goal 7:** *Reduce economic impacts of natural disasters.*

(Note: although numbered the goals are not prioritized.)

## **Existing Mitigation Activities**

Existing mitigation activities include current mitigation programs and activities that are being implemented by the county in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist the jurisdiction to better understand risk and can assist in documenting successes. For a comprehensive list of existing mitigation activities for each specific hazard, reference Volume II, *Hazard Annexes*.

## **Government Structure**

Beyond Emergency Management, most departments within the county and city governance structures have some degree of responsibility in building overall community resilience. Each plays a role in ensuring that jurisdiction functions and normal operations resume after an incident, and the needs of the population are met. For further explanation regarding how these departments influence hazard resilience, reference Appendix C, *Community Profile* and within the city addenda.

## **Existing Plans and Policies**

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Linking existing plans and policies to the NHMP helps identify what resources already exist that can be used to implement the action items identified in the Plan. Plans and policies already in existence have support

from local residents, businesses and policy makers.<sup>1</sup> A list documenting plans and policies already in place in the county and participating cities can be found in Appendix C, *Community Profile* and within the city addenda.

## Community Organizations and Programs

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. The county and cities can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. Appendix C, *Community Profile*, provides a comprehensive list of community organizations and programs, and offers a more thorough explanation of how existing community organizations and programs can be utilized for hazard mitigation.

## Mitigation Plan Action Items

Action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. They address both multi-hazard (MH) and hazard-specific issues. Action items can be developed through a number of sources such as local reports and plans, community stakeholder engagement processes, surveys, and committee work sessions. description of how the Plan’s mitigation actions were developed is provided below.

### Priority Action Items

Priority action items were identified and agreed upon by the 2021 Steering Committee. A survey including all action items was sent to committee members for the first round of prioritization. Any action items that were marked as high priority through the survey were brought forward to the Steering Committee for further discussion and finalization. High priority action items are designated in order to clarify the importance of these mitigation actions for the affected jurisdictions.

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<sup>1</sup> Raymond J. Burby, “Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities,” (1998).

## Action Item Worksheets

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below. These action item worksheets are located in Appendix A, *Action Item Forms*.

### Proposed Action Title

Each action item includes a brief description of the proposed action.

### Alignment with Plan Goals

The Plan goals addressed by each action item are identified as a means for monitoring and evaluating how well the mitigation plan is achieving its goals, following implementation.

### Affected Jurisdiction/s

Many of the action items within this Plan apply to all of the participating cities and the county; however, some action items are specific. The list of affected jurisdictions is provided on the right side of the matrix. Each city identified as an “affected jurisdiction” will contribute to accomplishing the specified action at a local level. The action item form in Appendix A provides more detailed information.

### Alignment with Existing Plans/Policies

Identify any existing community plans and policies where the action item can be incorporated. Incorporating the mitigation action into existing plans and policies, such as comprehensive plans, will increase the likelihood that it will be implemented.

The Jefferson County NHMP includes a range of action items that, when implemented, will reduce loss from hazard events in the County. Within the Plan, FEMA requires the identification of existing programs that might be used to implement these action items. Jefferson County and the participating cities currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvements plans, mandated standards, and building codes. To the extent possible, the jurisdictions will work to incorporate the recommended mitigation action items into existing programs and procedures. (Note: Jefferson County is currently participating in a review of their development code to determine options for improvement regarding the flood and wildfire hazards.)

Many of the recommendations contained in the Jefferson County NHMP are consistent with the goals and objectives of the existing plans and policies. Where possible, Jefferson County and the participating cities will implement the recommendations and actions contained in the NHMP through existing plans and policies. Plans and policies

already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.<sup>2</sup> Implementing the action items contained in the NHMP through such plans and policies increases their likelihood of being supported and implemented.

## Rationale or Key Issues Addressed

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Action items can be developed at any time during the planning process and can come from a number of sources, including participants in the planning process, noted deficiencies in local capability, or issues identified through the risk assessment. The rationale for proposed action items is based on the information documented in Section II and the Hazard Annexes.

## Ideas for Implementation

The ideas for implementation offer a transition from theory to practice and serve as a starting point for this Plan. This component of the action item is dynamic, since some ideas may prove to not be feasible, and new ideas may be added during the plan maintenance process. Ideas for implementation include such things as collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure.

## Coordinating (Lead) Organization

The coordinating organization is the public agency with the regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring and evaluation.

## Internal and External Partners

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the project Steering Committee but not necessarily contacted during the development of the Plan. The coordinating organization should contact the identified partner organizations to see if they are capable of and interested in participation. This initial contact is also to gain a commitment of time and/or resources toward completion of the action items.

*Internal partner organizations* are departments within the county or other participating jurisdiction that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

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<sup>2</sup> Ibid



*External partner organizations* can assist the coordinating organization in implementing the action items in various functions and may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations.

## Potential Funding Sources

Where possible, identify potential funding sources for the action item. Example funding sources can include: the federal Pre-Disaster Mitigation and Flood Mitigation Assistance Programs; state funding sources such as the Oregon Seismic Rehabilitation Grant Program; or local funding sources such as capital improvement or general funds. An action item may also have multiple funding sources.

## Estimated Cost

A rough estimate of the cost for implementing each action item is included. Costs are shown in general categories showing low, medium, or high cost. The estimated cost for each category is outlined below:

Low – Less than \$50,000

Medium - \$50,000 - \$100,000

High – More than \$100,000

## Timeline

Action items include both short and long-term activities. Each action item includes an estimate of the timeline for implementation. *Short-term action items* (ST) are activities that may be implemented with existing resources and authorities in one to two years. *Medium-term action items* (MT) may require some resource development and coordination and may take 2-5 years. *Long-term action items* (LT) may require new or additional resources and/or authorities, and may take from one to five years to implement. *Ongoing* action items signify that work has begun and will either exist over an indefinite timeline, or an extended timeline.

## Status

As action items are implemented or new ones are created during the Plan maintenance process, it is important to indicate the status of the action item—whether it is new, ongoing, deferred, or complete. Documenting the status of the action will make reviewing and updating the mitigation Plan easier during the Plan’s five-year update, and can be used as a benchmark for progress. *Deferred* action items have yet to see any significant work begin on the particular action.

## Priority

High priority action items are designated in order to clarify the importance of these mitigation actions for the affected jurisdictions.

## Action Item Development Process

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions. The majority of the action items were first created during the 2007-2008 NHMP planning process. During that process, the steering committee 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. 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 committee. All actions were then reviewed by the committee, discussed at length, and revised as necessary before becoming a part of this document. In 2013 and 2021, the Steering Committee reviewed the previous action items to provide a status update. New action items were developed by Steering Committee members and approved by the full group throughout the update process.

## Action Item Matrix

The action item matrix portrays the overall action plan framework and identifies linkages between the plan goals, partnerships (coordination and partner organizations), and actions. The matrix documents a description of the action, if the steering committee identified the action as high priority, the coordinating organization, partner organizations, timeline, and the plan goals addressed. Refer to Appendix A, *Action Items* for detailed information about each action item.

Highest priority action items as identified by the steering committee are denoted in table 3-1 below and repeated in table 3-2.

**Table 3-1 Jefferson County High Priority Action Items**

Action Item	Proposed Action Title
MH5	Explore emergency response and preparedness measures to address needs for action items identified in the 2021 NHMP update.
MH9	Develop strategies for collaborating and coordinating with other entities to improve mitigation and emergency management activities in Jefferson County.
MH10	Coordinate with managing agencies to ensure sufficient back-up energy sources exist for all critical infrastructure facilities.
MH12	Identify strategies to improve access to communities listed as at extreme or high risk to wildfire, flood, landslides, or winter storms (including creating/improving evacuation routes to 'one-way in/out' communities), paying particular attention to the communities of Crooked River Ranch, Camp Sherman, and Lake Chinook.
MH13	Create Mutual Aid Agreements between city, county, state, tribal and federal road and highway maintenance crews for effective road management during hazard events.
MH14	Upgrade emergency radio systems to ensure reliable communication among emergency services, specifically targeting communication towers, radio repeaters, and personal communication devices.
MH16	Support the development and coordination of the Regional Emergency Services Training and Coordination Center (RESTCC)
MH17	Adopt and integrate the new OR Alert Emergency System in Jefferson County
DR2	Seek and institute alternative and more reliable agricultural irrigation water source(s).
EQ1	Seismically retrofit Culver High School to reduce the facility's vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.
FL6	Update the County's FEMA Flood Insurance Rate Map.
FL7	Encourage ODOT to develop an emergency bypass route through Madras.
FL9	Continue compliance with the National Flood Insurance Program (NFIP).
WF1	Implement actions identified within the Jefferson County Community Wildfire Protection Plan (CWPP) and within the Greater Sisters CWPP for communities within Jefferson County.
WF2	Improve wildfire detection with addition of remote detection system, specifically for Round Butte.

Source Jefferson County NHMP Steering Committee, 2021.

**Table 3-2 Jefferson County Action Items**

Multi-Hazard Action Items	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status
MH #1		Coordinate with Oregon Department of Environmental Quality (DEQ) to monitor blue-green algae in reservoirs and other bodies of water in drought conditions to avoid harm to recreation and the environment.	Public Works	DEQ; Water/Irrigation Districts; Deschutes Valley Water District; OHA	Ongoing	Ongoing
MH #2		Identify and coordinate natural hazard mitigation activities and incentive programs	Community Development	Jefferson County Extension Office; FEMA; ODF; COFMS; USFS; NRCS	Ongoing	Ongoing
MH#3		Develop and deliver outreach and education programs on natural hazard mitigation activities and incentive programs for the residents of Jefferson county.	Fire Districts	Project Wildfire; OSU-Extension; Jefferson County Extension Office; FEMA; ODF; Emergency Management; COIC; COFMS; USFS; NRCS	Ongoing	Ongoing
MH#4		Inventory historic and cultural resources, with an emphasis on unreinforced masonry buildings, and identify their vulnerabilities to natural hazards to develop mitigation actions for their protection.	Community Development	Economic Development of Central Oregon; State Historic Preservation Officer; Jefferson County School Districts	Long Term	ongoing
MH #5	Yes	Explore emergency response and preparedness measures to address needs for action items identified in the 2021 NHMP update.	Emergency Services	Cities of Madras, Culver, and Metolius; Crooked River Ranch; Three Rivers; OEM; DHS; FEMA; Silver Jackets; State Fire Marshal	Ongoing	Ongoing
MH #6		Work with local businesses to develop business continuity plans.	Madras-Jefferson Chamber of Commerce	Crooked River Ranch- Terrebonne Chamber of Commerce; IBHS	Short Term	REMOVE
MH #7		Develop continuity of operations plans for Jefferson County to ensure continued operation in the event of a natural hazard emergency.	Emergency Services	Community Development; Public Works; Assessor; Treasurer; Clerk; County Commissioners; OEM	Short Term	Ongoing
MH #8		Coordinate existing mitigation activities with existing planning activities, to avoid duplicating efforts.	Emergency Services	Community Development; Public Works; OEM; DLC; DHS; OPDR	Ongoing	Ongoing
MH #9	Yes	Develop strategies for collaborating and coordinating with other entities to improve mitigation and emergency management activities in Jefferson County.	Emergency Services	Jefferson County Department of Health; St. Charles Madras Hospital; USFS; BLM; USFWS; CWPP Core Team; Silver Jackets; OEM	Ongoing	Ongoing
MH #10	Yes	Coordinate with managing agencies to ensure sufficient back-up energy sources exist for all critical infrastructure facilities.	Buildings and Grounds	Community Development; Public Works	Long Term	Deferred

Source Jefferson County NHMP Steering Committee, 2021.

**Table 3-2 Jefferson County Action Items (Continued)**

Multi-Hazard Action Items	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status
MH #11		Shorten spans between power line poles and add anchors in areas prone to windstorms and winter storms.	Public Works	Central Oregon Electric Cooperative; Wasco Electric Cooperative	Ongoing	Ongoing
MH #12	Yes	Identify strategies to improve access to communities listed as at extreme or high risk to wildfire, flood, landslides, or winter storms (including creating/improving evacuation routes to 'one-way in/out' communities), paying particular attention to the communities of Crooked River Ranch, Camp Sherman, and Lake Chinook.	County Commissioners	Emergency Services; Public Works; Unincorporated Communities; BLM; ODOT	Short Term	Ongoing
MH #13	Yes	Create Mutual Aid Agreements between city, county, state, tribal and federal road and highway maintenance crews for effective road management during hazard events.	Public Works; County Commissioners	Crooked River Ranch Special Road District; Warm Springs Road District; Incorporated cities; ODF; BLM; ODOT	Short Term	Ongoing
MH #14	Yes	Upgrade emergency radio systems to ensure reliable communication among emergency services, specifically targeting communication towers, radio repeaters, and personal communication devices.	Emergency Services	Public Works; Emergency Management; Fire Districts; Jefferson County Fire Defense Board; Police Department; County Commissioners; OEM; FEMA	Short Term	Ongoing
MH #15		Seek National Weather Service StormReady® community certification.	Emergency Manager	Public Works; Fire Districts; NWS; FEMA	Long Term	REMOVE
MH #16	Yes	Support the development and coordination of the Regional Emergency Services Training and Coordination Center (RESTCC)	Central Oregon Intergovernmental Council	Jefferson County Sheriff's Office; Board of County Commissioners; Cities of Madras, Metolius and Culver; Governor's Office Regional Solutions;	Long Term	NEW
MH #17	Yes	Adopt and integrate the new OR Alert Emergency System in Jefferson County	Jefferson County Sheriff's Office	F911, OEM, DAS	Ongoing	NEW
Drought Action Items	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status
DR #1		Coordinate with local irrigation and water purveying districts to identify areas in need of additional water resources.	North Unit Irrigation District (north); Central Oregon Irrigation District (south)	Public Works; Emergency Services; ODFW; ODF; BLM; Deschutes Valley Water District	Short Term	Ongoing
DR #2	Yes	Seek and institute alternative and more reliable agricultural irrigation water source(s).	North Unit Irrigation District (north); Central Oregon Irrigation District (south)	Public Works; Emergency Services; ODFW; ODF; BLM; Deschutes Valley Water District	Ongoing	NEW
DR#3		Improve irrigation efficiency by piping canals	Jefferson County	USDA; Central Oregon Irrigation Districts; Deschutes Water Alliance; Confederated Tribes of Warm Springs	Ongoing	NEW

Source: Jefferson County NHMP Steering Committee, 2021.

**Table 3-2 Jefferson County Action Items (Continued)**

Earthquake Action Items	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status
EQ #1	Yes	Seismically retrofit Culver High School to reduce the facility's vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.	Culver School District 4	Jefferson County; City of Culver; OEM; DOGAMI; FEMA; ODE; Business Oregon	Long Term	Deferred
EQ #2		Seismically retrofit Culver Police Department to reduce the facility's vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.	City of Culver - Administration and Police	Jefferson County; OEM; DOGAMI; FEMA; Business Oregon	Long Term	REMOVE
EQ #3		Seismically retrofit Jefferson County Fire District #1 Main Station to reduce the building's facility's to seismic hazards. Consider both structural and non-structural retrofit options.	Jefferson County Fire	Jefferson County Administration; OEM; DOGAMI; FEMA; Business Oregon	Long Term	Deferred
Flood Action Items	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status
FL #1		Develop flood mitigation strategies for critical facilities and infrastructure located in the floodplain.	Community Development	Public Works; Cities of Madras and Metolius; Crooked River Ranch; FEMA; OEM; Silver Jackets	Long Term	Ongoing
FL #2		Explore coordination and support strategies to minimize the negative impact of upstream development on rivers and streams.	Community Development	Public Works; County GIS; FEMA; DLCD	Long Term	Ongoing
FL #3		Upgrade culverts in unincorporated areas in Jefferson County to reduce flooding events on roads and bridges.	Public Works	ODFW; ODOT	Ongoing	Ongoing
FL #4		Implement erosion prevention strategies for gravel roads in Jefferson County.	Public Works	County Community Development; ODFW; ODOT	Ongoing	Ongoing
FL #5		Educate citizens in Jefferson County about flood issues and actions they can implement to mitigate flood risk.	Public Works	Community Development; FEMA; OEM; ACOE; Silver Jackets	Ongoing	Ongoing
FL #6	Yes	Update the County's FEMA Flood Insurance Rate Map.	Community Development	County GIS; FEMA; OEM; ACOE; Silver Jackets; DOGAMI	Long Term	Deferred
FL #7	Yes	Continue coordination with ODOT Region 4, Jefferson County, and the City of Madras to ensure a bypass route is always in place during Flood events and prioritize resources to ensure long-term reliability of the route.	County Commissioners	Public Works; Community Development; Emergency Services; ODOT; OEM; IHMT	Long Term	Ongoing
FL #8		Take steps to participate in the National Flood Insurance Program's (NFIP) Community Rating System to reduce NFIP premiums and to focus on community flood mitigation efforts.	Community Development	Public Works; FEMA; DLCD; DLCD - NFIP Coordinator	Ongoing	Ongoing
FL #9	Yes	Continue compliance with the National Flood Insurance Program (NFIP).	Community Development	County Commissioners; Public Works; FEMA; DLCD	Ongoing	Ongoing

Source: Jefferson County NHMP Steering Committee, 2021.

**Table 3-2 Jefferson County Action Items (Continued)**

<b>Flood Action Items</b>	<b>Priority</b>	<b>Proposed Action Title</b>	<b>Lead Agency</b>	<b>Partner Organization(s)</b>	<b>Timeline</b>	<b>Status</b>
FL #10		Address risk of flooding to back-up fuel stored below ground at Jefferson County Public Works.	Public Works	Fire Department; Police Department; Jefferson County Schools; Emergency Services	Long Term	Ongoing
FL #11		Identify authority and funding to mitigate flood risks of the Willow Creek flood channel to reduce flooding damage.	Community Development	Public Works; Emergency Services; ACOE; Silver Jackets; DLCDC - NFIP Coordinator	Long Term	Ongoing
<b>Landslide /Debris Flow</b>	<b>Priority</b>	<b>Proposed Action Title</b>	<b>Lead Agency</b>	<b>Partner Organization(s)</b>	<b>Timeline</b>	<b>Status</b>
LS #1		Identify and map areas vulnerable to landslides and develop mitigation strategies to reduce the likelihood of potentially hazardous events.	County Geographic Information Systems (GIS)	Community Development; Public Works; Central Oregon Electric Cooperative; Wasco Electric Cooperative; DOGAMI, ODOT	Ongoing	Ongoing
LS #2		Adopt development standards that specify maximum cuts and fills and do not allow major alterations of drainage patterns.	Community Development	County Commission; DLCDC	Long Term	Ongoing
<b>Volcanic Event</b>	<b>Priority</b>	<b>Proposed Action Title</b>	<b>Lead Agency</b>	<b>Partner Organization(s)</b>	<b>Timeline</b>	<b>Status</b>
VE #1		Include volcanic ash fall in the Health Department's public outreach efforts to address respiration hazards, targeting specific vulnerable populations such as the elderly and young.	Public Health	Emergency Services; Law Enforcement; USGS; Cascades Volcano Observatory	Long Term	Ongoing
<b>Wildfire Action Items</b>	<b>Priority</b>	<b>Proposed Action Title</b>	<b>Lead Agency</b>	<b>Partner Organization(s)</b>	<b>Timeline</b>	<b>Status</b>
WF #1	Yes	Implement actions identified within the Jefferson County Community Wildfire Protection Plan (CWPP) and within the Greater Sisters CWPP for communities within Jefferson County.	Jefferson County Fire Defense Board	Community Development; GIS; Three Rivers Colunteer Fire Department; Crooked River Ranch Rural Fire District; The Confederated Tribes of Warm Springs; Camp Sherman Fire Protection District; ODF; State Fire Marshall; BLM; OPRD; ODFW; Private land owners; Central Oregon Fire Management Services	Ongoing	Ongoing
WF #2	Yes	Improve wildfire detection with addition of remote detection system. (Round Butte)	Jefferson County Fire Defense Board	Rural Fire Protection Agencies; Emergency Services; ODF; US Forest Service; BLM; OEM; ODFW	Long Term	Ongoing
WF #3		Update Madras Airport Helicopter Base for wildland fire response	Madras Airport	USFS, ODF, Jefferson County Fire District #1, Jefferson County Sheriff's Office, City of Madras	Long Term	NEW

Source: Jefferson County NHMP Steering Committee, 2021.

**Table 3-2 Jefferson County Action Items (Continued)**

<b>Windstorm Action Items</b>	<b>Priority</b>	<b>Proposed Action Title</b>	<b>Lead Agency</b>	<b>Partner Organization(s)</b>	<b>Timeline</b>	<b>Status</b>
WD #1		Educate property owners on how to properly maintain trees to prevent power loss on power lines off the right of way.	Public Works	Central Oregon Electric Cooperative; Wasco Electric Cooperative	Ongoing	Ongoing
WD #2		Develop advanced alert systems and building codes sufficient to withstand and avoid damage from windstorms	Jefferson County Planning	Community Development; Cities of Madras, Metolius, and Culver; Oregon Building Codes Division; Fire Departments	Long Term	NEW
<b>Winter Storm Action Items</b>	<b>Priority</b>	<b>Proposed Action Title</b>	<b>Lead Agency</b>	<b>Partner Organization(s)</b>	<b>Timeline</b>	<b>Status</b>
WT #1		Explore improvements for adequately heating schools and other critical facilities in extreme cold events by improving insulation and heating systems.	Jefferson County School Districts	Public Works; Central Oregon Electric Cooperative; Wasco Electric Cooperative	Ongoing	Deferred
WT #2	Yes	Explore funding options to obtain equipment, such as power generators and plowing and pumping equipment, to help respond to winter storm events.	Public Works	School Districts; Churches; Cities of Madras, Culver, and Metolius; Central Oregon Electric Cooperative; Wasco Electric Cooperative; American Red Cross.	Ongoing	Ongoing
WT #3		Increase sanding of all stretches of roads (County-wide) during winter storms.	Public Works	Cities of Madras, Culver, and Metolius; ODOT	Long Term	REMOVE

Source: Jefferson County NHMP Steering Committee, 2021.



## **SECTION 4:**

# **PLAN IMPLEMENTATION AND MAINTENANCE**

The Plan Implementation and Maintenance section details the formal process that will ensure that the Jefferson County Multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) remains an active and relevant document. The plan implementation and maintenance process includes a schedule for monitoring and evaluating the plan 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 plan maintenance and implementation process.

## **Implementing the Plan**

The success of the Jefferson 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. The plan will be formally adopted, a coordinating body will be assigned, a convener shall be designated, the identified activities will be prioritized and evaluated, and finally, the plan will be implemented through existing plans, programs, and policies.

### **Plan Adoption**

The Jefferson County NHMP was developed and will be implemented through a collaborative process. After the Plan is locally reviewed and deemed complete, the Jefferson County Community Development Director submits it to the State Hazard Mitigation Officer (SHMO) at the Oregon Military Department – Office of Emergency Management (OEM). OEM submits the plan to the Federal Emergency Management Agency (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 plan via resolution. At that point the County will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds. Following adoption by the county, the participating jurisdictions should convene local decision makers and adopt the Jefferson County NHMP.

### **Convener**

The Jefferson County Community Development Director will take responsibility for plan implementation. The Jefferson County Emergency Management Coordinator will facilitate the Hazard Mitigation Coordinating body meetings and will assign tasks such as updating and presenting the plan to the rest of the members of the committee. Plan implementation and evaluation will be a shared responsibility among all of the assigned Hazard Coordinating Body Members. The convener's responsibilities include:

- Coordinate steering committee meeting dates, times, locations, agendas, and member notification;

- Documenting the discussions and outcomes of committee meetings;
- Serving as a communication conduit between the steering committee and the public/stakeholders;
- Identifying emergency management-related funding sources for natural hazard mitigation projects; and
- Utilizing the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

## **Coordinating Body**

The Jefferson County Convener and Emergency Management Coordinator will form a Hazard Coordinating Body for updating and implementing the NHMP. This body will be the existing Jefferson County steering committee for the NHMP update. Coordinating body responsibilities include:

- Attending future plan maintenance and plan update meetings (or designating a representative to serve in your place);
- Serving 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;
- Prioritizing and recommending funding for natural hazard risk reduction projects;
- Evaluating and updating the Natural Hazards Mitigation Plan in accordance with the prescribed maintenance schedule;
- Developing and coordinating ad hoc and/or standing subcommittees as needed; and
- Coordinating public involvement activities.

## **Members**

The following organizations were represented and served on the steering committee during the development of the Jefferson County NHMP:

- City of Culver - Administration
- City of Madras - Community Development
- City of Madras - Public Works
- City of Metolius - Administration
- City of Metolius - Public Works
- Crooked River Ranch - Administration
- Crooked River Ranch - Fire & Rescue
- Jefferson County - Administration
- Jefferson County - Community Development

- Jefferson County - Emergency Management and Sheriff's Office
- Jefferson County - GIS
- Jefferson County - Public Works
- Jefferson County Fire District #1
- Lake Chinook Fire & Rescue
- Oregon Department of Forestry
- Oregon Water Resources Department
- Oregon State University-Extension
- Portland General Electric
- Sister-Camp Sherman Fire District

To make the coordination and review of the Jefferson County Natural Hazard Mitigation Plan as broad and useful as possible, the coordinating body will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as either internal or external partners on the individual action item forms found in Appendix A.

## **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 plan, FEMA requires the identification of existing programs that might be used to implement these action items. Jefferson County, and the participating cities, currently addresses statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvement plans, mandated standards and building codes. To the extent possible, Jefferson County, and participating cities, will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the NHMP's recommendations are consistent with the goals and objectives of the participating cities and county's existing plans and policies. Where possible, Jefferson County, and participating cities, should implement the NHMP's recommended actions through existing plans and policies. Within the Plan, FEMA requires the identification of existing programs that might be used to implement these action items. Jefferson County and the participating cities currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvements plans, mandated standards, and building codes. To the extent possible, the jurisdictions will work to incorporate the recommended mitigation action items into existing programs and procedures. (Note: Jefferson County is currently participating in a review of their development code to determine options for improvement regarding the flood and wildfire hazards.)

Plans and policies already in existence often have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the NHMP's action items 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 & Building Codes
- Capital Improvement Plans

For additional examples of plans, programs or agencies that may be used to implement mitigation activities refer to list of plans in Appendix C, *Community Profile*.

## Plan Maintenance

Plan maintenance is a critical component of the NHMP. Proper maintenance of the plan ensures that this plan will maximize the county and participating city's efforts to reduce the risks posed by natural hazards. This section was developed by the University of Oregon's Partnership for Disaster Resilience and includes a process to ensure that a regular review and update of the plan occurs. The coordinating body and local staff are responsible for implementing this process, in addition to maintaining and updating the plan through a series of meetings outlined in the maintenance schedule below.

## Meetings

The Coordinating Body will meet on a **semi-annual basis** (twice per year) to complete the following tasks. The first meeting will take place in the spring, prior to the wildfire/ irrigation season. The meeting will include the County Coordinating Body, as well as the Steering Committee for the City of Madras. The second meeting of the year will take place in early fall, following the wildfire/ irrigation season. The meeting will include the County Coordinating Body, as well as the Steering Committees for the City of Culver and the City of Metolius.

- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the Plan and mitigation in general;
- Identify issues that may not have been identified when the Plan was developed;
- Prioritize potential mitigation projects using the methodology described below;
- Review existing and new risk assessment data;
- Discuss methods for continued public involvement; and
- Document successes and lessons learned during the year.

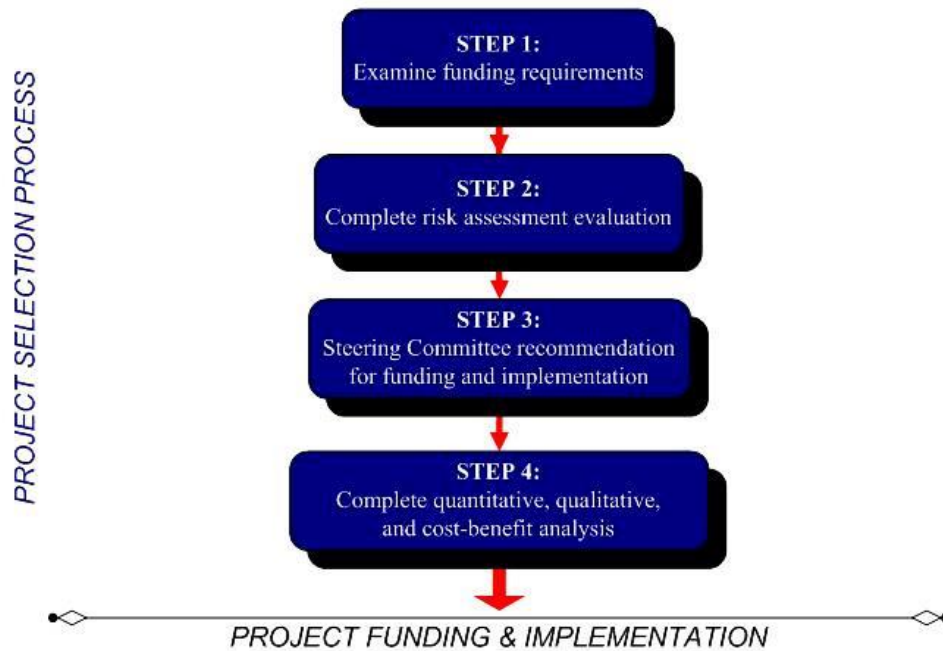
These meetings are an opportunity for the cities to report back to the county on progress that has been made towards their components of the NHMP.

The convener will be responsible for documenting the outcome of the semi-annual meetings in Appendix B. The process the Coordinating Body will use to prioritize mitigation projects is detailed in the section below. The Plan's format allows the county and participating jurisdictions 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. Projects may be identified by committee members, local government staff, other planning documents, or the risk assessment. Figure 4-1 illustrates the project development and prioritization process.

**Figure 4-1 Action Item and Project Review Process**



Source: Oregon Partnership for Disaster Resilience, 2008.

### Step 1: Examine funding requirements

The first step in prioritizing the plan’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 Appendix E, *Grant Programs and Resources* for a more comprehensive list of potential grant programs.

Because grant programs open and close on differing schedules, the coordinating body will examine upcoming funding streams’ requirements to determine which mitigation activities would be eligible. The coordinating body may consult with the funding entity, Oregon Military Department – Office 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 coordinating body’s semi-annual plan maintenance meetings.

### Step 2: Complete risk assessment evaluation

The second step in prioritizing the plan’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 coordinating body will determine whether or not the plan’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 coordinating body 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.

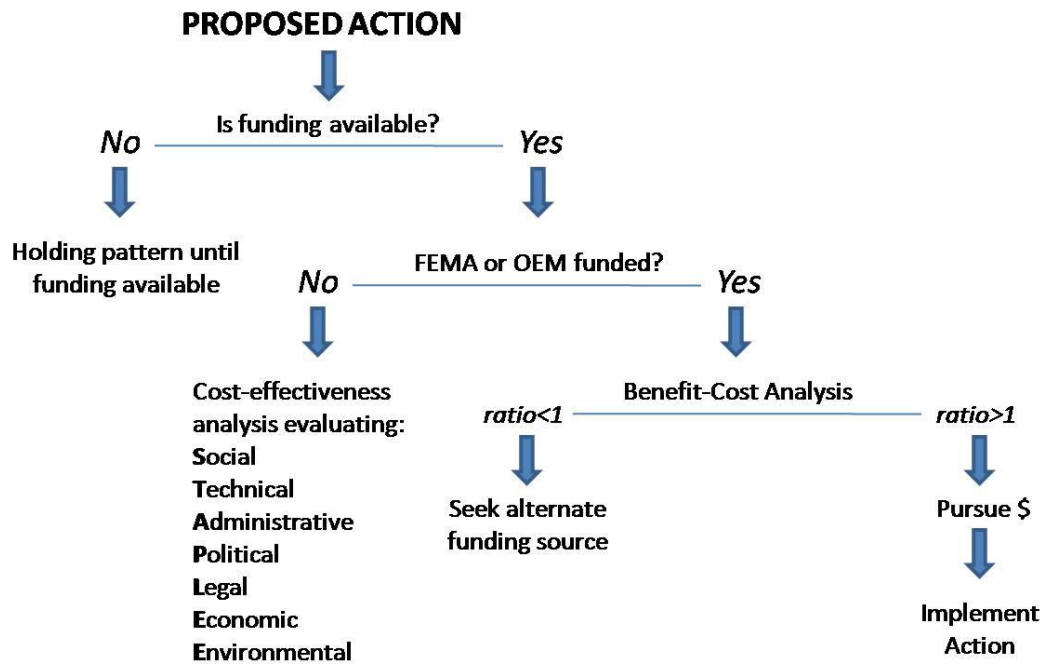
### **Step 3: Committee Recommendation**

Based on the steps above, the coordinating body will recommend which mitigation activities should be moved forward. If the coordinating body decides to move forward with an action, the coordinating organization designated on the action item form will be responsible for taking further action and, if applicable, documenting success upon project completion. The coordinating body 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) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity assists in determining whether a project is worth undertaking now, in order 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 Committee will use a Federal Emergency Management Agency-approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a benefit/cost 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 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. The Oregon Partnership for Disaster Resilience 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 & Participation

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Jefferson County NHMP. Although members of the Coordinating Body represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan.

To ensure that these opportunities will continue, the County and participating jurisdictions will:

- Post copies of their plans 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, Jefferson County will ensure continued public involvement by posting the Jefferson County NHMP on the County’s website (<http://www.co.jefferson.or.us/>). The Plan will also be posted on Central Oregon Intergovernmental Council’s project website (<https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/deschutes-county-nhmp/>).

## Five-Year Review of Plan

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. **The Jefferson County NHMP is due to be updated by [INSERT DATE].** The convener will be responsible for organizing the coordinating body to address plan update needs. The coordinating body will be responsible for updating any deficiencies found in the plan, and for ultimately meeting the Disaster Mitigation Act of 2000’s plan update requirements.

The following ‘toolkit’ can assist the convener in determining which plan update activities can be discussed during regularly-scheduled plan maintenance meetings, and which activities require additional meeting time and/or the formation of sub-committees.

**Table 4-1 Natural Hazards 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
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, 2021.

# **Volume II: Hazard Annexes**

# DROUGHT HAZARD ANNEX

## Significant Changes since the 2013 Plan

Major changes to this Annex include the removal of the Surface Water Supply Index section, and updating Figure DR-1 the US Drought Monitor. New information on the hazard and hazard history was added, including snowpack to water storage data, information from the City of Culver, and a new section on Future Climate Variability. In addition, the format of the section and minor content changes has occurred.

## Causes and Characteristics of Drought

A drought is a period of drier than normal conditions that results in water-related problems. 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 National Drought Mitigation Center and the National Center for Atmospheric Research define drought by categorizing it according to the “type of drought.” These types include the following:

### Meteorological or Climatological Droughts

Meteorological droughts are defined in terms of the departure from a normal precipitation pattern and the duration of the event. These droughts are a slow-onset phenomenon that can take at least three months to develop and may last for several seasons or years.

### Agricultural Droughts

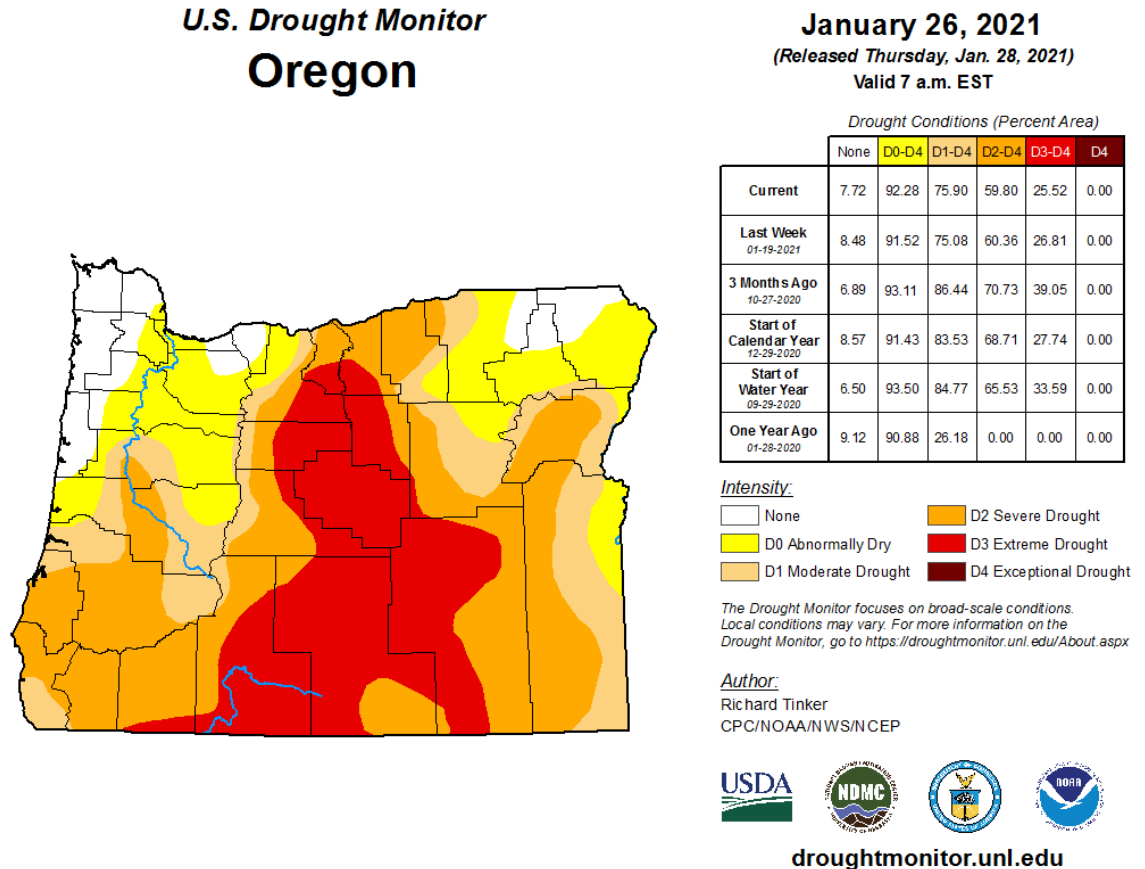
Agricultural droughts link the various characteristics of meteorological drought to agricultural impacts. The focus is on precipitation shortages and soil-water deficits. Agricultural drought is largely the result of a deficit of soil moisture. A plant's demand for water is dependent on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.

### Hydrological Droughts

Hydrological droughts refer to deficiencies in surface water and sub-surface water supplies. It is measured as stream flow, and as lake, reservoir, and groundwater levels. Hydrological measurements are not the earliest indicators of drought. When precipitation is reduced or deficient over an extended period of time, the shortage will be reflected in declining surface and sub-surface water levels.

The figure below shows the current Drought conditions monitor according to the National Drought Mitigation Center at the University of Nebraska, Lincoln. The measurement shown here displays the percent area of Drought severity conditions, which indicate that Jefferson County is currently registering *D0 Abnormally Dry*, which is relatively low (less dry) on the provided drought severity condition scale.

**Figure DR-1 U.S. Drought Monitor – Oregon, January 28, 2021**



Source: National Drought Mitigation Center, University of Nebraska, Lincoln. droughtmonitor.unl.edu, Accessed February 2, 2021.

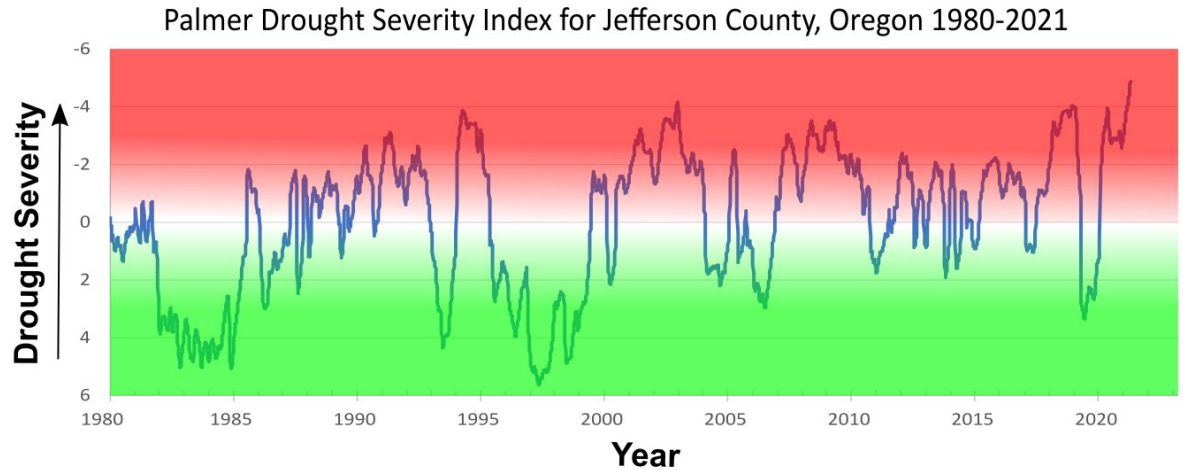
## History of Drought in Oregon and Jefferson County

The Palmer Index is most effective in determining long-term drought conditions—a matter of several months—and is not as good with short-term forecasts (a matter of weeks). It uses a 0 as normal scale, and drought is shown in terms of negative numbers; for example, negative 2 is moderate drought, negative 3 is severe drought, and negative 4 is extreme drought.<sup>1</sup> The Drought Severity Index for Jefferson County’s climate division shows cycles of

<sup>1</sup> NOAA, “The Palmer Drought Severity Index.”

drought over the period of record (1980-2021). Drought is not unexpected in a desert steppe environment such as Jefferson County. However, these data indicate that much of 2018 and now 2020-2021 is experiencing drought equal if not more severe than any other times over the period of record.

**Figure DR-2 Palmer Drought Severity Index since 1980, for Jefferson County Oregon**



Source: "The Palmer Drought Severity Index", <http://www.noaa.gov>

Periodically, this region experiences more significant drought conditions than what affects the region or the state. Figure 2 shows annual drought severity rating averages for Jefferson County.

### History of Droughts in Jefferson County

Oregon records, dating back to the late 1800s, clearly associate drought with a departure from expected rainfall. Concern for mountain snowpack, which feeds the streams and rivers, came later. Droughts were particularly noteworthy during the following years:

**Table DR-I History of Droughts**

Date	Location	Characteristics
1904-1905	Statewide	A state-wide drought period of about 18 months
1917-1931	Statewide	A very dry period punctuated by brief wet spells in 1920-21 and 1927
1928-1941	Statewide	A significant drought affected all of Oregon from 1928 to 1941. The prolonged statewide drought created significant problems for the agricultural industry. Punctuated by a three-year intense drought period from 1938-1941.
1959-1964	Eastern Oregon	Streamflows were low throughout eastern Oregon.
1976-1981	Statewide	Low stream flows prevailed in Western Oregon during the period from 1976-81, but the worst year, by far, was 1976-77, the single driest year of the century.
1985-1994	Statewide	A dry period lasting from 1985 to 1994 caused significant problems statewide. The peak year was 1992, when the state declared a drought emergency. 1994 was another severe drought year in Jefferson County, which prompted executive order EO-94-09 (July 26, 1994) declaring a State of Emergency in Jefferson County.
2000-2001	Statewide	Klamath drought intensifies; low snowpack in mountains worsens conditions. Draw down at Detroit Lake, all but curtails lake recreation.
Feb. 2005	Statewide	Harney County Drought Declaration by Executive Order 01-12 February 2005 was the driest February on record since 1977, surpassing 2001's 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 .
2012	Regional	Federal Secretary of Agriculture Drought Declaration
2015	Jefferson	Jefferson County Drought Declaration by Executive Order 15-06
2020	Jefferson	Jefferson County Drought Declaration by Executive Order 20-31

Source: Oregon Water Resources Department Public Declaration Status Report (2021)

Some Oregon droughts were especially significant during the period of 1928-1994. The period from 1928 to 1941 was a prolonged drought that caused major problems for agriculture. The only area spared was the northern coast, which received abundant rains in 1930-33. The three Tillamook burns (1933, 1939, and 1945) were the most significant results of this very dry period.

During 1959-1962 stream flows were low throughout Eastern Oregon, but areas west of the Cascades had few problems. Ironically, the driest period in Western Oregon was the summer following the benchmark 1964 flood. Low stream flows prevailed in Western Oregon during the period from 1976-81, but the worst year, by far, was 1976-77, the single driest year of the century. The Portland airport received only 7.19 inches of precipitation between October 1976 and February 1977, only 31% of the average 23.16 inches for that period. The 1985-94 drought was not as severe as the 1976-77 drought in any single year, but the cumulative effect of ten consecutive years with mostly dry conditions caused statewide problems. The peak year of the drought was 1992, when a drought emergency was declared for all of Oregon. Forests throughout the state suffered from a lack of moisture. Fires were common and insect pests, which attacked the trees, flourished.

In 2001 and 2002 Oregon experienced drought conditions. These conditions were compounded by actions taken by the federal government in the Klamath Basin. State declaration of drought conditions were made in various counties throughout Oregon during 2001, 2002, 2003, 2004 and 2005. During the 2005 drought the Governor issued declarations for eight counties, all east of the Cascades, and the USDA issued three drought declarations, overlapping two of the Governor's. State declarations were made for Wasco, Sherman, Grant, Lake, Malheur, Union, Baker, Wallowa, Harney, and Klamath counties. Federal declarations were made in Coos, Klamath, and Umatilla counties<sup>2</sup>. Wheeler County made a county declaration. The USDA declarations provided accessibility to emergency loans for crop losses<sup>3</sup>.

Based on the information above the Jefferson County Steering Committee determined that the history of drought events is **high**, with at least four events occurring over the last 100 years.

## Risk Assessment

According to the hazard history drought conditions are common in Jefferson County. The environmental and economic consequences can be significant, especially for Jefferson County's agricultural and recreational employment sectors. The average recurrence interval for severe droughts is somewhere between eight and twelve years.<sup>4</sup>

### How are Hazards Identified?

Hazard areas for droughts usually extend countywide when they do occur, although the cities in Jefferson County are rarely affected. All three cities (Culver, Madras and Metolius) are served by the Opal Springs aquifer, and supply is reliably abundant. Outside city limits, droughts affect recreational and agricultural operations. Typically, droughts occur regionally, and affect more than one county. The data for this risk assessment comes from gubernatorial executive orders and the Jefferson County 2021 NHMP Steering Committee.

### Probability Assessment

Historically, severe droughts have occurred in Jefferson County between eight and twelve years as shown in the hazard history above<sup>5</sup>. Given the history and the decreasing recurrence interval for severe droughts in Jefferson County, the steering committee determined that there is a **high** probability that the county will experience severe extended drought conditions in the future directly affecting the county; meaning one drought incident is likely to occur within a 10 to 35-year period. The city of Culver is considered to have a **high** occurrence probability to drought, Madras is considered to have a **low** occurrence probability to drought, and Metolius is considered to have **high** occurrence probability to

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<sup>2</sup> Note: When state or federal declarations are made contiguous counties are included even if they are not specifically mentioned as primary counties.

<sup>3</sup> Peter Halvorson, email message to Mike Howard, November 17, 2011.

<sup>4</sup> Jefferson County Sheriff's Office, *Jefferson County Hazard Analysis*, (2021).

<sup>5</sup> Department of Agriculture-Natural Resources Conservation Service, "Surface Water Supply Index, Upper Deschutes Basin, 2011-April 2013," [www.or.nrcs.usda.gov](http://www.or.nrcs.usda.gov).



the drought hazard. However, when there is a drought in Jefferson County, it will indirectly affect the cities of Culver, Madras, and Metolius.

## Future Climate Variability

One of the main aspects of the probability of future occurrences is its reliance on historic climate trends in order to predict future climate trends. Many counties in eastern Oregon are experiencing more frequent and severe droughts than is historically the norm, and many climate predictions see this trend continuing into the future. Temperatures in the Pacific Northwest region increased in the 20<sup>th</sup> Century by about 2.2 degrees Fahrenheit and are projected to increasingly rise by an average of 0.2 degrees to 1.0 degrees Fahrenheit per decade. Average temperature change by 2040 is projected to be 3.2 degrees Fahrenheit, and by 2080, 5.3 degrees Fahrenheit. Temperature increases will occur throughout all seasons, with the greatest variation occurring during summer months.<sup>6</sup> This information was considered while developing the probability of drought occurrence for the county

## Community Drought Issues

### What is susceptible to damage during a drought event?

Drought is frequently an "incremental" hazard, meaning both the onset and end are often difficult to determine in the absence of robust data serving as indicators to future drought events. Also, its effects may accumulate slowly over a considerable period of time and may linger for years after the termination of the event. Dust storms are a common occurrence during simultaneous high wind events and drought periods.

Droughts are not just a summer-time phenomenon; winter droughts can have a profound impact on agriculture, particularly east of the Cascade Mountains. Also, below average snowfall in higher elevations has a far-reaching effect, especially in terms of hydroelectric power, irrigation, recreational opportunities and a variety of industrial uses.

During drought events, a number of different community sectors are affected. All these sectors depend on local water resources, which can be significantly diminished in droughts. Drought can affect all segments of a jurisdiction's population, particularly those employed in water-dependent activities (e.g., agriculture, hydroelectric generation, recreation, etc.).

The agriculture economy depends on well water and irrigated water from reservoirs and rivers for watering crops, and the lower water levels that result from drought means less water available for agriculture. Often, farmers have to choose between spending more money for water, or suffer from a reduced yield. Weeds also become a problem. The North Unit Irrigation District (NUID) using data from federal and state agencies tracks snowpack in the Cascade Mountains and the amount of water stored in the Wickiup Reservoir. NUID uses the annual snowpack as an indicator of the amount of water that will be available for irrigation to Jefferson County farms. For example, if the current year's snowpack is 50% of average, the amount of water that would be available for Jefferson County farms two years in the future would be significantly less. As a result, the snowpack and water storage at

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<sup>6</sup> Climate Impacts Group, "Climate Change," <http://cses.washington.edu>

Wickiup Reservoir are strong indicators of the likelihood of drought conditions two years in advance.

There also are environmental consequences. A prolonged drought in forests promotes an increase of insect pests, which in turn, damage trees already weakened by a lack of water. A moisture-deficient forest constitutes a significant fire hazard (see the Wildfire summary). Forests in Jefferson County are more vulnerable to wildfires in drought conditions because trees become more stressed and their resistance to wildfires and disease is diminished. Dead fuel in forests is also higher than in the past, resulting in more available fuel that can lead to larger wildfire events. Drought significantly increases the probability for lightning-caused wildfires to occur, and provides ideal conditions for the rapid spread of wildfire. In addition, drought and water scarcity add another dimension of stress to species listed pursuant to the Endangered Species Act (ESA) of 1973.

Infrastructure can also be negatively affected by drought, especially the canal beds managed by the North Unit Irrigation District. Canal beds can dry up during drought periods affecting water allocation and replenishment of groundwater resources. Low water also means reduced hydroelectric production especially as the habitat benefits of water compete with other beneficial uses. Facilities affected by drought conditions include communications facilities, hospitals, and correctional facilities that are subject to power failures. Storage systems for potable water, sewage treatment facilities, water storage for firefighting, and hydroelectric generating plants also are vulnerable.

Local fish stocks and salmon restoration efforts are hampered due to less water in their habitat and the warming of water.

Finally, local reservoirs experience a higher level of evaporation in drought conditions. Water in reservoirs becomes warmer, encouraging the growth of blue-green algae, which can affect water quality for drinking, recreation, and wildlife. Agricultural lands in the Eastern outlying areas of the County are particularly susceptible to drought conditions.

## Vulnerability Assessment

The severity of a drought occurrence poses a risk for agricultural and timber losses, property damage, and disruption of water supplies and availability in urban and rural areas. Factors used to assess drought risk include agricultural practices, such as crop types and varieties grown, soil types, topography, and water storage capacity.

The Jefferson County Steering Committee estimates a **high** vulnerability to drought events, meaning more than 10% of the region's assets are likely to be affected by a severe drought. This ranking is consistent with the 2008 Jefferson County NHMP. The cities of Culver, Madras, and Metolius are considered to have **low** vulnerability to the drought hazard.

The maximum threat of a drought event is **high**, considering that over 25% of population and property could be impacted under a worst-case scenario.

## Hazard Risk Analysis

The Jefferson County Steering Committee completed a hazard risk analysis, based upon the previous plan's analysis, during this update. The hazard analysis, developed from a Federal

Emergency Management Agency (FEMA) tool that has been refined by the Oregon Military Department – Office of Emergency Management (OEM), addresses and weights (shown as percent within parentheses) the history (8%), vulnerability (21%), probability (29%), and maximum threat (42%) for each natural hazard and attributes a final hazard analysis score. The methodology produces scores that range from 24 to 240. Each category is associated with severity ratings (1 to 10) as follows: Low (1 – 3 points), Moderate (4 to 7 points) and High (8 to 10 points). For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation. The method provides the jurisdiction with a relative ranking from which to prioritize mitigation strategies, but does not predict the occurrence of a particular hazard (for more information on all scores see Volume I, Section 2 of this NHMP).

The Jefferson County hazard analysis score for drought is 216 (ranked #2 out of eight hazards). The Relative Risk Assessment survey completed by the 2021 Jefferson County NHMP Steering Committee found there to be no expected deaths or injuries, and moderate damage to facilities during a drought event (see Section 2, Risk Assessment for more information).

## **Existing Hazard Mitigation Activities**

Jefferson County currently addresses the drought hazard through water conservation measures and water monitoring. The North Unit Irrigation District has water conservation measures to limit water allocation to farmers and communities. The City of Metolius also has a water conservation ordinance to limit water use in drought conditions.

### **Drought Council**

The Drought Council is responsible for assessing the impact of drought conditions and making recommendations to the Governor’s senior advisors. The Water Availability Committee, a subcommittee of technical experts who monitor conditions throughout the state and report these conditions monthly, advises the Drought Council. In this manner the Drought Council keeps up-to-date on water conditions.

### **Natural Resources Conservation Service**

The United States Department of Agriculture Natural Resources Conservation Service (NRCS) has a regional service center located in Redmond (another is located in Warm Springs). The NRCS is dedicated to three main priorities involving resource preservation one among them is water quantity and quality. The NRCS incorporates a conservation implementation strategy to preserve natural resources into the future.<sup>7</sup>

## **Drought Mitigation Action Items**

There are three identified Drought action items for Jefferson County; in addition, several of the Multi-Hazard action items affect the Drought hazard. An action item matrix is provided

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<sup>7</sup> NRCS – Jefferson County “Information for Partners and Participants,” <http://www.or.nrcs.usda.gov>

within Volume I, Section 3, while action item forms are provided within Volume IV, Appendix A. To view city actions see the appropriate city addendum within Volume III.

# EARTHQUAKE HAZARD ANNEX

## Significant Changes since the 2013 Plan

Major changes to this Annex include changing the section on Crustal Earthquakes to Volcanic Earthquakes, and updating the Cascadia Subduction Figure EQ-1. In addition, the format of the section and minor content changes has occurred.

## Causes and Characteristics of Earthquake

Each year, the Pacific Northwest Seismic Network locates more than 1,000 earthquakes greater than magnitude 1.0 in Washington and Oregon. Of these, approximately two dozen are large enough to feel at magnitude 3.0 or greater. These noticeable events offer a subtle reminder that the Pacific Northwest is an earthquake-prone region.

Seismic hazards pose a real and serious threat to many communities in Oregon, including Jefferson County, requiring local governments, planners, and engineers to consider their community's safety. Currently, no reliable scientific means exists to predict earthquakes. Identifying seismic-prone locations, adopting strong policies, implementing measures, and using other mitigation techniques are essential to reducing risk from seismic hazards in Jefferson County.<sup>1</sup>

Oregon and the Pacific Northwest in general are susceptible to earthquakes from three sources: 1) shallow crustal events within the North American Plate; 2) deep intra-plate events within the subducting Juan de Fuca Plate; and 3) the off-shore Cascadia Subduction Zone.<sup>2</sup>

## Volcanic Earthquakes

Volcanic earthquakes are the most common types of earthquakes and occur at relatively shallow depths of six to twelve miles below the surface.<sup>3</sup> They are a result of magma moving through the crust, which is a good indicator of a coming eruption. While most volcanic earthquakes are smaller than magnitude 4.0 and generally create little or no damage, some can produce earthquakes of magnitudes 7.0 and higher and cause extensive damage.

## Deep Intraplate Earthquakes

Occurring at depths from 18 to 60 miles below the earth's surface in the subducting oceanic crust, deep intraplate earthquakes can reach magnitude 7.5.<sup>4</sup> In Oregon these earthquakes

<sup>1</sup> Oregon Military Department – Office of Emergency Management Interagency Hazard Mitigation Team "Oregon Natural Hazards Mitigation Plan," (Salem, OR: 2012).

<sup>2</sup> Community Planning Workshop, "Planning for Natural Hazards: Oregon Technical Resource Guide," (2000) 8-8.

<sup>3</sup> Ian Madin and others, "Relative Earthquake Hazard Maps Report," DOGAMI, (1999).

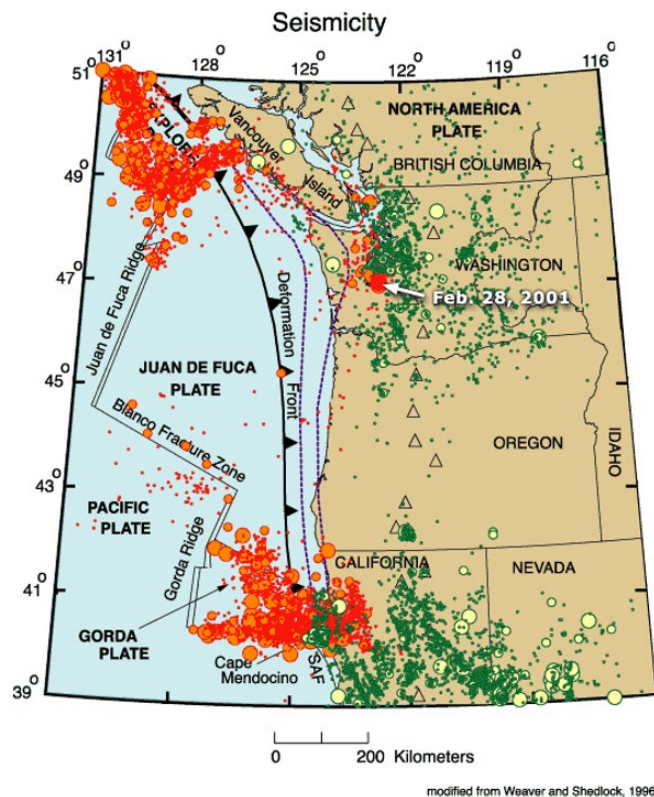
<sup>4</sup> Community Planning Workshop, "Planning for Natural Hazards: Oregon Technical Resource Guide," (2000) 8-8.

occur at lower rates and have not occurred at a damaging magnitude.<sup>5</sup> The February 28, 2001 earthquake in Washington State was a deep intraplate earthquake. It produced a rolling motion that was felt from Vancouver, British Columbia to Coos Bay, Oregon and east to Salt Lake City, Utah.<sup>6</sup>

## Subduction Zone Earthquakes

The Pacific Northwest is located at a convergent continental plate boundary, where the Juan de Fuca and North American tectonic plates meet. The two plates are converging at a rate of about 1.5 inches per year.<sup>7</sup> This boundary is called the Cascadia Subduction Zone (CSZ, see Figure EQ-1). It extends from British Columbia to northern California. Earthquakes are caused by the abrupt release of this slowly accumulated stress.

**Figure EQ-1 Cascadia Subduction Zone**



Source: <https://blogs.scientificamerican.com/rosetta-stones/intriguing-seismic-activity-along-the-cascadia-subduction-zone/>

Although there have been no large recorded earthquakes along the offshore Cascadia Subduction Zone, similar subduction zones worldwide do produce "great" earthquakes with magnitudes of 8 or larger. They occur because the oceanic crust "sticks" as it is being pushed beneath the continent, rather than sliding smoothly. Over hundreds of years, large stresses

<sup>5</sup> Oregon Military Department – Office of Emergency Management Interagency Hazard Mitigation Team "Oregon Natural Hazards Mitigation Plan," (Salem, OR: 2012).

<sup>6</sup> Richard Hill, "Geo Watch Warning Quake Shook Portland 40 Years Ago." The Oregonian. October 30, 2002.

<sup>7</sup> Oregon Military Department – Office of Emergency Management Interagency Hazard Mitigation Team "Oregon Natural Hazards Mitigation Plan," (Salem, OR: 2012).

build which are released suddenly in great earthquakes. Such earthquakes typically have a minute or more of strong ground shaking, and are quickly followed by numerous large aftershocks.

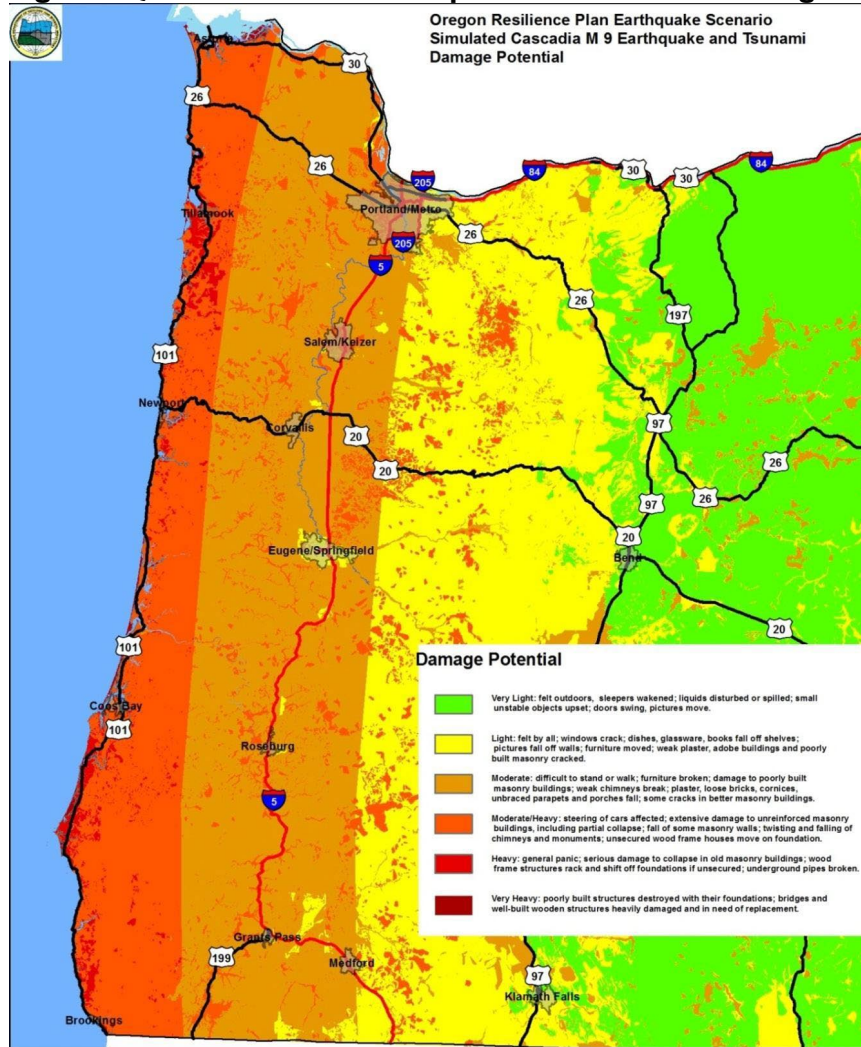
Historic subduction zone earthquakes include the 1960 Chile earthquake (magnitude 9.5), the 1964 southern Alaska (magnitude 9.2) earthquakes, the 2004 Indian Ocean earthquake (magnitude 9.0) and the 2011 Tohoku earthquake (magnitude 9.0). Geologic evidence shows that the Cascadia Subduction Zone has generated great earthquakes, most recently about 320 years ago.<sup>8</sup> Large earthquakes also occur at the southern end of the Cascadia Subduction Zone (in northern California near the Oregon border) where it meets the San Andreas Fault system.

While all three types of earthquakes have the potential to cause major damage, subduction zone earthquakes pose the greatest danger. A major CSZ event could generate an earthquake with a magnitude of 9.0 or greater resulting in devastating damage and loss of life. Such earthquakes may cause great damage to the coastal area of Oregon as well as inland areas in western Oregon. Jefferson County is unlikely to be directly affected by a subduction zone earthquake; however, the county could be affected as populations of refugees flee eastward (see figure below). Planning for Cascadia in Central Oregon includes a Regional Emergency Services Training Coordination Center that would facilitate operational coordination, resource staging, and recovery efforts.

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<sup>8</sup> Ibid

**Figure EQ-2 Cascadia M9 Earthquake and Tsunami Damage Potential**



Source: Oregon Resilience Plan, <http://www.oregon.gov/omd/oem/pages/ossprac/ossprac.aspx>

## Earthquake Hazards

It is estimated that shaking from a large subduction zone earthquake could last up to five minutes, however, crustal earthquakes are more likely in Jefferson County.<sup>9</sup> The specific hazards associated with an earthquake are explained below:

### Ground Shaking

Ground shaking is the motion felt on the earth’s surface caused by seismic waves generated by the earthquake. Ground shaking is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault that is slipping, and distance from the epicenter (where the earthquake originates).

<sup>9</sup> Community Planning Workshop, “Planning for Natural Hazards: Oregon Technical Resource Guide,” (2000) 8-9.



Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

## Ground Shaking Amplification

Ground shaking amplification refers to the soils and soft sedimentary rocks near the surface that can modify ground shaking from an earthquake. Such factors can increase or decrease the amplification (i.e., strength) as well as the frequency of the shaking. The thickness of the geologic materials and their physical properties determine how much amplification will occur. Ground motion amplification increases the risk for buildings and structures built on soft and unconsolidated soils.

## Surface Faulting

Surface faulting are planes or surfaces in Earth materials along which failure occurs. Such faults can be found deep within the earth or on the surface. Earthquakes occurring from deep lying faults usually create only ground shaking.

## Liquefaction and Subsidence

Liquefaction occurs when ground shaking causes wet, granular soils to change from a solid state into a liquid state. This results in the loss of soil strength and the soil's ability to support weight. When the ground can no longer support buildings and structures (subsidence), buildings and their occupants are at risk.

## Earthquake-Induced Landslides and Rockfalls

Earthquake-induced landslides are secondary hazards that occur from ground shaking and can destroy roads, buildings, utilities and critical facilities necessary to recovery efforts after an earthquake. Some roads within Jefferson County are built along areas prone to landslides and rockfalls, which could be triggered during an earthquake.

## History of Earthquakes in Oregon and Jefferson County

East of the Cascades the earthquake hazard is predominately of the crustal type. The amount of earthquake damage at any place will depend on its distance from the epicenter, local soil conditions, and types of construction. Due to Oregon's relatively short written history and the infrequent occurrence of severe earthquakes, few Oregon earthquakes have been recorded in writing.

### History of Earthquakes in Oregon

Several earthquake events have occurred east of the Cascades over the past 150 years. These include major earthquakes in 1949 (magnitude 7.1), 1962 (magnitude 5.2), and 2001 (magnitude



Image of damage from the 2001 Nisqually earthquake near Seattle

6.8). Table EQ-1 shows the location of selected Pacific Northwest earthquakes that have occurred since 1949.

**Table EQ-1 Oregon Earthquake History**

Date	Location	Magnitude	Comments
Approximate years: 1400 BCE, 1050, BCE 600 BCE 400, 750, 900	Offshore, Cascadia subduction zone	Probably 8.0-9.0	Researchers Brian Atwater and Eileen Hemphill-Haley have dated earthquakes and tsunamis at Willapa Bay, Washington; these are the midpoints of the age ranges for these six events.
January 26, 1700	Offshore, Cascadia Subduction zone	Approximately 9.0	Generated a tsunami that struck Oregon, Washington and Japan; destroyed Native American villages along the coast.
November 23, 1873	Oregon/California border, near Brookings	6.8	Felt as far away as Portland and San Francisco; may have been an intraplate event because of lack of aftershocks.
March, 1893	Umatilla	VI-VII (Modified Mercalli Intensity)	Damage unknown
July 15, 1936	Milton-Freewater	6.4	Two foreshocks and many aftershocks felt; \$100,000 damage (in 1936 dollars).
April 13, 1949	Olympia, Washington	7.1	Eight deaths and \$25 million damage (in 1949 dollars); cracked plaster, other minor damage in northwest Oregon.
January, 1951	Hermiston	V (Modified Mercalli Intensity)	Damage unknown
November 5, 1962	Portland/Vancouver	5.5	Shaking lasted up to 30 seconds; chimneys cracked, windows broke, furniture moved.
1968	Adel	5.1	Swarm lasted May through July, decreasing in intensity; increased flow at a hot spring was reported.
April 12, 1976	Near Maupin	4.8	Sounds described as distant thunder, sonic booms, and strong wind.
April 25, 1992	Cape Mendocino, California	7.0	Subduction earthquake at the triple-junction of the Cascadia subduction zone and the San Andreas and Mendocino faults.
March 25, 1993	Scotts Mill	5.6	On Mount Angel-Gates Creek fault; \$30 million damage, including Molalla High School and Mount Angel church.
September 20, 1993	Klamath Falls	5.9 and 6.0	Two deaths, \$10 million damage, including county courthouse; rockfalls induced by ground motion.

Source: Ivan Wong and others, "A Look Back at Oregon's Earthquake History, 1841-1994," in *Oregon Geology*, (1995), 125-139; Niewendorp, and others, "Map of Selected Earthquakes for Oregon, 1841 through 2002," DOGAMI, (2003).

## History of Earthquakes in the Jefferson County Region

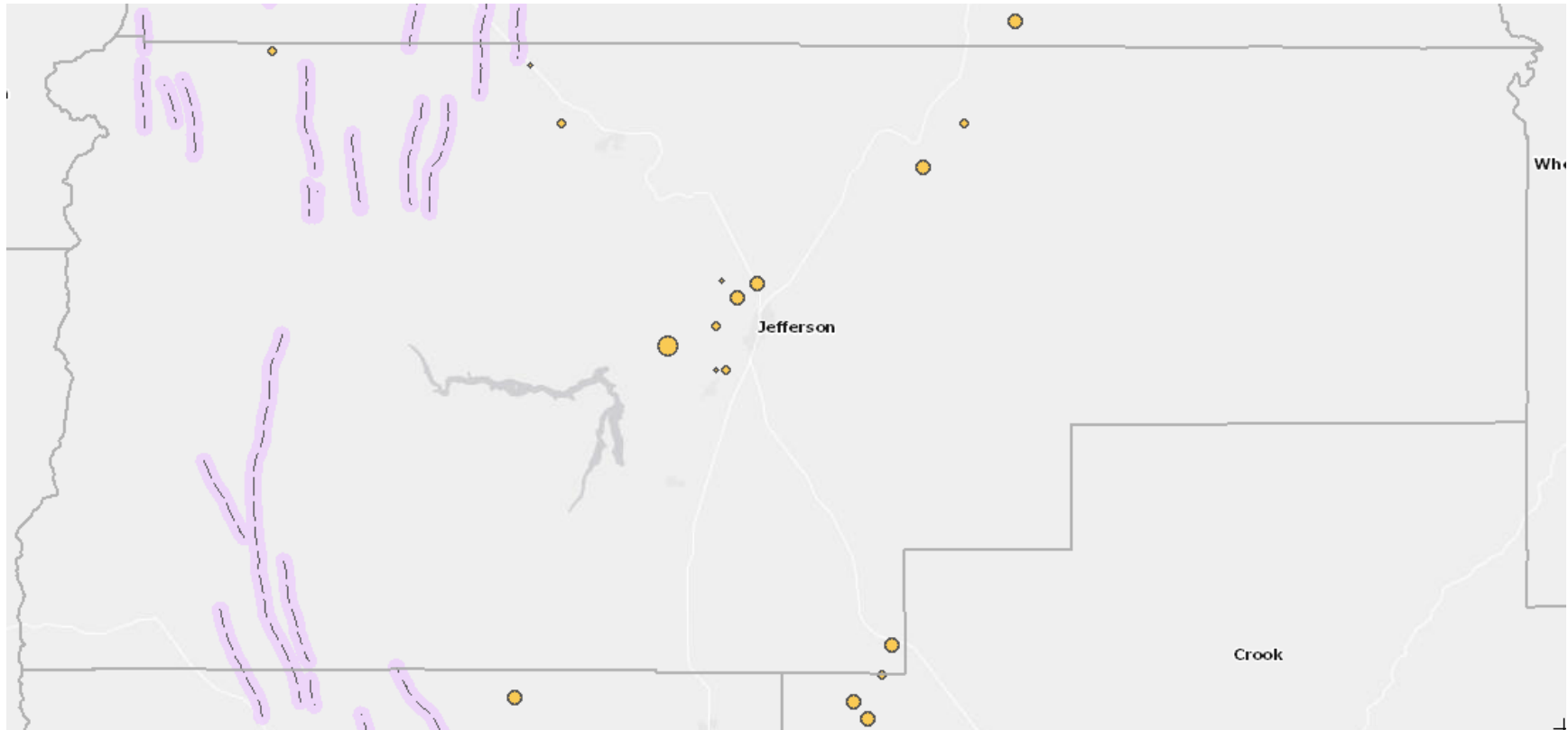
Earthquakes of estimated magnitudes of 0.5 and greater are known to occur in Jefferson County and the region around, although earthquakes below 3.0 are generally not felt by humans and must be picked up by specialized seismic equipment. Table EQ-2 shows data of Jefferson County region earthquakes greater than 3.0 magnitudes. Figure EQ-3 shows selected earthquakes in the Jefferson County region from 1971-2008.

**Table EQ-2 Earthquake History Greater than 3.0 near Jefferson County (1976 – 2010)**

Magnitude	Date	Location
3.6	12/30/2010	7.8 miles ESE from Maupin, OR
3.0	5/14/2010	32.4 miles WSW from The Dalles, OR
3.0 - 4.6	1/20/2007 - 1/2/2010	Approx. 7 miles ESE from Maupin, OR (18 different events)
3.3	7/7/2003	31.0 miles SW from The Dalles, OR
4.5	6/29/2002	30.7 miles SW from The Dalles, OR
3.2	1/11/1999	29.7 miles WNW from Maupin, OR
4.6	4/12/1976	12.8 miles ESE from Maupin, OR

Source: Pacific Northwest Seismic Network, "Earthquake Map," <http://www.pnsn.org/earthquakes/recent>

**Figure EQ-3 Selected Earthquakes (1971-2008)**



Source: DOGAMI Hazard Viewer

In the past century, there have been no reported damage or injuries in Jefferson County due to earthquakes.

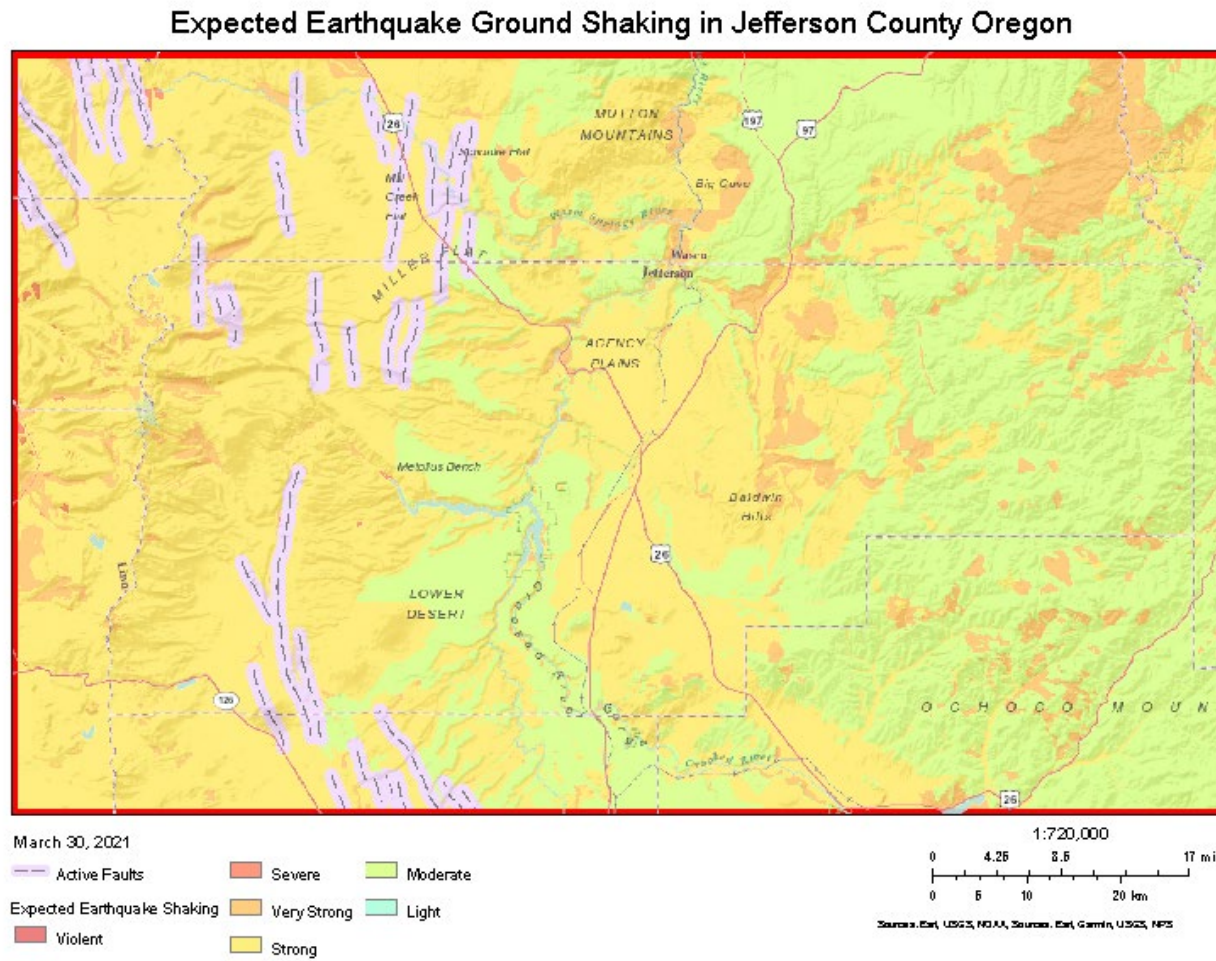
Based upon available information the Jefferson County Steering Committee determined that the history of earthquake events is **low**, with less than one significant event occurring over the last 100 years.

## **Risk Assessment**

### **How are Hazards Identified?**

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 a number of seismic hazard maps that are available for Oregon communities to use. The maps show liquefaction, ground motion amplification, landslide susceptibility, and relative earthquake hazards. COIC used the DOGAMI Statewide Geohazards Viewer to present visual maps of expected earthquake ground shaking (Figure EQ-4), and soft soils (Figure EQ-5). The legend for the DOGAMI Statewide Geohazards Viewer that provides the explanation of the content of EQ-5 is provided as Figure EQ-6.

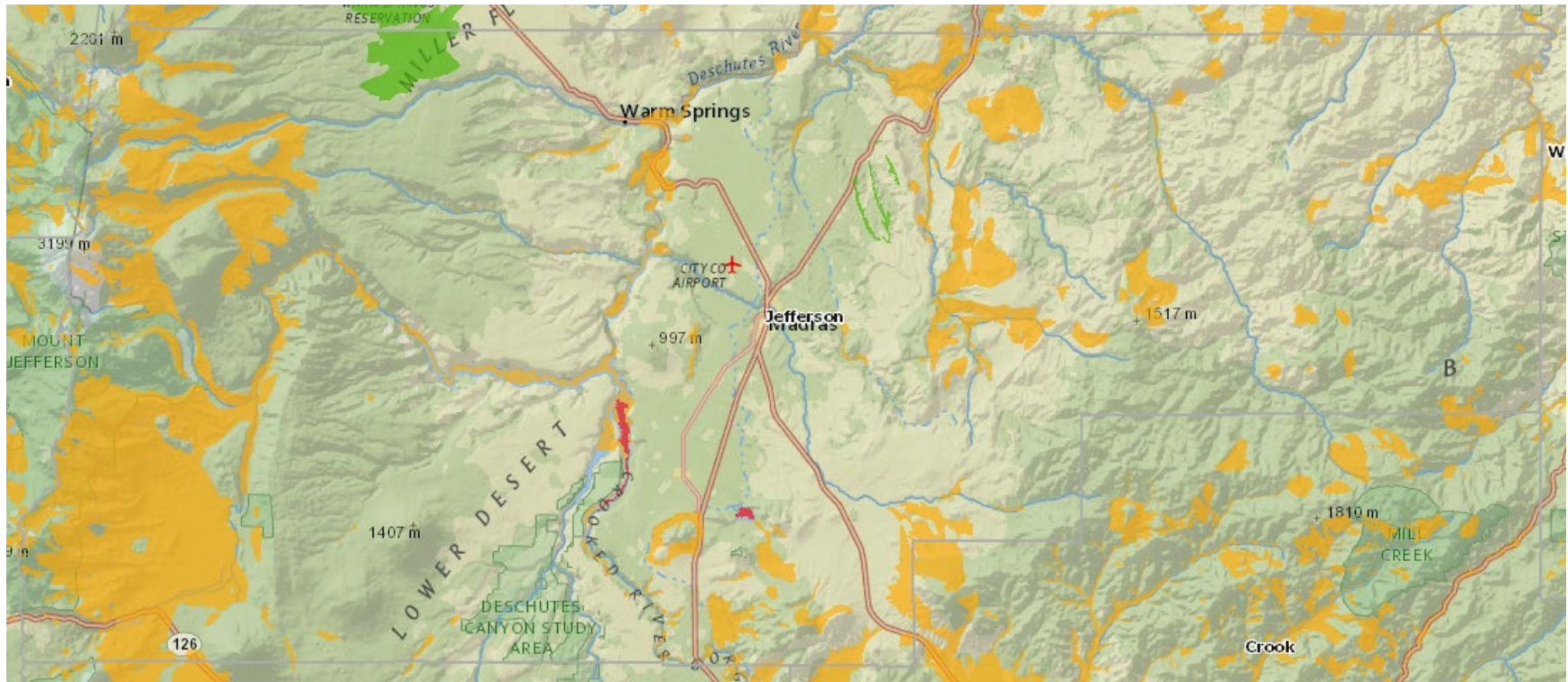
Figure EQ-4 Expected Shaking



Source: DOGAMI Hazard Viewer



**Figure EQ-5 Expected Soft Soil Hazards**



Source: DOGAMI Hazard Viewer (Legend provided below in Figure 6)

Figure EQ-6 DOGAMI HAZVU Legend

## Legend – DOGAMI Statewide Geohazards Viewer (HazVu)

<http://www.oregongeology.org/sub/hazvu/>

### Hazards

#### Flood Hazard

##### 100-Year Floodplain

The 100-year floodplain is a flood zone developed by statistical analyses of stream discharge data to define the 1%-annual-chance flood event (e.g. the "100-year flood"). The resulting flood water surface is mapped on best available topographic data, ranging from USGS topographic maps (least accurate) to lidar (most accurate).

##### Floodway

The floodway is the portion of the 100-Year Floodplain that carries the majority of flood waters, typically at high velocities. It is only defined for stream reaches where detailed studies have been conducted. New development/construction within the floodway is strongly discouraged or prohibited depending on the local regulatory or State standards.

#### Cascadia Earthquake and Tsunami Hazard

##### Statutory Tsunami Inundation Line

This line depicts the regulatory tsunami inundation boundary (Oregon Revised Statutes [ORS] 455.446 and 455.447) that was created by DOGAMI in 1995 to implement Senate Bill 379. It was created to prohibit the construction of new essential and special occupancy structures seaward of its location.

	<b>Violent</b>	<b>Cascadia Earthquake Expected Shaking</b> These data show the amount of shaking you can expect to feel if a magnitude 9.0 Cascadia Subduction Zone (CSZ) earthquake occurs. A CSZ earthquake will create a local tsunami that will inundate the Oregon coast.
	<b>Severe</b>	
	<b>Very Strong</b>	
	<b>Strong</b>	
	<b>Moderate</b>	
	<b>Light</b>	

#### Coastal Erosion Hazard

	<b>Very High (Active) Hazard Zone</b>	These hazard zones represent areas of low to very high (active) erosion of beach or dune sediments by wave action, tidal currents, or drainage. Oregon residents who own structures on or near a beach or bluff should be aware of this hazard and its potential impact. NO DATA denotes coastal areas not mapped.
	<b>High Hazard Zone</b>	
	<b>Moderate Hazard Zone</b>	
	<b>Low Hazard Zone</b>	
	<b>NO DATA</b>	

#### Volcano Hazard

	<b>High Hazard Zone</b>	These data depict areas where volcanic hazards may occur during or after volcanic activity. Volcanoes can produce volcanic ash, mudflows, debris flows, avalanches of hot volcanic material, lava flows, and landslides. Residents and visitors to these areas should have an evacuation plan ready should volcanic activity begin.
	<b>Moderate Hazard Zone</b>	



Oregon Department of Geology and Mineral Industries  
www.OregonGeology.org  
10/09/2012

### Landslide Hazard

	<b>Landslide</b>	Landslide is a general term for deposits of soil or rock that have been moved down a slope. Slides generally occur on moderate to steep slopes, especially in weak soil and rock. Buildings on landslides can be severely damaged when the landslide moves. Fans are accumulations of sediments that form at the mouths of steep canyons. Buildings on fans can be buried by sediment and debris during heavy rain storms.
	<b>Fan</b>	

### Earthquake Hazard

#### Active Faults

Potentially hazardous faults are those that have been identified by the US Geological Survey as having moved in the last 1.6 million years. These faults may be the source of future damaging earthquakes, and severe ground disruption is possible within the buffer zones.

#### Magnitude

	5-7
	3-5
	2-3
	1-2
	0-1

#### Earthquake Epicenter (1971-2008)

An earthquake epicenter is the point on the Earth's surface that is directly above the location where an earthquake originates.

	<b>High</b>
	<b>Moderate</b>
	<b>Low</b>

#### Earthquake Soft Soil Hazard

The intense shaking of an earthquake can cause soil liquefaction – where loosely packed, water-logged sediments are transformed into a substance that acts like a liquid. Buildings and infrastructure sitting on these soft soils are likely to be severely damaged in an earthquake.

	<b>Violent</b>
	<b>Severe</b>
	<b>Very Strong</b>
	<b>Strong</b>

#### Expected Earthquake Shaking

These data show the strongest shaking expected to occur during an earthquake in a 500-year period. The stronger the amount of shaking, the more structural damage will occur.

### Assets

#### Buildings

##### State Owned/Leased Facilities

Facilities owned or leased by the state of Oregon.

	<b>School</b>	<b>Public Buildings</b> The buildings shown represent schools and critical facilities that were evaluated in 2006 to assess their earthquake vulnerability. (Final results from this study were published by DOGAMI in 2007. See DOGAMI Open-File Report O-07-02.) This is not a comprehensive data layer of schools or critical facilities in the State. Use the Public Buildings Search Tool on the map to access the vulnerability reports and click on "RV5 Report."
	<b>Community College</b>	
	<b>Police Station</b>	
	<b>Fire Station</b>	
	<b>Emergency Operations Center</b>	
	<b>Hospital</b>	

Source: DOGAMI - HazVu, <http://www.oregongeology.org/sub/hazvu/hazvu-legend-descr.pdf>

## Probability Assessment

Paleoseismic studies along the Oregon coast indicate that the state has experienced seven Cascadia Subduction Zone (CSZ) events possibly as large as magnitude-9 in the last 3,500 years. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1,000 years. The last CSZ event occurred approximately 300 years ago. Scientists estimate the



chance in the next 50 years of a great subduction zone earthquake is between 10 and 20 percent, assuming that the recurrence is on the order of 400 +/- 200 years.<sup>10</sup>

New research from Oregon State University suggests that the CSZ has at least four segments that sometimes rupture independently of one another. Magnitude-9 ruptures affecting the entire subduction zone have occurred 19 times in the past 10,000 years. Over that time, shorter segments have ruptured farther south in Oregon and Northern California, producing magnitude-8 quakes. As such, the risks of a subduction zone quake may differ from north to south. Quakes originating in the northern portion of the CSZ tend to rupture the full length of the subduction zone. In southern Oregon and Northern California, quakes along the subduction zone appear to strike more frequently.<sup>11</sup> Though a CSZ earthquake rupture would not affect Jefferson County and Central Oregon in the same way that it would in counties located west of the Cascades, a chain effect of consequences, such as disrupted trade routes and an influx of possible refugees, could have serious impacts on Jefferson County communities.

Establishing a probability for crustal earthquakes located within Jefferson County is more difficult. Since 1971, there have been three earthquakes above magnitude 4 in the Jefferson County region (predominantly north in Wasco County and events associated with Mt. Hood). Oregon's seismic record is short and the number of earthquakes above a magnitude 4 centered in the central Oregon region is small. Therefore, any kind of prediction would be questionable. Earthquakes generated by volcanic activity in Oregon's Cascade Range are possible, but likewise unpredictable.

The Jefferson County steering committee determined that the probability of an earthquake event is **low**, meaning zero to one earthquake incident may occur within a 100-year period. The cities of Culver and Metolius are considered to have a **low** probability of earthquake occurrence; Madras is considered to have a **moderate** probability.

## Community Earthquake Issues

### What is susceptible to damage during an Earthquake Event?

Earthquake damage occurs because humans have built structures that cannot withstand severe shaking. Buildings, airports, schools, and lifelines (highways, phone lines, gas, water, etc.) suffer damage in earthquakes and can ultimately result in death or injury to humans. The Jefferson County Natural Hazards Mitigation Steering Committee identified a number of community assets that are vulnerable to earthquake hazards. Vulnerable community assets include vulnerable infrastructure, critical facilities, communities, populations, and economic vulnerabilities.

#### Death and Injury

Death and injury can occur both inside and outside of buildings due to falling equipment, furniture, debris, and structural materials. Likewise, downed power lines or broken water

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<sup>10</sup> Oregon Geology, Volume 64, No. 1, Spring 2002

<sup>11</sup> Joe Rojas-Burke, "Predicting the next Northwest mega-quake still a struggle for geologists." The Oregonian. April 20, 2010.

and gas lines endanger human life. Death and injury are highest in the afternoon when damage occurs to commercial and residential buildings and during the evening hours in residential settings.

The Crooked River Ranch has a large elderly population who may be particularly vulnerable to earthquake events. The assisted living/nursing facilities in Jefferson County may also be vulnerable because the facilities range from 10 to 25 years old and may not meet current seismic standards.

## Building and Home Damage

Wood structures tend to withstand earthquakes better than structures made of brick or unreinforced masonry buildings. Building construction and design play a vital role in the survival of a structure during earthquakes. Damage can be quite severe if structures are not designed with seismic reinforcements or if structures are located atop soils that liquefy or amplify shaking. Whole buildings can collapse or be displaced.

## Bridge and Dam Damage

All bridges can sustain damage during earthquakes, leaving them unsafe for use. More rarely, some bridges have failed completely due to strong ground motion. Bridges are a vital transportation link – damage to them can make some areas inaccessible.

Because bridges vary in size, materials, siting, and design, earthquakes will affect each bridge differently. Bridges built before the mid 1970's often do not have proper seismic reinforcements. These bridges have a significantly higher risk of suffering structural damage during a moderate to large earthquake. Bridges built in the 1980's and after are more likely to have the structural components necessary to withstand a large earthquake.

The High Bridge over the Crooked River and the Deschutes River Bridge are vulnerable to earthquakes, and if damaged, could significantly isolate the community. The bridges serve as the major links to the surrounding counties, and if rendered inoperable, there would only be a few ways in and out of the County. Other important bridges include the bridge on the road to Prineville on Highway 20 and the suspension bridges over Lake Billy Chinook.

Jefferson County contains a number of dams that could be potentially vulnerable to earthquakes. These dams include the Round Butte regulation dam that has electrical substation equipment, gas lines, and irrigation equipment. If damaged, the secondary effects to the economy could be significant. Other vulnerable dams include the Felton and Haystack dams which provide irrigation water to the surrounding farmers.

### 2001 Nisqually Earthquake

A 6.8 magnitude earthquake centered southwest of Seattle struck on February 28, 2001, followed by a mild aftershock the next morning, and caused more than \$1 billion worth of damage. Despite this significant loss, the region escaped with relatively little damage for two reasons: the depth of the quake center and preparations by its residents. Washington initiated a retrofitting program in 1990 to strengthen bridges, while regional building codes mandated new structures withstand certain amounts of movement. Likewise, historic buildings have been voluntarily retrofitted with earthquake-protection reinforcements.

Source: "Luck and planning reduced Seattle quake damage", CNN Report, March 1, 2001

The Opal Springs water station near Madras provides water to Jefferson County, and if damaged could restrict water distribution to the County.

Finally, water collection and treatment systems are also vulnerable to earthquake events.

## Damage to Lifelines

Lifelines are the connections between communities and critical services. They include water and gas lines, transportation systems, electricity, and communication networks. Ground shaking and amplification can cause pipes to break open, power lines to fall, roads and railways to crack or move, and radio or telephone communication to cease. Disruption to transportation makes it especially difficult to bring in supplies or services. All lifelines need to be usable after an earthquake to allow for rescue, recovery, and rebuilding efforts and to relay important information to the public.

The City of Madras is one of the most isolated, large communities in Central Oregon. Should an earthquake damage the County's transportation systems and bridges, connections to the larger region would be limited. The unincorporated community of Crooked River Ranch only has one entrance road, and should it be compromised could isolate the community from the rest of the county. Residents that have built their homes near canyon walls are also vulnerable to earthquake-induced landslides. Another vulnerable community is the unincorporated community of Three Rivers. The community is only accessible by a gravel road through the Deschutes National Forest or over suspension bridges crossing Lake Billy Chinook. Should these roads and bridges become impassable due to an earthquake, the Three Rivers area will likewise be isolated from the rest of the county.

## Disruption of Critical Facilities

Critical facilities are police stations, fire stations, hospitals, and shelters. These are facilities that provide services to the community and need to be functional after an earthquake event. The earthquake effects outlined above can all cause emergency response to be disrupted after a significant event.

The DOGAMI Statewide Seismic Needs Assessment summarized above lists the seismic risk associated with many of the critical facilities in Jefferson County. Other County buildings not assessed in the Seismic Needs Assessment include the County Courthouse, which is an unreinforced masonry building, and the Jefferson County office buildings that are also unreinforced masonry buildings.

One building that may be significantly impacted by an earthquake event is St. Charles Hospital, formerly Mountain View Hospital, which may be overwhelmed with mass casualties having only 291 beds to house patients. The HAZUS study completed by DOGAMI and summarized above further supports the assertion that mass casualties could overwhelm the hospital in the event of an earthquake, while the hospital itself is listed with a high collapse potential.

## Economic Loss: Equipment and Inventory Damage, Lost Income

Seismic activity can cause great loss to businesses, either a large-scale corporation or a small retail shop. Losses not only result in rebuilding cost, but fragile inventory and equipment can be destroyed. When a company is forced to stop production for just a day, business loss can be tremendous. Residents, businesses, and industry all suffer temporary loss of income when their source of finances are damaged or disrupted.

Jefferson County's buildings and transportation infrastructure are also vulnerable to earthquake events and could negatively impact the County's economy. As the HAZUS study summarized below, a large number of buildings could be negatively impacted in the event of an earthquake.

If an earthquake were to close Highway 97, a major north-south transportation route, the economic impacts could be significant. Highway 97 connects Jefferson County with the surrounding counties, and the route is a major trucking line that gets an average of 400 trucks a day. When I-5 closed in December 2007 due to flooding, the daily number of trucks averaged 1,000.

Finally, Jefferson County also has a number of railroad trestles that span large canyons in the County. The canyons include the Crooked River Gorge and over Willow Creek. North-south railroad travel through eastern Oregon could be negatively impacted if these railroad lines were damaged.

### Fire

Downed power lines or broken gas mains can trigger fires. When fire stations suffer building or lifeline damage, quick response to quench fires is less likely.

### Debris

After damage occurs to a variety of structures, much time is spent cleaning up brick, glass, wood, steel or concrete building elements, office and home contents, and other materials.

## Building Collapse Potential

In 2007 DOGAMI completed a Statewide Seismic Needs Assessment that used Rapid Visual Screening (RVS) to assess the seismic risk, also known as collapse potential, of schools, hospitals, and critical facilities such as police and fire stations in the state of Oregon. The RVS assessment is based on the maximum considered earthquake for the location being assessed, and rates buildings by a Very High, High, Moderate, or Low seismic risk.

The Seismic Needs Assessment assessed a total of 35 buildings in Jefferson County. The results are summarized below. Since the Needs Assessment, Culver and Metolius Police Departments no longer exist, Mountain View Hospital has become St. Charles Madras, and Madras PD is a part of the new City Hall.

**Table EQ-3 DOGAMI Building Collapse Potential Scores**

Facility	Level of Collapse Potential			
	Low (<	Moderate (>1%)	High (>10%)	Very High (100%)
<b>County</b>				
Jefferson County Middle School	X			
Jefferson County Sheriff Department	X			
Jefferson County RFPD #1	X			
Three Rivers VFD	X			
Warm Springs Elementary School (4 buildings)	X		X X X	
<b>Culver</b>				
Culver Elementary School	X			
Culver Middle School	X			
Culver High School (3 buildings)			X X	X
<b>Madras</b>				
Buff Elementary School	X			
Madras Elementary School (4 buildings)	X			X X X
Madras High School (3 buildings)	X	X		X
Westside Elementary School (6 buildings)			X	X X X X X
St. Charles Madras (3 buildings)			X X X	
<b>Metolius</b>				
Metolius Elementary School (2 buildings)			X X	

Source: DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment. <http://www.oregongeology.org/sub/projects/rvs/OFR-O-07-02-SNAA-onscreen.pdf>. Updated 2021.

## Vulnerability Assessment

The Community Hazard Issues section (above) discussed the major vulnerabilities to earthquake hazards. Given the relatively few community assets vulnerable to earthquakes, the Jefferson County steering committee rated Jefferson County as having a **moderate** vulnerability should an earthquake occur. A 'moderate' rating indicates that 1 - 10% of the population or regional assets would be affected by a major earthquake event. The cities of Culver and Metolius are considered to have a **moderate** vulnerability to the earthquake hazard; Madras was rated with a **high** vulnerability to the earthquake hazard.

The maximum threat of an earthquake event is **high**, considering the percentage of population and property that could be impacted under a worst-case scenario is more than 25%.

## **Hazard Risk Analysis**

The Jefferson County Steering Committee completed a hazard risk analysis, based upon the previous plan's analysis, during this update. The hazard analysis, developed from a Federal Emergency Management Agency (FEMA) tool that has been refined by the Oregon Military Department – Office of Emergency Management (OEM), addresses and weights (shown as percent within parentheses) the history (8%), vulnerability (21%), probability (29%), and maximum threat (42%) for each natural hazard and attributes a final hazard analysis score. The methodology produces scores that range from 24 to 240. Each category is associated with severity ratings (1 to 10) as follows: Low (1 – 3 points), Moderate (4 to 7 points) and High (8 to 10 points). For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation. The method provides the jurisdiction with a relative ranking from which to prioritize mitigation strategies, but does not predict the occurrence of a particular hazard (for more information on all scores see Volume I, Section 2 of this NHMP).

The Jefferson County hazard analysis score for earthquake is 129 (ranked #6 out of eight hazards). For more information on the relative risk see Volume I, Section 2 of this NHMP.

## **Existing Hazard Mitigation Activities**

Mitigation through either regulatory or non-regulatory, voluntary strategies allow communities to gain cooperation, educate the public and provide solutions to ensure safety in the event of an earthquake.

### **Individual Preparedness**

At an individual level, preparedness for an earthquake is minimal as perception and awareness of earthquake hazards are low.<sup>12</sup> Strapping down heavy furniture, water heaters and expensive personal property as well as having earthquake insurance, is a step towards earthquake mitigation.

### **Earthquake Awareness Month**

April is Earthquake Awareness Month. Oregon Military Department – Office of Emergency Management coordinates activities such as earthquake drills and encourages individuals to strap down computers, heavy furniture and bookshelves in homes and offices.

### **School Education**

Schools conduct earthquake drills regularly throughout Oregon and teach students how to respond when an earthquake event occurs.

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<sup>12</sup> Mark Darienzo, Oregon Military Department – Office of Emergency Management, Personal Interview, (February 22, 2001).

## **Building Codes**

The most significant mitigation activity Jefferson County is implementing for the earthquake hazard is through adoption and enforcement of the International Building Code that includes amendments to seismically retrofit new buildings. However, while new buildings include seismic retrofits, older buildings are still vulnerable.

The Oregon State Building Codes Division adopts statewide standards for building construction that are administered by the state, cities and counties throughout Oregon. The codes apply to new construction and to the alteration of, or addition to, existing structures. Within these standards are six levels of design and engineering specifications that are applied to areas according to the expected degree of ground motion and site conditions that a given area could experience during an earthquake. The Structural Code requires a site-specific seismic hazard report for projects including critical facilities such as hospitals, fire and police stations, emergency response facilities, and special occupancy structures, such as large schools and prisons.

The seismic hazard report required by the Structural Code for essential facilities and special occupancy structures considers factors such as the seismic zone, soil characteristics including amplification and liquefaction potential, any known faults, and potential landslides. The findings of the seismic hazard report must be considered in the design of the building. The Dwelling Code incorporates prescriptive requirements for foundation reinforcement and framing connections based on the applicable seismic zone for the area. The cost of these requirements is rarely more than a small percentage of the overall cost for a new building.

Requirements for existing buildings vary depending on the type and size of the alteration and whether there is a change in the use of the building that is considered more hazardous. Oregon State Building Codes recognize the difficulty of meeting new construction standards in existing buildings and allow some exception to the general seismic standards. Upgrading existing buildings to resist earthquake forces is more expensive than meeting code requirements for new construction. The state code only requires seismic upgrades when there is significant structural alteration to the building or where there is a change in use that puts building occupants and the community at greater risk.

Local building officials are responsible for enforcing these codes. Although there is no statewide building code for substandard structures, local communities have the option of adopting a local building code to mitigate hazards in existing buildings. Oregon Revised Statutes allow municipalities to create local programs to require seismic retrofitting of existing buildings within their communities. The building codes do not regulate public utilities or facilities constructed in public right-of-way, such as bridges.

## **Earthquake Mitigation Action Items**

There are three identified Earthquake action items for Jefferson County; in addition, several of the Multi-Hazard action items affect the Earthquake hazard. An action item matrix is provided within Volume I, Section 3, while action item forms are provided within Volume IV, Appendix A. To view city actions, see the appropriate city addendum within Volume III.

# FLOOD HAZARD ANNEX

## Significant Changes since the 2013 Plan

Major changes to this Annex include: Updated data for the National Flood Insurance Plan Table FL-2, and updated images for Figures FL-1 and FL-2. In addition, the format of the section and minor content changes has occurred.

## Causes and Characteristics of Flood

Flooding results when rain and snowmelt create 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 most destructive natural disasters have been floods. Flooding can be aggravated when rain is accompanied by snowmelt and frozen ground; the spring cycle of melting snow is the most common source of flood in the region.

Anticipating and planning for flood events is an important activity for Jefferson County. Federal programs provide insurance and funding to communities engaging in flood hazard mitigation. The Federal Emergency Management Association (FEMA) manages the National Flood Insurance Program (NFIP) and the Hazard Mitigation Grant Program (HMGP). The NFIP provides flood insurance and pays claims to policyholders who have suffered losses from floods. The HMGP provides grants to help mitigate flood hazards by elevating structures or relocating or removing them from flood hazard areas. These programs provide grant money to owners of properties who have suffered losses from floods, and in some cases, suffered losses from other natural hazard events.

The principal types of flood that occur in Jefferson County include:

### Riverine Floods

Riverine floods occur when water levels in rivers and streams overflow their banks. Most communities located along such water bodies have the potential to experience this type of flooding after spring rains, heavy thunderstorms or rapid runoff from snow melt. Riverine floods can be slow or fast rising, but usually develop over a period of days.

The danger of riverine flooding occurs mainly during the winter months, with the onset of persistent, heavy rainfall, and during the spring, with melting of snow in the Cascade Range. In Jefferson County, riverine floods occur with warm winter rain on snow and are the leading cause of flooding events in the County. Creeks most often affected by riverine flooding include Willow Creek in the City of Madras, an unnamed creek north of the City of Culver and Muddy Creek in eastern Jefferson County.



## **Flash Floods**

Flash floods usually result from intense storms dropping large amounts of rain within a brief period. Flash floods usually occur in the summer during thunderstorm season, appear with little or no warning and can reach full peak in a few minutes. They are most common in the arid and semi-arid central and eastern areas of the state where there is steep topography, little vegetation and intense but short-duration rainfall. Flash floods can occur in both urban and rural settings, often along smaller rivers and drainage ways. Flash flooding can occur in canyons in Jefferson County in the summer, with usually one warning issued per year. These flash flooding events occur most frequently along the Highway 26 corridor and on Highway 97.

In flash flood situations, waters not only rise rapidly, but also generally move at high velocities and often carry large amounts of debris. In these instances, a flash flood may arrive as a fast-moving wall of debris, mud, water or ice. Such material can accumulate at a natural or man-made obstruction and restrict the flow of water. Water held back in such a manner can cause flooding both upstream and then later downstream if the obstruction is removed or breaks free.

## **Shallow Area Floods**

These floods are a special type of riverine flooding. FEMA defines a shallow area flood hazard as an area that is inundated by a 100-year flood with a flood depth between one to three feet. Such areas are generally flooded by low velocity sheet flows of water. The City of Madras is located in the Willow Creek floodway and often experiences shallow flooding in the City during warm rain on snow events.

## **Urban Floods**

Urban flooding occurs where land has been converted from fields or woodlands to developed areas consisting of homes, parking lots, and commercial, industrial and public buildings and structures. In such areas the previous ability of water to filter into the ground is often prevented by the extensive impervious surfaces associated with urban development. This in turn results in more water quickly running off into watercourses, which causes water levels to rise above pre-development levels. During periods of urban flooding streets can rapidly become swift moving rivers and basements and backyards can quickly fill with water. Storm drains may back up with yard waste or other flood debris leading to further localized flooding. Another source of urban flooding is grading associated with development. In some cases, such grading can alter changes in drainage direction of water from one property to another.

## **Snow-melt Floods**

Flooding throughout the region is most commonly linked to the spring cycle of melting snow. The weather pattern that produces these floods occurs during the winter months and has come to be associated with La Nina events, a three to seven-year cycle of cool, wet weather. In brief, cool, moist weather conditions are followed by a system of warm, moist air from tropical latitudes. The intense warm rain associated with this system quickly melts

foothill and mountain snow. Above-freezing temperatures may occur well above pass levels (4,000-5,000 feet). Some of Oregon's most devastating floods are associated with these events.



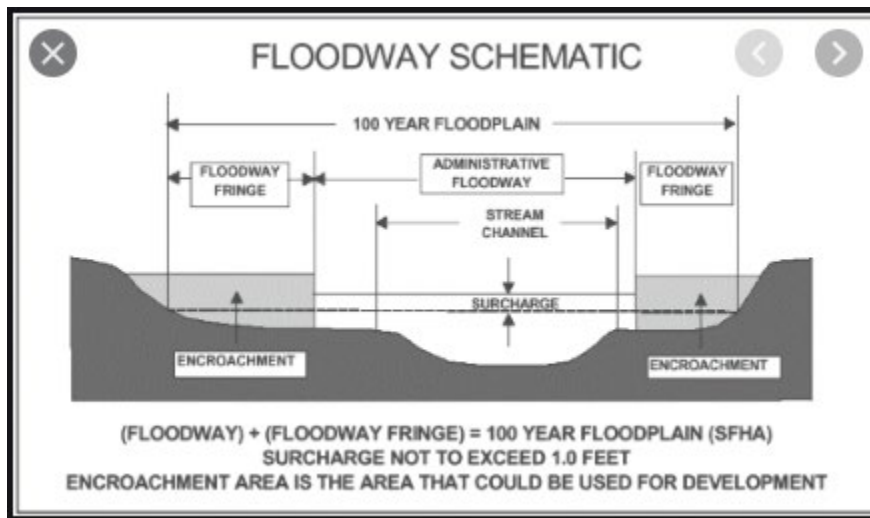
Image 1: A rain on snow event caused severe flooding for Willow Creek in 2006. This picture was taken from a bridge, which was later washed off its foundation.

## Terms Related to Flooding

### Floodplain

A floodplain is land 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 floodwater. The floodplain is made up of two areas: the flood fringe and the floodway:

#### Figure FL-1 Floodplain Schematic

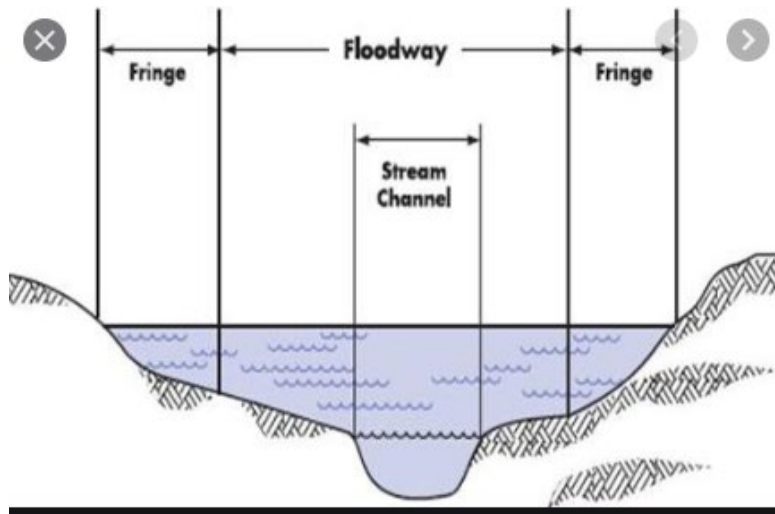


Source: Phil Stenbeck, Jefferson County Community Development Department, via email on April 23, 2021.

### Floodway

The floodway is the portion of the floodplain that is closer to the river or stream. For National Flood Insurance Program (NFIP) and regulatory purposes, floodways are defined as the channel of a river or stream, and the over-bank areas adjacent to the channel. Unlike floodplains, floodways do not reflect a recognizable geologic feature. The floodway carries the bulk of the floodwater downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures, so that flood flows are not obstructed or diverted onto other properties. The NFIP floodway definition 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 (See Figures FL-1 and FL-2)." Floodways are not mapped for all rivers and streams but are typically mapped in developed areas.

**Figure FL-2 Floodway Schematic**



Source: Phil Stenbeck, Jefferson County Community Development Department, via email on April 23, 2021.

## **The Flood Fringe**

The flood fringe refers to the outer portions of the floodplain, beginning at the edge of the floodway and continuing outward. This is the area where development is most likely to occur, and where precautions to protect life and property need to be taken (See Figure FL-1).

## **Factors that contribute to flooding in Jefferson County**

### **Precipitation**

Jefferson County climate is semi-arid with long, wet winters and short, dry summers. The County experiences over 300 days of sunshine per year. The average annual precipitation ranges from under 12 inches for the lower elevations to more than 40 inches at the higher elevations. It is during the winter “wet season” that flooding is most likely to occur. Snowmelt, particularly when combined with new rainfall, can cause flooding. Rain falling on top of snow causes the snow to quickly melt and river levels to rise rapidly.

### **Geography**

Jefferson County has a total area of 1,791 square miles. The county lies between the Cascades and Ochoco Mountains in the central part of Oregon. This area is primarily a high desert prairie with mountain ranges and isolated peaks. The region can be prone to flash flooding as a result of local geology; igneous rocks exposed at the surface increase water run-off.

### **Vegetation Cover**

Vegetation throughout the county is diverse and varies from ponderosa pine forest in the west to grasslands and juniper/sage ecosystems to the east. Outlying areas are used

primarily as ranch lands or farmland and natural areas administered by government agencies. The landscapes lack of vegetation allows intense rainfall to quickly run into streams, contributing to flooding.

## Location of Development

Due to the topography and semi-arid landscape, land is used most intensively within the cities of Madras, Culver, Metolius, and Crooked River Ranch. Widely dispersed rural ranches and populations present challenges for the county's resilience.

When development is located in the floodplain, it may cause floodwaters to rise higher than before the development was located in the hazard areas. Over time, when structures or materials are added to the floodplain and no fill is removed to compensate, serious problems can arise. The Jefferson County Comprehensive Plan prohibits most development in the floodway, but under certain circumstances may allow development in the floodplain.

Displacement of a few inches of water can mean the difference between no structural damage occurring in a given flood event and the inundation of many homes, businesses, and other facilities. Careful attention must be paid to development that occurs within the floodplain and floodway of a river system to ensure that structures are prepared to withstand base flood events.

## Surface Permeability

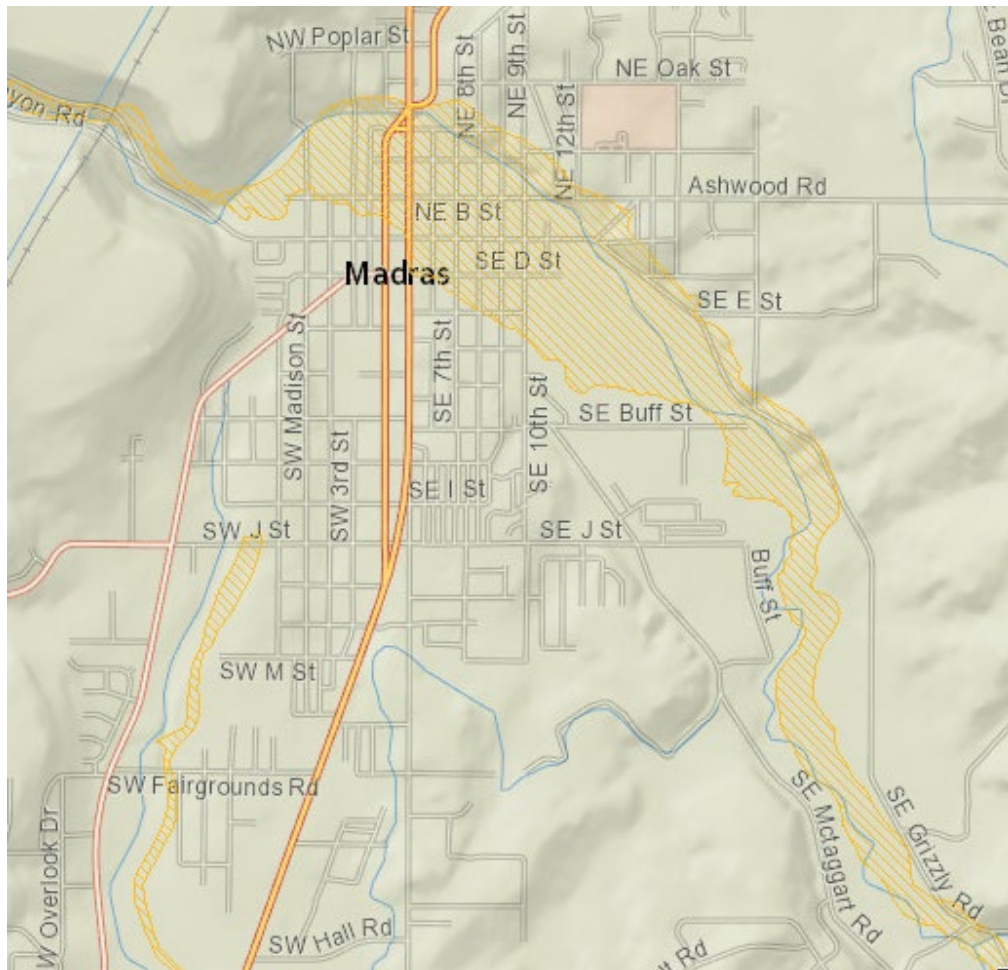
In urbanized areas, increased pavement leads to an increase in volume and velocity of runoff after a rainfall event, exacerbating potential flood hazards. Storm water systems collect and concentrate rainwater and then rapidly deliver it into the local waterway. Traditional storm water systems are a benefit to urban areas, by quickly removing captured rainwater. However, they can be detrimental to areas downstream because they cause increased stream flows due to the rapid influx of captured storm water into the waterway. It is very important to evaluate storm water systems in conjunction with development in the floodplain to prevent unnecessary flooding to downstream properties. Frozen ground is another contributor to rapid runoff in the urban and rural environment.

## History of Floods in Oregon and Jefferson County

Flooding occurs in Jefferson County approximately every ten years. The principle riverine flood sources include Willow Creek, an unnamed creek north of Culver, and Muddy Creek. Image FL-1 shows the FEMA Flood Data for Willow Creek through Madras. Table FL-1 (below) shows the history of flooding within the county.

The Jefferson County steering committee determined that the history of flood events is **moderate**, with two to three events occurring over the last 100 years.

**Figure FL-3 FEMA Flood Data for Willow Creek, Madras**



Source: DOGAMI Hazard Viewer

**Table FL-I Flooding History in Jefferson County**

Date	Location	Description	Remarks
11/16/1960 to 11/19/1960	Jefferson Co.	Severe storm	
2/1/1963	Jefferson Co.	Flooding from winter weather	
12/20/1964	Jefferson Co.	Extensive flooding in Willow Creek and in the City of Madras	Caused an estimated \$1.5 million in damage.
1/25/1965	Entire State	Severe flooding throughout the state	Rain on snow/frozen ground; \$34 million in damages statewide
12/12/1976	Jefferson Co.	Flash flood destroyed buildings in Ashwood area	
12/2/1977 to 12/12/1977	Jefferson Co.	Flooding due to large winter storm	
Feb. 1979	Jefferson Co.	Flooding in Madras	Caused over \$1 million in damages
12/1/1980	Jefferson Co.	Flooding due to large winter storm	
2/22 to 2/23/86	Entire State	Snowmelt flood	
Feb. 1996	Jefferson Co.	Flooding	Executive Order EO 96-15 declared a State of Emergency
3/21/1998	Jefferson Co.	Flooding due to spring melt	
5/1/1998	Central and Eastern Oregon	Numerous monthly rainfall records set; widespread flooding	Rain on snow event
Dec. 2005	Jefferson Co.	Warm spell followed by rain on snow. Led to flooding in Culver and Madras	Flooding let to 2 to 4 feet of water on the side streets in Madras and 18 inches of water flowing on Highway 97, with costs numbering in the hundreds of thousands. Madras Sheriff and Police Chief began notifying homeowners in the flood by going door to door. The City distributed about 1,000 bags, and Les Schwab Tire Center lent another 1,000 bags to volunteers. Water flooded into the Madras High School stadium, near the Lutheran Church of the Good Shepherd, on N. Ninth St, and the intersections of 4th and 5th streets and A and B streets. Both the north and outh lanes of Highway 97 were shut down. The willow Creek footbridge near the Lutheran Church was knocked off its foundation. Businesses flooded as well. The Deschutes River Bridge, a key access route to Warm Springs, almost reached capacity.
Jan. 2006	Jefferson Co.	Willow Creek spilled onto local roads, threatening homes and businesses.	

Sources: Taylor, George and Raymond Hatton, 1999, The Oregon Weather Book; Hazards & Vulnerability Research Institute (2007). The Spatial Hazard Events and Losses Database for the United States, Version 5.1 [Online Database]. Columbia, SC: University of South Carolina, <http://www.sheldus.org>; National Climatic Data Center, Storm Events, <http://www.ncdc.noaa.gov/stormevents>; FEMA, Oregon Severe Storms/ Flooding, <https://home.fema.gov/news/event.fema?id=672>; The Madras Pioneer Archives; 2012 Jefferson County NHMP steering committee.

## Risk Assessment

### How are Hazard Areas Identified?

Major riverine flood sources were identified in the region's flood insurance studies (FIS), the Region 6 Community Profile for Jefferson County and the 2021 Jefferson County Hazard Analysis. In addition, the City of Madras completed a Flood Mitigation Plan in 2005, which provided additional information regarding flooding events in the City of Madras. Much of downtown Madras is located in the Willow Creek floodplain and floodway, and suffers from occasional flooding events.

Jefferson County is a participant in the National Flood Insurance Program, as are the cities of Culver and Madras. Metolius is not included within the database. Jefferson County's Flood Insurance Rate Map (FIRM) was completed on July 17, 1989, and no updates have occurred since then. Culver's latest FIRM is dated February 18, 1988, and Madras' FIRM is dated July 17, 1989.

More in depth information about the NFIP can be found under "Federal Programs" in the "Existing Flood Mitigation Strategies" section.

### Repetitive Flood Loss in Jefferson County

Repetitive flood loss properties (those which have experienced multiple flood insurance claims) have been identified as high priority hazard projects by the NFIP. Nationwide, 40% of all flood insurance claims are paid on just 2% of insured properties. In Oregon, repetitive loss properties represent about 1% of all insured properties, and account for about 14% of all claims paid (19% of the dollar amounts paid).<sup>1</sup> The Community Repetitive Loss record for Jefferson County identifies zero repetitive loss buildings, and zero repetitive loss buildings within the cities of Culver and Madras.<sup>2</sup>

### Flood Insurance Rate Maps (FIRMs)

The Jefferson County Flood Insurance Rate Maps (FIRMs), like much of eastern Oregon are not modernized. Table FL-2 shows that as of June 17, 2021, Jefferson County (including the cities of Culver and Madras) has 152 National Flood Insurance Program (NFIP) policies in force, 1 claim and zero repetitive loss building. The last Community Assistance Visit (CAV) for Jefferson County was on September 14, 1994 (the most recent CAV was in Madras on November, 18 2004). The county, and cities, are not members of the Community Rating System (CRS). The table displays the number of policies by building type and shows that the majority of residential structures that have flood insurance policies are single-family homes and that there are 57 non-residential structures with flood insurance policies.

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<sup>1</sup> State Natural Hazards Mitigation Plan 3-FL-9

<sup>2</sup> Peffer, Lisa. Natural Hazards Planner. "Re: RL Qs from OPDR". Message to Michael Howard. May 28, 2013. Email.

**Table FL-2 Flood Insurance Detail**

Jurisdiction	Current FIRM Map	Policies	Pre-FIRM	Policies by Building Type			
				Single Family	2 to 4 Family	Other Residential	Non-Residential
Jefferson County	-	82	59	58	3	0	21
Jefferson County*	7/17/1989	10	6	10	0	0	0
Culver	9/4/1987	23	15	21	1	0	1
Madras	7/17/1989	47	37	26	2	0	19
Metolius	NA	NA	NA	NA	NA	NA	NA
Warm Springs	4/15/2002	2	1	1	0	0	1

Jurisdiction	Insurance in Force	Total Paid Claims	Substantial Damage Claims	Repetitive Loss Buildings	Total Paid Amount	CRS Class Rating	LAST CAV
Jefferson County	\$ 16,595,700	9	1	0	\$ 133,356	NA	-
Jefferson County*	\$ 2,970,000	6	1	0	\$ 130,863	NA	9/14/1994
Culver	\$ 3,585,800	0	0	0	\$ -	NA	9/14/1994
Madras	\$ 8,829,900	3	0	0	\$ 2,493	NA	11/14/2019
Metolius	NA	NA	NA	NA	NA	NA	NA
Warm Springs	1,210,000	0	0	0	0	NA	NA

Source: Adair, Celinda. NFIP Coordinator at the Oregon Department of Land Conservation and Development. "Re: Updated NFIP Data". Message to Shelby Knight. June 17, 2021. Email.

## Probability of Future Occurrence

Flooding events occur on a regular basis in Jefferson County, the most recent being in 2006 in the City of Madras. Given the history and the continued threat of flooding in Jefferson County, the steering committee determined that there is a **moderate** probability that the county will experience severe flooding in the future, meaning at least one incident is likely within a 35-75-year period. This rating is lower than the 2013 Jefferson County Hazard Analysis. The cities of Culver and Madras are considered to have a **high** probability to future flood events, while the city of Metolius is considered to have a **low** probability to future flood events.

### Future Climate Variability

One of the main aspects of the probability of future occurrences is its reliance on historic climate trends in order to predict future climate trends. Many counties in eastern Oregon are experiencing more frequent and intense rainfall and rapid snowmelt than is historically the norm, and many climate predictions see this trend continuing into the future. Temperatures in the Pacific Northwest region increased in the 20<sup>th</sup> Century by about 1.5 degrees Fahrenheit and are projected to increasingly rise by an average of 0.2 degrees to 1.0 degrees Fahrenheit per decade. Average temperature change by 2040 is projected to be 3.2 degrees Fahrenheit, and by 2080, 5.3 degrees Fahrenheit. Temperature increases will occur throughout all seasons, with the greatest variation occurring during summer months.<sup>3</sup> This

<sup>3</sup> Climate Impacts Group, "Climate Change," <http://cses.washington.edu/cig/pnwc/cc.shtml#anchor6>, accessed February 2013.



information was considered while developing the probability of flood occurrence for the county.

## Community Flood Issues

### What is susceptible to damage during a flood event?

The Jefferson County Steering Committee identified a number of community assets that are vulnerable to flooding events, especially critical facilities and vulnerable infrastructure.

#### Critical Facilities

There are a number of County facilities that are vulnerable to damage in a flood. The County Courthouse and the County offices are located in a floodway in Madras. This includes Community Development, the Annex Buildings, Old City Hall, the Old Courthouse, the Jefferson County Library District building, and Public Works.

A number of facilities in the City of Madras are also located in the Willow Creek floodplain. These include Madras schools, including Madras Primary and Madras High School.

#### Infrastructure

Flooding events in Jefferson County can also significantly impact infrastructure. Steering Committee members noted that a number of culverts in unincorporated areas in Jefferson County need further upgrading from 24-inch culverts to 32-inch. They also identified that the Deschutes River Bridge, a key access point to Warm Springs, is vulnerable to high level flooding, as was seen during the 1996 flood.

Flash flooding that occurs along roadways can also wash out roads. Gravel roads found throughout the county are susceptible to flooding events, such as in the Crooked River Ranch area and in the Three Rivers area.

## Vulnerability Assessment

There are a number of community assets that are vulnerable to flooding events, which are listed above in the Community Hazard Issues section. In addition, the City of Madras, where most of Jefferson County's vulnerable property is located, completed a flood mitigation plan in 2005. The plan valued the total private property in the floodway at \$4,784,000 (2004) and public property at \$3,002,000 (2004). The plan also identified the number and type of buildings in the floodway as well as developed a number of action items to minimize the flood risk. However, additional data assessing the flood vulnerability for the entire County (in addition to the City of Madras) is needed.

Given the number of residents, structures and facilities in or near the special flood hazard area, the Jefferson County NHMP steering committee rated the county's vulnerability to flood as **high**, meaning that more than 10% of the county's population or assets would be impacted by a flood. This rating is higher than the 2013 Jefferson County Hazard Analysis. The cities of Culver and Madras are considered to have a **high** vulnerability to future flood events, while Metolius is considered to have a **moderate** vulnerability to future floods event.

The maximum threat of a flood event is also **high**, considering that over 25% of population and property could be impacted under a worst-case scenario.

## Hazard Risk Analysis

The Jefferson County Steering Committee completed a hazard risk analysis, based upon the previous plan's analysis, during this update. The hazard analysis, developed from a Federal Emergency Management Agency (FEMA) tool that has been refined by the Oregon Military Department – Office of Emergency Management (OEM), addresses and weights (shown as percent within parentheses) the history (8%), vulnerability (21%), probability (29%), and maximum threat (42%) for each natural hazard and attributes a final hazard analysis score. The methodology produces scores that range from 24 to 240. Each category is associated with severity ratings (1 to 10) as follows: Low (1 – 3 points), Moderate (4 to 7 points) and High (8 to 10 points). For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation. The method provides the jurisdiction with a relative ranking from which to prioritize mitigation strategies, but does not predict the occurrence of a particular hazard (for more information on all scores see Volume I, Section 2 of this NHMP).

The Jefferson County hazard analysis score for flood is 177 (ranked #5 out of eight hazards). For more information on the relative risk see Volume I, Section 2 of this NHMP.

## Existing Flood Mitigation Activities

There are numerous programs currently under way in Jefferson County designed to mitigate the effects of flooding. These programs range from federally founded national programs to individual projects by landowners. This section outlines the major mitigation activities underway in Jefferson County

### Federal Programs

#### The National Flood Insurance Program (NFIP)

Since flooding is such a pervasive problem throughout the county, many residents maintain flood insurance policies to help recover from losses incurred from flooding events. However, while there are 317 parcels located within the mapped special flood hazard area (SFHA), there are only 135 policies in force (43% market penetration).<sup>4</sup> This suggests that a little over half of property owners lack insurance coverage.

The NFIP is a federal program administered by the Federal Emergency Management Agency (FEMA). The function of the NFIP is to provide flood insurance to homes and businesses located in floodplains at a reasonable cost, and to encourage the location of new development away from the floodplain. The program maps flood risk areas, and requires local implementation to reduce the risk, primarily through restricting new development in floodplains. The maps are known as Flood Insurance Rate Maps (FIRM). Jefferson County's FIRMs have not been updated since 1989 and the maps do not reflect current flood

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<sup>4</sup> Email from Chris Shirley, Oct. 2012 (Michael Howard)

patterns. The lack of accurate maps prevents the county from making sound planning decisions in regards to flood management.

Flood insurance covers only the improved land, or the actual building structure. The total claims from this program in Jefferson County are shown in Table FL-2. It is important to note that property located outside the SFHA may still be subject to severe flooding. FEMA reports that 25% to 30% of all flood insurance claims are from owners of property located in low to moderate-risk areas located outside of the SFHA.

Repetitive loss structures are defined as a National Flood Insurance Program (NFIP) – insured structure that has had at least two paid flood losses of more than \$1,000 each in any 10-year period since 1978<sup>5</sup>. Repetitive loss structures are troublesome because they continue to expose lives and property to the flooding hazard. Local governments as well as the federal agencies, such as FEMA, attempt to address losses through floodplain insurance and attempts to remove the risk from repetitive loss of properties through projects such as acquiring land and improvements, relocating homes or elevating structures. Continued repetitive loss claims from flood events lead to an increased amount of damage caused by floods, higher insurance rates, and contribute to the rising cost of taxpayer funded disaster relief for flood victims<sup>6</sup>.

### Community Rating System (CRS)

Another program under the NFIP is the Community Rating System (CRS). This voluntary program recognizes and rewards efforts that go beyond the minimum standards of the NFIP. This recognition is in the form of reduced flood insurance premiums for communities that adopt such standards. CRS encourages voluntary community activities that reduce flood losses, facilitate accurate insurance rating, and promote flood insurance awareness.

Jefferson County and the cities of Madras, Culver, and Metolius do not currently participate in the Community Rating System. Participation in the CRS would allow the jurisdictions to reduce individual homeowners flood insurance premium rates for Jefferson County policy holders to reflect the reduced flood risk resulting from the county's flood hazard mitigation actions.<sup>7</sup> For CRS participating communities, flood insurance premium rates are discounted in increments of 5%; i.e., a Class 1 community would receive a 45% premium discount, while a Class 9 community would receive a 5% discount.<sup>8</sup> Table FL-3 below illustrates how the CRS point system is broken down.

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<sup>5</sup> Federal Emergency Management Agency. Definitions, available online at <http://www.fema.gov/business/nfip/19def2.shtm#R>

<sup>6</sup> National Flood Insurance Program. Available online at <http://www.fema.gov/nfip>.

<sup>7</sup> Federal Emergency Management Agency Community Status Report Book - Oregon: Communities Participating in the National Flood Program. 2010

<sup>8</sup> Ibid.

**Table FL-3 Summary of Points and Insurance Rate Discounts Under CRS**

Credit Points	Class	Reductions
0-499	10	0%
500-999	9	5%
1000-1499	8	10%
1500-1999	7	15%
2000-2499	6	20%
2500-2999	5	25%
3000-3499	4	30%
3500-3999	3	35%
4000-4599	2	40%
4500+	1	45%

Source: FEMA, National Flood Insurance Program, <http://www.fema.gov/national-flood-insurance-program>.

## State Programs

### State Land Use Planning Goals

There are 19 statewide planning goals that guide land use in the State of Oregon. One goal in particular focuses on land use planning and natural hazards:

Goal 7: Areas Subject to Natural Disasters and Hazards, requires local governments to identify hazards and adopt appropriate safeguards for land use and development.<sup>9</sup> This goal is currently under review. In the wake of 1996 flood events, the governor directed state agencies to mitigate natural hazards. The Community Service Center at the University of Oregon conducted a review of Goal 7 and identified gaps in information. New information on hazards needed to be incorporated into local policies and there was no consistent evaluation of risk to people and property being conducted in the state. The Goal 7 revision also updated the list of hazards and terminology. The DLCD conducted eleven workshops across the state to get comments on proposed changes. Revisions to Goal 7 were adopted September 28, 2001 (effective June 1, 2002). Goal 7 revisions advocate the continuous incorporation of hazard information in local land use plans and policies.

The communities of Jefferson County, and the cities of Madras, Culver, and Metolius all have approved comprehensive plans that include information pertinent to Goal 7.

### Silver Jackets

The Silver Jackets program is a joint state-federal-local flood mitigation subcommittee, which is tied to a national USACE initiative. Jefferson County also has an action item to coordinate with the state and to contribute to the program (FL #8). Silver Jackets provides a forum where DLCD, DOGAMI, OEM, USACE, FEMA, USGS, and additional federal, state and sometimes local and Tribal agencies can come together to collaboratively plan and implement flood mitigation, optimizing multi-agency utilization of federal assistance by

<sup>9</sup> Hazard Mitigation Workshop, Department of Geology and Mineral Industries, Salem, Oregon, (May 1, 2001).

leveraging state/local/Tribal resources, including data/information, talent and funding, and preventing duplication among agencies.

Objectives of this subcommittee include:

- Facilitate strategic life-cycle flood risk reduction,
- Create or supplement a continuous mechanism to collaboratively solve state-prioritized issues and implement or recommend those solutions,
- Improve processes, identifying and resolving gaps and counteractive programs,
- Leverage and optimize resources,
- Improve and increase flood risk communication and present a unified interagency message, and
- Establish close relationships to facilitate integrated post-disaster recovery solutions.

The State of Oregon established “Silver Jackets”, as a subcommittee to the IHMT, with the primary intents of strengthening interagency relationships and cooperation, optimizing resources, and improving risk communication and messaging.

## **County and City Programs**

### **Zoning Ordinance – Floodplain Standards**

Community participation in the NFIP requires the adoption and enforcement of a local floodplain management ordinance that controls development in the floodplain. Jefferson County and the cities of Madras and Culver participate in the National Flood Insurance Program (NFIP). Communities participating in the NFIP may adopt regulations that are more stringent than those contained in 44 CFR 60.3, but not less stringent.<sup>10</sup>

This type of ordinance is currently in effect in Jefferson County (Section 316). Section 316 identifies the types of uses allowed in the floodplain and floodway; and outlines the compliance procedures and restrictions imposed on each use. Section 316 also describes construction performance standards and specifications for flood hazard protection. The cities of Culver and Madras also have floodplain ordinances and the County requires a floodplain permit for new development.

### **Flood Mitigation Plan**

Communities in Jefferson County have taken a number of mitigation measures against floods. The most significant mitigation activity is the 2005 Madras Flood Mitigation Plan funded by Flood Mitigation Assistance (FMA) program funding, and the 11 actions items that resulted from this plan. The mitigation plan outlines the flood vulnerability in Jefferson County’s largest city, and identifies mitigation activities the city can implement to reduce the impact of flood hazards.

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<sup>10</sup> FEMA, Region 10. Floodplain Management: a Local Administrator’s Guide to the National Flood Insurance Program.

## Floodplain Development

To minimize damage to structures during flood events, the county requires all new construction in the floodplain to get a floodplain development permit. The permit requires development to be anchored against movement by floodwaters, resistant to flood forces, constructed with flood resistant materials, and flood-proofed or elevated so that the first floor of living space, as well as all mechanical and services, is at least one foot above the elevation of the 100-year flood. These standards apply to new structures and to substantial improvements of existing structures. Critical facilities are required to the extent possible to be outside of the special flood hazard area. Other types of development within the floodplain, such as, grading, cut and fill, installation of riprap, and other bank stabilization techniques also require a floodplain development permit.<sup>11</sup>

## Elevation Certificate Maintenance

Elevation certificates are administered by Development Services and are required for buildings constructed in the floodplain in order to demonstrate that the building is elevated adequately to protect it from flooding.<sup>12</sup> The Elevation Certificate is an important administrative tool of the National Flood Insurance Program (NFIP). It is used to determine the proper flood insurance premium rate; it can be used to document elevation information necessary to ensure compliance with community floodplain management regulations; and it may be used to support a request for a Letter of Map Amendment (LOMA) or Letter of Map Revision based on fill (LOMR-F). Jefferson County has Elevation Certificates on file for many of the properties that have been developed.

## FEMA Flood Maps

The flood maps are known as Flood Insurance Rate Maps (FIRM). Jefferson County's FIRMs have not been updated since 1989 and the maps may not reflect current flood patterns. The lack of accurate maps prevents the county from making sound planning decisions in regards to flood management

## Local Mitigation Projects

Jefferson County and the cities of Culver, Madras, and Metolius have worked on a number of local projects that have helped to reduce the hazards of flooding. The City of Culver upgraded the culvert on 9<sup>th</sup> Street, reducing the impact on what had been a 10-year event in the city. A new J Street bridge was built in Madras as an alternative route during Willow Creek flooding events. The bridge has not been tested during a flooding event, but was built to 100-year flood standards.

In addition, the City of Madras relocated their City Hall and Police Station from the existing floodway with funding from the City of Madras, the U.S. Department of Agriculture and a grant from the Federal Emergency Management Agency. This has helped tremendously

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<sup>11</sup> Jefferson County Zoning Ordinance.

<sup>12</sup> Ibid.

because it removed two critical facilities from a flood risk area, and the old building was demolished.

## **Flood Mitigation Action Items**

Loss of life, property damage and economic impacts caused by floods are consequences Jefferson County, Madras, and Metolius Steering Committees determined need permanent mitigation that is provided by scripted and rehearsed emergency operations, i.e. flood fighting.

There are three identified Flood action items for Jefferson County; in addition, several of the Multi-Hazard action items affect the Flood hazard. An action item matrix is provided within Volume I, Section 3, while action item forms are provided within Volume IV, Appendix A. To view city actions, see the appropriate city addendum within Volume III.

# LANDSLIDES HAZARD ANNEX

## Significant Changes since the 2013 Plan

Major changes to this Annex include: The section on Erosion was removed from “Types of Landslides” and placed under the Risk Assessment. Figure LS-3 was updated, and new information on the Pelton Dam landslide was added under the Vulnerability section. In addition, the format of the section and minor content changes has occurred.

## Causes and Characteristics of Landslides

Landslides are a major geologic threat in almost every state in the United States. Nationally, landslides cause 25 to 50 deaths each year.<sup>1</sup> In Oregon, economic losses due to landslides for a typical year are estimated to be over \$10 million.<sup>2</sup> In years with heavy storms, such as in 1996, losses can be an order of magnitude higher and exceed \$100 million.<sup>3</sup> In Oregon, a significant number of locations are at risk from dangerous landslides and debris flows. While not all landslides result in property damage, many landslides impact transportation corridors, fuel and energy conduits, and communication facilities.<sup>4</sup> Increasing population in Oregon and the resultant growth in home ownership has caused the siting of more development in or near landslide areas. Often these areas are highly desirable owing to their location along the coast, rivers and on hillsides.

Landslides are fairly common, naturally occurring events in various parts of Oregon. In simplest terms, 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 understanding 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.

Landslides can be broken down into two categories: (1) rapidly moving; and (2) slow moving, in addition to “on-site” or “off-site” hazards. Rapidly moving landslides are typically “off-site” (debris flows and earth flows) and present the greatest risk to human life, and persons living in or traveling through areas prone to rapidly moving landslides are at increased risk of serious injury. Rapidly moving landslides have also caused most of the recent landslide-related injuries and deaths in Oregon. Slow moving landslides tend to be “on-site” (slumps,

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<sup>1</sup> Ibid.

<sup>2</sup> USGS Landslide Program Brochure, National Landslide Information Center, United States Geologic Survey.

<sup>3</sup> Interagency Hazard Mitigation Team. 2000. State Hazard Mitigation Plan. Oregon State Police – Office of Emergency Management.

<sup>4</sup> Eichorn, Ernie. Field Representative, Chemawa District, Bonneville Power Authority. Personal Interview. 10 November 2004.



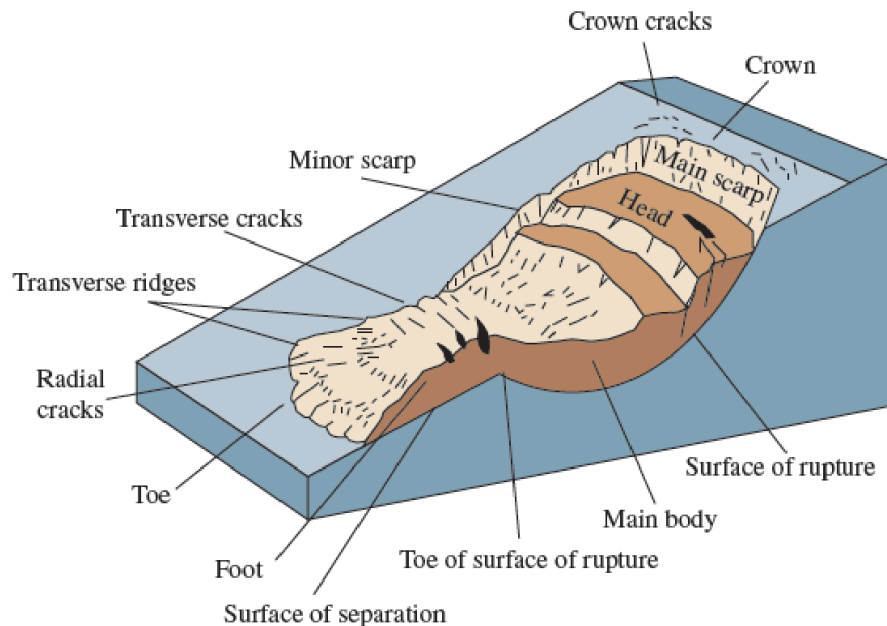
earthflows, and block slides) and can cause significant property damage, but are less likely to result in serious human injuries.

### Types of Landslides

Landslides are downhill or lateral movements of rock, debris, or soil mass. The size of a landslide usually depends on the geology and the landslide triggering mechanism. Landslides initiated by rainfall tend to be smaller, while those initiated by earthquakes may be very large. Slides associated with volcanic eruptions can include as much as one cubic mile of material.

Landslides vary greatly in the volumes of rock and soil involved, the length, width, and depth of the area affected, frequency of occurrence, and speed of movement. Some characteristics that determine the type of landslide are slope of the hillside, moisture content, and the nature of the underlying materials. Landslides are given different names depending on the type of failure and their composition and characteristics. Types of landslides include slides, rock falls, and flows. For more explanation on landslide types and characteristics, reference resources provided by the United States Geological Survey (USGS). Figure LS-1 depicts major landslide features and Figure LS-2 illustrates different types of landslides.

**Figure LS-1 Landslide Features**



Source: USGS. Landslide Factsheet. <http://pubs.usgs.gov/fs/2004/3072/>. 2004

### Slides

Slides move in contact with the underlying surface. These movements include rotational slides where sliding material moves along a curved surface and translational slides where movement occurs along a flat surface. These slides are generally slow moving and can be

deep. Slow-moving landslides can occur on relatively gentle slopes and can cause significant property damage, but are far less likely to result in serious injuries than rapidly moving landslides.<sup>5</sup>

### Rock Falls

Rock falls occur when blocks of material come loose on steep slopes. Weathering, erosion, or excavations, such as those along highways, can cause falls where the road has been cut through bedrock. They are fast moving with the materials free falling or bouncing down the slope. In falls, material is detached from a steep slope or cliff. The volume of material involved is generally small, but large boulders or blocks of rock can cause significant damage. Rock falls have the potential to break off power poles located on hillsides.<sup>6</sup>

### Flows

Plastic or liquid movements in which land mass (e.g. soil and rock) breaks up and flows during movement. Earthquakes often trigger flows.<sup>7</sup> Debris flows normally occur when a landslide moves downslope as a semi-fluid mass scouring, or partially scouring soils from the slope along its path. Flows are typically rapidly moving and also tend to increase in volume as they scour out the channel.<sup>8</sup> Flows often occur during intense-short duration storm events, can occur on gentle slopes, and can move rapidly for large distances.

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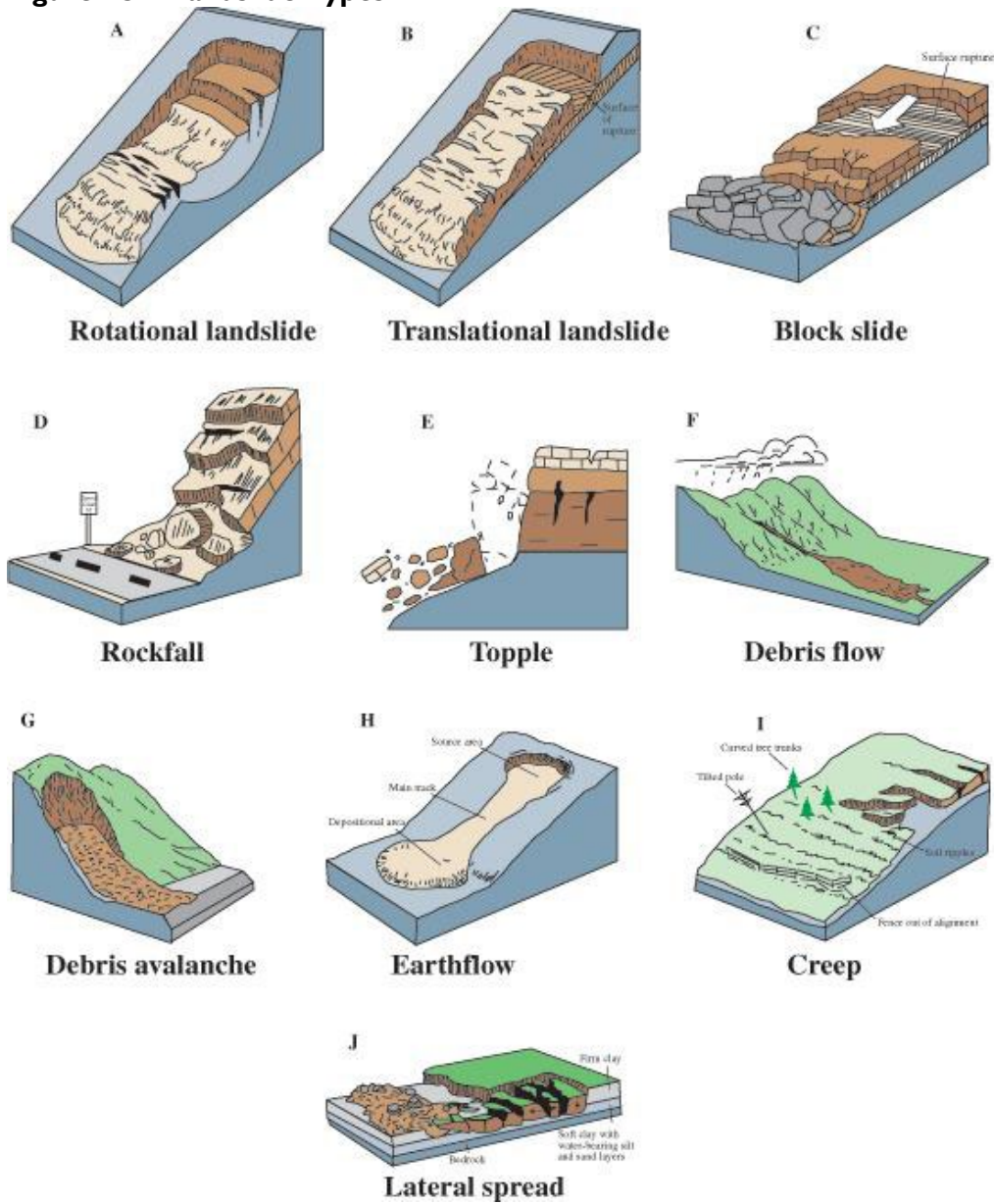
<sup>5</sup> Robert Olson Associates. June 1999. Metro Regional Hazard Mitigation Policy and Planning Guide. Portland, OR: Metro.

<sup>6</sup> Ibid.

<sup>7</sup> DOGAMI. Statewide Landslide Information Database for Oregon (SLIDO-2). <http://www.oregongeology.org/sub/slido/index.htm>

<sup>8</sup> Storm Impacts and Landslides of 1996 Final Report. (1999) Oregon Department of Forestry.

**Figure LS-2 Landslide Types**



Source: USGS. Landslide Factsheet. <http://pubs.usgs.gov/fs/2004/3072/>. 2004.

### Conditions Affecting Landslides

Natural conditions and human activities can both play a role in causing landslides. Certain geologic formations are more susceptible to landslides than others. Locations with steep slopes are at the greatest risk of slides. However, the incidence of landslides and their impact on people and property can be accelerated by development. Developers who are uninformed about geologic conditions and processes may create conditions that can increase the risk of or even trigger landslides.

There are four principal factors that affect or increase the likelihood of landslides:

- Natural conditions and processes including the geology of the site, rainfall, wave and water action, seismic tremors and earthquakes and volcanic activity.
- Excavation and grading on sloping ground for homes, roads and other structures.
- Drainage and groundwater alterations that are natural or human-caused can trigger landslides. Human activities that may cause slides include broken or leaking water or sewer lines, water retention facilities, irrigation and stream alterations, ineffective storm water management and excess runoff due to increased impervious surfaces.
- Change or removal of vegetation on very steep slopes due to timber harvesting, land clearing and wildfire.

## History of Landslides in Oregon

In recent events, particularly noteworthy landslides accompanied storms in 1964, 1982, 1966, 1996 and 2005. Two major landslide producing winter storms occurred in Oregon during November 1996. Intense rainfall on recently and past logged land as well as previously un-logged areas triggered over 9,500 landslides and debris flows that resulted directly or indirectly in eight fatalities. Highways were closed and a number of homes were lost. The fatalities and losses resulting from the 1996 landslide events brought about the passage of Oregon Senate Bill 12, which set site development standards, authorized the mapping of areas subject to rapidly moving landslides and the development of model landslide (steep slope) ordinances.

## History of Landslides Jefferson County

In Jefferson County, rock falls have occurred near Pelton Reservoir in the Warm Springs Reservation. As a result, Pelton Park was closed to visitors for a period of time. Additionally, the Camp Sherman wildfires in 2003 led to a series of landslides in the County. These areas are in the western and northwestern parts of the county, where steep slopes are more common.

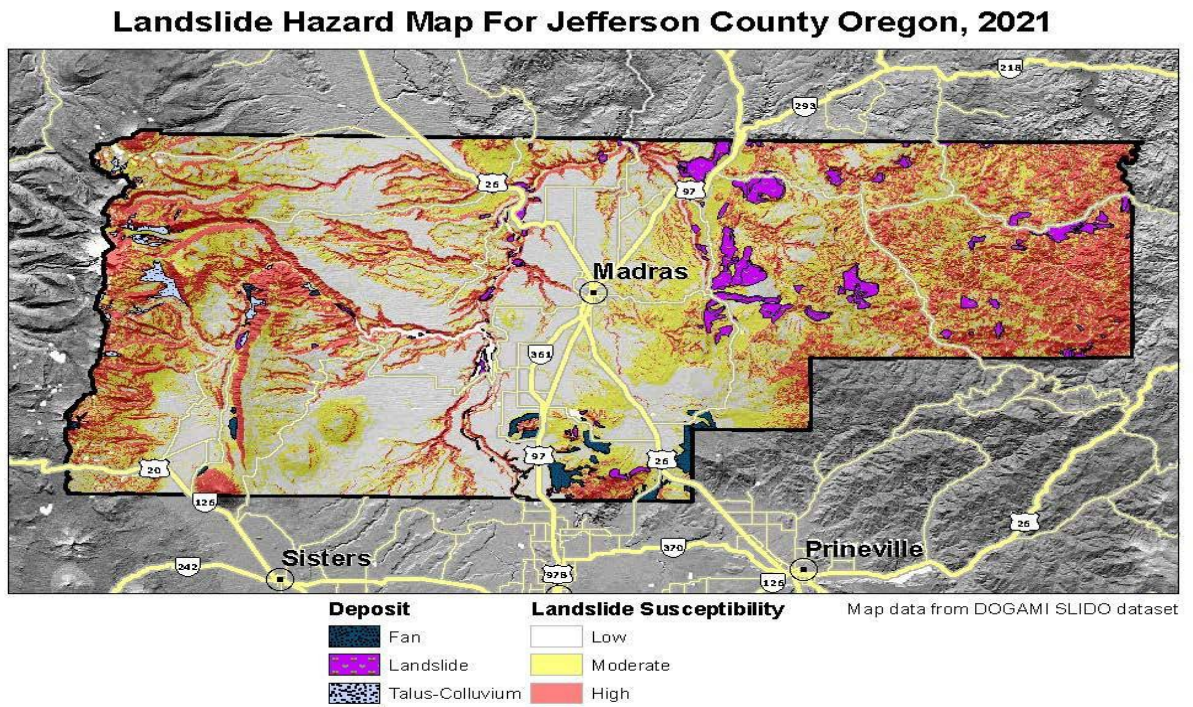
DOGAMI maps the State Landslide Information Layer for Oregon (SLIDO); Figure LS-3 relies on the 2021 SLIDO data and shows Jefferson County landslides that have been identified on published maps. The database contains only landslides that have been located on these maps. Many landslides have not yet been located or are not on these maps and therefore are not in this database. This database does not contain information about relative hazards<sup>9</sup>

Landslide hazards within Jefferson County are generally located near 1) Pelton Reservoir; 2) northwest roads leading to Crooked River Ranch; 3) Camp Sherman's southern access routes; 4) Jordan Road, near the bridge to Three Rivers; and 5) Highway 26 as the road descends into the canyon and on the approach into Warm Springs. Isolated incidents of landslides also occur within the Blue Mountains, as seen in Figure LS-3.

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<sup>9</sup> Oregon Natural Hazards Mitigation Plan, Landslide Chapter. The Interagency Hazards Mitigation Team, (2013) Oregon Military Department - Office of Emergency Management.

Figure LS-3 Mapped Landslides and Landslide Susceptibility in Jefferson County



Source: DOGAMI SLIDO Viewer

## Risk Assessment

### How are Hazard Areas Identified?

Geologic and geographic factors are important in identifying landslide-prone areas. Stream channels, for example, have major influences on landslides, due to undercutting of slopes by stream erosion and long-term hillside processes. Erosion occurs when ditches or culverts beneath hillside roads become blocked with debris. If the ditches are blocked, run-off from the slopes is inhibited during periods of precipitation. This causes the run-off water to collect in soil, and in some cases, cause a slide. Usually the slides are small (100 – 1,000 cubic yards), but they can be quite large.

The Oregon Department of Forestry (ODF) Storm Impacts Study conducted after the 1996-97 landslide events found that the highest probability for the initiation of shallow, rapidly moving landslides was on slopes of 70 to 80 percent steepness. A moderate hazard of shallow rapid landslide initiation can exist on slopes between 50 and 70 percent.<sup>10</sup>

In general, areas at risk to landslides have steep slopes (25 percent or greater,) or a history of nearby landslides. In otherwise gently sloped areas, landslides can occur along steep river and creek banks, and along ocean bluff faces. At natural slopes under 30 percent, most landslide hazards are related to excavation and drainage practices, or the reactivation of preexisting landslide hazards.<sup>11</sup>

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. Geo-engineers with the Oregon Department of Forestry estimate widespread landslide activity about every 20 years.

The Department of Land Conservation and Development (DLCD) requires local governments to address geologically unstable areas as part of their comprehensive plans through Statewide Land Use Planning Goal 7 (Areas Subject to Natural Hazards). In Jefferson County, little planning has been done concerning landslide hazards. Goal 7 envisions a process whereby new hazard inventory information generated by federal and state agencies is first reviewed by DLCD. DLCD then notifies the County of the new information, and the County has three years to respond to the information by evaluating the risk, obtaining citizen input, and adopting or amending implementation measures to address the risk. Jefferson County has not received notice of new inventory information concerning landslides.

Based on the information above the Jefferson County Steering Committee determined that the history of landslide events is **low**, with zero to one event occurring over the last 100 years.

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<sup>10</sup> Western Oregon Debris Flow Hazard Maps: Methodology and Guidance for Map Use. (1999).

<sup>11</sup> Ibid.

## Probability Assessment

The probability of a rapidly moving landslide occurring depends on a number of factors: these include 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 Oregon Department of Forestry tracks storms during the rainy season, monitors rain gages and snow melt, and issues warnings as conditions warrant.

Based on the landslide history, the Jefferson County NHMP steering committee determined that the probability of a landslide occurring is **low**, meaning that one incident is likely in a 35-75-year period. This rating is lower than the 2013 Jefferson County Hazard Analysis. The city of Madras is considered to have a **moderate** probability to landslide hazards while Metolius and Culver are considered to have a **low** probability to landslide hazards.

The probability of an area to have a landslide is increased depending on the factors that reduce the stability without causing failure (previously discussed). When several of these factors are combined, such as an area with steep slopes, weak geologic material, and previous landslide movement, the probability of future landslides is increased. There is a strong correlation between intensive winter rainstorms and the occurrence of rapidly moving landslides (debris flows).

## Community Landslide Issues

### What is susceptible to damage during a landslide event?

Depending upon the type, location, severity and area affected, severe property damage, injuries and loss of life can be caused by landslide hazards. Landslides can damage or temporarily disrupt utility services, roads and other transportation systems and critical lifeline services such as police, fire, medical, utility and communication systems, and emergency response. In addition to the immediate damage and loss of services, serious disruption of roads, infrastructure and critical facilities and services may also have longer-term impacts on the economy of the community and surrounding area.

Increasing the risk to people and property from the effects of landslides are the following three factors:

- Improper excavation practices, sometimes aggravated by drainage issues, can reduce the stability of otherwise stable slopes.
- Allowing development on or adjacent to existing landslides or known landslide-prone areas raises the risk of future slides regardless of excavation and drainage practices. Homeowners and developers should understand that in many potential landslide settings that there are no development practices that can completely assure slope stability from future slide events
- Building on fairly gentle slopes can still be subject to landslides that begin a long distance away from the development. Sites at greatest risk are those situated against the base of very steep slopes, in confined stream channels (small canyons), and on fans (rises) at the mouth of these confined channels. Home siting practices do not cause these landslides, but rather put residents and property at risk of



landslide impacts. In these cases, the simplest way to avoid such potential effects is to locate development out of the impact area, or construct debris flow diversions for the structures that are at risk.

For more information on the landslide hazard, please visit the state plan's Landslide chapter or the Oregon Technical Resource Guide.

### **Vulnerability Assessment**

According to the Jefferson County Natural Hazard Mitigation Steering Committee, none of the County's critical facilities are located within landslide hazard areas. Vulnerable communities and infrastructure, however, exist within the County. The Crooked River Ranch, for example, has roads between Madras and Crooked River Ranch that are susceptible to landslide hazards. In the event that a landslide blocks the road between Madras and Crooked River Ranch, Crooked River Ranch could be isolated from access to critical facilities, medical services, and food supplies.

Similarly, Camp Sherman is vulnerable to landslide events. Poor road conditions and wildfire events frequently lead to slides along potential evacuation routes.

The Three Rivers Bridge is subject to landslide events along Jordan Road, and landslides have occurred along Highway 26 where the road descends into the canyon and also ascends into Warm Springs.

Pelton Dam Road landslide occurred around March 2, 2020 when PGE personnel first noticed pavement cracking in the southbound lane of NW Pelton Dam Road. By March 5, 2020 substantial movement of the landslide had occurred as reported by a PGE geotechnical consultant. Prior to the landslide, a Lake Simtustus Resort contractor cut the toe of the slope in the fall of 2019 with substantial completion of the cut reported in November 2019. This was followed by removal of cut spoils from the area over the next one to two months.

The approximate 0.75-acre landslide lies on a southwest facing hillside above and immediately north of Lake Simtustus approximately 5.5 miles northwest of Madras. The landslide lies primarily on Lake Simtustus Resort property, and is approximately 220 feet wide at the toe and extends about 240 feet from the campground adjacent to the lake up to NW Pelton Dam Road. The slide was about 85 to 90 feet in height and occurred in relatively steep terrain ranging in gradient from about 10 to 35 degrees with steeper slopes noted at the upper (head) and lower (toe) areas. The southbound lane of NW Pelton Road was severely undermined by the slide and the roadway was closed until repairs could be completed by the end of 2020. The slope is sparsely vegetated with scattered Juniper trees with an understory of sage and other brush.

Figure LS-3 shows the areas vulnerable to landslide, as well as physical landslide locations. The majority of occurrences are along Highway 26, near Pelton Dam, and Highway 97.

The 2021 Jefferson County NHMP Steering Committee describes Jefferson County as having a **low** level of vulnerability for landslides, meaning <1% of the population or region assets would likely be affected by a major emergency or disaster, and the finding is the same as the 2008 Steering Committee's for the 2013 Jefferson County NHMP. The cities of Culver, Madras, and Metolius are considered to have a **low** vulnerability to landslide hazards.



The maximum threat of a landslide event is **low**, considering the percentage of population and property that could be impacted under a worst-case scenario is less than 5%.

### **Hazard Risk Analysis**

The Jefferson County Steering Committee completed a hazard risk analysis, based upon the previous plan's analysis, during this update. The hazard analysis, developed from a Federal Emergency Management Agency (FEMA) tool that has been refined by the Oregon Military Department – Office of Emergency Management (OEM), addresses and weights (shown as percent within parentheses) the history (8%), vulnerability (21%), probability (29%), and maximum threat (42%) for each natural hazard and attributes a final hazard analysis score. The methodology produces scores that range from 24 to 240. Each category is associated with severity ratings (1 to 10) as follows: Low (1 – 3 points), Moderate (4 to 7 points) and High (8 to 10 points). For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation. The method provides the jurisdiction with a relative ranking from which to prioritize mitigation strategies, but does not predict the occurrence of a particular hazard (for more information on all scores see Volume I, Section 2 of this NHMP).

The Jefferson County hazard analysis score for landslide is 24 (ranked #8 out of eight hazards). For more information on the relative risk see Volume I, Section 2 of this NHMP.

## **Existing Landslide Mitigation Activities**

The following activities are currently being carried out by local, regional, state, or national organizations.

### **Oregon Department of Forestry (ODF)**

The Oregon Department of Forestry has provided a preliminary indication of debris flows (rapidly moving landslides) in Western Oregon. Their debris flow maps include locations subject to naturally occurring debris flows and include the initiation sites and locations along the paths of potential debris flows (confined stream channels and locations below steep slopes). These maps neither consider the effects of management-related slope alterations (drainage and excavation) that can increase the hazard, nor do they consider very large landslides that could possibly be triggered by volcanic or earthquake activity. Areas identified in these maps are not to be considered “further review areas” as defined by Senate Bill 12 (1999).<sup>12</sup> Information used to develop the ODF Debris Flow maps include:

- Digital elevation models at 30-meter resolution, based on U.S. Geological Survey data, were used to derive slope steepness and then to develop polygons for assigned hazards. Note that actual slopes are steeper than these digitally elevated models.
- Mapped locations of Tye soil formation and similar sedimentary geologic units.
- Oregon Department of Forestry Storm Impacts and Landslides of 1996 study; debris flow initiation and path location data.

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<sup>12</sup> Database of Slope Failures in Oregon for Three 1996/1997 Storm Events. Hofmeister, R.J. (2000). Oregon Department of Geology and Mineral Industries – Special Paper 34.

- Stream channel confinement near steep hill slopes based on U.S. Geological Survey Digital Raster Graphics.
- Historical information on debris flow occurrence in western Oregon (from Oregon Dept. of Forestry, U.S. Forest Service, DOGAMI, Bureau of Land Management, and the Oregon Department of Transportation).
- Fan-shaped land formations below long, steep slopes.
- Areas of highest intensity precipitation do not appear to be correlated with known areas of high and extreme debris flow hazard, so precipitation intensity was not used to develop risk (hazard) ratings.<sup>13</sup>

### **Oregon Department of Geology and Mineral Industries (DOGAMI)**

The Oregon Department of Geology and Mineral Industries (DOGAMI) conducted field investigations and consolidated data on Oregon landslides associated with three flood events in 1996 and 1997. They collected evidence of over 9,000 landslide and slope failure locations in the state. The generation of a statewide landslide inventory is intended to provide a means for developing and verifying hazard models as well as to facilitate various local efforts aimed at minimizing risk and damage in future storm events. The database includes a digital Geographic Information System file with landslide locations, a digital database with details on each landslide, and an accompanying report.<sup>14</sup>

In addition to the slope failures report, DOGAMI is identifying and mapping further review areas. The further review areas identify where landslides have occurred and where landslides are likely to occur.<sup>15</sup>

### **Debris Flow Warning System**

The debris flow warning system was initiated in 1997 and involves collaboration between the Department of Forestry, DOGAMI, the Department of Transportation, local law enforcement, and National Oceanic and Atmospheric Administration (NOAA) Weather Radio and other media.

Since 2008, ODF meteorologists have not issued Debris Flow Warning for Oregon since they do not have sufficient resources. However, information is provided by the National Weather Service (NWS) and broadcast via the NOAA Weather Radio, and on the Law Enforcement Data System. The information provided does not include the Debris Flow Warning system as originally designed since the NWS does not have the geologic and geomorphology expertise. Instead they provide the following language in their flood watches that highlights the potential for landslides and debris flows<sup>16</sup>:

*A flood watch means there is a potential for flooding based on current forecasts. Landslides and debris flows are possible during this flood event. People, structures*

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<sup>13</sup> Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management

<sup>14</sup> NOAA, NWS. Letter dated December 20, 2010 from Stephen K. Todd, Meteorologist-in-Charge.

<sup>15</sup> Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management

<sup>16</sup> Ibid.

*and roads located below steep slopes, in canyons and near the mouths of canyons may be at serious risk from rapidly moving landslides.*

DOGAMI provides additional information on debris flows through the media. The Department of Transportation provides warning signs to motorists in landslide prone areas during high-risk periods.<sup>17</sup>

### **Landslide Brochure**

The Department of Geology and Mineral Industries (DOGAMI) developed a landslide public outreach brochure in cooperation with several other state agencies. Forty thousand copies were printed in November 1997 and were distributed widely through building code officials, county planners, local emergency managers, natural resource agency field offices, banks, real estate companies, insurance companies, and other outlets. Landslide brochures are available from DOGAMI, the Office of Emergency Management (OEM), Oregon Department of Forestry (ODF), and the Department of Land Conservation and Development (DLCD).<sup>18</sup>

### **Oregon State Building Code Standards**

The Oregon Building Codes Division adopts statewide standards for building construction that are administered by the state and local municipalities throughout Oregon. The One- and Two-Family Dwelling Code and the Structural Specialty Code contain provisions for lot grading and site preparation for the construction of building foundations.

Both codes contain requirements for cut, fill and sloping of the lot in relation to the location of the foundation. There are also building setback requirements from the top and bottom of slopes. The codes specify foundation design requirements to accommodate the type of soils, the soil bearing pressure, and the compaction and lateral loads from soil and ground water on sloped lots. The building official has the authority to require a soils analysis for any project where it appears the site conditions do not meet the requirements of the code, or that special design considerations must be taken. ORS 455.447 and the Structural Code require a seismic site hazard report for projects that include essential facilities such as hospitals, fire and police stations and emergency response facilities, and special occupancy structures, such as large schools and prisons. This report includes consideration of any potentially unstable soils and landslides.<sup>19</sup>

### **Steep Slope Development Standards**

Section 412 of the Jefferson County Zoning Ordinance states the steep slope setback requirements for buildings and developments, including decks near slopes greater than 33.3%.

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<sup>17</sup> Planning for Natural Hazards: Oregon Technical Resource Guide. Community Planning Workshop. (July 2000). Chapter 5.

<sup>18</sup> Ibid.

<sup>19</sup> Ibid.

## **Landslide Mitigation Action Items**

There are two identified Landslide action items for Jefferson County; in addition, a few of the Multi-Hazard action items affect the Landslide hazard. An action item matrix is provided within Volume I, Section 3, while action item forms are provided within Volume IV, Appendix A. To view city actions, see the appropriate city addendum within Volume III.

# VOLCANIC EVENT HAZARD ANNEX

## Significant Changes since the 2013 Plan

Major changes to this Annex include: Additional information was provided about Mount Jefferson and Fields of Mafic Volcanoes. Figures VE-6 and VE-7 were updated with maps from USGS; and Table VE-1 was updated to show the relevant volcanoes for the region. In addition, the format of the section and minor content changes has occurred.

## Causes and Characteristics of Volcanic Events

The Cascade Range of the Pacific Northwest has more than a dozen active volcanoes. These familiar snow-clad peaks are part of a 1,000-mile-long chain of mountains that extend from southern British Columbia to northern California. Cascade volcanoes tend to erupt explosively, and have occurred at an average rate of 1-2 per century during the last 4,000 years. Future eruptions are certain. Seven Cascade volcanoes have erupted since the first U.S. Independence Day slightly more than 200 years ago.<sup>1</sup> These include two volcanoes that are nearby Jefferson County (Mount St. Helens and Mount Hood). Four of those eruptions would have caused considerable property damage and loss of life had they occurred today without warning. Mount Saint Helens is an active volcano in this chain, which erupted violently in 1980 and began erupting steam and ash again during fall 2004 and spring 2005. Mt. Mazama (more popularly known as Crater Lake), Mount Hood, Mount Jefferson, Newberry Volcano and the Three Sisters vicinity (including Mt. Bachelor and Broken Top) are all potentially active volcanoes in Oregon that are relatively close to the county.

The existence, position and recurrent activity of Cascade volcanoes is related to the convergence of shifting crustal plates. The effects of a major volcanic event can be widespread and devastating. The Cascade Range in Washington, Oregon and northern California is one of the most volcanically active regions in the United States. As population increases in the Pacific Northwest, areas near volcanoes are being developed and recreational usage is expanding. As a result, more and more people and property are at risk from volcanic activity.

Volcanic activity can produce many types of hazardous events including landslides, fallout of tephra (volcanic ash), lahars, pyroclastic flows, and lava flows.<sup>2</sup> Pyroclastic flows are fluid mixtures of hot rock fragments, ash, and gases that can move down the flanks of volcanoes at speeds of 50 to more than 150 kilometers per hour (30 to 90 miles per hour).<sup>3</sup> Lahars or volcanic debris flows are water-saturated mixtures of soil and rock fragments and can travel very long distances (over 100 km) and travel as fast as 80 kilometers per hour (50 miles per

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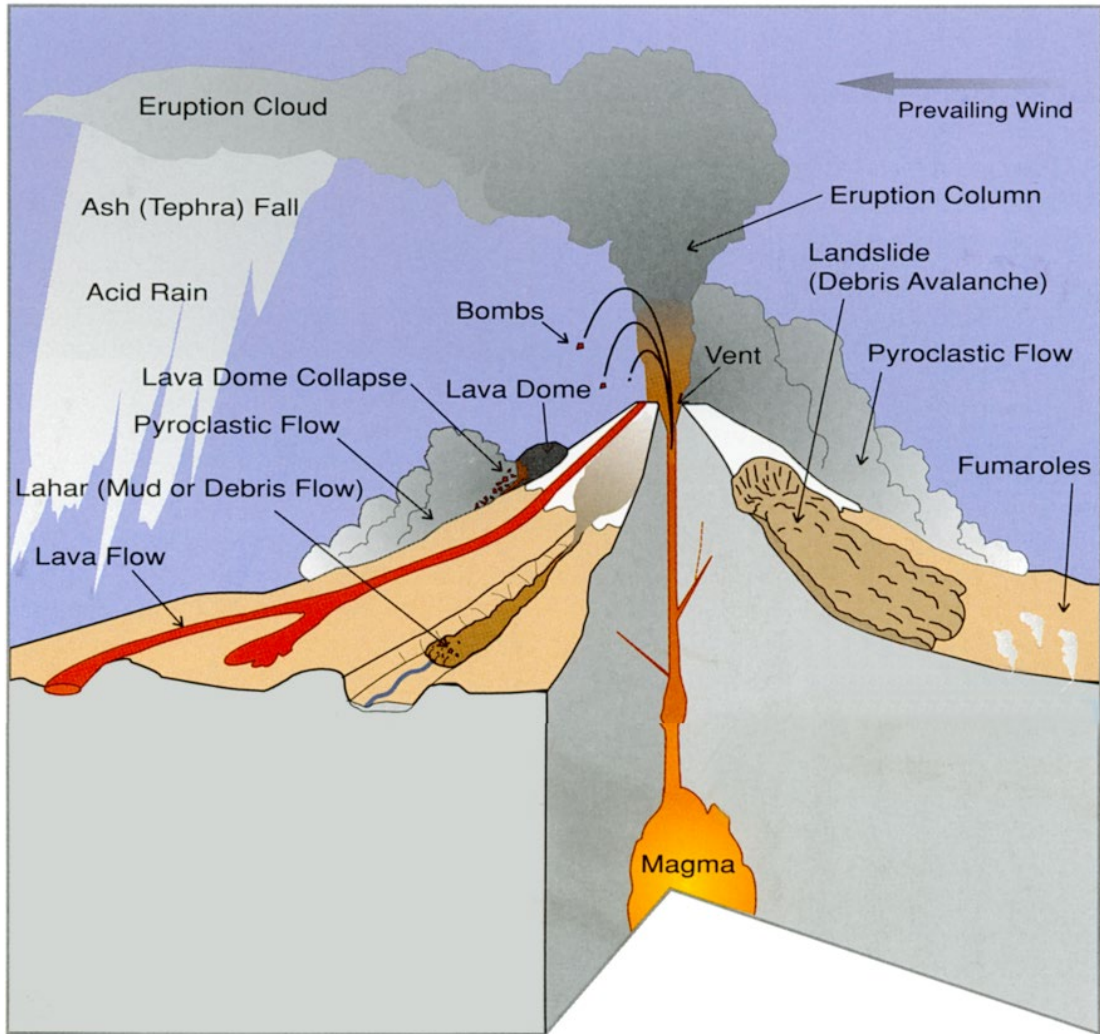
<sup>1</sup> Preparing for The Next Eruption in the Cascades: USGS Open-File Report 94-485

<sup>2</sup> W.E. Scott, R.M. Iverson, S.P. Schilling, and B.J. Fischer, Volcano Hazards in the Three Sisters Region, Oregon: U.S. Geological Survey Open-File Report 99-437, 14p, 2001.

<sup>3</sup> Ibid

hour) in steep channels close to a volcano.<sup>4</sup> These hazards can affect very small local zones (only meters across) to areas hundreds of kilometers downwind.<sup>5</sup>

**Figure VE-I Volcanic Hazard from a Composite Type Volcano**



Source: Walder et al, "Volcano Hazards in the Mount Jefferson Region," 1999; W.E. Scott, R.M. Iverson, S.P. Schilling, and B.J. Fischer, Volcano Hazards in the Three Sisters Region, Oregon: U.S. Geological Survey Open-File Report 99-437, 14p., 200.

## Related Hazards

### Ash fall / Tephra

One of the most serious hazards from an eruption is the rock (*bombs*) and dust-sized ash particles - called *tephra* - blown into the air. Dust-sized ash particles can travel enormous distances and are a serious by-product of volcanic eruptions. Within a few miles of the vent, the main tephra hazards to man-made structures and humans include high temperatures,

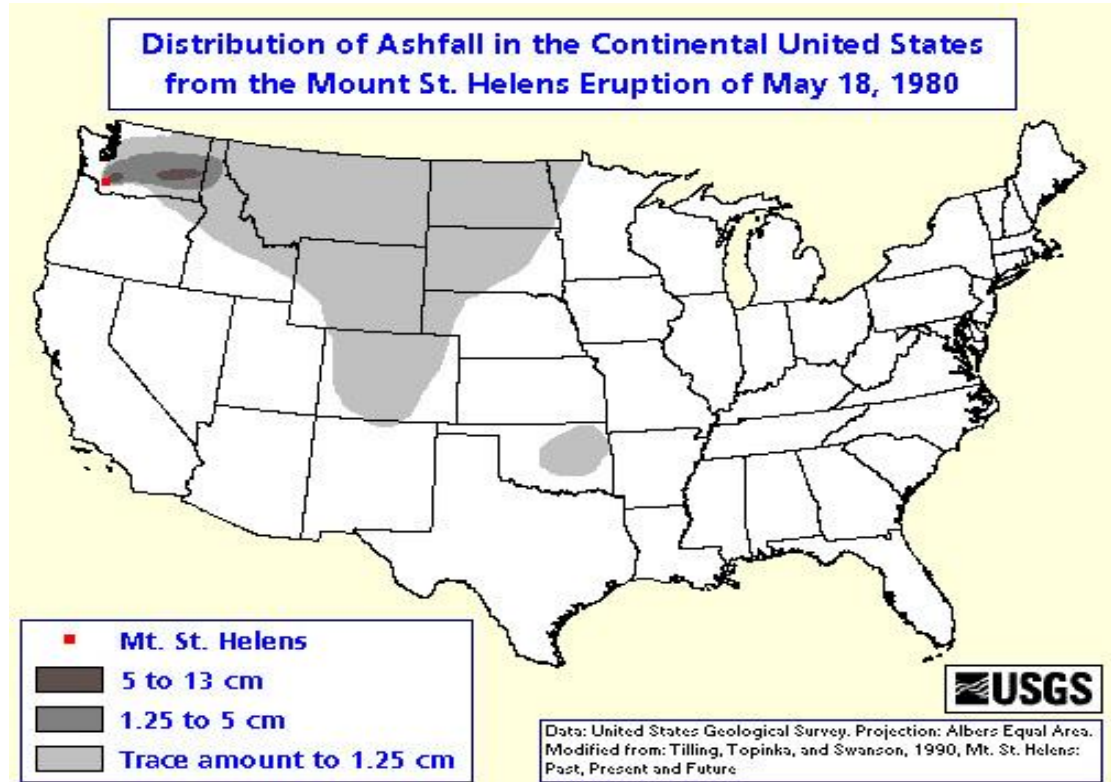
<sup>4</sup> Ibid

<sup>5</sup> Walder et al, "Volcano Hazards in the Mount Jefferson Region," 1999

being buried, and being hit by falling fragments. Within ten to twelve miles, hot tephra may set fire to forests and flammable structures.

During an eruption that emits ash, the ash fall deposition is controlled by the prevailing wind direction.<sup>6</sup> The predominant wind pattern over the Cascades is from the west, and previous eruptions seen in the geologic record have resulted in most ash fall drifting to the east of the volcanoes.<sup>7</sup> The potential and geographical extent of volcanic ash fall in the Pacific Northwest from an eruption on Mt. St. Helens is depicted in Figure VE-2 below.<sup>8</sup>

**Figure VE-2 Distribution of Ashfall in the Continental United States from the Mount St. Helens Eruption of May 18, 1980**



Source: United States Geological Survey, 1990

## Earthquakes

Earthquakes can trigger volcanic events or they can cause them. An earthquake produced by stress changes in solid rock from injection or withdrawal of magma (molten rock) is called a volcano-tectonic earthquake. The other categories of volcanic earthquakes, called long period earthquakes, are produced by the injection of magma into surrounding rock. Volcanic earthquakes tend to be mostly small and not a problem for areas tens of miles from the volcano.

<sup>6</sup> Ibid.

<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

## Lava flows

Lava flows are streams of molten rock that erupt relatively non-explosively from a volcano and move downslope, causing extensive damage or total destruction by burning, crushing, or burying everything in their paths. Secondary effects can include forest fires, flooding, and permanent reconfiguration of stream channels.<sup>9</sup> The most likely instance of a lava flow in Jefferson County would occur near Mount Jefferson in the western half of the county.

## Pyroclastic flows and surges

Pyroclastic flows are avalanches of rock and gas at temperatures of 600 to 1500 degrees Fahrenheit. They typically sweep down the flanks of volcanoes at speeds of up to 150 miles per hour. Pyroclastic surges are a more dilute mixture of gas and rock. They can move even more rapidly than a pyroclastic flow and are more mobile. Both generally follow valleys, but surges sometimes have enough momentum to overtop hills or ridges in their paths. Because of their high speed, pyroclastic flows and surges are difficult or impossible to escape. If it is expected that they will occur, evacuation orders should be issued as soon as possible for the hazardous areas. Objects and structures in the path of a pyroclastic flow are generally destroyed or swept away by the impact of debris or by accompanying hurricane-force winds. Wood and other combustible materials are commonly burned. People and animals may also be burned or killed by inhaling hot ash and gases. The deposit that results from pyroclastic flows is a combination of rock bombs and ash and is termed *ignimbrite* or welded tuff. These deposits may accumulate to hundreds of feet thick and can harden to resistant rock.<sup>10</sup> Residents in the western half of Jefferson County have a potential risk if these events occur at Mount Jefferson.

## Lahars and debris flows

A lahar consists of a mixture of water and rock fragments that flow down the slope of a volcano, usually along a stream channel. A lahar can be generated by volcanic activity (for example, melting snow or glacier), prolonged rain, or other weather conditions resulting in rapid snow melt. When moving, a lahar resembles a mass of wet concrete carrying rocks and boulders. Lahars vary in size and speed. Large lahars may be hundreds of meters wide, tens of meters deep, and move faster than a person can run. The Cascade Mountains and nearby floodplains contain abundant evidence of lahar activity and destruction. Past lahars at Mount Hood completely buried valley floors in the Sandy, Hood, and White River drainages. Lahars can disrupt utility and transportation systems. Municipalities, industries and individuals who take their water from streams affected by lahars may have water quality and/or quantity issues.

Debris flows are sudden and very rapid movements of rock and soil downhill; they are often called mudslides. They can be triggered by a variety of phenomena, including weather conditions, very steep slopes, and earthquakes. Debris flows can travel miles and attain speeds as high as 100 miles per hour. Structures and objects in their path (e.g., dams,

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<sup>9</sup> Oregon State Natural Hazard Mitigation Plan. 2012. "Volcanic Hazards Chapter," [http://csc.uoregon.edu/opdr/sites/csc.uoregon.edu.opdr/files/docs/ORNHMP/OR-SNHMP\\_volcano\\_chapter.pdf](http://csc.uoregon.edu/opdr/sites/csc.uoregon.edu.opdr/files/docs/ORNHMP/OR-SNHMP_volcano_chapter.pdf), accessed February 2013

<sup>10</sup> Ibid.



bridges) will sometimes be incorporated into the flow. They often contain enough water to transform into lahars. Debris flows are common throughout the steep volcanoes of the Cascade Range.

The major hazard to human life from lahars and debris flows is from burial and impact by boulders and other debris. Buildings, dams, bridges, and other property in the path of a lahar can be buried, smashed, or carried away. Flooding can occur behind temporary dams created by logjams or other debris in streams.

Homes and facilities located in floodplains could be washed away or damaged. Endangered species could be adversely affected by changes in streams, including the deposition of debris in streambeds and floodplains. For example, salmonids trying to spawn could find it impossible to swim upstream.

Both debris flows and lahars can occur for many years after an eruptive episode at a volcano.

### **Landslides (debris avalanches)**

Because the volcanoes that form the Cascade Mountains are composed of layers of weak fragmented rock and lava they are prone to gravity driven failure such as landslides. Landslides range in size from small to massive summit or flank failures. They may be triggered by volcanic activity or during times of excessive rainfall or snowmelt. Speeds of movement range from slow creep to more catastrophic failure. If enough water is incorporated into the material the failure will become a lahar. Primary hazards are to roads, bridges, dams, and buildings that might be constructed on the landslide or be damaged by the movement.

## **History of Volcanic Events in Oregon and Jefferson County**

The history of volcanic activity in the Cascade Range is contained in its geologic record, and the age of the volcanoes vary considerably. Figure VE-3 below, shows the history of Cascade Range eruptions. All of the Cascade volcanoes are characterized by long periods of dormancy and intermittent activity. These characteristics make predictions, recurrence intervals, or probability very difficult to attain. As of March 2021, no Cascadia Volcano is under an Activity Alert.<sup>11</sup>

### **Fields of Mafic Volcanoes**

Hundreds of geologically young volcanoes composed of cinders, ash, and lava flows dot the Central Oregon landscape among the major volcanic centers. Many, such as Forked Butte cinder cone and several other nearby cones south of Mt. Jefferson occur on or near larger composite volcanoes; others occur many miles from larger volcanoes. Some of these volcanoes are small cinder cones; others are large shield volcanoes that stand more than 1,000 meters (3,300 feet) above their bases and can be more than 10 kilometers (6 miles) wide. Numerous mafic volcanoes occupy the area between Mt. Jefferson and Mt. Hood to the north, and between Mt. Jefferson and the Three Sisters region to the south.

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<sup>11</sup> USGS. U.S. Volcanoes and Current Activity Alerts. <http://volcanoes.usgs.gov/>

Future eruptions of mafic volcanoes are possible anywhere in the broad central Cascades region, although eruptions are probably more likely to occur in the greater Three Sisters area and on the flanks of Newberry Volcano, judging from the volcanic history of the past 14,000 years. Tephra from eruptions of mafic volcanoes will affect areas chiefly east of the Cascade crest. Tephra falls from ongoing eruptions of mafic volcanoes could last months to years, or even longer, would be a chronic nuisance in western parts of Jefferson County. Once an eruption begins, the ultimate extent of lava flows will depend on vent location, local topography, and the total volume and rate of lava erupted, but scientists will be able to make forecasts about areas at greatest risk. Future lava-flow eruptions in the central Cascades are more likely to occur away from populated areas and are more likely to impact forests and stream channels, but could also impact major highways and power-line corridors.

## Mount Jefferson

The closest volcano to Jefferson County is Mt. Jefferson, a stratovolcano located in the Mount Jefferson Wilderness area and the Warm Springs Indian Reservation. Two types of volcanoes are found in the Mt. Jefferson region: the stratovolcano of Mt. Jefferson itself, and monogenetic volcanoes scattered throughout the region.

Stratovolcanoes like Mt. Jefferson are characterized by periodic eruptions over tens to hundreds of thousands of years and can display a wide range of eruption styles. Mt. Jefferson was built by repeated eruptions over hundreds of thousands of years, with its last eruptive episode during the last major glaciation which ended about 15,000 years ago. Geologic evidence shows that Mt. Jefferson is capable of large explosive eruptions. The largest such eruption occurred between 35,000 and 100,000 years ago and deposited ash as far away as the present-day town of Arco in southeast Idaho. Although there has not been an eruption at Mt. Jefferson for some time, experience at explosive volcanoes elsewhere suggests that Mt. Jefferson cannot be regarded as extinct. If Mt. Jefferson erupts again, areas close to the eruptive vent will be severely affected, and even areas tens of kilometers (tens of miles) downstream along river valleys or hundreds of kilometers (hundreds of miles) downwind may be at risk. A concern at Mt. Jefferson is the possibility that small to-moderate sized landslides could occur even during periods of no volcanic activity. Such landslides may transform as they move into lahars (watery flows of rock, mud, and debris) that can inundate areas far downstream. The population at immediate risk in the Mt. Jefferson region is small, but these residents as well as other people who visit the area for recreation and work purposes should be aware of the potential hazards. Probably the greatest concern in the Mt. Jefferson region is the possibility that large lahars might enter reservoirs on either side of the volcano, namely, Detroit Lake to the west and Lake Billy Chinook to the east. Lahars entering these lakes could set up large waves that could overtop dams and possibly cause dam failure, with catastrophic effects downstream. Such events have very low probabilities but great potential consequences.<sup>12</sup>

*Monogenetic volcanoes* are small volcanoes that, in the Cascade Range, are scattered throughout the entire region including on the slopes of larger stratovolcanoes. These volcanoes typically erupt for brief intervals of time—weeks to perhaps centuries—and generally display a narrower range in eruptive behavior than stratovolcanoes. Numerous

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<sup>12</sup> Volcano hazards in the Mount Jefferson region, Oregon. <https://pubs.er.usgs.gov/publication/ofr9924>

monogenetic volcanoes occupy the area between Mt. Jefferson and Mt. Hood to the north, and between Mt. Jefferson and the Three Sisters region to the south. Over a span of hundreds of thousands of years, these monogenetic volcanoes have built a broad upland area (hundreds to thousands of square kilometers/miles) of lava domes, shield volcanoes, cinder cones, and lava flows. The most recent eruptions of this type occurred less than 7,000 years ago, from four volcanic vents in a region between 6 and 12 km (4 and 8 miles) south of Mt. Jefferson.<sup>13</sup>

## The Three Sisters Area

The Three Sisters area is the second closest volcanic area to Jefferson County. It is comprised of a cluster of composite cones including North Sister, Middle Sister, South Sister, Broken Top, and Mount Bachelor. The Three Sisters region is ranked by the U.S. Geological Survey as a “very high threat” and is among the top 10 most hazardous volcanoes in the U.S.<sup>14</sup> South Sister is the most active volcano in the region and last erupted around 2,200 to 2,000 years ago. The event was of relatively modest scale. However, at least four times within the last 700,000 years, explosive eruptions from the area have created tephra fallout deposits as thick as 42 feet. Such an event would be unlikely today.<sup>15</sup> Between 1996 and 2000, there has been an uplift of about four inches, three miles west of South Sister and was probably caused by an accumulation of magma approximately four miles under the earth. This growth has slowed substantially since 2005.<sup>16</sup>

## Mount Hood

Mount Hood is the third closest volcano to Jefferson County. It has erupted sporadically for about 500,000 years. Two major eruptive periods during the last 1,500 years have created pyroclastic flows and lahars which mainly affected Sandy River and its tributaries to the south and west. The last eruptive period was around 1781.<sup>17</sup> Mt. Hood is ranked by the U.S. Geological Survey as a “very high threat” volcano and is among the top 10 most hazardous volcanoes in the U.S.<sup>18</sup>

## Newberry Volcano

Another nearby volcano is Newberry Volcano, the largest volcano in the Cascades volcanic arc. The volcano last erupted about 1,300 years ago and remains active. Its eruptive history has produced ash, tephra, pyroclastic flows, and lava flows. Around 75,000 years ago, a large, explosive eruption collapsed the summit and created two caldera lakes. Newberry is ranked by the U.S. Geological Survey as a “very high threat” volcano and is among the top

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<sup>13</sup> Cascade Volcano Observatory, Mt. Jefferson. <https://www.usgs.gov/volcanoes/mount-jefferson/>

<sup>14</sup> 2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment. <https://pubs.usgs.gov/sir/2018/5140/sir20185140.pdf>

<sup>15</sup> USGS. Description: Three Sisters Volcanoes, Oregon. [http://vulcan.wr.usgs.gov/Volcanoes/Sisters/description\\_three\\_sisters.html](http://vulcan.wr.usgs.gov/Volcanoes/Sisters/description_three_sisters.html)

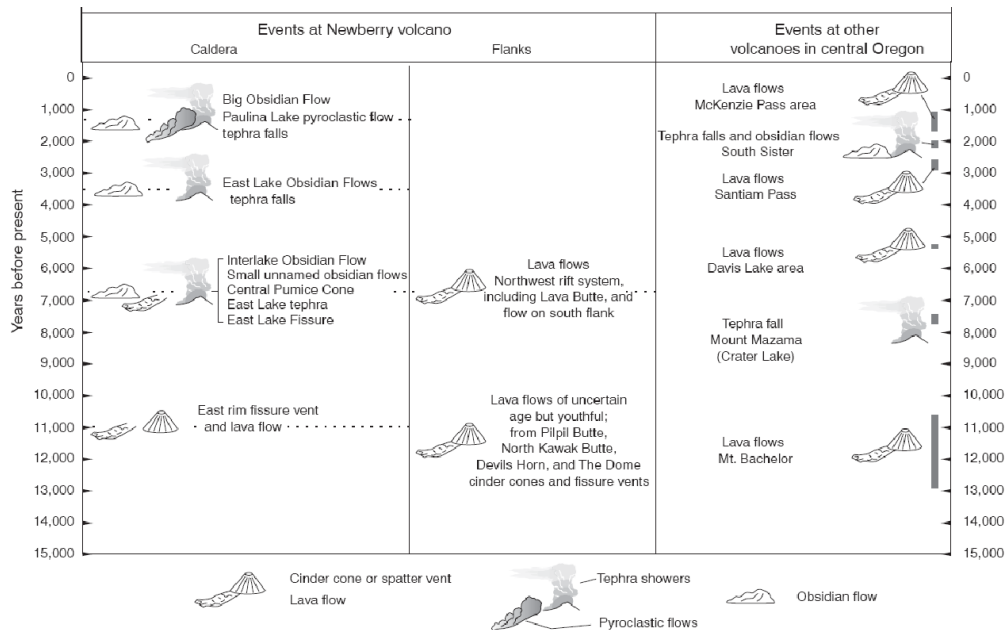
<sup>16</sup> USGS> Three Sisters, Oregon Information Statement – April 11, 2007. [http://vulcan.wr.usgs.gov/Volcanoes/Sisters/WestUplift/information\\_statement\\_04-11-07.html](http://vulcan.wr.usgs.gov/Volcanoes/Sisters/WestUplift/information_statement_04-11-07.html)

<sup>17</sup> USGS. Mount Hood. [http://volcanoes.usgs.gov/volcanoes/mount\\_hood/](http://volcanoes.usgs.gov/volcanoes/mount_hood/)

<sup>18</sup> 2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment. <https://pubs.usgs.gov/sir/2018/5140/sir20185140.pdf>

20 most hazardous volcanoes in the U.S.<sup>19</sup> Extensive lava flows erupted about 350,000 years ago and about 75,000 years ago from the north flank of Newberry Volcano. These flows were channeled through the Deschutes and Crooked river canyons into areas that are now parts of southwest Jefferson County. Potential future eruptions from rift zones on the north flank of Newberry represent the most credible lava-flow threat to a large settled area in the United States outside of Hawai'i. Lava flows advance relatively slowly compared to rapid flows such as lahars and pyroclastic flows, so they rarely threaten human life. But advancing lava flows ensure almost total destruction from burial and incineration. Lava flows can crush or bury structures, roads, railroads, power lines, gas lines, and other important infrastructure. They can also dam rivers and streams, causing floods and contamination of drinking water, and they can ignite fires. Once lava begins to flow from a vent, scientists are typically able to forecast which areas down slope are at greatest risk.

**Figure VE-3 Notable events at Newberry volcano and in central Oregon during the past 15,000 years**



Source: D.R. Sherrod, L.G. Mastin, W.E. Scott, and S.P. Schilling, 1997, Volcano Hazards at Newberry Volcano, Oregon: U.S. Geological Survey Open-File Report 97-513

## Mount Mazama (Crater Lake)

Mt. Mazama (Crater Lake) produced the largest known eruption (7,000 years ago) from the Cascade Range, forming a massive caldera that took the volcano from approximately 12,000 feet to 1,932 feet at its deepest point. Continued eruptions have created Wizard Island as well as two other submerged cones in the crater floor.<sup>20</sup> Ash from this eruption covered large areas of what is now Jefferson County. Crater Lake is ranked by the U.S. Geological

<sup>19</sup> Ibid.

<sup>20</sup> USGS. Description: Mount Mazama Volcano and Crater lake Caldera, Oregon. [http://vulcan.wr.usgs.gov/Volcanoes/CraterLake/description\\_crater\\_lake.html](http://vulcan.wr.usgs.gov/Volcanoes/CraterLake/description_crater_lake.html)

Survey as a "very high threat" volcano and is among the top 20 most hazardous volcanoes in the U.S.<sup>21</sup>

## **Mt St. Helens**

Mt. St. Helens, a volcano in Washington State, is the most active volcano in the Cascade Range. It is ranked by the U.S. Geological Survey as a "very high threat" volcano and is among the top 5 most hazardous volcanoes in the U.S.<sup>22</sup> On May 18, 1980, following two months of earthquakes and minor eruptions and a century of dormancy, Mt. St. Helens exploded in one of the most devastating volcanic events of the 20th century. Although less than 0.1 cubic mile of magma was erupted, 58 people died and damage exceeded 1.2 billion dollars. Fortunately, most people in the area were able to evacuate safely before the eruption because the U.S. Geological Survey (USGS) and other scientists had alerted public officials to the danger. As early as 1975, USGS researchers had warned that Mt. St. Helens might soon erupt. Larger, longer lasting events have occurred in the volcano's past and are likely to occur in the future. Coming more than 60 years after the last major event in the Cascades (Lassen Peak), the explosion of St. Helens was a spectacular reminder that the millions of residents of the Pacific Northwest share the region with live volcanoes.<sup>23</sup>

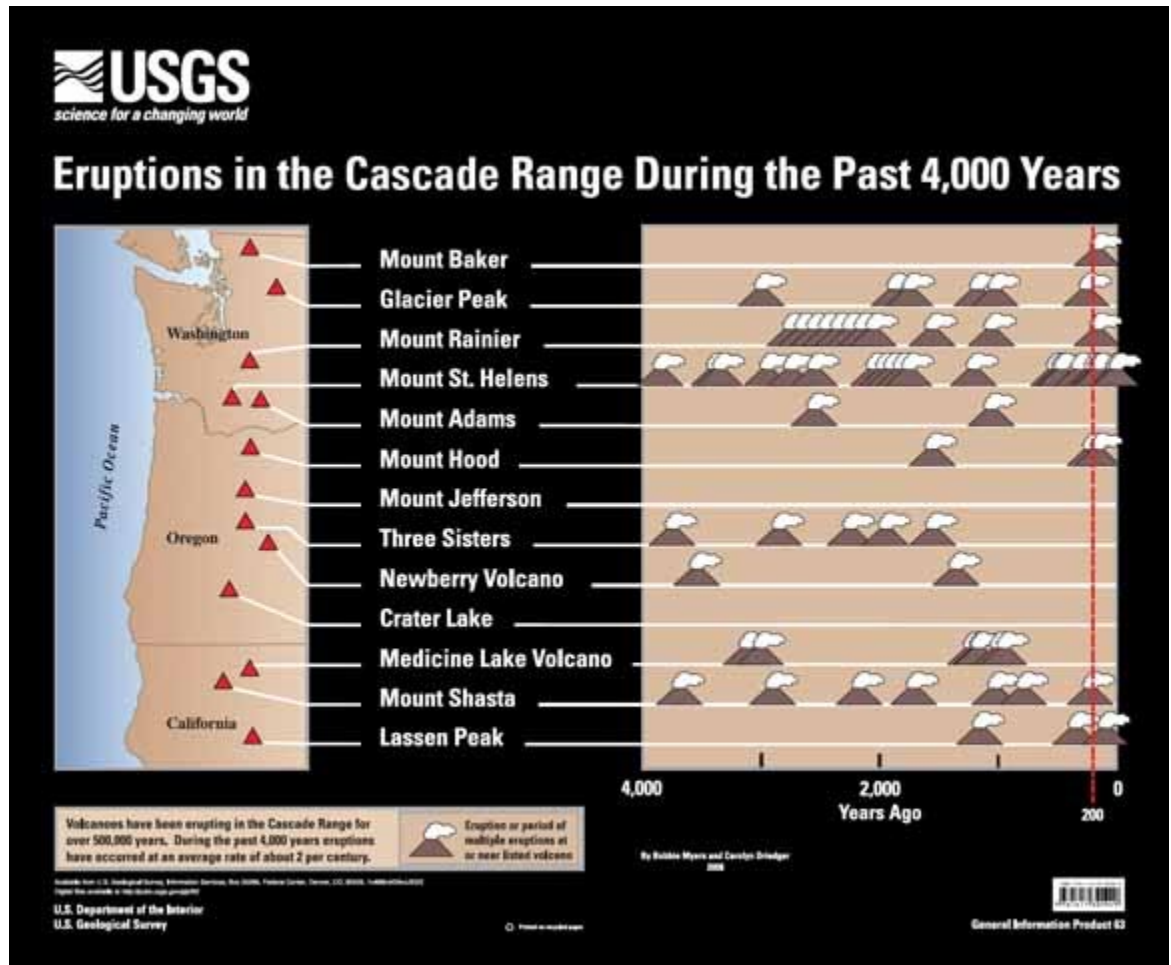
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<sup>21</sup> 2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment  
<https://pubs.usgs.gov/sir/2018/5140/sir20185140.pdf>

<sup>22</sup> 2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment  
<https://pubs.usgs.gov/sir/2018/5140/sir20185140.pdf>

<sup>23</sup> Dzurisin, Dan, Peter H. Stauffer, and James W. Hendley II, Living With Volcanic Risk in the Cascades, USGS Fact Sheet 165-97, (2000).

Figure VE-4 Cascade Range Eruptions in the past 4,000 Years



Source: Bobbie Myers & Carolyn Driedger. USGS General Information Product 63. <https://pubs.usgs.gov/gip/63/>

**Table VE-1: Regional Volcanic Information**

Volcano	Comment
Mount Saint Helens	Mount St. Helens, located in southwestern Washington. It is fifty thousand years old. Over the past 521 years it has produced four major explosive eruptions and dozens of smaller eruptions. On May 18th, 1980, Mount St. Helens exploded violently after two months of intense earthquake activity and intermittent, relatively weak eruptions, causing the worst volcanic disaster in the recorded history of the United States. Mount St. Helens continued to be active, on March 8, 2005, a plume of ash and steam spewed nearly seven miles high into the air. Ten small earthquakes were measured in the area leading up to the eruption. The largest appeared to be a magnitude 2.5, according to the USGS.
Three Sisters & Broken Top	The Three Sisters are located just west of Bend. South Sister had a very small ongoing uplift, which began in 1996 and became undetectable by 2003. This uplift was about one inch a year and likely indicated movement of a small amount of magma. There is no immediate danger of a volcanic eruption or other hazardous activity. The potential exists, however, that further activity could increase danger.
Newberry Volcano	Newberry Volcano is located east of the Cascade Range and about 20 miles south east of Bend. It is about 600,000 years old and has had thousands of eruptions both from the central vent area and along its flanks. The most recent eruption was 1,300 years ago. Future eruptions are likely to include lava flows, pyroclastic flows, lahars, and ashfall. Most effects from these activities would be felt within, or up to a few miles beyond, the existing caldera. Ash could fall a few dozen miles from the eruptive center.
Mount Mazama/ Crater Lake	Crater Lake is located in the south-central region of Oregon. About 7,700 years ago, the ancient Mount Mazama erupted with great violence, leaving the caldera that Crater Lake now occupies. The most recent volcanic eruption was about 5,000 years ago and occurred within the caldera. No eruptions have occurred outside the caldera since 10,000 years ago. The probability of another caldera-forming eruption is very low, as is the probability of eruptions occurring outside the caldera.

Source: Oregon Natural Hazards Mitigation Plan (2012); 2018 Update to the U.S. Geological Survey National Volcanic Threat Assessment <https://pubs.usgs.gov/sir/2018/5140/sir20185140.pdf>

## Risk Assessment

### How are Hazard Areas Identified?

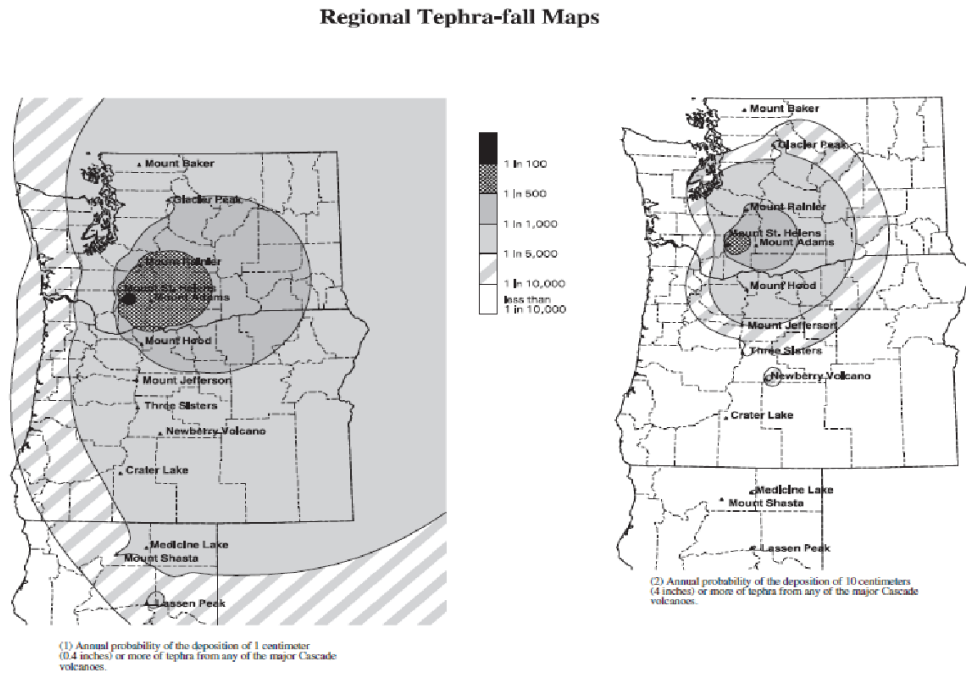
Communities that are closer to volcanoes may be at risk to the proximal hazards, as well as the distal hazards, such as lahars, lava flows, and ash fall.

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](http://vulcan.wr.usgs.gov/Publications/hazards_reports.html).

Scientists also 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 VE-6 depicts the potential and geographical extent of volcanic ash fall in excess of ten centimeters from a large eruption of Mt. St. Helens.

**Figure VE-5 Regional Tephra-fall Maps**



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

In Jefferson County, Mt. Jefferson poses the greatest risk to County residents. Volcano-related hazards from Mt. Jefferson would include tephra (volcanic ash), lahar, lava flow, debris flow / avalanche, and pyroclastic flow.<sup>24</sup> The volcano is not extinct, and it’s capable of large explosive eruptions. In addition to Mt. Jefferson, several prominent volcanoes surround the western side of Jefferson County, the closest being the Three Sisters area, including Broken Top and Mount Bachelor, Newberry Volcano, and Mount Hood.

## Probability Assessment

Recent work by the Volcano Hazards Group of the USGS has attempted to rank the relative hazards of volcanoes in North America. According to this study, Oregon has four Very High Threat Volcanoes: Mount Hood, Three Sisters, Newberry Volcano, and Crater Lake.<sup>25</sup>

There are multiple active volcanoes that could potentially impact Jefferson County and the broader region. These include Mt. Jefferson, the Three Sisters Area (including Broken Top and Mt. Bachelor), Newberry Volcano, Mt. Hood, Mt. Mazama (Crater Lake), Mt. St. Helens. According to the U.S. Geological Survey, Mount Jefferson has not erupted in the last 200

<sup>24</sup> USGS Open File Reports 99-24, 99-437, 97-513.

<sup>25</sup>Ewert, J.W., Diefenbach, A.K., and Ramsey, D.W., 2018, 2018 update to the U.S. Geological Survey national volcanic threat assessment: U.S. Geological Survey Scientific Investigations Report 2018–5140, 40 p., <https://doi.org/10.3133/sir20185140>.



years but is not extinct.<sup>26</sup> However, only one of these volcanoes, Mount St. Helens, has impacted Central Oregon within the past 30 years. Before Mount St. Helens, Lassen Peak in Northern California erupted on May 22, 1915. In the last 200 years, seven volcanoes have erupted in the Cascade Arc: Mount Baker, Glacier Peak, Mount Rainier, and Mount St. Helens in Washington, Mount Hood in Oregon, and Mount Shasta and Lassen Peak in Northern California.<sup>27</sup>

Mt. St. Helens remains a probable source of air borne tephra. It has repeatedly produced voluminous amounts of this material and has erupted much more frequently in recent geologic time than any other Cascade volcano. It blanketed Yakima and Spokane, Washington during the 1980 eruption and again, in 2004. During the 1980 eruption, members of the steering committee remember having ash fall within Jefferson County. The location, size and shape of the area affected by tephra are determined by the vigor, and duration of the eruption and the wind direction.

The most recent series of events at Newberry Volcano, which occurred about 1,300 years ago, consisted of lava flows and tephra fall. Newberry Volcano's recent history also includes pyroclastic flows and numerous lava flows. Volcanoes in the Three Sisters region, such as Middle and South Sister, and Mt. Mazama (Crater Lake) have also erupted explosively in the past. These eruptions have produced pyroclastic flows, lava flows, lahars, debris avalanches, and tephra. Any future eruptions at these volcanoes would most likely resemble those that have occurred in the past.

Geoscientists have provided some estimates of future activity in the vicinity of Newberry Volcano and its adjacent areas. They estimate a 1 in 3000 chance that some activity will take place in a 30-year period. In the Three Sisters region, the probability of future activity is roughly 1 in 10,000 but any restlessness would greatly increase this estimate.

Given the history for volcanic events in Jefferson County, the steering committee determined that there is a **low** probability that the county will experience a volcanic event in the future; meaning one volcanic event is likely to occur within a 75 to 100-year period. The cities of Culver, Madras, and Metolius are considered to have a **low** probability of a volcanic event.

## Community Volcanic Event Issues

### What is susceptible to damage during a hazard event?

Volcanic events can send ash airborne for hundreds or even thousands of miles. An erupting volcano can also trigger flash floods, earthquakes, rockfalls, and mudflows. Volcanic ash can contaminate water supplies, cause electrical storms, and collapse roofs.<sup>28</sup> Areas of vulnerability in the event of volcanic eruption, for which the greatest threat in Jefferson

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<sup>26</sup>[http://vulcan.wr.usgs.gov/Volcanoes/Jefferson/description\\_jefferson.html](http://vulcan.wr.usgs.gov/Volcanoes/Jefferson/description_jefferson.html)

<sup>27</sup> Dzurisin, Stauffer & Hendley, *Living with Volcanic Risk in the Cascades*. USGS. <http://pubs.usgs.gov/fs/1997/fs165-97/fs165-97.pdf>

<sup>28</sup> Dzurisin, Dan, Peter H. Stauffer, and James W. Hendley II, *Living with Volcanic Risk in the Cascades*, USGS Fact Sheet 165-97, (2000).

County is natural resources, buildings and infrastructure, pollution and visibility, economic impacts, and death and injury.

## Natural Resource Damage

In the event of a volcanic event, natural systems could be threatened by ash fall, pyroclastic and lahar flows, or lava flows. Ash could affect air and water quality and Jefferson County's watersheds could be severely impacted by mudflows and volcanic ash falls derived from regional volcanic activity. Lava flows can ignite forest fires and lahars, flash floods, and debris flows can increase sediment loads in rivers and streams, impacting fisheries and aquatic ecosystems.

## Building and Infrastructure Damage

Buildings and other property in the path of a flash flood, debris flow, or tephra fall can be damaged. Thick layers of ash can weaken roofs and cause collapse, especially if wet. Clouds of ash often cause electrical storms that start fires or damp ash can short-circuit electrical systems and disrupt radio communication. Round Butte Dam and Pelton Dam are also susceptible to damage caused by lahar flows.

## Pollution and Visibility

Tephra fallout from an eruption column can blanket areas within a few miles of the vent with a thick layer of pumice. High-altitude winds may carry finer ash tens to hundreds of miles from the volcano, posing a hazard to flying aircraft, particularly those with jet engines. In an extreme situation, the Madras Municipal Airport would need to close to prevent the detrimental effect of fine ash on plane engines and for pilots to avoid total impaired visibility. Fine ash in water supplies will cause brief muddiness and chemical contamination.

## Economic Impacts

Volcanic events can disrupt the normal flow of commerce and daily human activity without causing severe physical harm or damage. Ash a few millimeters thick can halt traffic, possibly up to one week, and cause rapid wear of machinery, clog air filters, block drains and water intakes, and can kill or damage agriculture.

Transportation of goods between Jefferson County and nearby communities and trade centers could be deterred or halted. Subsequent airport closures can disrupt airline schedules for travelers. Fine ash can cause short circuits in electrical transformers, which in turn cause electrical blackouts. Volcanic activity can also force nearby recreation areas to close for safety precautions long before the activity ever culminates into an eruption. The interconnectedness of the region's economy would be disturbed after a volcanic eruption due to the interference of tephra fallout with transportation facilities such as the regional highways (HWY 26 and HWY 97).

## Death and Injury

Inhalation of volcanic ash can cause respiratory discomfort, damage or result in death for sensitive individuals miles away from the volcano. Likewise, emitted volcanic gases such as fluorine and sulfur dioxide can kill vegetation for livestock or cause a burning discomfort in

the lungs. Hazards to human life from debris flows are burial or impact by boulders and other debris.

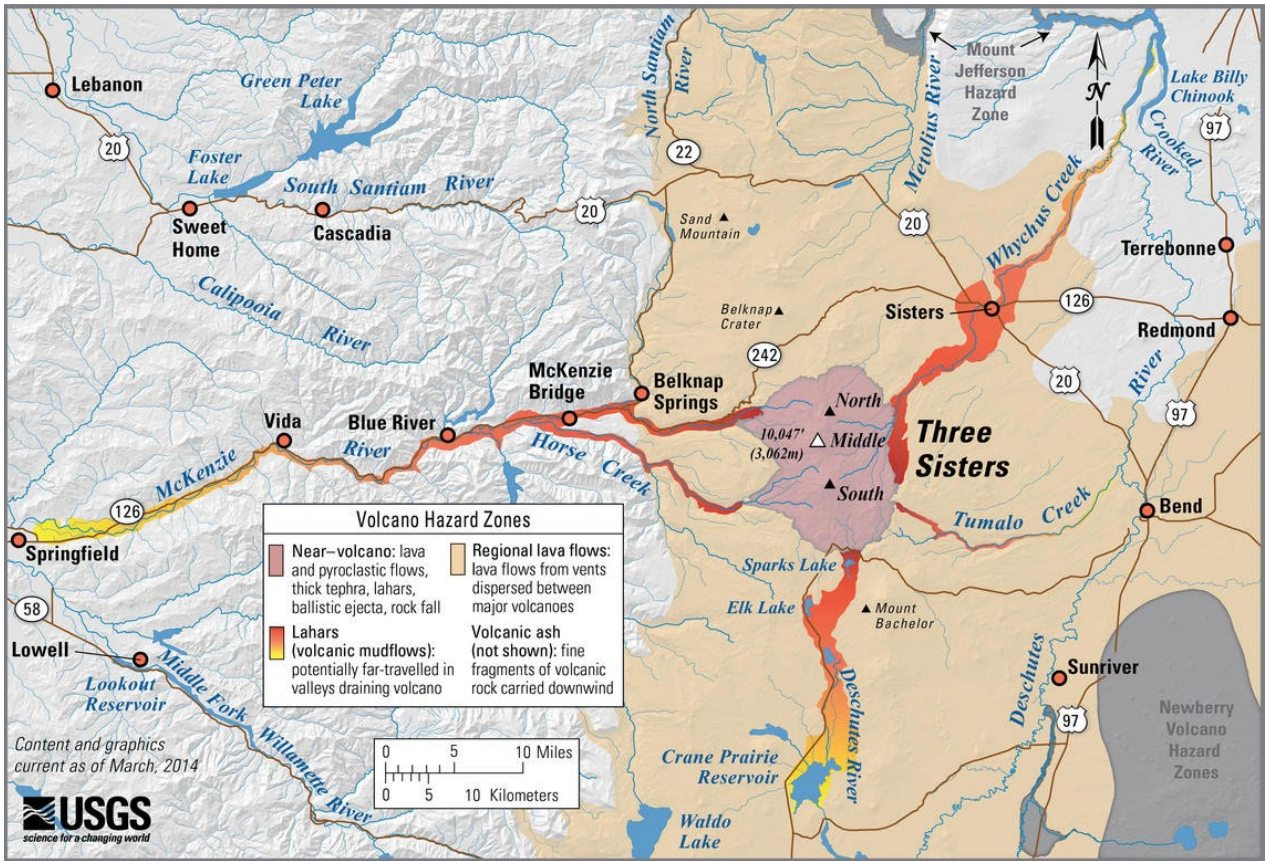
## **Vulnerability Assessment**

For Jefferson County, the largest vulnerability in terms of volcanic hazards lies in ash fallout from a volcanic event in the Cascades and lahar flows moving down Shitike Creek, Whitewater River, and the Metolius River. Ash can disrupt the engines of motor vehicles and can affect vulnerable populations such as people with asthma. Lahar flows could greatly impact the Confederated Tribes of Warm Springs, Round Butte Dam, Pelton Dam, and properties along Lake Billy Chinook. A volcanic event in Jefferson County may force Interstate 26 to close. In addition, many traditional tribal areas in Warm Springs, such as berry picking areas, are threatened by a possible volcanic eruption.

### **Cascadia: Living On Fire**

A detailed report of the Pacific Northwest's catastrophic hazards and history written by Rick Gore appears in the May 1998 National Geographic, Vol. 193, No. 5. For more information or to request a back copy of this article, visit [www.nationalgeographic.com](http://www.nationalgeographic.com).

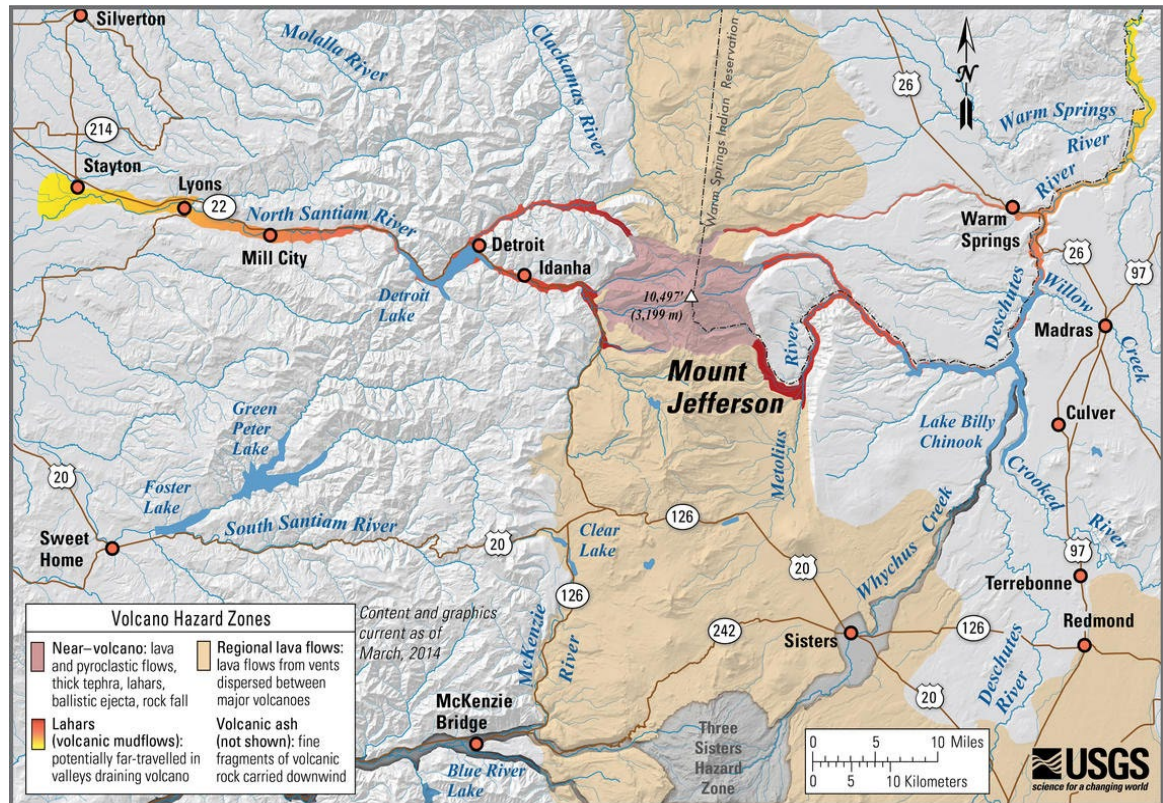
**Figure VE-6 Three Sisters Volcanic Hazard**



Source: USGS Hazard Maps. <https://www.usgs.gov/observatories/cascades-volcano-observatory/volcano-hazards-cascade-range>



**Figure VE-7 Mount Jefferson Volcanic Hazard**



Source: USGS Hazard Maps. <https://www.usgs.gov/observatories/cascades-volcano-observatory/volcano-hazards-cascade-range>

While a quantitative vulnerability assessment (an assessment that describes the number of lives or amount of property exposed to the hazard) has not yet been conducted for Jefferson County volcanic eruption events, there are many qualitative factors (issues relating to what is in danger within a community) that point to potential vulnerability.

Based upon known vulnerabilities (see below) the Jefferson County NHMP Steering Committee determined that the vulnerability to volcanic eruptions is **high**, meaning more than 10% of the County population is likely to be affected by a volcanic eruption. This is the same as the 2013 Jefferson County Hazard Analysis. The cities of Culver, Madras and Metolius are considered to have a **high** vulnerability to a volcanic event.

The maximum threat of a volcanic eruption is also **high**, considering that over 25% of population and property could be impacted under a worst-case scenario.

## Hazard Risk Analysis

The Jefferson County Steering Committee completed a hazard risk analysis, based upon the previous plan's analysis, during this update. The hazard analysis, developed from a Federal Emergency Management Agency (FEMA) tool that has been refined by the Oregon Military Department – Office of Emergency Management (OEM), addresses and weights (shown as percent within parentheses) the history (8%), vulnerability (21%), probability (29%), and maximum threat (42%) for each natural hazard and attributes a final hazard analysis score. The methodology produces scores that range from 24 to 240. Each category is associated

with severity ratings (1 to 10) as follows: Low (1 – 3 points), Moderate (4 to 7 points) and High (8 to 10 points). For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation. The method provides the jurisdiction with a relative ranking from which to prioritize mitigation strategies, but does not predict the occurrence of a particular hazard (for more information on all scores see Volume I, Section 2 of this NHMP).

The Jefferson County hazard analysis score for a volcanic event is 144 (ranked #7 out of eight hazards). For more information on the relative risk see Volume I, Section 2 of this NHMP.

## **Existing Volcanic Eruption Mitigation Activities**

A major existing strategy to address volcanic hazards is to publicize and distribute volcanic hazard maps through DOGAMI's HazVu and monitoring done by the USGS. The volcanoes most likely to constitute a hazard to Oregon communities have been the subject of USGS research. Open-file reports (OFR) address the geologic history of these volcanoes and lesser-known volcanoes in their immediate vicinity. These reports also cover associated hazards and possible mitigation strategies. They are available for volcanoes near Jefferson County including: Mount Saint Helens, Mt. Jefferson, Three Sisters, Newberry Volcano and Crater Lake.

## **Volcanic Event Mitigation Action Items**

There is one Volcano action item for Jefferson County; in addition, a few of the Multi-Hazard action items affect the Volcano hazard. An action item matrix is provided within Volume I, Section 3, while action item forms are provided within Volume IV, Appendix A. To view city actions, see the appropriate city addendum within Volume III.

# WILDFIRE HAZARD ANNEX

## Significant Changes since the 2013 Plan

Major changes to this Annex include: Significant updates of information from recent fires and data from the 2016 Community Wildfire Protection Plan, as well as information relating to the impacts of climate change, Firewise communities, and other details. Several maps were updated, Table WF-1 was updated, and Tables WF-2 and WF-3 from the 2013 Plan were removed.

## Causes and Characteristics of Wildfire

Wildfire is an essential part of Oregon's ecosystem, but it is also a serious threat to life and property particularly in the state's growing rural communities. Areas of wildfire risk exist throughout the state with areas in central, southwest and northeast Oregon having the highest risk. The Oregon Department of Forestry has estimated that there are about 250,000 homes in areas of serious wildfire risk.

Wildfires threaten valued forest, agricultural lands and individual home sites. State or federal firefighters provide the only formal wildfire suppression service in some areas and, will only protect structures outside their jurisdiction if resources are available. As a result, many rural dwellings are vulnerable and have no designated form of fire protection. Once a fire has started, homes and developments in wildland settings complicate firefighting activities and stretch available human and equipment resources. The loss of property and life, however, can be minimized through cooperation, preparedness, and mitigation activities.

Oregon has a very lengthy history of wildfires in undeveloped wildlands but also in the developing wildland/urban interface (WUI), areas of forested land intermixed with residential buildings and other structures. There are large areas in Jefferson County that make up the WUI, which is susceptible to wildfire. Other areas that are less forested or are covered by brush and grassland are also susceptible. Based on historical data, wildfires have occurred frequently in this region and are very likely to happen again. As the population in this region grows and development in the WUI increases, fires will pose an increasing threat to life and property.

To reduce the impact of wildfire on the county, the Jefferson County Community Wildfire Protection Plan (CWPP) was adopted in May 2016. The CWPP provides detailed information on the vulnerability and history of wildfire in the county, and provides a series of mitigation actions the county can implement to reduce the impact of wildfire. Additional wildfire protection information and guidance comes from the Greater Sisters Country CWPP, December 2009. These plans, along with the Jefferson County Living with Fire: Wildfire Preparedness Plan, serve as references and resources for this NHMP.

The impact on communities from wildfire can be huge. In 1990, Bend's Awbrey Hall Fire destroyed 21 homes, causing \$9 million in damages and costing over \$2 million to suppress. The wildfires of 2002 came on early, and they came on hot. A July 9 lightning strike on the Warm Springs Indian Reservation touched off the Eyerly Fire, which burned 23,000 acres and 18 homes in the Lake Chinook Fire & Rescue subdivision before it was subdued more than three weeks later. While the fire still blazed, more lightning in the following days sparked another fire six miles away, and the Eyerly Fire became a complex, burning through the Deschutes National Forest and tribal lands in Jefferson County. The scenario was repeated through July and August in the hot, dry forests across southern and Central Oregon. Fire crews battled 19 major fires that year burning on nearly 450,000 acres at a cost of \$150 million to suppress.

As of December of 2020, the Santiam Fire was the most devastating wildfire in Oregon. This wildfire burned in Marion, Jefferson, Linn, and Clackamas counties that burned 402,274 acres. The fire started as three separate fires: Beachie Creek, Lionshead, and P-515. All three fires were ignited by lightning on August 16, 2020. These three fires gradually grew in size before explosively spreading on September 8, 2020 during a heatwave that was fanned by powerful and sustained east winds. On September 8, 2020 the Beachie Creek and Lionshead Fires merged, and the combined fire was labeled the Santiam Fire. Later the P-515 Fire merged into the Lionshead Fire a few days later to form the largest and most catastrophic fire in State history. The Santiam Fire destroyed over 1,500 structures, including the cities of Detroit and Gates, with Idanha, Mill City, and Lyons suffering varying amounts of damage. The fire killed 5 people.

On the morning of August 16, thunderstorms moved across Oregon, starting multiple fires, including the Beachie Creek Fire, the Lionshead Fire, and the P-515 Fire. The Lionshead and P-515 Fires were ignited in the Warm Springs Indian Reservation, near Mount Jefferson, while the Beachie Creek Fire was ignited near Opal Creek, to the west of the other two fires. Initially, the three fires were unremarkable, being relatively small wildfires that smoldered in the rugged terrain of the Opal Creek and Mount Jefferson Wildernesses, within the Willamette National Forest. However, the fires gradually grew in size, since firefighters opted to use only indirect methods and water drops to fight the fires, due to the dangers of directly fighting the fires in the steep, mountainous terrain. Fire officials noted the potential for the fires to become active and explosively spread under the right conditions, despite their small size at the time.

High winds had a significant negative effect on the Beachie, Lionshead, and P-515 fires. On September 7, powerful east winds blew across Oregon and the Pacific Northwest, reaching speeds over 50 miles per hour, causing the fires to explode in size as they raced westward, with the Lionshead Fire burning down portions of Idanha. The winds also blew down power lines around Santiam Canyon, sparking 13 spot fires between Detroit and Mehama, which quickly grew into a large blaze that merged with the Beachie Creek Fire within hours. Due to the rapid spread of the Santiam and Beachie Creek Fires, and the imminent threat they posed to communities to the west, including areas as far west as Salem, mass evacuations were ordered in Marion County. Early on September 8, the Lionshead and Beachie Creek Fires merged, probably at a point north of Detroit. On September 23, the Santiam Fire exceeded 400,000 acres in size.



The impact on communities from wildfire can be huge. In 1990, Bend's Awbrey Hall Fire destroyed 21 homes, caused \$9 million in damage and cost more than \$2 million to suppress. The 1996 Skeleton fire in Bend burned over 17,000 acres and damaged or destroyed 30 homes and structures. Statewide that same year, 218,000 acres burned, 600 homes were threatened and 44 homes were lost. These wildfire events provided an impetus for addressing wildland urban interface development and hazardous fuel mitigation statewide.

As development continues in the wildland urban interface, increasing numbers of residents are at risk from wildland fires. The Labor Day fires of 2020 demonstrated the significant risks many of our community's face. High winds fanned existing fires and caused additional fires throughout Oregon. Eleven lives were lost, over 4000 homes destroyed and a million acres of Oregon burned during the fires. 38% of the homes destroyed were within urbanized cities and demonstrate the risk posed to communities adjacent to wildland fuels. Current building codes in Jefferson County, and most of Oregon, do not require homes to be built to wildfire resistant standards. This results in homes becoming fuel for wildfires in the wildland urban interface.

## Western Juniper

Western Juniper are among the least fire-resistant plants we have in our local landscape. Juniper have a lacy, evergreen foliage which burns quickly because of its texture. Juniper contains flammable volatile oils, identifiable by their strong odor and sticky sap. Junipers frequently have dry and dead wood and leaves, resins or waxes and wood branches which add to the quick to burn or burst into fire. Junipers when burning create suppression issues due to the Long and Short range spotting. When burning Junipers put off intense heat making it hard for firefighters to get close. Deep duff, create mopping up juniper, a long and tedious job, but if missed a juniper with green branches on it can explode days after you think the fire is out. Among firefighters, Juniper has the nickname of "the gasoline plant".

## Wildfires

Wildfires that have the potential to affect Jefferson County can be divided into four categories: interface, wildland, range, and firestorms.

### Interface Fires

An interface fire occurs where wildland and developed areas come together. Both vegetation and structural development combine to provide fuel. The wildland/urban interface (sometimes called rural interface in small communities or outlying areas) can be divided into three categories.

- The classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas.
- The mixed wildland/urban interface is more typical of the problems in areas of exurban or rural development: isolated homes, subdivisions, resorts and small communities situated predominantly in wildland settings.

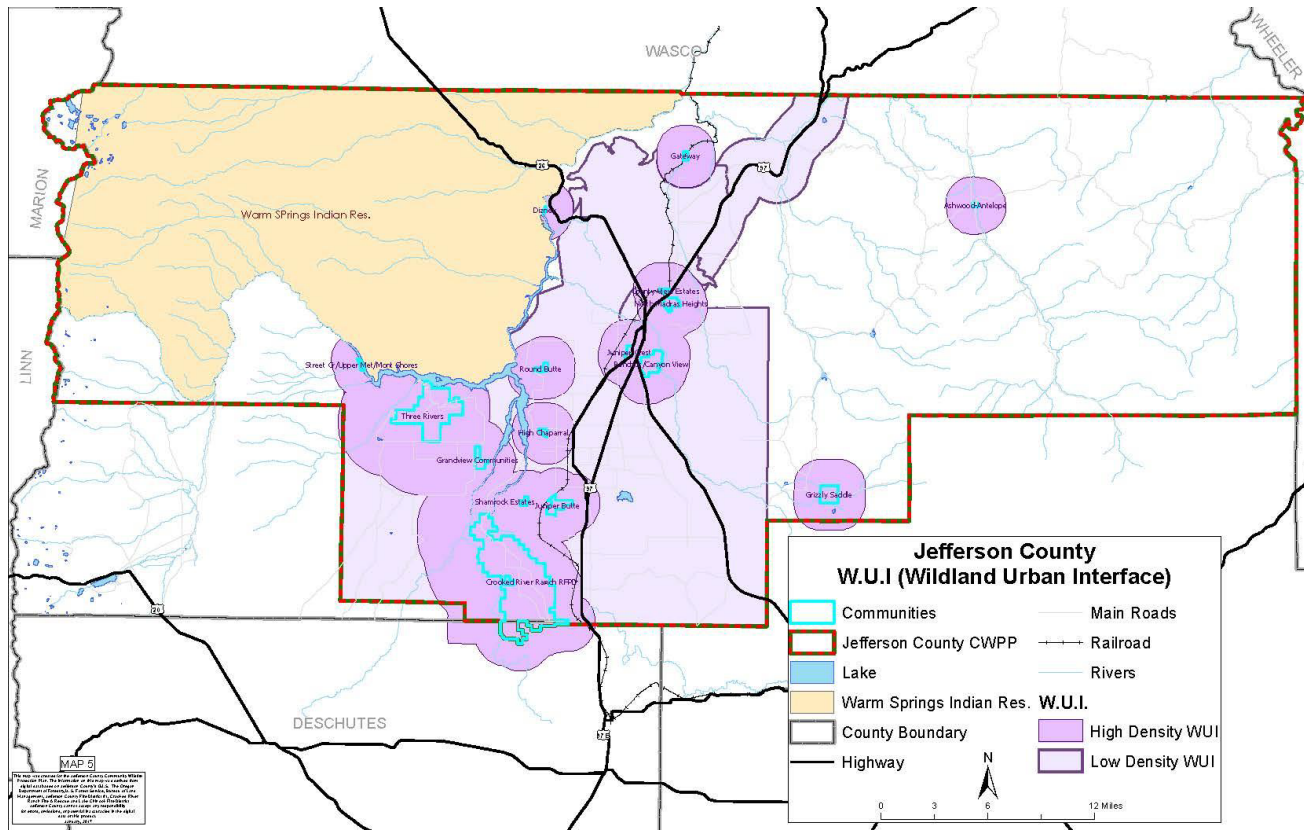
- The occluded wildland/urban interface is where islands of wildland vegetation exist within a largely urbanized area.

## Wildland/Urban Interface Communities

Wildland Urban Interface (WUI) Communities in Jefferson County include those listed later in this chapter as 'at risk' communities. In 2005, the WUI was designated to be a radius of 1.5 miles from the center of the identified communities. In 2011, this radius was extended to a three-mile radius for the communities of Sid Walter, Warm Springs, Seekseequa, Lake Chinook Fire & Rescue, Rim Park and Crooked River Ranch. In 2016, the radius expanded further to incorporate a majority of the County along county lines, only excluding the southeast portion, where this area is included in the Greater Sisters CWPP. The Jefferson County CWPP is currently being updated and is expected to be complete in December of 2021. As of April 2021, the Steering Committee decided to expand the WUI boundary along county lines, including the southeast portion (Camp Sherman, Suttle Lake).

Figure WF-1 shows WUI communities within Jefferson County. For access to the full 2016 CWPP and maps, visit <https://www.coic.org/emergency-preparedness/jefferson-co-cwpp/>

**Figure WF-1 Jefferson County WUI Communities**



\* Green and red line denotes the boundary of the Jefferson County CWPP.  
 Source: Jefferson County CWPP, 2016

## Wildland Fires

A wildland fire's main fuel source is natural vegetation. Often referred to as forest fires, they can occur in national forests, parks, and private timberland. A wildland fire can become an interface fire if it encroaches on developed areas.

## Range Fires

Range fires burn across land that is typically open, lacking in timber, and on public or private rangeland. Such lands are predominantly used for grazing or wildlife management purposes. Juniper, bitterbrush, and sage are the common fuels involved. These fires tend to spread rapidly and vary from being easy to difficult to suppress. They often occur in areas lacking both wildland and structural fire protection services.

## Firestorms

Firestorms are events of such extreme intensity that effective suppression is virtually impossible. Firestorms often occur during dry, windy weather and generally burn until conditions change or the available fuel is consumed. The disastrous 2020 Labor Day fires in western Oregon are an example of fires that developed into a firestorm.

## Conditions Contributing to Wildfires

Ignition of a wildfire may occur naturally from lightning or from human causes such as debris burns, arson, careless smoking, and recreational activities or from an industrial accident. Once started, three main conditions affect the fire's behavior: fuel, topography, and weather.

### Fuel

Fuel is the material that feeds a fire. Fuel is classified by volume and type. Oregon is prone to wildfires due to its abundance of flammable vegetation in conifer-dominant forests, grasslands and rangelands. Most of the wildland-urban interface areas in Jefferson County occur in areas dominated by juniper/sage/grass sites.<sup>1</sup> A century of successful fire suppression has facilitated an increase in juniper encroachment and vegetation density on lands that historically had fewer trees. This increase in volume, density, and continuity of fuels has had substantial impacts on fire spread and intensity.

Structures and flammable materials in developed areas can also be considered fuel. 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. Embers or firebrands can travel by wind and ignite flammable materials used in and around homes. New residents in remote locations are often surprised to learn that in moving away from urban areas, they have also left behind readily available fire services providing structural protection.

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<sup>1</sup> Jefferson County Community Wildfire Protection Plan, May 2011.

## Topography

Topography influences the movement of air and directs a fire's course. Slope and hillsides are key factors in fire behavior. Unfortunately, hillsides with steep topographic characteristics are also desirable areas for residential development.

In this region, much of the topography is hilly or mountainous which can increase wildfire hazard. These areas can cause a wildfire to spread rapidly and burn larger areas in a shorter period of time, especially, if the fire starts at the bottom of a slope and migrates uphill as it burns. Wildfires tend to burn more slowly on flatter lying areas but this does not mean these areas are exempt from a rapidly moving or spreading fire. Other hazards that can affect these areas after a fire has been extinguished include landslides or debris flows and erosion.

## Weather

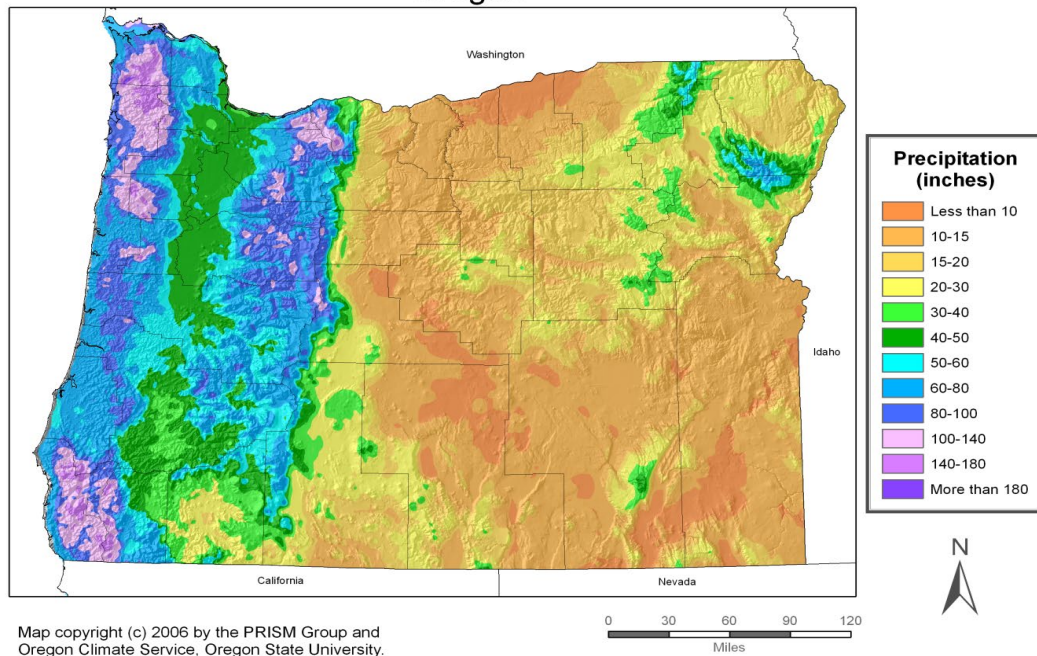
Weather is the most variable factor affecting wildfire behavior. High-risk areas in Oregon share a hot, dry season in late summer and early fall with high temperatures and low humidity. The dry season contributes to the flammability of fuels.

The natural ignition of wildfires is largely a function of weather and fuel; human-caused fires add another dimension to the probability. Lightning strikes in areas of forest or rangeland combined with any type of vegetative fuel source will always remain a source for wildfire. Thousands of lightning strikes occur each year throughout much of the region. Fortunately, not every lightning strike causes a wildfire, though they are a major contributor.

Wind plays an important role in fire development from an ignition and fire spread. High winds are common in Jefferson county, predominantly from low-pressure weather systems moving in from the West, but can also occur during dangerous dry East wind events.

## Figure WF-2 Oregon Average Annual Precipitation

Average Annual Precipitation, 1971-2000  
Oregon



Source: PRISM Group and Oregon Climate Service, Oregon State University "Oregon Average Annual Precipitation (1971-2000)" <http://www.ocs.orst.edu/prism/index.phtml>

## History of Wildfire in Jefferson County

Oregon has a very lengthy history of fire in undeveloped wildland and in the developing urban/wildland interface. In recent years, the cost of fire suppression has risen dramatically; a large number of homes have been threatened or burned, more firefighters have been placed at risk and fire protection in wildland areas has been reduced. These things prompted the passage of Oregon Senate Bill (SB) 360 (Forestland / Urban Interface Protection Act, 1997). SB 360: 1) establishes legislative policy for fire protection, 2) defines urban/wildland interface areas for regulatory purposes, 3) establishes standards for locating homes in the urban/wildland interface, and 4) provides a means for establishing an integrated fire protection system.

**Table WF-I Significant Wildfires in Jefferson County**

Date	Fire Name	Acres Burned	Cause	Comments
1984	Crooked River Ranch	400	Human	
1985	Crooked River Ranch	400	Human	
1992	Sage Flat	1,035	Human	FEMA-02082-FSA
1994	LeClair	33,490	Human	Warm Springs Indian Reservation
1996	Ashwood; Donnybrook	118,000	Human	Communities of Ashwood and Donnybrook threatened
1996	Little Cabin	2,438	Human	EO 96-34; threatened Forest park area south of Madras
1996	Simnasho	11,800	Human	Warm Springs Indian Reservation; KaNeeTa Resort and Simnasho areas threatened
2002	Eyerly	23,573	Natural	EO 02-05; FEMA-2443-FMAGP; Communities threatened include Camp Sherman, southeast corner of Warm Springs Reservation, Lake Billy Chinook, the Three Rivers Recreation area. Lost 18 residences.
2003	B&B; Booth	90,800	Natural	EO 03-14; FEMA-2493-FMAGP; threatened Camp Sherman. Lost 8 cabins, 1 auditorium among others.
2013	Sunnyside Turnoff	51,480	Human	Warm Springs Indian Reservation
2015	County Line 2	>67,000	Unknown	

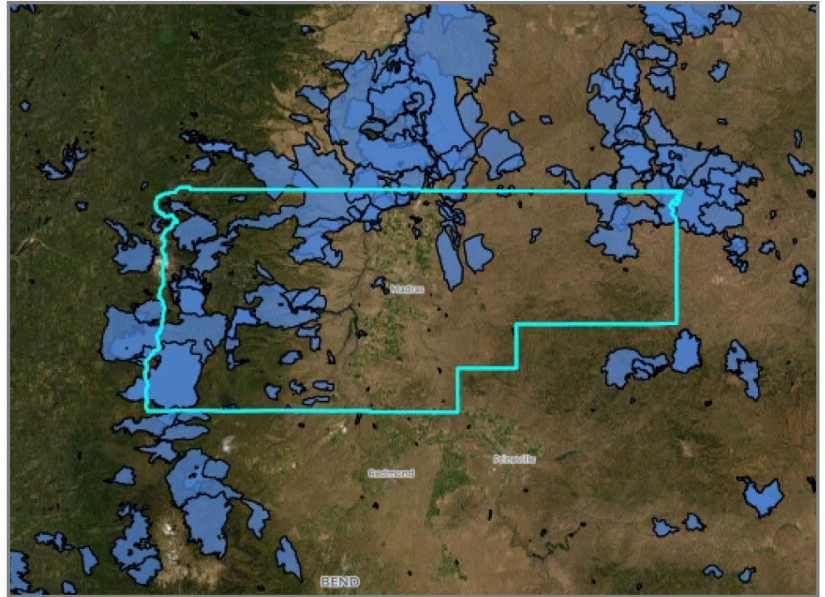
Source: State of Oregon NHMP, 2020

## WF-3 Fire History - Fire Perimeters

### FIRE HISTORY - FIRE PERIMETERS

Although most wildfires in Oregon are human-caused and suppressed quickly while small, Oregon has experienced many large wildfires. The map and table below show the footprints of fires that have occurred in your area since 2000.

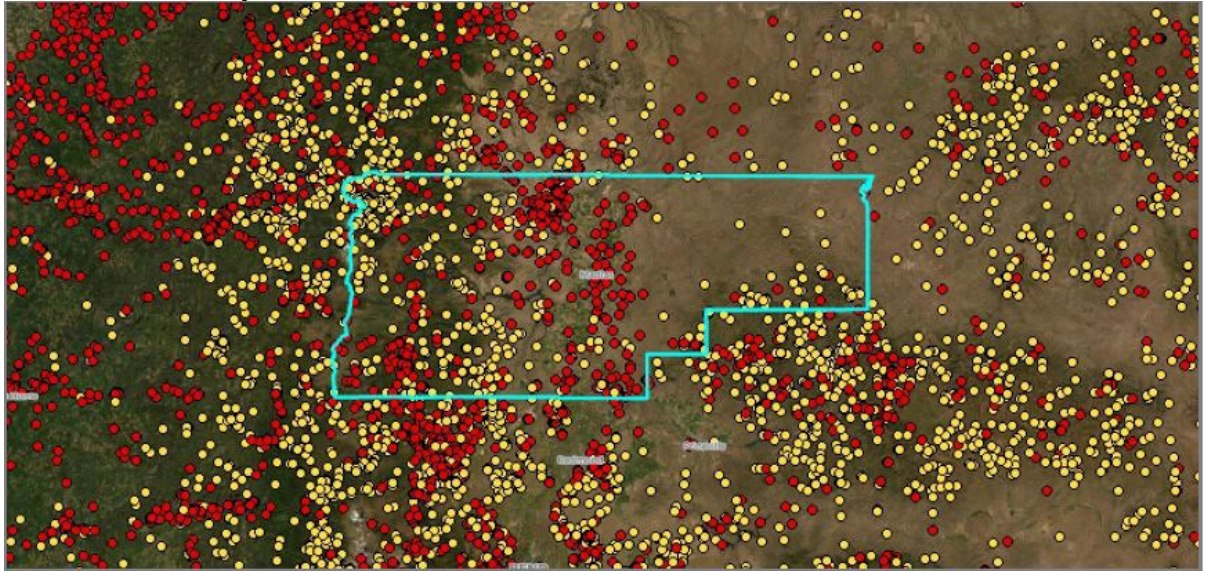
 Perimeter



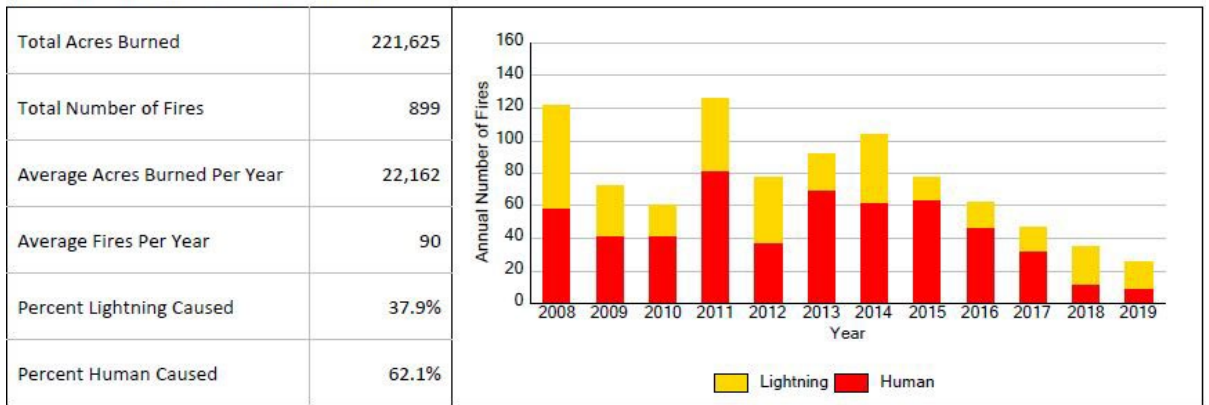
Source: Advanced Oregon Wildfire Risk Explorer Report, Jefferson County. Accessed April 2021.  
[https://tools.oregonexplorer.info/OE\\_HtmlViewer/index.html?viewer=wildfireplanning](https://tools.oregonexplorer.info/OE_HtmlViewer/index.html?viewer=wildfireplanning)



### WF-4 Fire History - Fire Starts



Jefferson County fire starts between 2008-2019



Source: Advanced Oregon Wildfire Risk Explorer Report, Jefferson County. Accessed April 2021.  
[https://tools.oregonexplorer.info/OE\\_HtmlViewer/index.html?viewer=wildfireplanning](https://tools.oregonexplorer.info/OE_HtmlViewer/index.html?viewer=wildfireplanning)

As Figure WF-4 shows, the majority of Jefferson County’s large fires have occurred in the western half of the county. The majority of these western lands are sovereign to the Confederated Tribes of Warm Springs.

The Jefferson County NHMP Steering Committee determined that the history of wildfire events is **high**, with 4 or more events occurring over the last 100 years.

## Risk Assessment

To view the latest information on wildfire risk in Jefferson County, see the Oregon Wildfire Risk Explorer Advanced Report attached. This report was generated by the CWPP Steering Committee in April 2021. The report includes land ownership and management, fire history, overall wildfire risk, burn probability, fire intensity, overall impact, hazard to potential structures, risk to assets, risk to people and property, and potential impact to people and property, infrastructure, wildlife, forest vegetation, and timber resources. For more information on the Oregon Wildfire Risk Explorer, visit [https://tools.oregonexplorer.info/OE\\_HtmlViewer/index.html?viewer=wildfireplanning](https://tools.oregonexplorer.info/OE_HtmlViewer/index.html?viewer=wildfireplanning)

## Probability of Future Occurrence

In Oregon, wildfires are inevitable. Although usually thought of as being a summer occurrence, wildland fires can occur during any month of the year. The vast majority of wildfires burn between June and October. Dry spells during the winter months, especially when combined with winds and dead fuels, may result in fires that burn with intensity and a rate of spread that surprise many people. Wildland fire is a common occurrence in Jefferson County. However, as the Jefferson County CWPP explains, wildfire risk to human welfare and economic and ecological values is more serious today than in the past because of the buildup of hazardous fuels, construction of houses in proximity to forests and rangelands, increased outdoor recreation, and a lack of public understanding of wildfire.<sup>2</sup>

Wildfires result from natural causes (e.g., lightning strikes) or human starts (i.e., mechanical failure, unattended campfire, debris burning, or arson). The natural ignition of forest fires is largely a function of weather and fuel; human-caused fires add another dimension to probability and is correlated with population growth. Dry and diseased forests can be mapped accurately and the probability of lightning strikes has been modeled. Each forest is different and consequently has different probability/recurrence estimates.

There are a number of often-discussed strategies to reduce the negative impacts of these phenomena. They include land-use regulations, management techniques, site standards, building codes, and educating and incentivizing landowners to use defensible space principles. All of these have a bearing on a community's ability to prevent, withstand, and recover from a wildfire event.

Given the history for wildfire in Jefferson County, the steering committee determined that there is a **high** probability that the county will experience wildfire in the future; meaning at least one wildfire incident is likely to occur within a 10-year period. This rating is consistent with the 2013 Jefferson County Hazard Analysis. The city of Madras is considered to have a **high** occurrence probability to wildfires and Culver and Metolius are considered to have a **low** occurrence probability to the wildfire hazard.

### Future Climate Variability

Wildfire activity is strongly linked to summer climate, with the largest fires occurring exclusively in warm and dry summers. The most obvious impact of climate change in the

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<sup>2</sup> Ibid.

west in recent years has been fire. Recent catastrophic fires in California and major wildfires in Oregon highlight the vulnerability of the state to increasing wildfire in a warming climate<sup>3</sup>. Climate variability affects wildfires by increasing the size and severity of wildfires by drought conditions, high-wind events, and lightning activity due to more extreme lightning storms in the summer and fall. For example, the Lionshead Fire ignited in August of 2020 by a lightning storm, the 402,274-acre fire ravaged multiple communities in northwestern Oregon, before it was fully contained on December 10, 2020. The Beachie Creek, Lionshead, and P-515 fires were ignited by lightning on August 16, 2020. The first three fires gradually grew in size, before explosively spreading in early September during a heatwave, fanned by powerful east winds. The fire destroyed over 1,500 structures, including the cities of Detroit and Gates, with Idanha, Mill City, and Lyons suffering varying amounts of damage, becoming one of the most destructive wildfires in the recorded State history<sup>4</sup>. Fire risk is projected to increase across the entire state by midcentury, with the largest increases in the Willamette Valley and eastern Oregon. The associated wildfire smoke creates a health hazard for vulnerable communities, especially outdoor laborers and children, who may be exposed to poor air quality.

One of the main aspects of the probability of future occurrences is its reliance on historic climate trends in order to predict future climate trends. Many counties in eastern Oregon are experiencing more frequent and severe wildfires than is historically the norm, and many climate predictions see this trend continuing into the future. Temperatures in the Pacific Northwest region increased in the 20<sup>th</sup> Century by about 1.5 degrees Fahrenheit and are projected to increasingly rise by an average of 0.2 degrees to 1.0 degrees Fahrenheit per decade. Average temperature change by 2040 is projected to be 3.2 degrees Fahrenheit, and by 2080, 5.3 degrees Fahrenheit. Temperature increases will occur throughout all seasons, with the greatest variation occurring during summer months.<sup>5</sup> Hotter temperatures mean more combustible vegetation. Longer dry seasons mean a greater potential of fires occurring and increases in annual acres burned. This information was considered while developing the probability of wildfire occurrence for the county.

## Community Hazard Issues

### What is susceptible to damage during a hazard event?

The effects of fire on ecosystem resources can include damages, benefits, or some combination of both. Ultimately, a fire's effects depend largely on the characteristics of the fire site, the severity of the fire, its duration and the value of the resources affected by the fire.

The ecosystems of most wildlands depend upon fire to maintain various functions. These benefits can include, depending upon location and other circumstances, reduced fuel load, disposal of debris from thinned tree stands, altered plant competition, watershed enhancements, release of soil nutrients, increased forage plant production, and improved

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<sup>3</sup> [https://www.oregon.gov/lcd/NH/Documents/Apx\\_9.1.21\\_OR\\_ClimateAssmtRpt4\\_2019\\_OPT.pdf](https://www.oregon.gov/lcd/NH/Documents/Apx_9.1.21_OR_ClimateAssmtRpt4_2019_OPT.pdf)

<sup>4</sup> [https://en.wikipedia.org/wiki/Santiam\\_Fire](https://en.wikipedia.org/wiki/Santiam_Fire)

<sup>5</sup> Climate Impacts Group, "Climate Change," <http://cses.washington.edu/cig/pnwc/cc.shtml#anchor6>, accessed February 2013.

wildlife habitat and aesthetic environments. Despite these potential benefits, fire has historically been suppressed for years because of its effects on timber harvest, loss of scenic and recreational values and the obvious threat to property and human life.

The effects of a wildfire on the built environment, particularly in the face of a major wildfire event, can be devastating to people, homes, businesses and communities. As noted above, fuel, topography, and weather are the key determinants for wildfires. A number of other factors also have been identified which affect the degree of risk to people and property in identified wildfire interface areas. These include:

- Combustible roofing material (for example cedar shakes)
- Gutter and debris maintenance
- Wood construction
- Homes and other structures with no defensible space
- Roads and streets with substandard width, grades, weight-load and connectivity standards making evacuation and fire response more difficult
- Subdivisions and homes surrounded by heavy natural fuel types
- Structures on steep slopes covered with flammable vegetation
- Limited on-site or community water supply
- Locations with normal prevailing winds over 30 miles per hour
- Lack of emergency notification and evacuation plan

Of particular concern to firefighters are developments with narrow roadways and few routes of egress, or routes with very limited accessibility. Many new subdivisions are constructed with cul-de-sacs, which contribute to the problem of road access. Most cul-de-sacs do not allow rear access to homes, which can be a significant problem for firefighters and emergency services in defending the structure and ensuring the safety of its inhabitants.

The Jefferson County Steering Committee identified the following “one-way out” community that has only a single access route: Crooked River Ranch. This limits the evacuation process should a disaster occur in the community, and makes the community more vulnerable to events like wildfires. Water supply is a critical factor in their ability to fight WUI fires. Developments lacking an adequate water supply and hydrant taps create extra challenges for firefighting personnel. Another water supply issue is that of small diameter pipe water systems, which are inadequate to provide sustained fire-fighting water flows.

## Threat to Life and Property

The interface between urban/suburban areas and wildlands has an increased exposure of wildfire to life and property. In many cases, existing fire protection services cannot adequately protect new development. Wildfires that involve structures present complex and dangerous situations for firefighters.

The federal government owns approximately 27.8% of the land within Jefferson County. The two largest agencies with authority over federal lands are the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS). The Confederated Tribes of Warm Springs Reservation and the Bureau of Indian Affairs (BIA) comprise 22.3% of the County.

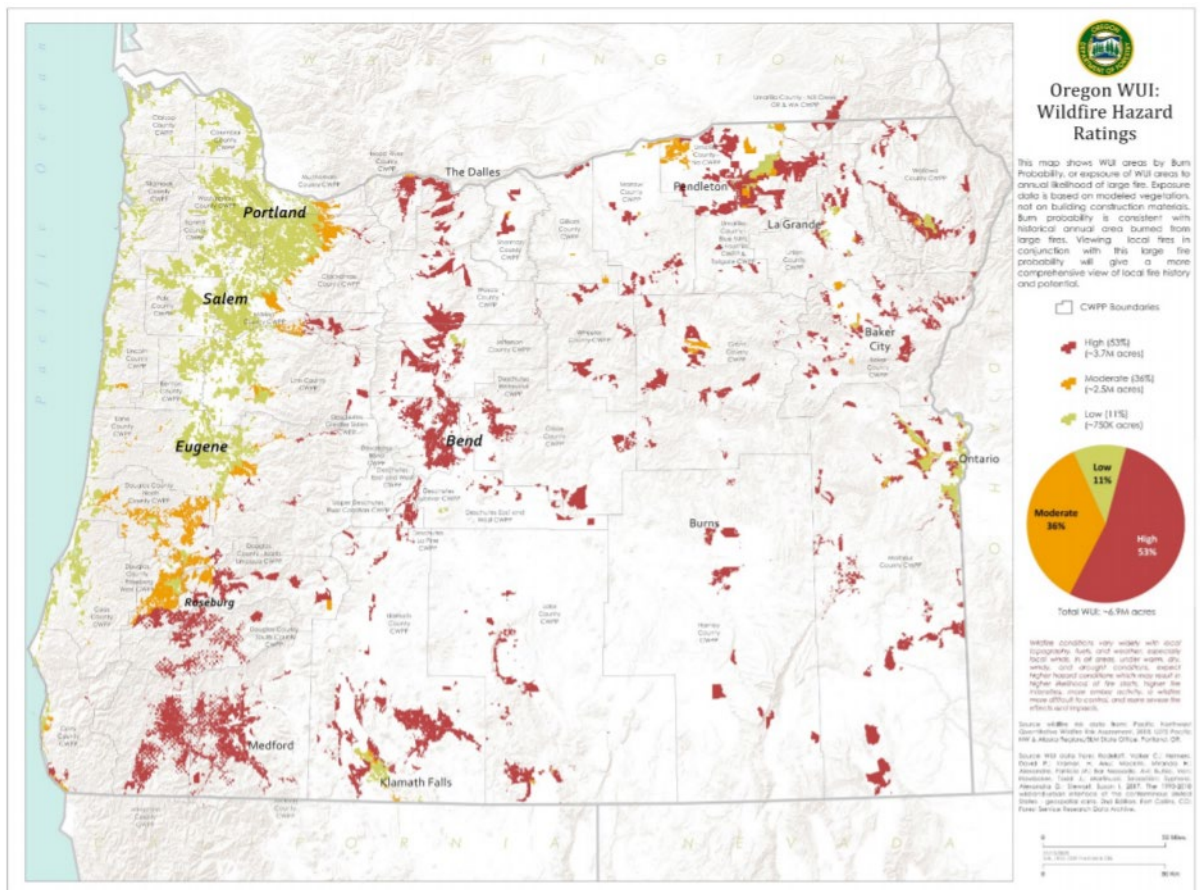


## Personal Choices

Many interface areas, found at lower elevations and drier sites, are also desirable real estate. More people in Oregon are becoming vulnerable to wildfire by choosing to live in wildfire-prone areas.<sup>6</sup> Figure WF-5 illustrates the communities of highest risk in Oregon; the area surrounding Crooked River Ranch is an area of particular concern, as shown in the red below on the southern border of Jefferson County.

A community at risk is a geographic area within and surrounding permanent dwellings 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.<sup>7</sup> A statewide *Communities at Risk* map was created in 2020 in order to prioritize fuel mitigation projects to minimize overall wildfire risk to communities in the state. The Wildfire Hazard Ratings map in Figure WF-5 shows WUI areas by Burn Probability, or exposure of WUI areas to annual likelihood of large fires.<sup>8</sup>

**Figure WF-5 Communities at Risk**



Source: Oregon Department of Forestry, Communities at Risk Report (2020)

<sup>6</sup> National Wildland/Urban Interface Fire Protection, Fire protection in the Wildland/Urban Interface: Everyone's responsibility, Washington D.C., (1998).

<sup>7</sup> Oregon Natural Hazard Mitigation Plan, 2020.

<sup>8</sup> Oregon Department of Forestry, Communities at Risk Report (2020).

## Private Lands

Private development in Jefferson County is at risk of wildfire, particularly in areas located outside of rural fire districts where structural fire protection is not provided. In certain areas fire trucks cannot negotiate steep grades, poor road surfaces, narrow roads, flammable or inadequately designed bridges, or traffic attempting to evacuate the area. Little water during the fire season and severe fuel loading add to the problem. In some areas, current protection resources are stretched thin, thus both property in the interface and traditionally-protected property in the forests and cities are at greater risk from fire. While the Firewise program has increased knowledge of fire risk, many property owners in the interface are not aware of the problems and threats that they face and owners in some areas have done little to manage or offset fire hazards or risks on their own property.

## Drought

Recent concerns about the effects of climate change, particularly drought, are contributing to concerns about wildfire vulnerability. Unusually dry winters and hot summers increase the likelihood of a wildfire event, and place importance on mitigating the impacts of wildfire before an event takes place. See *Future Climate Variability* for more information on the impacts of climate change on drought and other factors of wildfire.

## Vulnerability Assessment

An understanding of risk begins with the knowledge that wildfire is a natural part of forest, range and grassland ecosystems. Past forest practices included the suppression of all fires. This practice, coupled with hundreds of acres of dry bush or trees weakened or killed through insect infestation, has fostered a dangerous situation. Present state and national forest practices include the reduction of understory vegetation through thinning and prescribed (controlled) burning.<sup>9</sup>

Each year a significant number of people build homes within or on the edge of the forest (urban/wildland interface), thereby increasing wildfire hazards. In Oregon, many communities (incorporated and unincorporated) are within or adjacent to areas subject to serious wildfire hazards. Such development has greatly complicated firefighting efforts and significantly increased the cost of fire suppression.<sup>10</sup> See listing of interface communities in the section above labeled “How are hazard areas identified?”

Given the information provided above, the steering committee determined that there is a **high** vulnerability to wildfires in Jefferson County; meaning more than 10% of the County population is likely to be affected by a wildfire disaster. This rating is consistent with the 2013 Jefferson County NHMP steering committee hazard analysis. The city of Madras considers itself to have a **high** vulnerability to wildfires, while the cities of Culver and Metolius are considered to have a **moderate** vulnerability to the wildfire hazard.

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<sup>9</sup> State of Oregon Natural Hazard Mitigation Plan. Regional Risk Assessment, Region 6: Central Oregon, “Volcano-Related Hazards,” p. 24-28. March, 2006.

<sup>10</sup> State of Oregon Natural Hazard Mitigation Plan. Regional Risk Assessment, Region 6: Central Oregon, “Volcano-Related Hazards,” p. 24-28. March, 2006.

The maximum threat of a wildfire event is **high**, considering the percentage of population and property that could be impacted under a worst-case scenario is greater than 5-25%.

## Hazard Risk Analysis

The Jefferson County Steering Committee completed a hazard risk analysis, based upon the previous plan’s analysis, during this update. The hazard analysis, developed from a Federal Emergency Management Agency (FEMA) tool that has been refined by the Oregon Military Department – Office of Emergency Management (OEM), addresses and weights (shown as percent within parentheses) the history (8%), vulnerability (21%), probability (29%), and maximum threat (42%) for each natural hazard and attributes a final hazard analysis score. The methodology produces scores that range from 24 to 240. Each category is associated with severity ratings (1 to 10) as follows: Low (1 – 3 points), Moderate (4 to 7 points) and High (8 to 10 points). For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation. The method provides the jurisdiction with a relative ranking from which to prioritize mitigation strategies, but does not predict the occurrence of a particular hazard (for more information on all scores see Volume I, Section 2 of this NHMP).

The Jefferson County hazard analysis score for wildfire is 230 (ranked #1 out of eight hazards). For more information on the relative risk see Volume I, Section 2 of this NHMP.

## Existing Wildfire Mitigation Activities

Jefferson County completed a [Community Wildfire Protection Plan](#) (CWPP) in December of 2016 and is currently updating the CWPP for completion in 2021-22. Additionally, the 2019 [Greater Sisters Community Wildfire Protection Plan](#) (CWPP) encompasses lands within Jefferson County. The CWPPs identify communities at risk, and recommends strategies for reducing those risks. Existing programs include Firewise and the [Oregon Living with Fire](#) collaborative.

The Jefferson County CWPP is meant to serve as the wildfire chapter for the Jefferson County Natural Hazards Mitigation Plan. As such, the CWPP includes a county-wide risk assessment, a description of communities “at risk,” and recommendations for mitigating wildfire hazards. The Greater Sisters CWPP includes similar information.

## Existing Fire Suppression Authorities

The following are the existing fire suppression authorities within Jefferson County:<sup>11</sup>

- Ashwood-Antelope RFPA
- Bureau of Indian Affairs/Warm Springs
- Bureau of Land Management-Prineville District
- Central Oregon Fire Management Services
- Crooked River Ranch Fire & Rescue
- Gateway RFPA
- Jefferson County Fire District # 1

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<sup>11</sup> Jefferson County Community Wildfire Protection Plan, December 2016.

- Lake Chinook Fire & Rescue
- Oregon Department of Forestry (ODF)

Mutual Aid Agreements exist among the fire authorities for mutual aid and support in the event of a wildfire event, including a Memorandum of Understanding between the Confederated Tribes of Warm Springs and Jefferson County Fire District #1; however, each authority operates under regulations that dictate their area of responsibility and specify limitations.

The Bureau of Land Management (BLM) has conducted public outreach campaigns to inform the public and visitors to BLM land of the natural hazards the county is susceptible to. The Central Oregon Fire Management Service (COFMS), which includes BLM, USFS and USNG, has consolidated federal responses to wildfires in Jefferson County. The COFMS handles the management of fuel treatment and fire suppression on all lands belonging to these federal agencies within the County.

In Forest Service lands, prescribed burns are conducted on a regular basis to prevent larger forest fires from occurring. While not eliminating the fire hazard completely, prescribed burns can reduce the intensity of a wildfire by eliminating fuels and assist in wildfire suppression.

## Rangeland Fire Protection Associations

Rangeland Fire Protection Associations (RFPAs) provide wildfire protection of private land within Jefferson County. RFPAs (formed under ORS 477.315) protect over 3.2 million acres of private land in eastern Oregon with support from the Oregon Department of Forestry (ODF). RFPAs operate as independent associations of landowners that provide their own protection with the support of the ODF (chiefly technical support for grants, grant writing, procurement of equipment and firefighting training)<sup>12</sup>. The ODF provides a small source of funding for the RFPAs, however, the majority of funds come from federal grants (primarily Volunteer Fire Assistance and Rural Fire Assistance). Additional fees are collected from voluntary membership dues. The RFA has a responsibility to protect private lands of members and non-members alike per the agreement formed with ODF when the RFA is formed.

The following three RFPAs are active within Jefferson County<sup>13</sup>:

- Ashwood-Antelope RFA
- Twickenham RFA
- Gateway RFA

## Oregon Department of Forestry

ODF is involved with local fire chiefs and local fire departments to provide training. Local firefighters can get a range of experience from exposure to wildland firefighting. Local firefighters can also obtain their red card (wildland fire training documentation), and attend

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<sup>12</sup> Foster, Gordon. Oregon Department of Forestry. "Status of Rangeland Fire Protection Associations". 2011. <http://www.oregon.gov/odf/fire/fpfc/rfawhite.pdf>. Accessed March 2013.

<sup>13</sup> Jefferson County Community Wildfire Protection Plan, December 2016.



extensive workshops combining elements of structural and wildland firefighting, defending homes, and operations experience. For years, ODF has worked with industrial partners (big timber companies) to share equipment in the case of extremely large fires.

## **U.S. Forest Service**

The U.S. Forest Service (USFS) is involved in a fuel-loading program implemented to assess fuels and reduce hazardous buildup on U.S. forestlands. The USFS is a cooperating agency and has an interest in preventing fires in the interface (particularly within the Ochoco National Forest), as fires often burn up the hills and into the higher elevation U.S. forestlands.

## **Firewise**

Jefferson County participates in the Firewise program. Developed by the National Fire Protection Association, the Firewise program features templates to help communities to reduce risk and protect property from the dangers of wildland fires. Along with an interactive, resource rich website full of free materials, the program offers training throughout the nation on utilizing their program. During wildfire events the county provides materials to homeowners and alerts residents of wildfire risks. The Community Wildfire Protection Plan is available online: <https://www.coic.org/emergency-preparedness/jefferson-co-cwpp/>, and the Oregon Office of Emergency Management has this CWPP, the Greater Sisters Country Community Wildfire Protection Plan and the Jefferson County Living with Wildfire: Wildfire Preparedness Plan online as well: <http://www.oregon.gov/OMD/OEM>. Jefferson County has four communities registered in the Firewise program: Three Rivers, Culver, Summerlane Community-Camp Sherman, and Metolius Meadows-Camp Sherman.

## **CWPP Identified Actions<sup>14</sup>**

The primary focus of the Jefferson County CWPP is countywide. The plan emphasizes the communities of Madras, Culver, Metolius, Crooked River Ranch, Lake Chinook Fire & Rescue, the Confederated Tribes of Warm Springs and other rural residences throughout the county. The Wildland-Urban Interface (WUI) is designated as the boundaries of Jefferson County. Human life and welfare are values at risk to wildfire because of the buildup of hazardous fuels around communities and structures, poor emergency vehicle ingress and egress, a large area to cover with the fire authorities, and inadequately trained and/or equipped fire suppression authorities. Throughout the County, there are scattered small communities and ranches with houses and out-buildings without structural fire protection because they are outside the Jefferson County Fire District # 1 and other rural fire protection districts. Other economic values at risk include businesses, farmland, ranchland, grazing land, hunting and other recreational land, historic and cultural sites, and critical infrastructure.

Jefferson County has also come one step closer to implementing mitigation activities with an action plan matrix in Section 7 of the CWPP. The CWPP lists four mitigation measures communities can implement to reduce the risk of fires on communities. The Actions are

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<sup>14</sup> Jefferson County CWPP, December 2016.

organized into Communities with lead agencies assigned. The Action types are: Approve and Maintain Fuels Reduction and Defensible Space, Community Infrastructure Development, Fire Readiness, and Prevention Education. This plan also refers to other plans like the Greater Sisters Country Community Wildfire Protection Plan, thoroughly covering all of Jefferson County. After this Action grid is a Performance Measure section that outlines regular updates of the plan.

The above mentioned CWPP list of mitigation actions have been adopted and referenced by the Jefferson County Steering Committee as indicated in action item WF #1.

## **Wildfire Mitigation Action Items**

There are three Wildfire action items for Jefferson County; in addition, a few of the Multi-Hazard action items affect the Wildfire hazard. An action item matrix is provided within Volume I, Section 3, while action item forms are provided within Volume IV, Appendix A. To view city actions, see the appropriate city addendum within Volume III.

# WINDSTORMS HAZARD ANNEX

## Significant Changes since the 2013 Plan

Major changes to this Annex include: Updated Table WD-1 and removed the Oregon Building Codes Wind Speed Map. Minor mechanical and grammatical changes were made as well.

## Causes and Characteristics of Windstorms

Extreme winds occur throughout Oregon. The most persistent high winds take place along the Oregon Coast and in the Columbia River Gorge. High winds in the Columbia Gorge are well documented. The Gorge is the most significant east-west gap in the Cascade Mountains between California and Canada. Wind conditions in central Oregon are not as dramatic as those along the coast or in the Gorge yet can cause dust storms or be associated with severe winter conditions such as blizzards. A majority of the destructive surface winds striking Oregon are from the southwest. Some winds blow from the east but most often do not carry the same destructive force as those from the Pacific Ocean.

Although rare, tornados can and do occur in Oregon. Tornadoes are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating winds and strong vertical motion, which possess remarkable strength and cause widespread damage. Wind speeds in excess of 300 mph have been observed within tornadoes, and it is suspected that some tornado winds exceed 400 mph. The low pressure at the center of a tornado can destroy buildings and other structures it passes over. Tornadoes are most common in the Midwest, and are more infrequent and generally small west of the Rockies. Nonetheless, Oregon and other western states have experienced tornadoes on occasion, many of which have produced significant damage and occasionally injury or death. Oregon's tornadoes can be formed in association with large Pacific storms arriving from the west. Most of them, however, are caused by intense local thunderstorms. These storms also produce lightning, hail, and heavy rain, and are more common during the warm season from April to October.<sup>1</sup> There was a F0 tornado in Jefferson County on July 16, 1993.<sup>2</sup> There is no record of damage caused by this event. There was also a F0 tornado that touched down on June 9, 2004 on the west side of Madras. A storage shed which had been bolted to a concrete slab was picked up by the tornado and sent two to three hundred feet into the air, clearing to fences and landing next to a tree. Apart from tornados, extreme wind events are also of concern.

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<sup>1</sup> Taylor, George H., Holly Bohman, and Luke Foster. August 1996. A History of Tornadoes in Oregon. Oregon Climate Service. Corvallis, OR: Oregon State University. [http://www.ocs.orst.edu/pub\\_ftp/reports/book/tornado.html](http://www.ocs.orst.edu/pub_ftp/reports/book/tornado.html)

<sup>2</sup> Tornado Project Online. Oregon Tornadoes 1950-1995. <http://www.tornadoproject.com/alltorns/ortorn.htm#J>

## History of Windstorms in Jefferson County

Windstorms occur yearly; more destructive storms occur once or twice per decade, most recently in August of 2013. The following windstorms have affected Jefferson County:

**Table WD-I – Partial History of Significant Windstorms (1931 to 2020)**

Date	Location	Event	Comments
April 21-22, 1931	Western and northeastern Oregon	Wind	Official wind speeds were only 27-36 mph, but unofficial reports were as high as 78 mph. These very strong winds caused extensive damage, especially in northern Oregon.
November 10-11, 1951	Statewide	Wind	Widespread damage, transmission and utility lines, wind speeds 40-60 mph, gust 75-80 mph
December 4, 1951	Statewide	Wind	Wind Speed up to 60 mph in Willamette Valley, 75 mph gusts; damage to building and utility lines.
December 21-23, 1955	Statewide	Wind	Wind speeds 55-65mph, with 69 mph gusts. Considerable damage to buildings and utility lines.
November 3, 1958	Statewide	Wind	Wind speeds up to 51 mph, with 71 mph gusts. Major highways blocked by fallen trees.
October 12, 1962	Almost all of Oregon	Wind	Oregon's most famous and most destructive windstorm, the Columbus Day Storm, produced a barometric pressure low of 960 mb
March 25-26, 1971	Most of Oregon	Wind	Storm center moved into NW Washington, bringing cold front heading east and damaging winds on March 26.
November 13-15, 1981	Pacific Northwest	Wind	Back-to-back storms on the 13th and 15th of November
January 6-8, 1990	Statewide	Wind	Severe windstorm
January 11-12, 1991	Most of Oregon	Wind	Severe windstorm
March 3, 1991	Cascades and northeastern Oregon	Wind	This windstorm caused extensive damage. In Pendleton, where the wind was 48 mph and gust were as high as 74 mph, an apartment building roof blew off and landed on a car in the parking lot. The roofs of Willowcreek Elementary School and Kays Café were also blown off (Kays Cafe roof landed on top of a neighboring building). Dust that was blown around because of the wind caused three car accidents. One was a four-car pileup, another was a two-car wreck, and the third happened when a trailer being towed fishtailed because of the wind, broke away, and ripped out its rear axel. Amazingly, no one was hurt. Wind speeds ranged from 44 to 52 mph with gusts from 54 to 75 mph.

**Table WD-I – Partial History of Significant Windstorms (Continued)**

Date	Location	Event	Comments
December 12, 1991	Northeast and Central Oregon	Wind	Severe windstorm
July 16, 1993	Jefferson County	Tornado	A F0 tornado touched down in Jefferson County. There is no record of damage caused by this event.
December 12, 1995	Statewide	Wind	Strongest windstorm since Nov. 1981; barometric pressure of 966.1 mb at Astoria, and an Oregon record low 953 mb off the coast; major disaster declaration FEMA-1107-DR-OR
June 9, 2004	Jefferson County	Funnel Cloud Tornado	A F0 funnel cloud touched down on the west side of Madras. A storage shed which has been bolted to a concrete slab was picked up by the tornado. The storage shed was sent two to three hundred feet in the air, clearing two fences and landing next to a tree.
October 31, 2005	Central Oregon	Wind	A strong wind gust blew a Ponderosa Pine tree over onto a home in southeast Bend. The property damage from this event is estimated at \$50,000
November 1, 2005	Central Oregon	Wind	A strong wind gust blew over a Ponderosa Pine Tree which fell on two mobile homes causing extensive damage at Sisters Mobile Home Park. The property damage from this event is estimated at \$40,000.
October 18, 2007	Central Oregon	Wind	A cold front brought strong winds with gusts 40-50 mph which knocked down trees and power lines in Sisters. One tree fell onto a house
August, 2, 2009	Central Oregon	Wind	One to 2 inch diameter tree limbs broken off and trees bending to snapping point. Culver, Oregon experienced hail.
July 1, 2010	Jefferson County	Dust Devil	A dust devil occurred at the Rockhound Show at the fairgrounds just south of Madras. Several canopies from vendors were destroyed with tarps in the trees. Although nobody was injured, a tray of rocks tossed and hit one man. A 25-lb lead ball that was used as a paperweight was found on top of a awning of a motorhome. A vehicle was forced into another vehicle.

**Table WD-I – Partial History of Significant Windstorms (Continued)**

Date	Location	Event	Comments
August 25, 2013	Jefferson County	Wind and hail	Devastating hail and wind storm that dropped an inch or more of precipitation and caused severe damage, including a death by lightning strike and three-car crash just a mile from each other. Hail and strong winds significantly damaged crops, power poles, trees and wheel lines for irrigation. 11 power poles were snapped five to six feet up out on Emmerson Street and the Gateway area lost power.
November 17, 2015	Northeast and Central Oregon	Wind	A powerful storm system brought high winds to much of Oregon from areas east of the Cascades into the Columbia Basin. Wind gusts in Central Oregon ranged from 45 to 55 mph with the strongest winds to the north and east where blowing dust resulted in a fatality accident along I-84.
December 21, 2015	Central Oregon	Wind	A strong low pressure system brought powerful west to southwest winds to the region. Maximum wind gusts ranged from 51 mph at the Haystack RAWS in southeast Jefferson County to 60 mph in the Board Hollow region in the eastern part of the county. A wind gust to 64 mph was recorded at the Redmond
April 7, 2017	Central Oregon	Wind	Measured gusts of 55 to 60 mph southeast of Bend. Numerous reports of trees downed in the Bend and Metolius areas with some road blockages and damage to homes.
January 23, 2019	Central Oregon	Wind	A downslope wind storm brought high winds to portions of Central Oregon. The strongest winds occurred along the east slopes of the Cascades, where wind gusts of 60 to 75 mph were reported along with sporadic tree damage and power outages. Further east, wind gusts were generally between 45 and 60 mph with a 48 mph gust at Juniper Butte and gusts to 55 mph at the Metolius RAWS and near 60 mph on the Warm Springs Reservation.
August 9, 2019	Jefferson County	Thunderstorm Wind	Thunderstorms developed east of the Cascades and brought isolated damaging winds to portions of Jefferson County. A 58 mph wind gusts was recorded at Warm Springs with minor structural damage reported.
May 30, 2020	Jefferson County	Thunderstorm Wind	A significant severe thunderstorm event occurred during the afternoon hours as a strong upper level storm system combined with moist unstable air to trigger severe thunderstorms. One more significant storm traveled northward just west of highway 97 affected areas from Culver to Metolius. In this area, numerous large trees were uprooted and snapped, hundreds of yards of irrigation line were dislodged and mangled, and several power poles were toppled. Some of the most significant damage included destruction of a handful of agricultural out buildings and partial or total roof removals of at least two manufactured homes. Extreme straight line winds of 80 to 115 mph were estimated based on these damages. Winds also affected areas in and around Madras where numerous trees were reported down.
August 17, 2020	Jefferson County	Thunderstorm Wind	Isolated severe thunderstorms resulted in high winds and associated damages during the afternoon and evening hours. Several trees and power poles were blown down along highway 26 between Madras and Warm Springs. Some structural damage was also reported in the Gateway area with winds estimated at 60 to 65 mph.

Sources: Oregon State Natural Hazard Mitigation Plan 2012; George and Ray Hatton, 1999, The Oregon Weather Book; NOAA Storm Events Database, <http://www.ncdc.noaa.gov/stormevents/>. Accessed March 1, 2021.

Due to the history of wind events in Jefferson County the steering committee determined that the history of windstorm events is **moderate**, with one incident occurring every 35 - 75 years.

## Risk Assessment

### How are Hazard Areas Identified?

Windstorms in Jefferson County usually occur from October to March, and their extent is determined by their track, intensity (the air pressure gradient they generate), and local terrain.<sup>3</sup> The National Weather Service uses weather forecast models to predict oncoming windstorms, while monitoring storms with weather stations in protected valley locations throughout Oregon.<sup>4</sup>

Extreme weather events are experienced in all regions of Oregon. The regions that experience the highest wind speeds are in the Central and North Coast of Region 1. The table below 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 Jefferson County, within Region 6, can expect to be exposed to lower wind speeds than most regions within the state.

**Table WD-2 Probability of Severe Wind Events by NHMP Region**

	25-Year Event (4% annual probability)	50-Year Event (2% annual probability)	100-Year Event (1% annual probability)
<b>Region 1:</b> Oregon Coast	75 mph	80 mph	90 mph
<b>Region 2:</b> North Willamette Valley	65 mph	72 mph	80 mph
<b>Region 3:</b> Mid/Southern Willamette Valley	60 mph	68 mph	75 mph
<b>Region 4:</b> Southwest Oregon	60 mph	70 mph	80 mph
<b>Region 5:</b> Mid-Columbia	75 mph	80 mph	90 mph
<b>Region 6:</b> Central Oregon	60 mph	65 mph	75 mph
<b>Region 7:</b> Northeast Oregon	70 mph	80 mph	90 mph
<b>Region 8:</b> Southeast Oregon	55 mph	65 mph	75 mph

Source: Oregon State Natural Hazard Mitigation Plan, 2020

<sup>3</sup> State of Oregon Natural Hazards Mitigation Plan. Oregonshowcase.org, March 2006.  
[http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP\\_wind\\_chapter\\_2009.pdf](http://www.oregonshowcase.org/downloads/pdf/stateplan/OR-SNHMP_wind_chapter_2009.pdf)

<sup>4</sup> "Some of the Area's Windstorms." National Weather Service, Portland.  
<http://www.wrh.noaa.gov/pqr/paststorms/wind.php>

## Probability Assessment

Windstorms affect Jefferson County on nearly a yearly basis, especially in the Crooked River Ranch area where winds can reach 65 mph. Steering committee members revealed that both the cities of Madras and Metolius are subject to windstorm events, though Madras is a little more protected from extreme events due to its topography (located within a bowl). The City of Culver also experiences windstorms, but to a lesser degree than the other cities. More destructive storms occur once or twice per decade. According to the State NHMP Region 6 – Central Oregon where Jefferson County is located is likely to experience windstorms of 60 mph during a 25-year cycle. It should be noted that some of the report incidents are localized events that do not affect large areas of the county or cities.

Due to the frequency of historical events, the Jefferson County NHMP steering committee rated Jefferson County as having a **moderate** level of probability for windstorms; meaning one incident is likely within a 35-75-year period. The cities of Madras and Metolius are considered to have a **high** occurrence probability of the windstorm hazard; the City of Culver is considered to have a **low** occurrence probability.

## Community Hazard Issues

### What is susceptible to damage during a hazard event?

The damaging effects of windstorms may extend for distances of 100 to 300 miles from the center of storm activity. Positive wind pressure is a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Debris carried along by extreme winds can contribute directly to injury and loss of life and indirectly through the failure of protective structures (i.e., buildings) and infrastructure. High winds can topple trees and break limbs which in turn can result in power outages and disrupt telephone, computer, and TV and radio service.

Negative pressure also affects the sides and roof: passing currents create lift and suction forces that act to pull building components and surfaces outward. The effects of winds are magnified in the upper levels of multi-story structures. As positive and negative forces impact and remove the building protective envelope (doors, windows, and walls), internal pressures rise and result in roof or leeward building component failures and considerable structural damage. The effects of winds are magnified in the upper levels of multi-story structures. Manufactured homes, multi-story retirement homes, and buildings in need of roof repair are structures that may be most vulnerable to wind storms. Buildings adjacent to open fields or adjacent to trees are also more vulnerable to wind storms than more protected structures. The effects of wind speed are shown in Table WD-3 (Note, as indicated above wind speeds in central Oregon rarely exceed 85 mph).

Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights, and parks, among others. Roads blocked by fallen trees during a windstorm may have severe consequences to people who need access to emergency services. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Windstorms can cause flying debris, which can also damage utility lines. Overhead power lines can be damaged even in relatively



minor windstorm events. Industry and commerce can suffer losses from interruptions in electric service and from extended road closures. They can also sustain direct losses to buildings, personnel, and other vital equipment. There are direct consequences to the local economy resulting from windstorms related to both physical damages and interrupted services.

**Table WD-3 Effects of Wind Speed**

Wind Speed (mph)	Wind Effects
25-31	Large branches will be in motion.
32-38	Whole trees in motion; inconvenience felt walking against the wind.
39-54	Twigs and small branches may break off trees; wind generally impedes progress when walking; high profile vehicles such as trucks and motor homes may be difficult to control.
55-74	Potential damage to TV antennae; may push over shallow rooted trees, especially if the soil is saturated.
75-95	Potential for minimal structural damage, particularly to unanchored mobile homes; power lines, and signs; and tree branches may be blown down.
96-110	Moderate structural damage to walls, roofs, and windows; large signs and tree branches blown down; moving vehicles pushed off roads.
111-130	Extensive structural damage to walls, roofs, and windows; trees blow down; mobile homes may be destroyed.
131-155	Extreme damage to structures and roofs; trees uprooted or snapped.
Greater than 155	Catastrophic damage; structures destroyed.

Source: Washington County, Office of Consolidated Emergency Management. Wind Effects.

In addition to the immediate effects of wind damage, the loss of power due to windstorms can have widespread impacts on business and economic activity. A sustained loss of power can also seriously strain provision of emergency services and the operation of water and sewer facilities and transportation systems.

For more information on the windstorm hazard, please visit the state plan’s Windstorm chapter.<sup>5</sup> This chapter describes current state programs and strategies, highlights successes in mitigation, and proposes short and long-term actions for future mitigation in the state.

### Vulnerability Assessment

Many buildings, utilities, and transportation systems within Jefferson 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



A tree came crashing down in front of a residence during the Aug. 25, 2013 storm.

<sup>5</sup> Oregon Natural Hazards Mitigation Plan (2020)

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 Jefferson County, trees are more likely to blow over during the winter (wet season). Also, irrigation wheel lines frequently get tangled in windstorms, and ultimately affect the agriculture economy.

The Jefferson County NHMP steering committee described Jefferson County as having a **moderate** vulnerability for windstorms, meaning 1-10% of the population or region assets are likely to be affected by a major windstorm emergency or disaster. The cities of Culver and Metolius are considered to have a **high** vulnerability to the windstorm hazard; Madras is considered to have a **moderate** vulnerability.

The maximum threat of a windstorm is **high**, considering the percentage of population and property that could be impacted under a worst-case scenario is over 25%.

## Hazard Risk Analysis

The Jefferson County Steering Committee completed a hazard risk analysis, based upon the previous plan's analysis, during this update. The hazard analysis, developed from a Federal Emergency Management Agency (FEMA) tool that has been refined by the Oregon Military Department – Office of Emergency Management (OEM), addresses and weights (shown as percent within parentheses) the history (8%), vulnerability (21%), probability (29%), and maximum threat (42%) for each natural hazard and attributes a final hazard analysis score. The methodology produces scores that range from 24 to 240. Each category is associated with severity ratings (1 to 10) as follows: Low (1 to 3 points), Moderate (4 to 7 points) and High (8 to 10 points). For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation. The method provides the jurisdiction with a relative ranking from which to prioritize mitigation strategies, but does not predict the occurrence of a particular hazard (for more information on all scores see Volume I, Section 2 of this NHMP).

The Jefferson County hazard analysis score for windstorm is 178 (ranked #4 out of eight hazards). For more information on the relative risk see Volume I, Section 2 of this NHMP.

## Existing Windstorm Mitigation Activities

The Oregon Building Code (both residential and other code) sets standards for structures to withstand 80 mph winds. It is based on the 2003 edition of the International Residential Code and the International Building code. FEMA has recommended having a safe room in homes or small businesses to prevent residents and workers from “dangerous forces” of

extreme winds to avoid injury or death. This recommendation is provided through FEMA's resource manual: Taking Shelter From the Storm.<sup>6</sup>

Existing strategies and programs at the state level are usually performed by Public Utility Commission (OPUC), Building Code Division (BCD), Oregon Department of Forestry (ODF), Oregon Emergency Management (OEM), Oregon Department of Transportation (ODOT), and the Oregon Emergency Response System (OERS), who all have vital roles in providing windstorm warnings statewide.

The Public Utility Commission ensures the operators manage, construct and maintain their utility lines and equipment in a safe and reliable manner. These standards are listed on the following website: <http://www.puc.state.or.us/PUC/safety/index.shtml>

The OPUC promotes public education and requires utilities to maintain adequate tree and vegetation clearances from high voltage utility lines and equipment.

Oregon Emergency Management strives to reduce any damage and impacts caused by windstorms by working in partnership with PUC, ODOT. ODF promotes mitigation strategies and programs that reduce tree-caused damage to utility systems and highway corridors. In addition, Jefferson County has an Active Tree Removal plan to assist with maintaining trees around power lines.

## **Windstorm Mitigation Action Items**

There are two Windstorm action items for Jefferson County; in addition, a few of the Multi-Hazard action items affect the Windstorm hazard. An action item matrix is provided within Volume I, Section 3, while action item forms are provided within Volume IV, Appendix A. To view city actions, see the appropriate city addendum within Volume III.

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<sup>6</sup> <http://www.fema.gov/safe-room-resources/fema-p-320-taking-shelter-storm-building-safe-room-your-home-or-small-business>

**Significant Changes since the 2013 Plan**

Major changes to this Annex include: A new section on Future Climate Variability, and a significant number of additions to Table WT-1 Significant Winter Storm History for Jefferson and Nearby Counties.

**Causes and Characteristics of Winter Storms**

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. Jefferson County is in Zone 7: South Central Area and Zone 6: North Central Area. The climate in Zone 7 generally consists of wet winters and dry summers.<sup>1</sup> These wet winters result in potentially destructive winter storms that produce heavy snow, ice, rain and freezing rain, and high winds. Severe storms affecting Oregon with snow and ice typically originate in the Gulf of Alaska or in the central Pacific Ocean. Winter storms occur over eastern Oregon regularly during November through February.<sup>2</sup> Cold arctic air sinks south along the Columbia River basin, filling the valleys with cold air.<sup>3</sup>

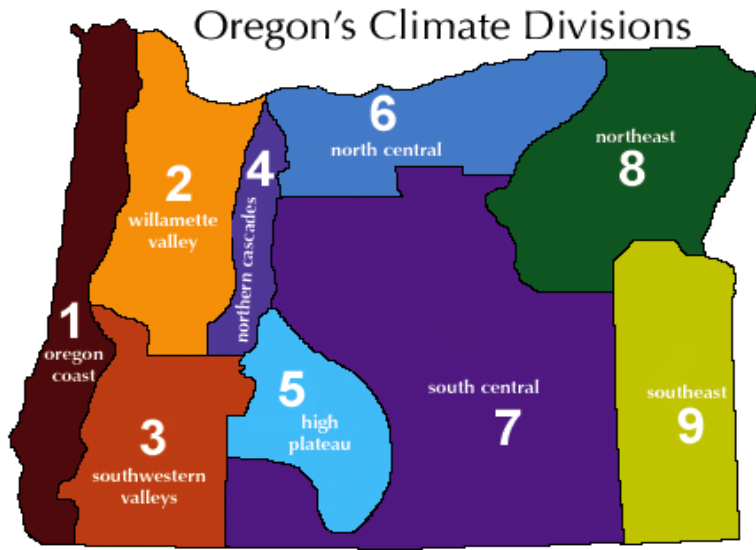
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<sup>1</sup> Oregon Climate Service, “Climate of Jefferson County,” [http://www.ocs.orst.edu/county\\_climate/Jefferson\\_files/Jefferson.html](http://www.ocs.orst.edu/county_climate/Jefferson_files/Jefferson.html), Accessed July 3, 2013.

<sup>2</sup> Oregon State Natural Hazards Mitigation Plan “Winter Storms Chapter” 3-WS-1 2020

<sup>3</sup> Ibid

**Figure WT-I Oregon Climate Divisions**



Source: Oregon Climate Service, "Climate of Jefferson County,"  
[http://www.ocs.orst.edu/county\\_climate/Jefferson\\_files/Jefferson.html](http://www.ocs.orst.edu/county_climate/Jefferson_files/Jefferson.html)

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.

Additionally, as a result of heavy snow, black ice can form on most road surfaces. The black ice produces a shiny surface that can easily fool drivers into thinking it is water is on the road. Black ice is formed when condensation such as dew freezes when temperatures reach 32 degrees Fahrenheit or below, forming a thin layer of ice. This condition is likely to form on and under bridges and overpasses, in shady spots and intersections.

The principal types of winter storms that occur in Jefferson County include:

### **Snow Storm**

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**

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.

## Future Climate Variability

Much of Oregon has seen a decline in spring snowpack, and it will continue to significantly decline, especially at lower elevations. Oregon's mountain snowpack serves multiple economic, ecological, and social functions, and the snowcapped peaks are part of the state's and Jefferson County's cultural identity. Mountain snowpack acts as a natural reservoir which enhances summertime surface and groundwater supply. In Jefferson County, the snowpack equates to the amount of water stored in Wickiup Reservoir for which is used for agricultural purposes in Jefferson County through the North Unit Irrigation District canal system. Meager mountain snowpack creates water scarcity in the state, as evidenced by droughts in 2015 and 2018. Snowpack is crucial for agricultural economy.

From 2018 to 2021, North Unit Irrigation District has imposed irrigation restrictions on Jefferson County agriculturists. In 2020 some of the greatest impacts were observed where agriculturalists let fields lay fallow. Jefferson County has 44,481 acres of irrigated farm land for which produced over \$67 million in crop values.<sup>4</sup> Recent research shows that the observed declines in snowpack since 1985 were smaller than they would have been without natural climate variability, which is expected to reverse and produce much larger declines. These changes in snowpack present a dual risk to the state. In winter, increases in average streamflow will be the result of precipitation falling as rain instead of snow and rapid runoff, increasing flood risk in some basins. Summer flows may be reduced by as much as 50% in some basins, presenting challenges to junior water rights holders, hydroelectric power generation, and those not served by reservoir or groundwater storage. Lower flows also impact important commercial and tribal fisheries.<sup>5</sup>

## History of Winter Storms in Jefferson County

Destructive winter storms, producing snow and ice, have occurred throughout Central Oregon's history. The most significant storms, which have affected Jefferson County, are listed below:

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<sup>4</sup>[https://www.nass.usda.gov/Publications/AgCensus/2017/Online\\_Resources/County\\_Profiles/Oregon/cp41031.pdf](https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Oregon/cp41031.pdf)

<sup>5</sup> [https://www.oregon.gov/lcd/NH/Documents/Apx\\_9.1.21\\_OR\\_ClimateAssmtRpt4\\_2019\\_OPT.pdf](https://www.oregon.gov/lcd/NH/Documents/Apx_9.1.21_OR_ClimateAssmtRpt4_2019_OPT.pdf)

**Table WT-I Significant Winter Storm History for Jefferson and Nearby Counties**

Date	Location	Event	Comments
Dec. 22, 1861	Pacific Northwest	Snowstorm Cold Weather	Very snowy winter; temperatures ranged from 0°F to -30° F. Over ten thousand cattle in eastern Oregon and Washington starved to death. Storm produced between 1 and 3 feet of snow.
Jan. 11-15, 1916	Entire State	Snowstorm	Two storms. Heavy snowfall, especially in mountaneous areas; coldest winter on record since record keeping began.
Dec. 15-16, 1924	Entire State	Cold Weather	Coldest December on record at the time; Drewsey and Riverside set a state record for lowest temperature at -53° F
Jan. 20-25, 1927	Entire State	Cold Weather	Harney Experiment Station reached -36° F
Feb. 1933	All of Oregon	Cold Weather	Coldest February to date for eastern Oregon. Seneca and Ukiah reached -54°F, all time records for Oregon.
Jan. 31 - Feb. 4, 1937	Statewide	Snowstorm	Heavy snows throughtout state.
mid Jan.- Feb., 1950	Across the State	Ice/Snowstorm Cold Weather	Extremely low temperatures for nearly two months; heaviest snowfalls since 1890; blizzard conditions from Jan. 9 to 18. Halted all traffic for three days and people were moved to safety by railway.
Mar. 1-2, 1960	Entire State	Snowstorm	Heavy snow throughout state. Four known injuries, but no fatalities. Major traffic jams.
Jan. 25-30, 1969	Entire State	Snowstorm	Heavy snow throughout state
Jan. 9-11, 1980	Entire State	Snowstorm	Series of string storms across state. Many injuries and power outages.
Feb. 7-8, 1985	Entire State	Snowstorm	Heavy snow throughout state
Feb. 1986	Central/Eastern Oregon	Snowstorm	Heavy snow. Traffic accidents; broken power lines
Mar. 23, 1988	Entire state	Snowstorm	Strong winds; heavy snow.
Feb. 1-8, 1989	Entire State	Snowstorm Cold Weather	Heavy snow and cold temperatures throughout state.
Feb. 11-16, 1990	Entire State	Snowstorm Strong Winds	Heavy snow throughout state
Jan. 6-7, 1991	All of eastern Oregon	Snowstorm	The higher lands of eastern Oregon accumulated between 1 and 6 inches of new snow. Two traffic related fatalities.
Nov. 1993	Cascade Mountains	Snowstorm	Heavy snow throughout region
Feb. 10, 1994	Southeastern Oregon	Snowstorm	Heavy snow throughout the region.
Jan. 16-18, 1996	Columbia Gorge, Willamette Valley	Ice/Snowstorm Cold Weather	Cold air funneling through the Columbia River Gorge with overrunning moisture created freezing rain with heavy accumulations of glaze ice. Scattered power outages and minor traffic accidents.
Feb. 2-4, 1996	Columbia Gorge, Willamette Valley	Ice Storm	A warm front overrunning cold air produced an ice storm that caused widespread disruptions of traffic and power outages. Numerous traffic accidents and one fatality.
Winter 1998-99	Entire State	Snowstorm	One of the snowiest winters in Oregon history (Snowfall at Crater Lake: 586 inches)
Jan. 10, 2000	Central Oregon	Heavy Snow	11 inches of new snow fell in La Pine at an elevation of 4,200 ft. This storm led to a fatality when icy roads caused a collision between a car and a logging truck on Highway 26 at the Ochoco Reservoir east of Prineville.
May 6, 2002	Central Oregon	Extreme Cold Wind Chill	Area low temperatures dipped into the mid teens and 20s across central and north central Oregon.
Oct. 30-31, 2002	Central Oregon	Extreme Cold Wind Chill	An artic front moved through the region bringing much colder temperatures. Many locations broke all time records for the month of October. Madras saw a low of -2 degrees Fahrenheit.
Dec. 2003- Jan 2004	Most of Oregon	Snowstorm	Preliminary damage assessments from this event estimated almost \$16 million dollars in impacts to state and local agencies across most of Oregon
Nov. 2005	Jefferson County	Snowstorm Cold Weather	Snow fall and dropping temperatures halted road extension projects on J Street.

**Table WT-I Significant Winter Storm History for Jefferson and Nearby Counties (Continued)**

Date	Location	Event	Comments
Nov. 2006	Jefferson County	Snowstorm	Heavy snow caused sport cancellations.
Jan. 2008	Statewide	Snowstorm Cold Weather	Heavy snow and single digit weather.
Jan. 4-5, 2004	Central Oregon	Cold Wind Chill	An arctic air mass moved south out of British Columbia, setting daily record low temperatures for January 5th. Meacham broke an all time record low temperature on the morning of January 5th, with a low temperature of -31 degrees Fahrenheit. Madras saw a record low of -4. The cold temperatures and slick roadways resulted in several school closures and cancellations.
Apr. 17, 2006	Central Oregon	Heavy Snow	Heavy snow hit the south and east parts of Bend with 8 to 11 inches of snow.
Dec. 18-24, 2008	Central Oregon	Heavy Snow	Moist Pacific air over running Arctic air at the surface led to heavy snowfall.
Dec. 31, 2009	Central Oregon	Heavy Snow	A surge of moist Pacific air brought heavy snowfall. Camp Sherman saw 5 inches.
Jan. 24, 2010	Central Oregon	Heavy Snow	A moist Pacific disturbance brought heavy snowfall to northcentral and central Oregon. Snowfall amounts in inches include: Camp Sherman (7).
Apr. 2, 2010	Central Oregon	Heavy Snow	A strong cold front and associated upper level trough brought late season heavy snow.
Nov. 21-24, 2010	Central Oregon	Heavy Snow and Cold Temperatures	A powerful arctic front brought widespread heavy snow to much of Central Oregon. Snow totals ranged from 7 to 10+ inches in many areas including Bend and La Pine. Camp Sherman saw nearly a foot. In the wake of the heavy snow, bitter cold settled in with sub-zero low temperatures on Nov 24.
Dec. 17-18, 2010	Central Oregon	Heavy Snow	Abundant Pacific moisture combined with very cold temperatures to bring heavy snow to northern and central Oregon. Snow totals ranged from 6 to 10 inches with 8 inches near Redmond, just under 7 inches in Madras, and 9 inches at Camp Sherman.
Dec. 14-15, 2011	Central Oregon	Heavy Snow	A Pacific storm system and slow moving Arctic front brought a prolonged period of snow to the region. Snow totals of 6 to 10 inches were observed in many areas including Bend, Redmond, Tumalo, and Camp Sherman.
Jan. 17-18, 2012	Northern and Central Oregon	Heavy Snow	A series of storm systems interacted with an Arctic front to bring several waves of moderate to heavy snow to the region. Snow totals ranged from 8 to 15+ inches. Camp Sherman recorded 16 inches with totals ranging from 6 to 10 inches in many other areas including Bend, Black Butte Ranch, and La Pine.
Feb. 24-25, 2012	Central Oregon	Heavy Snow	A winter storm system brought a bout of heavy snow to some areas. 6 to 10 inches of snow fell from Sunriver to Camp Sherman.
Mar. 20-21, 2012	Central Oregon	Heavy Snow	A late season winter storm pummeled portions of Central Oregon. Snow totals ranged from 8 to 12 inches in many areas including Camp Sherman (12 inches), Culver (7.5 inches), and Black Butte Ranch (10 inches).
Feb. 6-8, 2014	Central Oregon	Heavy Snow	A series of storm systems brought several waves of moderate to heavy snow to the region with snow totals of 10 to 20+ inches. Select observations include Camp Sherman (22 inches), in and around Bend (16-18 inches), and Warm Springs (14 inches).
Nov. 12-14, 2014	Northern and Central Oregon	Ice and Heavy Snow	A warm frontal system and abundant moisture interacted with a shallow Arctic airmass, bringing a mixed mode of freezing rain and snow. Freezing rain eventually transitioned to heavy snow with hefty accumulations in many areas. Ice accumulations ranged from 0.5 to 1 inch, with nearly an inch observed in Bend. Snow totals include 20 inches near Redmond, 21 inches in Sisters, and 19 inches east of Prineville.



**Table WT-I Significant Winter Storm History for Jefferson and Nearby Counties (Continued)**

Date	Location	Event	Comments
Dec. 14-15, 2016	Entire State	Heavy Snow	A powerful Pacific storm system brought abundant moisture into the region. With cold air in place, many areas of northern and central Oregon saw moderate to heavy snow.
Jan. 3-4, 2017	Central Oregon	Heavy Snow	A strong winter storm system brought bouts of heavy snow to much of central and east-central Oregon.
Feb 7-9, 2017	Northern and Central Oregon	Heavy Snow, Sleet, and Freezing Rain	A slow moving winter storm brought widespread wintry precipitation to the Inland Northwest, including Oregon. Substantial snow accumulations occurred in many areas, including Central Oregon.
Nov. 10-11, 2017	Northern and Central Oregon	Heavy Snow	A strong upper storm system moved across southern Oregon, resulting in heavy snow banding across much of northern and central Oregon. This resulted in widespread heavy snow accumulations.
Mar. 1-2, 2018	Northern and Central Oregon	Heavy Snow	A late season winter storm brought snow to much of Oregon with moderate to heavy accumulations in Central and northern Oregon.
Feb. 3-4, 2019	Northern and Central Oregon	Heavy Snow	A series of winter storm systems brought hefty snow accumulations to the higher elevations of the Cascades and Blue Mountains and their adjacent slopes. This included moderate to heavy accumulations in and around Central Oregon.
Feb. 9-10, 2019	Northern and Central Oregon	Heavy Snow	A powerful Pacific storm collided with Arctic air to bring moderate to heavy snow to many areas. Snow totals of 6 to 12 inches were recorded in many areas of Central Oregon.
Feb. 23-25, 2019	Northern and Central Oregon	Heavy Snow	A prolonged period of winter weather occurred as a moist southwesterly flow continued to bring moisture into an unseasonably frigid airmass east of the Cascades. This resulted in multi-day snow totals of 1 to 3 feet in some areas including Sisters (40 inches), Bend (33 inches), Redmond (30 inches), and Prineville (22 inches). The heavy snow resulted in at least a couple roof failures in the Bend area.
Nov. 26-27, 2019	Central Oregon	Heavy Snow	An early season winter storm brought snow totals of 6 to 10 inches to many areas of Central Oregon.
Feb. 12-16, 2021	Northern and Central Oregon	Heavy Snow	Several storm systems moved into the Inland Northwest in the wake of an unusually cold Arctic intrusion. This resulted in several rounds of moderate to heavy snows across much of northern, central, and eastern Oregon. Heavy snow fell in many areas with total accumulations up to 10 to 24 inches.

Sources: Oregon Weather Book, NOAA Storm Events Database, <http://www.ncdc.noaa.gov/stormevents/>, Accessed April 30, 2021.

The Jefferson County NHMP Steering Committee determined that the history of winter storm events is **low**, with zero to one severe winter storm events occurring over the last 100 years.

## Risk Assessment

### How are Hazard Areas Identified?

Winter storms occur in all parts of the county. The extent depends upon air temperatures, the level of moisture in the atmosphere, and elevation. Between November and February, snowstorms regularly occur over central Oregon and Jefferson County. Average annual

snowfall in Madras is 11.2 inches. Areas within Jefferson County range in average annual snowfall from 2.2 inches per year (Pelton Dam) to 19.3 inches per year (Antelope 1 NW).<sup>6</sup>

The magnitude or severity of severe winter storms is determined by a number of meteorological factors including the amount and extent of snow or ice, air temperature, wind speed, and event duration. Precipitation, an additional element of severe winter storms, is measured by gauging stations.

The National Weather Service, Portland Bureau, is responsible for monitoring stations and providing public warnings on storm, snow, and ice events as appropriate.

## Probability Assessment

The recurrence interval for severe winter storms throughout Oregon is about every 13 years; however, there can be many localized storms between these periods. Winter storms do occur in eastern Oregon regularly from November through February. Jefferson County experiences winter storms a couple times every year, to every other year. Given the number of residents, structures and facilities exposed to the winter storm hazard, the Jefferson County NHMP steering committee rated the probability of the county's exposure to winter storm as **high**, meaning at least one incident is likely within a 10-35-year period. The cities of Culver, Madras, and Metolius are also believed to have a **high** probability of future occurrences.

## Community Hazard Issues

### What is susceptible to damage during a hazard event?

Severe winter weather can be a deceptive killer. Winter storms that bring snow, ice, cold weather and high winds can cause significant impacts on life and property. Many severe winter storm deaths occur as a result of traffic accidents on icy roads, heart attacks when 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 major obstacles to providing critical emergency response, police, fire and other disaster recovery services.

Severe winter weather can 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 uninsulated water lines serving schools, businesses, industry, and individual homes. If lasting more than several days, all of these effects can create significant economic impacts for the communities

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<sup>6</sup> Oregon Climate Service, "Climate of Jefferson County," [http://www.ocs.orst.edu/county\\_climate/Jefferson\\_files/Jefferson.html](http://www.ocs.orst.edu/county_climate/Jefferson_files/Jefferson.html), Accessed July 3, 2013.

affected as well as the surrounding region, and even outside of Oregon. In rural areas, severe winter storms can isolate small communities, farms and ranches and create serious problems for open range cattle operations.

## Vulnerability Assessment

Perhaps the most advantageous aspect of Central Oregon's cold and snowy winters is the fact that the region is typically prepared, and those visiting the region usually come prepared. As can be expected, however, there are occasions when preparation cannot meet the challenge. In Jefferson County, extreme cold and heavy snow can disrupt farming practices. Likewise, schools have trouble heating their buildings. Jefferson County, as well as the 509J School District each own a snowplow, however, during heavy snow events, the limited numbers of snowplows are unable to clear side streets. Limited funding also makes it difficult to sand secondary roads, and sometimes only curves or hills are sanded while flat stretches of roads are not. Main thoroughfares have first priority, and residential or county roads are rarely plowed. As a result, school buses sometimes cannot run. The constant freezing and melting of snow around manholes often lead to potholes, and power outages can be frequent in adverse weather. Finally, extreme cold can cause breaks in water pipelines when temperatures drop below 10 F. Specific estimates of property and infrastructural damages for winter storm events are not available at this time. See 'Community Hazard Issues' above for a greater description of the County's vulnerabilities to winter storms.

The Jefferson County NHMP steering committee determined that the county's vulnerability to winter storm events is **high**, meaning more than 10% of the population or region assets would likely be affected by a major emergency or disaster. The cities of Culver and Madras are also believed to have a **high** vulnerability, and Metolius has a **moderate** vulnerability.

The maximum threat of a winter storm event is **high**, considering the percentage of population and property that could be impacted under a worst-case scenario is greater than 25%.

## Hazard Risk Analysis

The Jefferson County Steering Committee completed a hazard risk analysis, based upon the previous plan's analysis, during this update. The hazard analysis, developed from a Federal Emergency Management Agency (FEMA) tool that has been refined by the Oregon Military Department – Office of Emergency Management (OEM), addresses and weights (shown as percent within parentheses) the history (8%), vulnerability (21%), probability (29%), and maximum threat (42%) for each natural hazard and attributes a final hazard analysis score. The methodology produces scores that range from 24 to 240. Each category is associated with severity ratings (1 to 10) as follows: Low (1 – 3 points), Moderate (4 to 7 points) and High (8 to 10 points). For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation. The method provides the jurisdiction with a relative ranking from which to prioritize mitigation strategies, but does not predict the occurrence of a particular hazard (for more information on all scores see Volume I, Section 2 of this NHMP).

The Jefferson County hazard analysis score for winter storm is 204 (ranked #3 out of eight hazards). For more information on the relative risk see Volume I, Section 2 of this NHMP.

## Existing Winter Storm Mitigation Activities

Studded tires can be used in Oregon from November 1 to April 1. They are defined under Oregon Law as a type of traction tire. Research shows that studded tires are more effective than all-weather tires on icy roads, but can be less effective in most other conditions.

Highway maintenance operations are guided by local level of service (LOS) requirements. In general, classifications of highways receive more attention. Routes on the National Highway System network, primary interstate expressways and primary roads, will be cleared more quickly and completely. In Jefferson County, this includes Highway 97 and Highway 26. Critical areas like mountain passes will have snow-chain requirements for vehicles, and many local streets are “snow emergency routes” that will be cleared of parked cars. Parking lot and sidewalk snow removal is mostly the responsibility of property owners, sometimes by local ordinance.

Oregon Department of Transportation (ODOT) spends about \$16 million per year on snow and ice removal from the state highway system through winter maintenance practices. These practices include: snow plowing, sanding roadways for ice, and using anti-icing chemicals.

Through the educational collaboration between the Oregon Department of Forestry and the Pacific Northwest Chapter, International Society of Arboriculture (ISA) the *How to Recognize and Prevent Tree Hazards* activity brochure was created. This was created after the February 2002 event that occurred. In addition, Jefferson County has an active Tree Removal Program for trees located over power lines.

TripCheck provides traffic incident, weather, and highway condition reports, as well as useful links to bus, rail, airport, and truck information. The website provides road condition images from approximately 140 road cameras, including over 40 in rural areas such as mountain passes where knowing road conditions can be crucial to safety:  
<http://www.TripCheck.com/>.

## Winter Storm Mitigation Action Items

There are three Winter Storm action items for Jefferson County (one of which was removed by the Steering Committee during the 2021 update). In addition, a few of the Multi-Hazard action items affect the Winter Storm hazard. An action item matrix is provided within Volume I, Section 3, while action item forms are provided within Volume IV, Appendix A. To view city actions, see the appropriate city addendum within Volume III.

# CITY OF CULVER ADDENDUM

## Purpose

This document serves as an update for the City of Culver's Addendum to the Jefferson County Natural Hazard Mitigation Plan (NHMP). This is the first Addendum for the City of Culver for the Jefferson County NHMP. The City's Addendum is considered part of the county's multi-jurisdictional plan, and meets the following requirements: (1) Multi-jurisdictional Plan Adoption §201.6(c)(5), (2) Multi-jurisdictional Participation §201.6(a)(3), (3) Multi-Jurisdictional Risk Assessment §201.6(c)(2) (iii), and (4) Multi-jurisdictional Mitigation Strategy §201.6(c)(3) (iv).

A description of the city specific planning and adoption process follows, along with detailed community specific action items. Information about the city's risk relative to the county's risk to natural hazards is documented in the addendum's Hazard Analysis and Issue Identification section. The section considers how the city's risk differs from or matches that of the county's; additional information on Risk Assessment is provided within the Jefferson County NHMP's Section 2 – Risk Assessment.

The development of Culver's city addendum is further discussed throughout the plan and in the Jefferson County NHMP Planning and Public Process Appendix, which provides an overview of alterations to the document that took place during the city addendum update process.

## How was the Plan Developed?

The NHMP was developed by the Jefferson County Natural Hazards Mitigation Plan steering committee, while this addendum was created by the City of Culver steering committee. The Jefferson County Emergency Manager was designated as the NHMP's convener and will take the lead in implementing, maintaining and updating the plan. Locally, the City of Culver convened a steering committee for the purpose of developing the city's addendum in 2021.

## 2008 Plan Development

In Fall 2005, the Oregon Natural Hazards Workgroup (ONHW, now the Oregon Partnership for Disaster Resilience) at the University of Oregon's Community Service Center partnered with the Department of Geology and Mineral Industries (DOGAMI) and the Southeast Oregon Region (Harney and Malheur as well as Jefferson and Lake) counties to develop a Pre-Disaster Mitigation Planning Grant proposal. Each county joined the Partnership for Disaster Resistance and Resilience (The Partnership) by signing (through their County Commissions) a Memorandum of Understanding for this project. FEMA awarded the Southeast Oregon Region grant to support the development of the natural hazard mitigation plans for the four counties in the region. ONHW, DOGAMI and the communities were awarded the grant in the Fall of 2005 and local planning efforts in this region began in the Fall of 2006 and county and city meetings proceeding in 2007.

The Jefferson County Multi-jurisdictional NHMP was formally adopted by Jefferson County on November 26, 2008 and approved by FEMA on December 16, 2008 (Madras approved its addendum on January 13, 2009). To maintain its compliance with the Disaster Mitigation Act of 2000 (DMA2K), the plan required an update by December 16<sup>th</sup>, 2013.

## 2021 Plan Update

The City of Culver created an addendum to the Jefferson County NHMP in 2021, facilitated by Central Oregon Intergovernmental Council (COIC). Steering committee members contributed data, reviewed, and provided guidance towards the community profile, risk assessment, mitigation strategy (action items), and implementation and maintenance plan. The local steering committee met on one occasion: April 9<sup>th</sup>, 2021. The addendum reflects effort from the formal meeting and during subsequent informal meetings between members of the steering committee and with COIC (see Appendix B for more information).

## Public Participation

An open public involvement process is essential to the development of an effective plan. In order to develop a comprehensive approach to reducing the effects of natural disasters, the planning process should include opportunities for the public, neighboring communities, local and regional agencies, as well as, private and nonprofit entities to comment on the plan. COIC provided a publicly accessible project webpage for the general public in order to make meeting materials and contact information available throughout the 2021 update process.

In addition, COIC administered a public opinion survey to obtain additional input from the public regarding the County's risks, vulnerabilities, hazards history, and mitigation strategies. See Volume IV, Appendix F for more information.

The Jefferson County Natural Hazard Mitigation Plan is the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee and the process see this NHMP's Volume I, Acknowledgements and Executive Summary, and Volume IV, Appendix B.

Developing a jurisdictional NHMP is a requirement for the city to gain eligibility for the Federal Emergency Management Agency's Pre-Disaster Mitigation, Hazard Mitigation, and Flood Mitigation Assistance grant Programs. This project is funded through the Federal Emergency Management Agency's (FEMA) FY20 Post Fire Mitigation Grant Program (HMGP-PF-FM-5195-OR-4)).

**The Culver Addendum to the Jefferson County NHMP was adopted on [insert date] and the NHMP and Addendum were approved by FEMA on [insert date]. To maintain its compliance with the Disaster Mitigation Act of 2000, the plan required an update by [insert date].**

The Jefferson County Natural Hazard Mitigation Plan is the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee and the process see this NHMP's Volume I, Acknowledgement and Executive Summary, and Volume IV, Appendix B.

## **How Were the Action Items Developed?**

In 2021, COIC administered a survey to begin the process of developing action items with the local steering committee. COIC and the local steering committee then worked to discuss and further develop action items specific to the risks and vulnerabilities for the City of Culver. The city's actions are listed below. For more detailed information on each action, see the action item forms at the end of this Addendum.

**Table CU-1 City of Culver Action Items**

<b>2021 Action Items</b>	<b>Priority</b>	<b>Proposed Action Title</b>	<b>Lead Agency</b>	<b>Partner Organization(s)</b>	<b>Timeline</b>	<b>Status</b>
MH#1		Develop a continuity of operations plan for the City of Culver to ensure continued operation in the event of a natural hazard emergency.	City Manager	City Council, City Mayor, Jefferson County, FEMA, COIC	Short Term	New
MH#2		Develop a city emergency communications hotline for sharing information and updates during or after a disaster event.	City of Culver	City Council, Sheriff's Office, Jefferson County	Short Term	New
MH#3		Encourage citizens to sign up for the Emergency Alert System.	Sheriff's Office	City Council, City Mayor, Jefferson County	Short Term	New
FL#1	Yes	Complete Phase 2 of new stormwater system in Culver.	Public Works	City Council, City Mayor, Jefferson County	Medium Term	New
WD #1		Educate property owners on how to properly maintain trees to prevent power loss on power lines off the right of way in partnership with the County.	Public Works	Central Oregon Electric Cooperative, Jefferson County	Ongoing	New

Source: City of Culver NHMP Steering Committee, 2021



# Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Culver addendum to the Jefferson County NHMP. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the city addendum is considered part of the county plan, the city will look for opportunities to partner with the County. The City's steering committee will convene after re-adoption of the City of Culver addendum annually in early fall, following the wildfire/ irrigation season. The City will coordinate with the Jefferson County Convener. The city's Public Works Director will serve as the local convener and will be responsible for convening the local steering committee. The convener will also remain active in the County's planning process.

## Implementation through Existing Programs

Many of the Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Culver will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

The City of Culver currently has the following plans that relate to natural hazard mitigation:

- Culver Comprehensive Land Use Plan relates to natural hazard mitigation through its section that outlines Culver's goals, policies, and implementation measures
- City Floodplain Management Program

The steering committee and the community's leadership have the option to add or implement action items at any time. This allows the steering committee to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest priority. When new actions are identified, they should be documented using the action item form. Once a proposed action form has been submitted to the convener, the action will become part of the City's addendum.

## Continued Public Participation

Keeping the public informed of the city's efforts to reduce the city's risk to future natural hazards events is important for successful plan implementation and maintenance. The city is committed to involving the public in the plan review and updated process. The City Addendum along with the County Plan will be posted on-line on COIC's website (<https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/jefferson-county-nhmp/>), as well as the county and city websites, so that the public may view the plan at any time.

In addition, natural hazards information dissemination is conducted throughout the year when opportunities present themselves via the city offices and website.

## Plan Maintenance

The Jefferson County Natural Hazard Mitigation Plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

The City of Culver Natural Hazard Mitigation Addendum includes three sections: 1) a Community Profile and Asset Identification, 2) Hazard Identification and Risk Assessment, and 3) a Mitigation Strategy section.

# COMMUNITY PROFILE

## ASSET IDENTIFICATION

This section provides information about city specific asset identification. For information on the characteristics of Culver, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see the County NHMP Appendix C, Community Profile. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

We live in a place with a varied geography and communities. We would like to recognize and acknowledge the indigenous land of the Confederated Tribes of Warm Springs, Molalla, Paiute, Klamath, Modok, Yahooskin Band of Snake Indians, and Tribes of Middle Oregon. We want to recognize the people that came before us and honor their traditions and stewardship of the land. Acknowledgement is a simple, powerful way of showing respect for Indigenous People's history and culture.

### Asset Identification

The following assets identified by the City of Culver were gathered from the local steering committee during the formal meeting on July 20th, 2021. The City of Culver has the following assets:

#### Critical and Essential Facilities and Infrastructure

- Culver City Hall
- Culver Wastewater Treatment Facility
- BNSF Railroad Tracks

#### Culver School District

- Culver Elementary
- Culver Middle School
- Culver High School
- Culver School District

#### Social Service Providers

Please see <https://www.thrivecentraloregon.org/services> for a comprehensive list of resource providers throughout Central Oregon, including Culver.

## Population

Culver's 2020 PSU certified population estimate is 1,570 people<sup>1</sup>. The city's population has grown an estimated 213 people or 16% since the 2010 Census. Culver's acknowledged Coordinated Population Forecast is 1,850 people by the year 2040, which represents an increase of 280 people or 18% between 2020 and 2040.

## Environmental Assets

- Culver Veteran Memorial Park

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<sup>1</sup> <https://www.pdx.edu/population-research/population-estimate-reports>

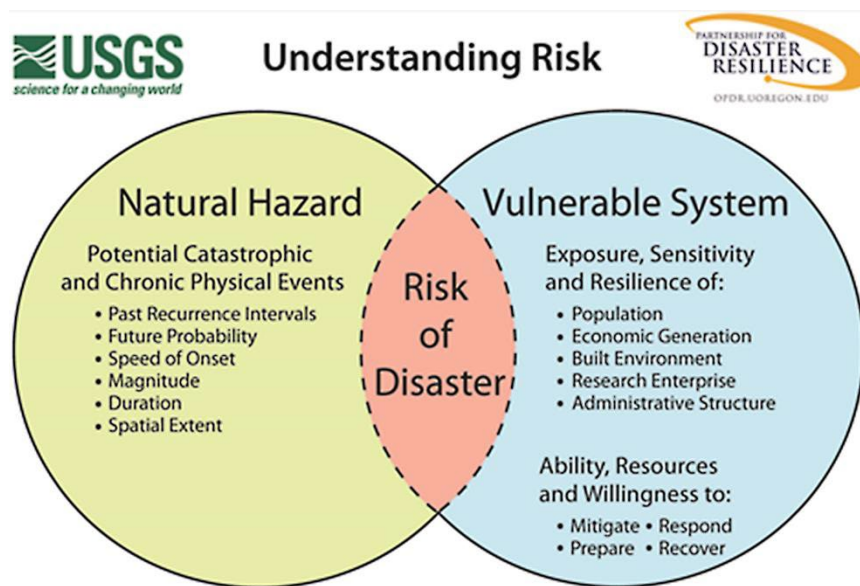
# RISK ASSESSMENT

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- Phase 1: Identify hazards that can impact 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 information presented below, along with hazard specific information presented elsewhere in this addendum, within the Hazard Annexes (Volume II), and community characteristics presented in the Community Profile (Appendix C), will be used as the local level rationale for the risk reduction actions identified in this addendum. The risk assessment process is graphically depicted in Figure CU-1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards overlap vulnerable systems.

Figure CU-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience

## Hazard Analysis Methodology

This NHMP utilizes a hazard analysis methodology that was first developed by FEMA circa 1983, and gradually refined by the Oregon Military Department's Office of Emergency Management 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 endeavors to reflect 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%.

This method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular 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.

In this analysis, severity ratings, and weight factors, are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario), and probability as shown in the table below. See Volume I, Section 2 (Risk Assessment) for more information.

## Hazard Analysis

On July 20th, 2021, the City of Culver addendum steering committee developed their hazard vulnerability assessment (HVA), using the County's HVA as a reference. Changes from the County's HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to the City of Culver, which are discussed throughout this addendum.

Table CU-3 shows the HVA matrix for Culver showing each hazard listed in order of rank from high to low. 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.

**Table CU-2 Hazard Analysis Matrix – City of Culver**

Hazard	History	Vulnerability	Maximum		Total Threat Score	Hazard Rank	County Hazard Rank
			Threat	Probability			
Winter Storm	6	45	90	63	204	#1	#3
Drought	18	25	90	63	196	#2	#2
Windstorm	4	50	100	21	175	#3	#4
Flood	18	45	50	56	169	#4	#5
Volcanic Event	2	45	90	7	144	#5	#6
Earthquake	2	20	100	7	129	#6	#7
Wildfire	2	25	20	7	54	#7	#1
Landslide/Debris Flow	2	5	10	7	24	#8	#8

Source: City of Culver NHMP Steering Committee, and Jefferson County NHMP Steering Committee, 2021.

The following table categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Jefferson County NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings).

**Table CU-3 Probability and Vulnerability Comparison – Culver and Jefferson County**

Hazard	Culver		Jefferson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	<b>Moderate</b>	High	High
Earthquake	Low	Moderate	Low	Moderate
Flood	<b>High</b>	High	Moderate	High
Landslide/Debris Flow	Low	Low	Low	Low
Volcanic Event	Low	High	Low	High
Wildfire	<b>Low</b>	<b>Moderate</b>	High	High
Windstorm	<b>Low</b>	<b>High</b>	Moderate	Moderate
Winter Storm	High	High	High	High

Source: City of Culver NHMP Steering Committee, and Jefferson County NHMP Steering Committee, Update 2021.

## Drought

The steering committee determined that the city’s vulnerability to drought is **moderate**, which is lower than the county’s vulnerability. The city has a dependable water source that is not affected by regional agricultural droughts. The steering committee noted that drought has become more common in their region, and thus estimated that the probability of a drought event affecting the city is **high**. Droughts impact individual farm owners, the agricultural industry as a whole, and other agricultural related sectors, which Culver is connected with. Residents within Culver may be indirectly impacted by a drought, such as experiencing economic hardship from the agricultural and ranching industries.

*For more information on the Drought Hazard (including history and extent) see the Drought Annex in Volume II.*

## Earthquake

The steering committee determined that the city's vulnerability to earthquake is **moderate**, which is lower than the county's vulnerability. There's no past "recent" history of earthquakes in Jefferson County or Culver; as such the probability of an earthquake event is **low**. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake. Culver High School is a critical facility within Culver that is identified as having a moderate, high, or very high collapse potential. The Wastewater Treatment Plant is also an unstable, critical facility in the city. Additionally, the City of Culver is susceptible to isolation given that SW Culver Highway is the major transportation route. Should an earthquake damage this transportation route, Culver may find itself isolated.

*For more information on the Earthquake Hazard (including history and extent) see the Earthquake Annex in Volume II.*

## Flood

The steering committee determined that the city's vulnerability to flood is **high**, which is the same as the county's vulnerability. The city is not located near any rivers, streams, or lakes, and has experienced urban flooding due to heavy rains or snow melt events. When this happens, sheet flooding occurs from water channeling and flowing from the south through the city's commercial and residential areas located between First Ave on the east and the railroad tracks to the west. Due to the history of floods in Culver, the probability of a flood event is **high** and occurs once about every 4-6 years.

*For more information on the Flood Hazard (including history and extent) see the Flood Annex in Volume II.*

## Landslide

The steering committee determined that the city's vulnerability to landslide is **low**, which is the same as the county's vulnerability. There are no steep slopes that would directly affect the City of Culver. Landslide events would most likely impact Culver if a landslide closed Highway 97, Highway 26, or SW Culver Highway. Any such landslide would affect commerce in Culver by delaying traffic and commuters. The probability of a landslide event is **low**.

*For more information on the Landslide Hazard (including history and extent) see the Landslide Annex in Volume II.*

## Volcanic Event

The steering committee determined that the city's vulnerability to a volcanic event is **high**, which is the same as the county's vulnerability. While a volcanic event may not have a direct impact on the City of Culver, the ash fallout from an event in the Cascades could potentially affect Culver, especially for people with respiratory problems. There is also potential for people in the area to be evacuated should an eruption occur. The steering committee acknowledged that because a volcanic event has not happened in the recent past, the probability of a volcanic event is **low**.



*For more information on the Volcanic Hazard (including history and extent) see the Volcanic Annex in Volume II.*

## **Wildfire**

The steering committee determined that the city's vulnerability to wildfire is **moderate**, which is lower than the county's vulnerability. The City is surrounded by agricultural fields, which are less likely to burn than sagebrush, grasslands, or forested areas. Fires that affect the city are usually human caused and include house fires or brush burning, not wildfires. The probability of a wildfire affecting the city is **low**.

*For more information on the Wildfire Hazard (including history and extent) see the Wildfire Annex in Volume II.*

## **Windstorm**

The steering committee determined that the city's vulnerability to a windstorm is **high**, which is higher than the county's vulnerability. Windstorms occur during both the winter and summer months coming either with cold air or, in some cases, with thunderstorms. In rare instances there is the risk of tornado in the area. The last recorded tornado in Jefferson County was a F0 tornado that touched down on June 9, 2004 on the west side of Madras. A storage shed which had been bolted to a concrete slab was picked up by the tornado and sent two to three hundred feet into the air, clearing two fences and landing next to a tree. Additionally, a windstorm occurred in May 2020 which caused major damage in Culver. Over 75% of homes and businesses were damaged in some way, and 100% of the residents were affected in some manner. The damage in the area was extensive with power outages extending over 10 days for some customers; the majority of the city experienced 3-4 days without power. While damaging when they do occur, the steering committee determined the probability of a windstorm event is **low**.

*For more information on the Windstorm Hazard (including history and extent) see the Windstorm Annex in Volume II.*

## **Winter Storm**

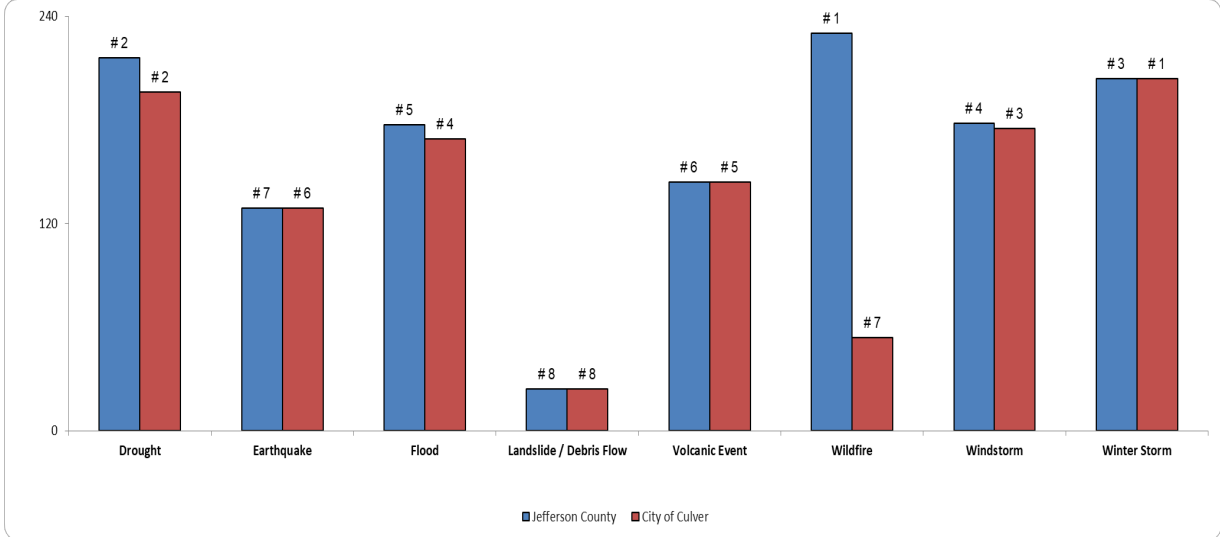
The steering committee determined that the city's vulnerability to a winter storm is **high**, which is the same as the county's vulnerability. Death rarely results from winter storms, but roadways that are damaged or made temporarily inaccessible can hinder police, fire, and medical responses to urgent calls. Culver is severed from other communities to the North and South when SW Culver Highway, Highway 97 and Highway 26 are closed due to ice or other severe winter weather. Additionally, winter storms can damage property and disrupt utilities. The City does have the capability to clear snow from city streets should heavy snowfall occur. Considering the history of winter storms in the region the probability of a winter storm event is **high**.

*For more information on the Winter Storm Hazard (including history and extent) see the Winter Storm Annex in Volume II.*

# Summary

The figure below presents a summary of the hazard analysis for the City of Culver and compares the results to the assessment completed by the Jefferson County NHMP Steering Committee. In terms of overall rank, the steering committee rated their risk to winter storm, flood, and volcanic event higher than the county.

**Figure CU-2 Overall Hazard Analysis Comparison – Culver and Jefferson County**



Source: City of Culver NHMP Steering Committee, and Jefferson County NHMP Steering Committee, 2021.

## Mitigation Plan Mission

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

The mission of the Jefferson County NHMP is to:

***To create a disaster-resilient Jefferson County***

The 2021 local steering committee reviewed the 2021 plan mission statement for the county and agreed it accurately describes the overall purpose and intent of this plan.

## Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jefferson County citizens, 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 particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

***Goal 1:*** Save lives and reduce injuries

***Goal 2:*** Minimize and prevent damage to public and private buildings, infrastructure, and services.

***Goal 3:*** Increase cooperation and coordination among private partners with local, state, tribal and federal entities.

***Goal 4:*** Increase education, outreach and awareness.

***Goal 5:*** Protect natural and cultural resources.

***Goal 6:*** Ensure the plan has direct linkages to efficient and effective recovery strategies.

***Goal 7:*** Reduce economic impacts of natural disasters.

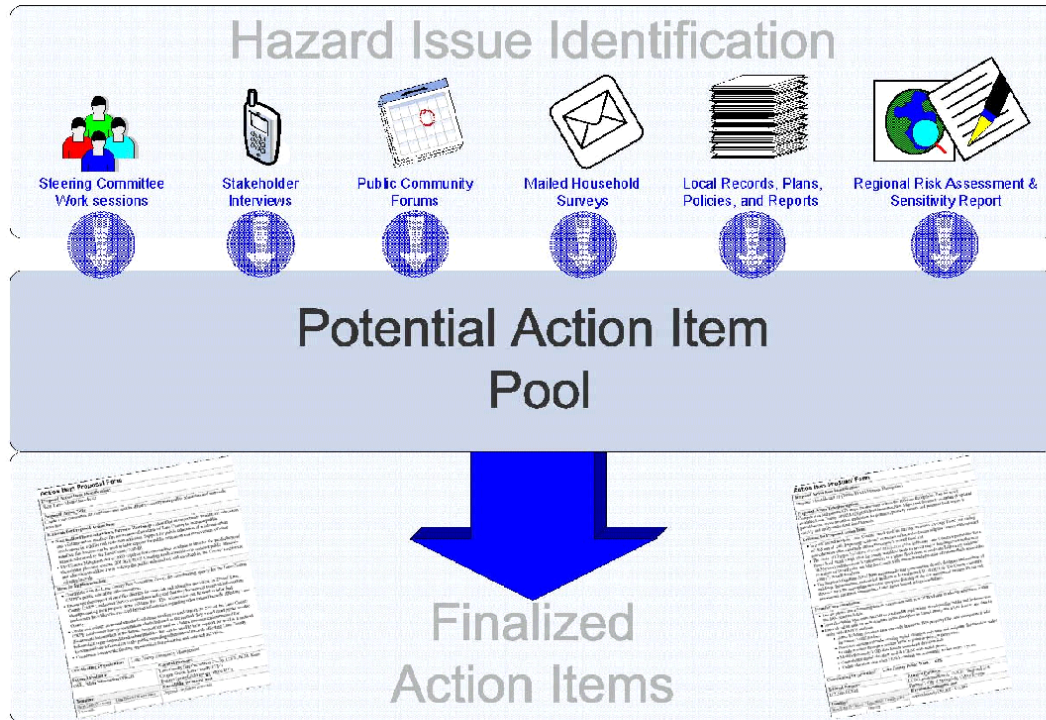
(Note: although numbered the goals are not prioritized.)

## Mitigation Plan Action Items

Short- and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. They address both multi-hazard (MH) and hazard-specific issues. Action items can be developed through a

number of sources. The figure below illustrates some of these sources. A description of how the plan’s mitigation actions were developed is provided below.

**Figure CU-3 Development of Action Items**



Copyright 2008 The Partnership for Disaster Resilience – Community Service Center University of Oregon

Source: Oregon Partnership for Disaster Resilience

## Action Item Worksheets

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described within Volume I, Section 3 (Mitigation Strategy). Culver specific action item worksheets are located at the end of this Addendum.

The city is also a party to several actions described in the County NHMP; each jurisdiction listed on the County Action Item forms as an “Affected Jurisdiction” will contribute to and work towards completion of that action as it pertains to their jurisdiction. For detailed information on each County level action item form see Volume I, Section 3, Mitigation Strategy and Volume IV, Appendix A, Action Item Forms.

## **Action Item Development Process**

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions by the steering committee. A number of actions identified by the County steering committee include the City as an affected jurisdiction; these actions are broad actions that include implementation components at both the county and city level. All actions were reviewed by the committee and revised as necessary before becoming a part of this document.

# ATTACHMENT I: ACTION ITEM FORMS

## Action Item Forms

The action item forms portray the overall action plan framework and identify linkages between the plan goals, partnerships (coordination and partner organizations), and actions. Table CU-4 provides a list of actions for the city. The pages that follow include individual forms for each mitigation action.

**Table CU-4 Action Item Timelines, Status, High Priority and Related Hazards**

Action Item	Timeline	Status	High Priority	Related Hazard								
				Drought	Earthquake	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm	
MH #1	Short Term	New		X	X	X	X	X	X	X	X	X
MH #2	Short Term	New		X	X	X	X	X	X	X	X	X
MH #3	Short Term	New		X	X	X	X	X	X	X	X	X
FL #1	Short Term	New	Yes			X						
WD #1	Ongoing	New									X	

Source: City of Culver Steering Committee, 2021.

<b>Action Item: Multi-Hazard #1</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Develop a continuity of operations plan for the City of Culver to ensure continued operation in the event of a natural hazard emergency.		1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
Culver Floodplain Management Program			
<b>Rationale for Proposed Action Item:</b>			
Developing a continuity of operations plan will help ensure that the Culver government is able to continue serving the community in case of a disaster event, as well as post-disaster.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Work with the City of Culver, community organizations, and community members to identify critical services and infrastructure operated by the City. Prioritize the services and infrastructure to implement or fix if impacted by the disaster.		New. Added in 2021.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
City of Culver, FEMA, Jefferson County Emergency Management	Low (less than \$50,000)	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input checked="" type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	City Manager		
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Council, City Mayor		FEMA, COIC, Jefferson County	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	

<b>Action Item: Multi-Hazard #2</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Develop a City emergency communications hotline for sharing information and updates during or after a disaster event.		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
None.			
<b>Rationale for Proposed Action Item:</b>			
An emergency hotline run by the city will assist with centralizing the sources of local information to ease communication issues, avoid redundancy or confusion, and help connect citizens to resources they need through one streamlined service. This will also help other emergency personnel share information directly to the community (County, Sheriff's Office, State/Federal agencies).			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Establish a phone line at the city dedicated to sharing information in the community.		New. Added in 2021.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
City of Culver, FEMA, Jefferson County	Low (less than \$50,000)	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	City of Culver		
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Council		Sheriff's Office, Jefferson County	
<b>Form Submitted by:</b>	2021 Steering Committee		
<b>Action Item Status:</b>	NEW		



<b>Action Item: Multi-Hazard #3</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Encourage citizens to sign up for the Emergency Alert System.		1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
None.			
<b>Rationale for Proposed Action Item:</b>			
Getting more citizens in Culver signed up for the emergency alert system will help increase community awareness of natural disaster events, assist with evacuation efforts, and generally help increase awareness of natural disaster risk to the community.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Conduct community outreach through the city in partnership with community organizations.		New. Added in 2021.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
City of Culver, FEMA, Jefferson County	Low (less than \$50,000)	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input checked="" type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Sheriff's Office		
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Council, City Mayor		Jefferson County	
<b>Form Submitted by:</b>	2021 Steering Committee		
<b>Action Item Status:</b>	NEW		

<b>Action Item: Flood #1</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Complete Phase 2 of the new stormwater system in Culver.		1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
City Floodplain Management Program			
<b>Rationale for Proposed Action Item:</b>			
Completing this stormwater system will help prevent future flooding and protect natural and cultural resources, as well as critical infrastructure and homes in Culver.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
The City is currently completing Phase 1 of the stormwater system lead by the Public Works Department.		New. Added in 2021.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
City of Culver, Jefferson County, State of Oregon	High (more than \$100,000)	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input checked="" type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Culver Public Works		
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Council, City Mayor		Jefferson County	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	

<b>Action Item: Windstorm #1</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Educate property owners on how to properly maintain trees to prevent power loss on power lines off the right of way in partnership with the County.		1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
None.			
<b>Rationale for Proposed Action Item:</b>			
Helping property owners learn how to identify and address trees that may impact power lines off the right of way will support the County and City in preventing power loss during a storm. This also helps reduce City maintenance costs, and encourages citizens to take a role in reducing the impacts of a wind event in the community.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Conduct tree workshops via the City to help educate property owners on how to maintain trees.		New. Added in 2021.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
City of Culver, FEMA, Jefferson County	Low (less than \$50,000)	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Public Works		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Central Oregon Electric Cooperative, Jefferson County	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	

## ATTACHMENT 2: ACTION ITEM FORM TEMPLATE

Action Item:	Alignment with Plan Goals:	High Priority Action Item?
	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>
		<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)
<b>Coordinating Organization:</b>		
<b>Internal Partners:</b>		<b>External Partners:</b>
<b>Form Submitted by:</b>		
<b>Action Item Status:</b>		

# LAKE CHINOOK FIRE DISTRICT ADDENDUM

## Purpose

This document serves as an Addendum for Lake Chinook Fire District's inclusion to the Jefferson County Natural Hazard Mitigation Plan (NHMP). This is the first Addendum for the Lake Chinook Fire District for the Jefferson County NHMP. The Fire District's Addendum is considered part of the county's multi-jurisdictional plan, and meets the following requirements: (1) Multi-jurisdictional Plan Adoption §201.6(c)(5), (2) Multi-jurisdictional Participation §201.6(a)(3), (3) Multi-Jurisdictional Risk Assessment §201.6(c)(2) (iii), and (4) Multi-jurisdictional Mitigation Strategy §201.6(c)(3) (iv).

A description of the district specific planning and adoption process follows, along with detailed community specific action items. Information about the district's risk relative to the county's risk to natural hazards is documented in the addendum's Hazard Analysis and Issue Identification section. The section considers how the district's risk differs from or matches that of the county's; additional information on Risk Assessment is provided within the Jefferson County NHMP's Section 2 – Risk Assessment.

The development of the Lake Chinook Fire District Addendum is further discussed throughout the plan and in the Jefferson County NHMP Planning and Public Process Appendix, which provides an overview of alterations to the document that took place during the district addendum build process.

## How was the Plan Developed?

### Public Participation

An open public involvement process is essential to the development of an effective plan. In order to develop a comprehensive approach to reducing the effects of natural disasters, the planning process should include opportunities for the public, neighboring communities, local and regional agencies, as well as, private and nonprofit entities to comment on the plan. COIC provided a publicly accessible project webpage for the general public in order to make meeting materials and contact information available throughout the 2021-22 update process.

In addition, COIC administered a public opinion survey to obtain additional input from the public regarding the County's risks, vulnerabilities, hazards history, and mitigation strategies. See Volume IV, Appendix F for more information. COIC also worked with Lake Chinook Fire District to distribute a survey for community members to provide input on the final draft of this Addendum. Only one comment was received, which was addressed by Chief Don Colfels. The comment and response are included in this NHMP's Appendix B.

Updating the mitigation plan is a requirement to gain eligibility for the Federal Emergency Management Agency's Pre-Disaster Mitigation, Hazard Mitigation, and Flood Mitigation

Assistance grant programs. This project is funded through the Federal Emergency Management Agency's (FEMA) FY20 Post Fire Mitigation Grant Program (HMGP-PF-FM-5195-OR-4).

**The Lake Chinook Fire District Addendum to the Jefferson County NHMP was adopted on [insert date] and approved by FEMA on [insert date]. The Jefferson MNHMP was approved by FEMA on [insert date], the plan is effective for Jefferson County and Lake Chinook Fire District through [insert date].**

The Jefferson County Natural Hazard Mitigation Plan is the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee and the process see this NHMP's Volume I, Acknowledgements and Executive Summary, and Volume IV, Appendix B.

## **How Were the Action Items Developed?**

In 2022, COIC administered a survey to begin the process of developing action items with the local steering committee. COIC and the local steering committee then discussed and further developed action items specific to the risks and vulnerabilities for the Lake Chinook Fire District. The District's actions are listed below. For more detailed information on each action, see the action item forms at the end of this memo.

**Table LC-1 Lake Chinook Fire District Action Items**

Multi-Hazard Action Items	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Plan Goals								
						1	2	3	4	5	6	7		
MH#1	x	Improve access and egress in Lake Chinook		Jefferson County Public Works, State Parks, PGE, ODOT	Short term	x								
MH#2	x	Improve adequacy of emergency services radio communication within the Cove Palisades State park		PGE, FEMA, LCF&R JCFD, JCSO, OPRD	Short term	x								
MH#3		Rehabilitate the Deschutes River Bridge at Lake Billy Chinook, and its sister structure crossing the Crooked River arm of the lake		State Parks	Long term	x	x				x	x	x	
LS#1	x	Conduct a study of the risk of landslides in the Fire District, and implement actions to address those risks		FEMA, OEM, DOGAMI	Short term	x	x	x			x	x	x	
WF#1	x	Water infrastructure and supply		Jefferson County Public Works, State Parks, PGE, ODOT	Medium term	x	x				x			x
WF#2	x	Implement priority action items from the Jefferson County CWPP (2022)		US Forest Service, BLM, Oregon Dept of Forestry, Oregon Parks and Recreation, Oregon State Fire Marshal, Central Oregon Intergovernmental Council, Portland General Electric, Jefferson County, Bureau of Indian Affairs	Ongoing	x	x	x	x	x	x	x	x	
WS#1	x	Develop ongoing plan to reduce the hazards from Winter Storms in the Grandview/Lake Chinook Fire District area		Lake Chinook Communities	Short term	x	x		x			x	x	

Source: Lake Chinook Fire District NHMP Steering Committee, 2022

# Plan Implementation and Maintenance

The Fire District Board will be responsible for adopting the Lake Chinook Fire District addendum to the Jefferson County NHMP. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the District addendum is considered part of the county plan, the District will look for opportunities to partner with the County. The District's steering committee will convene after adoption of the Lake Chinook Fire District addendum on the same bi-annual schedule as the county (once in the spring, before the wildfire season and once in the fall, after the wildfire season). The Fire Chief will serve as the convener and will be responsible for convening the steering committee. The convener will also remain active in the County's planning process.

## Implementation through Existing Programs

Many of the Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the District's existing plans and policies. Where possible, the Lake Chinook Fire District will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

The Lake Chinook Fire District currently has the following plans that relate to natural hazard mitigation:

- Jefferson County Community Wildfire Protection Plan
- FireWise USA Communities Action Plans

The steering committee and the District's leadership have the option to add or implement action items at any time. This allows the steering committee to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest priority. When new actions are identified, they should be documented using the action item form. Once a proposed action form has been submitted to the convener, the action will become part of the District's addendum.

## Continued Public Participation

Keeping the public informed of the District's efforts to reduce the District's risk to future natural hazards events is important for successful plan implementation and maintenance. The District is committed to involving the public in the plan review and updated process. The District Addendum along with the County Plan will be posted online on COIC's website (<https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/jefferson->



[county-nhmp/](#)), as well as the County and Fire District websites, so that the public may view the plan at any time.

In addition, natural hazards information dissemination is conducted throughout the year when opportunities present themselves via the District's offices and website.

## Plan Maintenance

The Jefferson County Natural Hazard Mitigation Plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County plan update process, the District will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

The Lake Chinook Fire District Natural Hazard Mitigation Addendum includes three sections: 1) a Community Profile and Asset Identification, 2) Hazard Identification and Risk Assessment, and 3) a Mitigation Strategy section.

# COMMUNITY PROFILE

## ASSET IDENTIFICATION

This section provides information about district-specific asset identification. For information on the characteristics of the Lake Chinook Fire District in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation, see the County NHMP Appendix C, Community Profile. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the district-specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

The district is located on Lake Billy Chinook on the high desert plateau in Central Oregon. It covers nearly 50 square miles of territory, 25 miles from the nearest town through winding canyons, switch-back grades and a single lane bridge. Roadways are two lane county roads with 50% unpaved, some non-graded, some non-maintained. Landslides are a common occurrence on these roads during winter months and winter storms. There is only one all-weather access road to this area during the winter. At times that may not be accessible to all vehicles.

The District comprises four subdivisions, consisting of clusters of homes, small businesses and surrounding ranch lots, has scattered private timber land and is surrounded by federally lands managed by Deschutes National Forest, Crooked River National Grassland and BLM. The largest subdivision, Three Rivers, comprising approximately 650 homes on 4,000 acres is completely off-grid using solar for its primary source of electricity.

Wildfires have increased in intensity and severity over the past decade, threatening our safety, health, water security, economic security and environment. Eight out of the ten wildfires in the past eight years went to over 1000 acres during the first operational period (an operational period is usually 12 hours). Fuels treatments in our High-Risk areas are critical to mitigate catastrophic wildfire. Our area is predominantly a recreational area. Lake Billy Chinook surrounds our district. The area hosts approximately 36,000 visitors during the summer months. It is a very popular recreational lake in Central Oregon for water skiing, sailing, jet skiing and boating. Lake Billy Chinook holds largemouth and smallmouth bass, rainbow, brown and bull trout, kokanee salmon, whitefish, as well as suckers, minnows and dace. The many canyons hold tributaries to the lake and are critical to the Kokanee Salmon project. The area also hosts the Metolius Mule Deer Winter Range, which consists of over 10,000 acres (out of over 100,000 acres total) of land situated between the Deschutes and Metolius arms of Lake Billy Chinook. This area provides critical winter habitat for mule deer, elk, bats and other wildlife. Protecting this area is highly important to the Fire District, County, and region for environmental, social, and ecological values.

We live in a place with a varied geography and communities. We would like to recognize and acknowledge the indigenous land of the Confederated Tribes of Warm Springs, Molalla, Paiute, Klamath, Modok, Yahooskin Band of Snake Indians, and Tribes of Middle Oregon. We want to recognize the people that came before us and honor their traditions and

stewardship of the land. Acknowledgement is a simple, powerful way of showing respect for Indigenous People's history and culture.

## Asset Identification

The following assets identified by the Lake Chinook Fire District were gathered from the local steering committee during the formal meeting on May 4th, 2022. The Lake Chinook Fire District has the following assets:

### Critical and Essential Facilities and Infrastructure

- Lake Chinook Fire & Rescue Facility
- Lake Billy Chinook Airport
- Lake Chinook Fire & Rescue Heli-Pad
- Three Rivers Boat Ramp and Park
- Pine Telephone Central Office
- Pine Telephone Wi-Max Tower
- Pelton Round Butte Project Area
- State Park Campgrounds and Day-Use Infrastructure (water, marina, roads, power, etc.)
- Lake Chinook Village Store
- Two suspension bridges
- Jordan Road (single ingress/egress into the District)

### Social Service Providers

Please see <https://www.thrivecentraloregon.org/services> for a comprehensive list of resource providers throughout Central Oregon, including the Lake Chinook Fire District.

### Population

Given the highly rural nature of the Lake Chinook Fire District, the committee has included the population information for the community subdivision called Grandview that is covered by the District. In 2020, Grandview had a population of 902 over approximately 398 square miles of land; the population has nearly doubled from 2010 when it was estimated at 504 residents. The 2020 median age is approximately 56 and over 40% of the population is 60+ years old.<sup>1</sup> The communities protected by the Lake Chinook Fire District can be described as a mix of retirement and vacation communities due to the proximity to Lake Billy Chinook recreation area. The area hosts an estimated 36,000 visitors during the summer months, increasing the potential impact of natural hazards with such a sharp rise in traffic to this rural part of the county.

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<sup>1</sup>U.S. Census Bureau (2020). *American Community Survey 5-year estimates*. Retrieved from *Census Reporter Profile page for Grandview CCD, Jefferson County, OR*.  
<<http://censusreporter.org/profiles/06000US4103191224-grandview-ccd-jefferson-county-or/>>

## **Environmental Assets**

- Metolius Mule Deer Winter Range
- Crooked, Metolius, and Deschutes Rivers: Fisheries and Resources for Threatened and Endangered and Sensitive Species
- Wild Turkey Federation Projects
- Lake Billy Chinook
- PGE Wildlife Enhancement Projects

## **Land Use**

- Recreational use at Lake Billy Chinook
- Rangeland
- BLM
- USFS
- PGE
- Vacant large acre residential lots
- Forestland

## **Economic Resources**

- Lake Billy Chinook Recreation Area
- Some timber sales
- Quarries

## **Cultural and Historic Resources**

- Homesteads
- Balancing Rocks
- Archeological Sites
- Historic Sites
- Prehistoric Sites

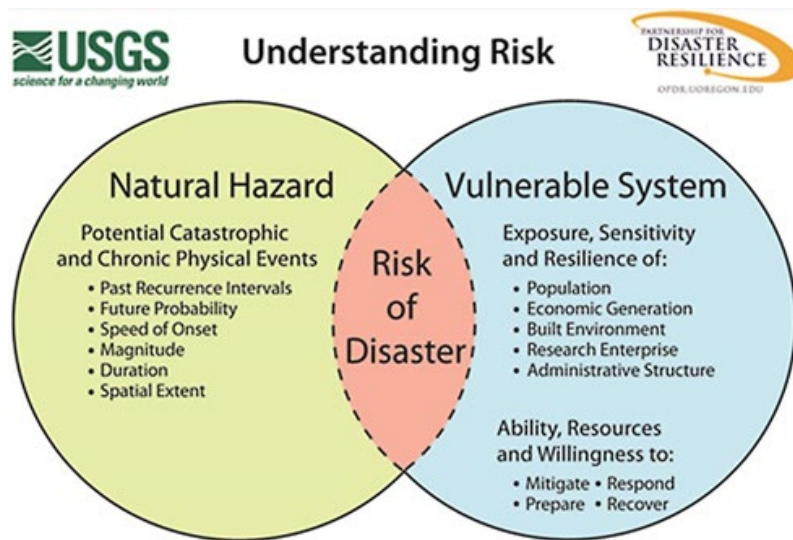
# RISK ASSESSMENT

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact 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 information presented below, along with hazard specific information presented elsewhere in this addendum, within the Hazard Annexes (Volume II), and community characteristics presented in the Community Profile (Appendix C), will be used as the local level rationale for the risk reduction actions identified in this addendum. The risk assessment process is graphically depicted in Figure CU-1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards overlap vulnerable systems.

Figure LC-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience

## Hazard Analysis Methodology

This NHMP utilizes a hazard analysis methodology that was first developed by FEMA circa 1983, and gradually refined by the Oregon Military Department's Office of Emergency Management 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 endeavors to reflect 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%.

This method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular 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.

In this analysis, severity ratings, and weight factors, are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario), and probability as shown in the table below. See Volume I, Section (3 Risk Assessment) for more information.

## Hazard Analysis

On May 4th, 2022, the Lake Chinook Fire District addendum steering committee developed their hazard vulnerability assessment (HVA), using the County's HVA as a reference. Changes from the County's HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to the Lake Chinook Fire District, which are discussed throughout this addendum.

Table LC-2 shows the HVA matrix for Lake Chinook with each hazard listed in order of rank from high to low. For local jurisdictions, 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.

**Table LC-2 Hazard Analysis Matrix – Lake Chinook Fire District**

Hazard	History	Maximum		Total Threat Score	Hazard Rank	County Hazard Rank
		Vulnerability	Threat Probability			
Wildfire	20	50	90	70	230	#1
Winter Storm	18	50	90	56	214	#2
Landslide/Debris Flow	10	45	80	63	198	#3
Windstorm	16	25	60	56	157	#4
Drought	18	35	40	63	156	#5
Flood	14	15	70	56	155	#6
Volcano Event	2	45	90	7	144	#7
Earthquake	2	20	100	7	129	#8

Source: Lake Chinook Fire District NHMP Steering Committee, and Jefferson County NHMP Steering Committee, 2021-22.

The following table categorizes the probability and vulnerability scores from the hazard analysis for the District and compares the results to the assessment completed by the Jefferson County NHMP Steering Committee (areas of differences are noted with **bold** text within the District’s ratings).

**Table LC-3 Probability and Vulnerability Comparison – Lake Chinook Fire District and Jefferson County**

Hazard	Lake Chinook		Jefferson County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	<b>Moderate</b>	High	High
Earthquake	Low	<b>Moderate</b>	Low	Low
Flood	High	<b>Low</b>	High	Moderate
Landslide/Debris Flow	<b>High</b>	<b>High</b>	Moderate	Low
Volcanic Event	Low	High	Low	High
Wildfire	High	High	High	High
Windstorm	<b>High</b>	<b>Moderate</b>	Moderate	Low
Winter Storm	High	High	High	High

Source: Lake Chinook Fire District NHMP Steering Committee, and Jefferson County NHMP Steering Committee, Update 2021-22.

## Drought

The steering committee determined that the District’s vulnerability to drought is **moderate**, which is lower than the county’s vulnerability. The District has a dependable water source that is not affected by regional agricultural droughts. The steering committee noted that drought has become more common in their region, and thus estimated that the probability of a drought event affecting the District is **high**. The biggest impact of drought in Lake Chinook FD is the impact to fuels; further drying out wildfire fuels in the event of a drought can result in a greater threat of wildfire. There is no threat to agriculture from drought as there is no agricultural activity in the District. Extended drought can affect the water levels in the region at large, for residents, recreation, and other uses.

*For more information on the Drought Hazard (including history and extent) see the Drought Annex in Volume II.*

## **Earthquake**

The steering committee determined that the District's vulnerability to earthquakes is **moderate**, which is higher than the county's vulnerability. There's no past "recent" history of earthquakes in Jefferson County or Lake Chinook; as such the probability of an earthquake event is **low**. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake. Additionally, the Lake Chinook Fire District is susceptible to isolation given its remote location. Should an earthquake damage Jordan Road, the community may find itself isolated. The two suspension bridges in Lake Chinook are also at high risk of collapse in the event of seismic activity.

*For more information on the Earthquake Hazard (including history and extent) see the Earthquake Annex in Volume II.*

## **Flood**

The steering committee determined that the District's vulnerability to flood is **low**, which is lower than the county's vulnerability. The District is located near Crooked, Deschutes, and Metolius Rivers, as well as Lake Billy Chinook, whose water level is regulated by the Federal Energy Regulatory Commission. Juniper Creek is the only waterway that regularly floods, though with little impact to critical infrastructure, people or property. The probability of a flood event in the Lake Chinook Fire District is **high**.

*For more information on the Flood Hazard (including history and extent) see the Flood Annex in Volume II.*

## **Landslide**

The steering committee determined that the District's vulnerability to landslide is **high**, which is higher than the county's vulnerability. The main access point to Lake Chinook Fire District, Jordan Road, is a 13-mile, winding canyon road with steep cliffs. During heavy rains and winter storms, this roadway is highly likely to experience landslide events. Any such landslide would affect access to the area by delaying traffic and commuters, and potentially cutting off the community's main ingress and egress for the canyon. The only other option to leave the District is a partially maintained road to Sisters, which is unreliable and requires high clearance for vehicles. The probability of a landslide event is **high**.

*For more information on the Landslide Hazard (including history and extent) see the Landslide Annex in Volume II.*

## **Volcanic Event**

The steering committee determined that the District's vulnerability to a volcanic event is **high**, which is the same as the county's vulnerability. While a volcanic event may not have a



direct impact on the Lake Chinook Fire District, the ash fallout from an event in the Cascades could potentially affect the District, especially for people with respiratory problems. There is also potential for people in the area to be evacuated should an eruption occur. The steering committee acknowledged that because a volcanic event has not happened in the recent past, the threat of an eruption is ever present. Therefore, the steering committee determined that the probability of a volcanic event is **low**.

*For more information on the Volcanic Hazard (including history and extent) see the Volcanic Annex in Volume II.*

## **Wildfire**

The steering committee determined that the District's vulnerability to wildfire is **high**, which is the same as the county's vulnerability. Wildfires have increased in intensity and severity over the past decade. Eight out of the ten wildfires in the past eight years reached over 1000 acres in the initial operational period (usually 12 hours). Our fuels are juniper trees with bitterbrush, sagebrush and grasses. These range fires have a typical rate of spread of approximately 80 chains/hr. In the Jefferson County Community Wildfire Protection Plan (CWPP) risk assessment, the four subdivisions within the Lake Chinook Fire District are all rated as "extreme risk" with two subdivisions receiving a "High Density Extreme" rating. The impact of late season rains can also be significant on fuel loads in the District, resulting in longer, dryer grasses leading into the wildfire season. The probability of a wildfire affecting the District is **high**. The Jefferson County CWPP can be found at <https://www.jeffco.net/ps/page/jefferson-county-community-wildfire-protection-plan>.

*For more information on the Wildfire Hazard (including history and extent) see the Wildfire Annex in Volume II.*

## **Windstorm**

The steering committee determined that the District's vulnerability to a windstorm is **moderate**, which is higher than the county's vulnerability. Windstorms occur during both the winter and summer months coming either with cold air or, in some cases, with thunderstorms. In rare instances there is the risk of tornadoes in the area. The last recorded tornado in Jefferson County was a F0 tornado that touched down on June 9, 2004 on the west side of Madras. A storage shed which had been bolted to a concrete slab was picked up by the tornado and sent two to three hundred feet into the air, clearing two fences and landing next to a tree. Additionally, a windstorm occurred in May 2020 which caused major damage in Lake Chinook Fire District. The District experienced high winds and debris in a small portion of the area; the State Park experienced higher winds and greater damage than the rest of the District. Windstorms occur frequently in the Lake Chinook Fire District; as such the probability of a windstorm event is **high**.

*For more information on the Windstorm Hazard (including history and extent) see the Windstorm Annex in Volume II.*

## Winter Storm

The steering committee determined that the District’s vulnerability to a winter storm is **high**, which is the same as the county’s vulnerability. Death rarely results from winter storms, but given that Lake Chinook has one main access road that is maintained by the County, there are significant impacts to residents during winter storms when the road is iced over. Additionally, the smaller roads in Lake Chinook Fire District are not plowed, and Jordan Road, the main access road, is not sanded. This can lead to residents being trapped in their homes and in the canyon for extended periods of time. This can also limit the ability of emergency services and other service providers to reach residents or address impacts of the storm. Considering the history of winter storms in the region the probability of a winter storm event is **high**.

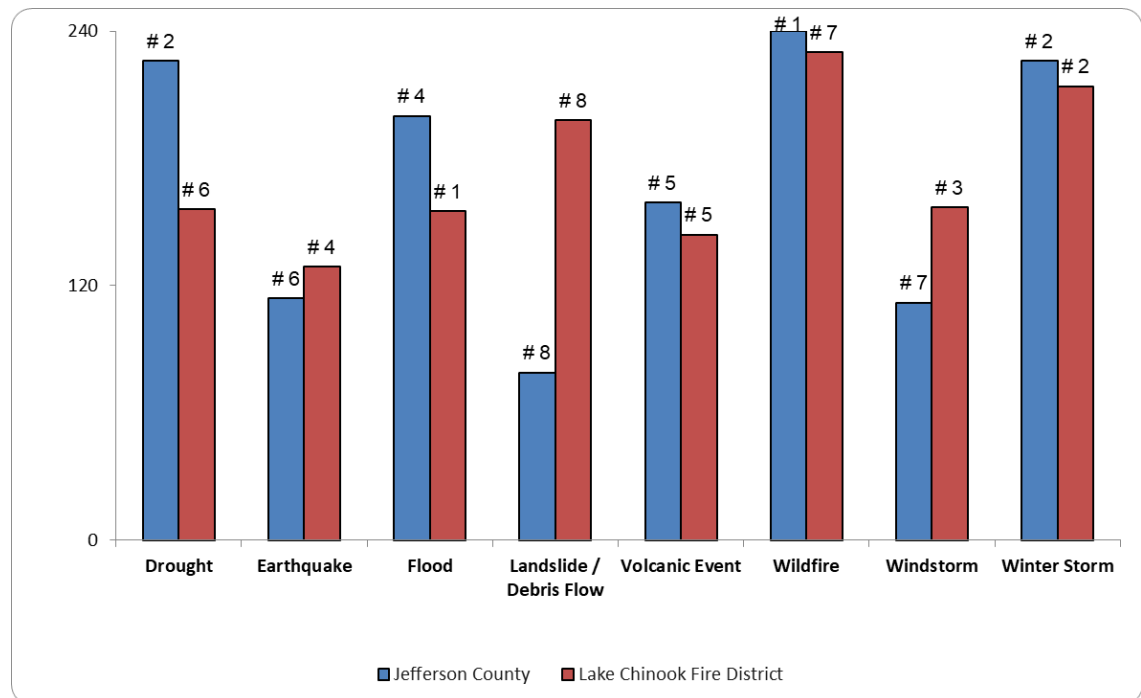
*For more information on the Winter Storm Hazard (including history and extent) see the Winter Storm Annex in Volume II.*

### Summary

The figure below presents a summary of the hazard analysis for the Lake Chinook Fire District and compares the results to the assessment completed by the Jefferson County NHMP Steering Committee.

In terms of history, probability, vulnerability, and maximum threat, the hazard analysis for the district overall rated their threat to earthquake, landslide, and windstorm higher than the county.

**Figure LC-2 Overall Hazard Analysis Comparison – Culver and Jefferson County**



Source: Lake Chinook Fire District NHMP Steering Committee, and Jefferson County NHMP Steering Committee, 2021-22.

## Mitigation Plan Mission

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

The mission of the Jefferson County NHMP is to:

*To create a disaster-resilient Jefferson County*

The 2022 local steering committee reviewed the 2021 plan mission statement for the county and agreed it accurately describes the overall purpose and intent of this plan.

## Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jefferson County citizens, 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 particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

Goal 1: Save lives and reduce injuries

Goal 2: Minimize and prevent damage to public and private buildings, infrastructure, and services.

Goal 3: Increase cooperation and coordination among private partners with local, state, tribal and federal entities.

Goal 4: Increase education, outreach and awareness.

Goal 5: Protect natural and cultural resources.

Goal 6: Ensure the plan has direct linkages to efficient and effective recovery strategies.

Goal 7: Reduce economic impacts of natural disasters.

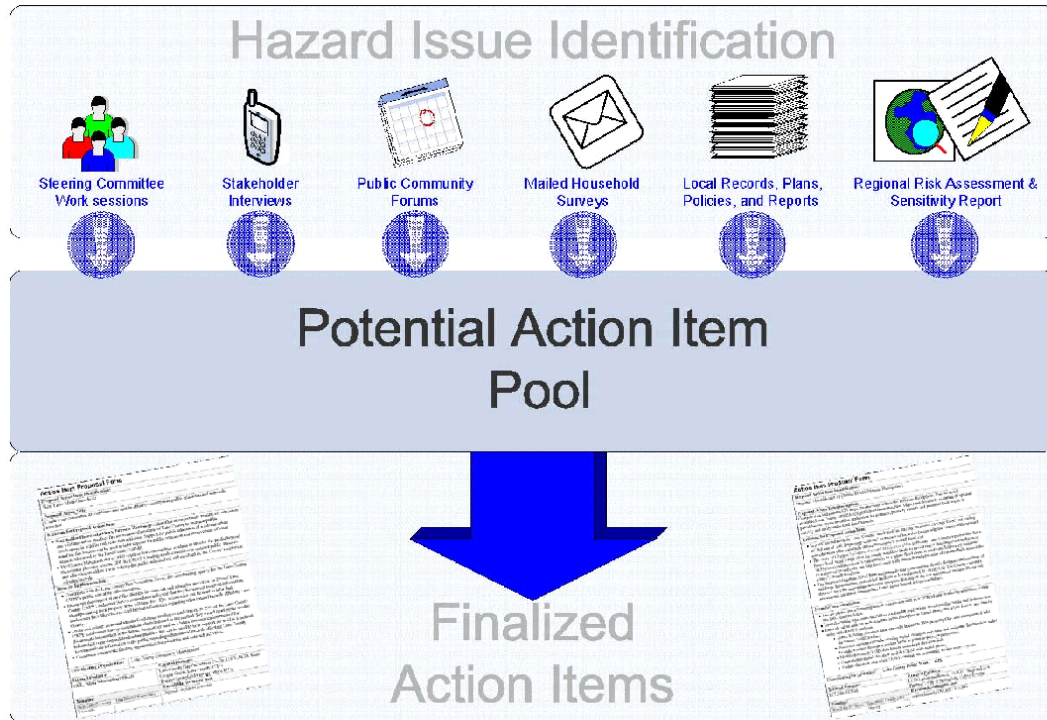
(Note: although numbered the goals are not prioritized.)

## Mitigation Plan Action Items

Short- and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. They address both multi-hazard (MH) and hazard-specific issues. Action items can be developed through a

number of sources. The figure below illustrates some of these sources. A description of how the plan’s mitigation actions were developed is provided below.

**Figure LC-3 Development of Action Items**



Copyright 2006 The Partnership for Disaster Resilience – Community Service Center University of Oregon

Source: Oregon Partnership for Disaster Resilience

## Action Item Worksheets

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described within Volume I, Section 3 (Mitigation Strategy). The District specific action item worksheets are located in Attachment 1, Action Item Forms.

The District is also a party to several actions described in the County NHMP; each jurisdiction listed on the County Action Item forms as an “Affected Jurisdiction” will contribute to and work towards completion of that action as it pertains to their jurisdiction.

## **Action Item Development Process**

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions by the steering committee. A number of actions identified by the County steering committee include the District as an affected jurisdiction; these are broad actions that include implementation components at both the County and District level. All actions were reviewed by the committee and revised as necessary before becoming a part of this document.

# ATTACHMENT I: ACTION ITEM FORMS

## Action Item Forms

The action item forms portray the overall action plan framework and identify linkages between the plan goals, partnerships (coordination and partner organizations), and actions. Table LC-4 provides a list of actions for the District. The pages that follow include individual forms for each mitigation action.

**Table LC-4 Action Item Timelines, Status, High Priority and Related Hazards**

Action Item	Timeline	Status	High Priority	Related Hazard								
				Drought	Earthquake	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm	
MH #1	Short Term	New	Yes		X		X	X	X	X	X	X
MH #2	Short Term	New	Yes		X		X		X	X	X	X
MH #3	Long Term	New			X		X	X	X	X	X	X
LS#1	Short Term	New	Yes				X					
WF#1	Medium Term	New	Yes						X			
WF#2	Ongoing	New	Yes						X			
WS#1	Short Term	New	Yes									X

<b>Action Item: Landslide #1</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Conduct a study of the risks of landslide in the Lake Chinook Fire District, and implement actions to improve conditions and reduce risks.		Goals 1-3, 5-7	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
Public Works may have an existing plan for Jordan Road			
<b>Rationale for Proposed Action Item:</b>			
Landslides, mud flows, debris flows, and rockfalls are hazards that impact the access and egress to the Lake Chinook Fire District. These events occur naturally in the canyon several times a year. The canyons above Jordan Road seem to be extremely unstable. Factors include seasonal, climate, and weather-related phenomena have a direct effect on the extent of slides and debris flows. These risks are elevated during winter storms and severe thunderstorms. Given the extreme danger these hazards pose, the knowledge and understanding of a site's geology and risk of these hazards is essential in order to adequately plan, design, and construct a safe development.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Conduct a study of the geology and risk of landslide events in the Fire District. Increase County removal of rock. Continued surveys of slide prone area. Install netting to prevent rockfalls.		New. Added in 2022.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
Jefferson County, PGE, FEMA	High - More than \$100,000	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input checked="" type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Jefferson County Public Works		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		FEMA, OEM, DOGAMI	
<b>Form Submitted by:</b>	Lake Chinook Steering Committee		
<b>Action Item Status:</b>	NEW		

<b>Action Item: MH#1</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Improve access and egress to the Lake Chinook community and businesses.		Goal 1	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
Jefferson County Community Wildfire Protection Plan			
<b>Rationale for Proposed Action Item:</b>			
Access and egress are annually challenged due to wildfire, landslides and winter storms. Many of the bridges in Lake Chinook need repair. During storm events, landslides, or other emergencies in the winter, there is only one all-weather access road, which can become overloaded and damaged from excessive use in an emergency. Additionally, many vehicles are unable to access this road due to rough terrain, resulting in risk to human life during emergencies and natural disasters.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Improve secondary access route to Sisters. Repair Bridges. Create Temporary Refuge areas during wildfires. Improve winter maintenance on Jordan Road during winter storms.		NEW. Added in 2022.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
Jefferson County USDA Rural Development ODOT	High (more than \$100,000)	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input checked="" type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Jefferson County		
<b>Internal Partners:</b>		<b>External Partners:</b>	
County Public Works		State Parks, PGE, ODOT	
<b>Form Submitted by:</b>	Lake Chinook Addendum Steering Committee		
<b>Action Item Status:</b>	NEW		



<b>Action Item: Multi-Hazard #2</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Improve adequacy of emergency services radio communication within the Cove Palisades State Park		Goal 1	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
FERC licensing Plan with PGE			
<b>Rationale for Proposed Action Item:</b>			
Currently Public service agencies do not have adequate radio reception while responding to life safety incidents in the Cove Palisades State Park and on Lake Billy Chinook.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Install public service emergency services repeaters so that LCF&R and JCFD#1 radios have reception in the Cove Palisades State Park and Lake Billy Chinook		New. Added in 2022.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
Jefferson County, PGE, FEMA, LCF&R JCFD, JCSO, OPRD	50,000	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input checked="" type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Jefferson County		
<b>Internal Partners:</b>		<b>External Partners:</b>	
OPRD		Jefferson County, PGE, FEMA, LCF&R JCFD, JCSO	
<b>Form Submitted by:</b>	Lake Chinook Fire District Steering Committee		
<b>Action Item Status:</b>	NEW		

Action Item: Multi-Hazard #3	Alignment with Plan Goals:	High Priority Action Item?
Rehabilitate the Deschutes River Bridge at Lake Billy Chinook, and its sister structure crossing the Crooked River arm of the lake.	Goals 1, 2, 5-7	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
Jefferson County 2020 Transportation System Plan. Funding from a grant to the Jefferson County Public Works Dept. for an estimate of \$10.5 million to conduct “spot repairs” on the above-mentioned bridges.		
<b>Rationale for Proposed Action Item:</b>		
<p>The unique nature of these suspension bridges and their large size warrant ongoing proactive rehabilitation to protect the substantial investment they represent. The action item will be to preserve, maintain and improve these two essential bridges, as they provide the only year-round access and egress to the Plateau west of aforementioned rivers, to include the Cove Palisades State Park, Rim Park, Forest Park, Chinook Village, Three Rivers Subdivision, and the Perry South and Monty campgrounds,</p> <p>A) Crooked River Bridge; A two lane bridge built in 1963 rehabbed in 1998 currently has an 11.5 sufficiency score out of a possible 0-100. (0 being worst 100 being best) ODOT most recent report in May 2021 offers a “Fair” condition report of the bridge.</p> <p>B) Deschutes River Bridge; a single lane, “one vehicle occupancy at a time” built in 1963 rehabbed in 2002 with a 2021 sufficiency score of 23.9. ODOT report in May 2021 indicates the Deschutes bridge is in “Fair” condition.</p> <p>Having said that, these two bridges are the only year-round access and egress. A secondary route offers an unimproved road not usable during inclement weather to most if not all vehicles due to many contributing issues such as. rough terrain, heavy snow, washout due to flooding, wildfires etc. Resulting in the bridges to be the only access for more than 1,000 properties with an expansive summer seasonal population from May -September. It is worth mentioning Lake Billy Chinook is the 3rd most popular water recreational destination in the State of Oregon. The unprecedented exchange of land parcels being bought/sold has significantly impacted the growth of the population and the way it is used. Meaning there is an obvious switch from the previous abundance of the “absentee landowner” to the “new landowners” push to improve the land to make it either a camp spot, install a tiny home or new construction to build a shop or home. The population explosion which began in 2016 has only increased in pressure since the COVID-19 pandemic’s start significantly increasing the use of both bridges.</p>		
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>
<ol style="list-style-type: none"> <li>1) Being the grant is competitive state wide we are hopeful the obvious need for funds weighs heavy enough to win.</li> <li>2) Improve Geneva Road (the secondary access) from Jordan to Jefferson/Deschutes County Line.</li> <li>3) Toll options, for commercial grade/weight vehicles and/or passenger vehicles</li> </ol>		Improvements have been made to Geneva Road but it is still a gravel/dirt unimproved road.
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>
ODOT, Jefferson County, state/federal grants, PGE	HIGH - Spot Repair Only \$10.5 Million	<input type="checkbox"/> Ongoing <input checked="" type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)

<b>Coordinating Organization:</b>	Lake Chinook Fire District
<b>Internal Partners:</b>	<b>External Partners:</b>
Public Works	State Parks
<b>Form Submitted by:</b>	
<b>Action Item Status:</b>	NEW

<b>Action Item: Wildfire #1</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Enhance water infrastructure and resources for firefighting and fire suppression.		Goals 1, 2, 5-7	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
NONE			
<b>Rationale for Proposed Action Item:</b>			
Currently there is very little water infrastructure or resources for firefighting and fire suppression. We currently have to rely on water tenders to shuttle water to all fire incidents. We have several large water tanks buried throughout the area to help provide water resources and 20,000 gallons at the fire station which we store.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
<ul style="list-style-type: none"> <li>- apply for any grant/finance resources that could adequately fostered fire suppression resources.</li> <li>- Water storage in tanks to provide central access points for supply</li> <li>- access to grant and financing technical assistance for our agency achieve goals for any infrastructure</li> </ul>		New. Added in 2022.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
USDA, FEMA, Department of Commerce Economic Development Administration (EDA), HUD, EPA	\$5,000,000	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input checked="" type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Jefferson County Public Works		
<b>Internal Partners:</b>	<b>External Partners:</b>		
	Jefferson County, PGE, FEMA, Lake Chinook Fire & Rescue		
<b>Form Submitted by:</b>	Lake Chinook Steering Committee		
<b>Action Item Status:</b>	NEW		

Action Item: Wildfire #2	Alignment with Plan Goals:	High Priority Action Item?
Implement the priority action items for Lake Chinook identified within the 2022 Jefferson County Community Wildfire Protection Plan (CWPP)	Goals 1-7	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
2022 Jefferson County CWPP The Cohesive Wildland Fire Management Strategy		
<b>Rationale for Proposed Action Item:</b>		
<p>Community Wildfire Protection Plans (CWPPs) are the result of the Healthy Forest Restoration Act of 2003 which, as part of a historical bipartisan legislative effort, call for communities to collaborate with state and local agencies to determine priorities for hazardous fuels projects on federal and private lands in the wildland-urban interface (WUI). The Jefferson County CWPP is a county-wide, strategic assessment of the risks, hazards, and mitigation and prevention opportunities associated with wildfire in our communities.</p> <p>For thousands of years wildland fires have moved across Oregon’s landscape. In the early 1900’s, European settlers began to suppress these fires resulting in unnatural fuels buildup. As a result, wildfires have increasingly impacted communities, especially those developing in the Wildland-Urban Interface (WUI), an area where wildland fuels and residences are intermixed. The result has been an increase in the number of homes lost each decade to wildfire. With a growing population living in and near the WUI, and often away from structural and wildland response, strategic, collaborative, and community-focused strategies are essential to keeping our communities safe from the threat of wildfire. Lake Chinook Fire &amp; Rescue communities are rated Extreme or High Density Extreme risk per the CWPP, meaning these communities are particularly vulnerable to wildfire and require a multi-faceted, strategic approach to risk reduction.</p> <p>The CWPP identifies the following as priority action items for the Lake Chinook Fire &amp; Rescue District:</p> <ul style="list-style-type: none"> <li>• <i>Defensible Space:</i> proper management of vegetation surrounding homes or structures to reduce the threat from wildfire, and increase number of Firewise communities</li> <li>• <i>Fuels Reduction:</i> reduce fire intensity and improve potential control locations through activities like creation of fuel breaks for/by undeveloped properties and large parcel landowners.</li> <li>• <i>Community Infrastructure:</i> development of water supply, access/egress improvements, evacuation routes, communication sites and water storage facilities, and EMS facilities, improve resiliency of critical community infrastructure (e.g. water storage and infrastructure, especially for RFPAs)</li> <li>• <i>Fire Readiness:</i> EMS training, apparatus acquisition, capacity and staffing, communications and fire suppression equipment, and pre-planning/triage/classification.</li> <li>• <i>Fire Prevention and Mitigation Education:</i> educating the public on wildfire risks and promoting fire safety mitigation practices using materials from nationally and locally recognized fire prevention education programs (e.g. Firewise; Ready, Set, Go; Fire Adapted Communities; Keep Oregon Green; OSU-Extension resources; etc.)</li> <li>• Additional infrastructure and resources for firefighting and fire suppression</li> <li>• infrastructure capable of providing adequate water services for fire suppression</li> </ul>		

<b>Ideas for Implementation:</b>		<b>Action Item Status</b>
<p>Given the nature of the priorities and differences between communities within the LCF&amp;R district, the approach for implementation will be multi-faceted and tailored to each circumstance. General implementation strategies may look like partnering where possible to pool resources and accomplish work on adjacent lands, offer reimbursement or other incentives for landowners to maintain their property, host public meetings and engagement events that include education on fire risk and defensible space standards. Limitations prohibit the effective development of partners necessary to do landscape scale mitigation projects. BLM will not engage a project without a NEPA study and the will not do a NEPA study for small postage stamp projects. A Multi-Jurisdictional Wildfire Mitigation Plan is necessary to bring all the land managers and landowners to the table and BLM to do a NEPA study.</p>		New - 2022
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>
Local, state, and federal (e.g. Title III, Oregon SB 762, FEMA)	N/A	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)
<b>Coordinating Organization:</b>	Lake Chinook Fire & Rescue	
<b>Internal Partners:</b>	<b>External Partners:</b>	
	US Forest Service, BLM, Oregon Dept of Forestry, Oregon Parks and Recreation, Oregon State Fire Marshal, Central Oregon Intergovernmental Council, Portland General Electric, Jefferson County, Bureau of Indian Affairs	
<b>Form Submitted by:</b>	Shelby Knight, Resilience Planner for COIC	
<b>Action Item Status:</b>	NEW	

<b>Action Item: Winter Storm #1</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Develop ongoing plan to reduce the hazards from Winter Storms in the Grandview/Lake Chinook Fire District area.		Goals 1, 2, 4, 6, 7	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
None			
<b>Rationale for Proposed Action Item:</b>			
The combined perils of snow, ice, freezing temperatures, and high winds pose multiple risks, including threats to public safety and the potential to cause major property damage and disruption to commerce. Winter storm conditions can threaten transportation safety limiting access and egress through the canyon during the event and result in snow or ice accumulations that can collapse roofs, topple trees and cause landslides. Planners should also be mindful of the impacts that severe winter storms may have on vulnerable populations especially the elderly who live in the area.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Increase County snow removal along SW Jordan Rd. BOC approve sanding of ice prone areas of SW Jordan Rd LCF&R to acquire a 4x4WD Ambulance. County to increase snow removal in subdivisions of Rim Park, Forest Park and Air Park.		NEW. Added in 2022.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
Jefferson County, PGE, FEMA, OEM	Medium - \$50,000 – \$100,000	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input checked="" type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Jefferson County Public Works		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Lake Chinook Communities	
<b>Form Submitted by:</b>	Lake Chinook Steering Committee		
<b>Action Item Status:</b>	NEW		

## ATTACHMENT 2:

### ACTION ITEM FORM TEMPLATE

Action Item:	Alignment with Plan Goals:	High Priority Action Item?
	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>
		<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)
<b>Coordinating Organization:</b>		
<b>Internal Partners:</b>		<b>External Partners:</b>
<b>Form Submitted by:</b>		
<b>Action Item Status:</b>		



# CITY OF MADRAS ADDENDUM

## Purpose

This document serves as an update for the City of Madras' Addendum to the Jefferson County Natural Hazard Mitigation Plan (NHMP). The City of Madras' original addendum to Jefferson County's NHMP was completed in 2008. The City conducted an update to its original addendum in 2013, which coincided with the final stages of an update to the Jefferson County NHMP. The City's Addendum is considered part of the county's multi-jurisdictional plan, and meets the following requirements: (1) Multi-jurisdictional Plan Adoption §201.6(c)(5), (2) Multi-jurisdictional Participation §201.6(a)(3), (3) Multi-Jurisdictional Risk Assessment §201.6(c)(2) (iii), and (4) Multi-jurisdictional Mitigation Strategy §201.6(c)(3) (iv).

A description of the city specific planning and adoption process follows, along with detailed community specific action items. Information about the city's risk relative to the county's risk to natural hazards is documented in the addendum's Hazard Analysis and Issue Identification section. The section considers how the city's risk differs from or matches that of the county's; additional information on Risk Assessment is provided within the Jefferson County NHMP's Section 2 – Risk Assessment.

Updates to Madras' city addendum are further discussed throughout the plan and in the Jefferson County NHMP Planning and Public Process Appendix, which provides an overview of alterations to the document that took place during the city addendum update process.

## How was the Plan Developed?

The NHMP was developed by the Jefferson County Natural Hazards Mitigation Plan steering committee, while this addendum was created by the City of Madras steering committee. The Jefferson County Emergency Manager was designated as the NHMP's convener and will take the lead in implementing, maintaining and updating the plan. Locally, the City of Madras convened a steering committee for the purpose of developing and updating the city's addendum.

### 2008 Plan Development

In Fall 2005, the Oregon Natural Hazards Workgroup (ONHW, now the Oregon Partnership for Disaster Resilience) at the University of Oregon's Community Service Center partnered with the Department of Geology and Mineral Industries (DOGAMI) and the Southeast Oregon Region (Harney and Malheur as well as Jefferson and Lake) counties to develop a Pre-Disaster Mitigation Planning Grant proposal. Each county joined the Partnership for Disaster Resistance and Resilience (The Partnership) by signing (through their County Commissions) a Memorandum of Understanding for this project. FEMA awarded the Southeast Oregon Region grant to support the development of the natural hazard mitigation plans for the four counties in the region. ONHW, DOGAMI and the communities were

awarded the grant in the Fall of 2005 and local planning efforts in this region began in the Fall of 2006 and county and city meetings proceeding in 2007.

The Jefferson County Multi-jurisdictional NHMP was formally adopted by Jefferson County on November 26, 2008 and approved by FEMA on December 16, 2008 (Madras approved its addendum on January 13, 2009). To maintain its compliance with the Disaster Mitigation Act of 2000 (DMA2K), the plan required an update by December 16<sup>th</sup>, 2013.

## **2014 Plan Update**

The City of Madras created an addendum to the Jefferson County NHMP in 2014, facilitated by Oregon Partnership Disaster Resilience (OPDR). Steering committee members contributed data, reviewed, and provided guidance towards the community profile, risk assessment, mitigation strategy (action items), and implementation and maintenance plan. The Madras Addendum to the Jefferson County NHMP was adopted on March 25, 2014 and the NHMP and Addendum were approved by FEMA on February 9, 2014. To maintain its compliance with the Disaster Mitigation Act of 2000, the plan required an update by February 9<sup>th</sup>, 2018.

## **2021 Plan Update**

The Jefferson County plan and the City of Madras addendum were updated in 2021 to maintain compliance with the Disaster Mitigation Act of 2000. The local steering committee was closely involved throughout the 2021 update process of the county plan and served as the local oversight body. The local steering committee met on one occasion: May 18<sup>th</sup>, 2021 to update the city's addendum (see Appendix B for more information). Steering committee members contributed data, reviewed, and provided guidance towards the community profile, risk assessment, mitigation strategy (action items), and implementation and maintenance plan. The addendum reflects effort from the formal meeting and during subsequent informal meetings between members of the steering committee and with Central Oregon Intergovernmental Council (COIC).

## **Public Participation**

An open public involvement process is essential to the development of an effective plan. In order to develop a comprehensive approach to reducing the effects of natural disasters, the planning process should include opportunities for the public, neighboring communities, local and regional agencies, as well as, private and nonprofit entities to comment on the plan. COIC provided a publicly accessible project webpage for the general public in order to make meeting materials and contact information available throughout the 2021 update process.

In addition, COIC administered a public opinion survey to obtain additional input from the public regarding the County's risks, vulnerabilities, hazards history, and mitigation strategies. See Volume IV, Appendix F for more information.

Updating the mitigation plan is a requirement to gain eligibility for the Federal Emergency Management Agency's Pre-Disaster Mitigation, Hazard Mitigation, and Flood Mitigation Assistance grant Programs. This project is funded through the Federal Emergency Management Agency's (FEMA) FY20 Post Fire Mitigation Grant Program (HMGP-PF-FM-5195-OR-4).

The Madras Addendum to the Jefferson County NHMP was adopted on [DATE] and approved by FEMA on [DATE]. The Jefferson MNHMP was approved by FEMA on [DATE]. The plan is effective for Jefferson County and Madras through [DATE].

The Jefferson County Natural Hazard Mitigation Plan is the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee and the process see this NHMP's Volume I, Acknowledgements and Executive Summary, and Volume IV, Appendix B.

## **How Were the Action Items Developed?**

The City's action items were originally developed through a two-stage process in 2014. In stage one, OPDR facilitated a work session with the working group to discuss the city's risk and to identify potential issues. In the second stage, OPDR developed potential actions based on the hazards and the issues identified by the working group. During the 2021 process, re-evaluated the Action Items with the local steering committee and updated actions, noting what accomplishments had been made, if the actions were still relevant; and supporting the development of any new action items. The City's actions are listed below. For more detailed information on each action, see the action forms at the end of this Addendum.

**Table MA-1 City of Madras Action Items**

2021 Action Items	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status
MH #1		Obtain reverse 9-1-1 (automated notification system) for hazard warning purposes.	Police Department	City Council, OEM, FEMA, DHS	Long Term	Complete
MH #2		Encourage private utility companies to underground existing power lines.	Public Works	City Council, Community Development, Pacific Power, Central Oregon Electric Co-op	Ongoing	Remove
MH #3		Integrate Madras' NHMP addendum into its comprehensive plan.	Community Development	City Council, Emergency Management, FEMA, OPDR, DLCD, OEM	Short Term	Complete
EQ #1		Seismically retrofit Madras Elementary School to reduce the facility's vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.	Jefferson County SD 509J	Jefferson County, City of Madras, OEM, DOGAMI, FEMA, ODE, Business Oregon	Long Term	Complete
EQ #2	Yes	Seismically retrofit Madras High School to reduce the facility's vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.	Jefferson County SD 509J	Jefferson County, City of Madras, OEM, DOGAMI, FEMA, ODE, Business Oregon	Long Term	Deferred
EQ #3		Seismically retrofit Westside Elementary School to reduce the facility's vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.	Jefferson County SD 509J	Jefferson County, City of Madras, OEM, DOGAMI, FEMA, ODE, Business Oregon	Long Term	Complete
EQ #4	Yes	Seismically retrofit St. Charles - Madras Hospital to reduce the facility's vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.	St. Charles - Madras Hospital	Jefferson County, City of Madras, OEM, DOGAMI, FEMA, Business Oregon	Long Term	Deferred
FL #1		Conduct education to teach government staff, elected officials, and homeowners about no adverse impact (NAI) floodplain management practices.	Community Development	Public Works, DLCD, OEM, FEMA	Ongoing	Deferred
FL #2		Remove city facilities (e.g., Public Works Building) from the special flood hazard area.	Public Works	Community Development, FEMA, OEM, DLCD- NFIP Coordinator	Ongoing	Deferred
FL #3	Yes	Create a city-level incentive program to remove and relocate flood risk properties out of the floodway, and convert the land to open space.	Community Development	OEM, FEMA	Ongoing	Deferred

Source: City of Madras NHMP Steering Committee, 2021

**Table MA-1 City of Madras Action Items (continued)**

FL #4		Elevate the C Street Bridge.	Public Works	Community Development, FEMA, OEM	Long Term	Deferred
FL #5	Yes	Trim large trees and brush along Willow Creek.	Public Works		Ongoing	Ongoing
FL #6	Yes	Update the Madras Flood Insurance Rate Maps.	Community Development	Planning Commission, FEMA, OEM, ACOE, Silver Jackets, DOGAMI, DLCD - NFIP Coordinator	Long Term	Ongoing
FL #7	Yes	Replace the B Street pedestrian footbridge north of the Public Works building.	Community Development	Public Works, OEM, FEMA	Short Term	Complete
FL #8		Implement and update actions identified in the City of Madras Flood Mitigation Plan.	Community Development	Silver Jackets	Short Term	Deferred
FL #9	Yes	Update City Development Code to comply with NFIP Floodplain Development regulations	City of Madras	Community Development Department, DLCD, OEM, FEMA	Short Term	New
WF#1		Hire additional firefighter staff to fight wildland fires in the summer.	Jefferson County Fire District #1	City of Madras, Jefferson County, PGE, COIC	Ongoing	New
WF#2	Yes	Identify Wildland Fuel Breaks for juniper clearing, in and around the city limits of Madras along with the county.	Jefferson County Fire District #1	City of Madras, Jefferson County, BLM, ODF, USFS	Ongoing	New
WF#3		Include defensible space standards in City development code.	City of Madras	Community Development, Jefferson County	Short Term	New

Source: City of Madras NHMP Steering Committee, 2021

# PLAN IMPLEMENTATION AND MAINTENANCE

## How Will the Plan be Implemented?

The City Council will be responsible for adopting the City of Madras addendum to the Jefferson County NHMP. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the city addendum is considered part of the county plan, the city will look for opportunities to partner with the County. The City's working group will convene after re-adoption of the City of Madras addendum annually in the spring, before the wildfire season. The City will coordinate with the Jefferson County Convener. The City's Community Development Director will serve as the local convener and will be responsible for convening the local steering committee. The convener will also remain active in the County's planning process.

## Implementation through Existing Programs

Many of the Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Madras will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

The City of Madras currently has the following plans that relate to natural hazard mitigation:

- Madras Comprehensive Land Use Plan (March 2018) relates to natural hazard mitigation through its section that outlines Madras' goals, policies, and implementation measures
- The City of Madras Flood Mitigation Plan (2005) outlines land use regulations and mitigation goals related to flooding from Willow Creek.

The steering committee and the community's leadership have the option to add or implement action items at any time. This allows the steering committee to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest priority. When new actions are identified, they should be documented using the action item form. Once a proposed action form has been submitted to the convener, the action will become part of the City's addendum.

## Continued Public Participation

Keeping the public informed of the city's efforts to reduce the city's risk to future natural hazards events is important for successful plan implementation and maintenance. The city is committed to involving the public in the plan review and updated process. The City Addendum along with the County Plan will be posted on-line on COIC's website (<https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/jefferson-county-nhmp/>), as well as the County and City websites, so that the public may view the plan at any time.

In addition, natural hazards information dissemination is conducted throughout the year when opportunities present themselves via the city offices and website.

## Plan Maintenance

The Jefferson County Natural Hazard Mitigation Plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

The City of Madras Natural Hazard Mitigation Addendum includes three sections: 1) a Community Profile and Asset Identification 2) Hazard Identification and Risk Assessment, and 3) Mitigation Strategy section.

# COMMUNITY PROFILE ASSET IDENTIFICATION

This section provides information about city specific asset identification. For information on the characteristics of Madras, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Appendix C, Community Profile. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

We live in a place with a varied geography and communities. We would like to recognize and acknowledge the indigenous land of the Confederated Tribes of Warm Springs, Molalla, Paiute, Klamath, Modok, Yahooskin Band of Snake Indians, and Tribes of Middle Oregon. We want to recognize the people that came before us and honor their traditions and stewardship of the land. Acknowledgement is a simple, powerful way of showing respect for Indigenous People's history and culture.

## Asset Identification

The following assets identified by the City of Madras were gathered from the Asset Identification meetings held with community members on July 22, 2008. These assets were confirmed and updated by the City of Madras steering committee on two occasions; **August 15<sup>th</sup>, 2013 and May 18<sup>th</sup>, 2021.**

The City of Madras has the following assets:

### Critical and Essential Facilities

- Jefferson County Fairgrounds
- City Police
- Madras City Hall
- Public Works
- Madras Municipal Airport
- St Charles - Madras Hospital
- County Courthouse
- Highways 97 and 26

### Jefferson County, State, and Federal Critical and Essential Facilities (located in Madras):

- Jefferson County Fire District #1
- Oregon State Police
- Jefferson County Sheriff's Office
- Deer Ridge Correctional Institute
- Oregon Department of Transportation - Maintenance Yard



- Jefferson County EMS

## **Madras School District**

- Madras and Buff Elementary Schools
- Jefferson County Middle School
- Madras High School
- Madras Performing Arts Center
- 509J School District Administrative Offices
- COCC Madras Campus - university (not madras school district)

## **Social Service Providers**

Please see <https://www.thrivecentraloregon.org/services> for a comprehensive list of resource providers throughout Central Oregon, including Madras.

## **Population**

Madras' 2020 PSU certified population estimate is 6,470<sup>1</sup>. The City's population has grown an estimated 424 people or 7.01% since the 2010 Census. Madras' acknowledged Coordinated Population Forecast is 8,423 people by the year 2032, which represents an increase of 1943 people or 30.18% between 2021 and 2032.

## **Environmental Assets**

- Juniper Hills Park
- Bean Park
- Sahalie Park
- Willow Creek

## **Economy**

- EDCO

## **Cultural and Historic Resources**

- Jefferson County Library
- Old County Courthouse

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<sup>1</sup> <https://www.pdx.edu/population-research/population-estimate-reports>

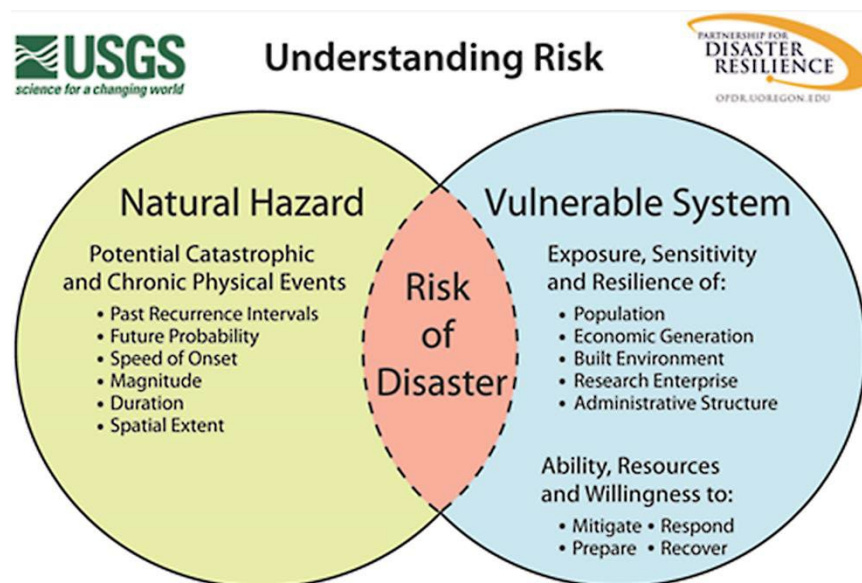
# RISK ASSESSMENT

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact 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 information presented below, along with hazard specific information presented elsewhere in this addendum, within the Hazard Annexes (Volume II), and community characteristics presented in the Community Profile (Appendix C), will be used as the local level rationale for the risk reduction actions identified in this addendum. The risk assessment process is graphically depicted in Figure MA-1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards overlap vulnerable systems.

Figure MA-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience

## Hazard Analysis Methodology

This NHMP utilizes a hazard analysis methodology that was first developed by FEMA circa 1983, and gradually refined by the Oregon Military Department's Office of Emergency Management 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 endeavors to reflect 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%.

This method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular 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.

In this analysis, severity ratings, and weight factors, are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario), and probability as shown in the table below. See Volume I, Section 2 (Risk Assessment) for more information.

## Hazard Analysis

On May 18, 2021, the City of Madras addendum steering committee developed their hazard vulnerability assessment (HVA), using the County's HVA as a reference. Changes from the County's HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to the City of Madras, which are discussed throughout this addendum.

Table MA-2 shows the HVA matrix for Madras showing each hazard listed in order of rank from high to low. 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.

**Table MA-2 Hazard Analysis Matrix – City of Madras**

Hazard	History	Vulnerability	Maximum Threat	Probability	Total Threat Score	Hazard Rank	County Hazard Rank
Flood	20	50	80	70	220	#1	#5
Winter Storm	18	45	90	63	216	#2	#3
Wildfire	20	50	80	63	213	#3	#1
Windstorm	18	35	70	70	193	#4	#4
Drought	16	40	50	63	169	#5	#2
Volcano	2	40	100	14	156	#6	#6
Earthquake	2	20	100	7	129	#7	#7
Landslide/Debris Flow	12	10	20	28	70	#8	#8

Source: City of Madras NHMP Steering Committee, 2021.

Table MA-3 categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Jefferson County NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings).

**Table MA-3 Probability and Vulnerability Comparison**

	<b>Madras</b>		<b>Jefferson County</b>	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	High	High	High
Earthquake	Low	<b>High</b>	Low	Moderate
Flood	<b>High</b>	High	Moderate	High
Landslide/Debris Flow	<b>Moderate</b>	Low	Low	Low
Volcanic Event	Low	High	Low	High
Wildfire	<b>Moderate</b>	<b>Low</b>	High	High
Windstorm	<b>High</b>	Moderate	Moderate	Moderate
Winter Storm	High	High	High	High

Source: City of Madras NHMP Steering Committee, 2021.

## Drought

The steering committee determined that the city’s vulnerability to drought is **low**, which is lower than the county’s vulnerability. The city has a dependable water source that is not affected by regional agricultural droughts, thus the probability of a drought event affecting the city is **low**. Droughts impact individual farm owners, the agricultural industry as a whole, and other agricultural related sectors. Residents within Madras may be indirectly impacted by a drought, such as experiencing economic hardship from the agricultural and ranching industries. Drought events may increase the probability of wildfire events.

*For more information on the Drought Hazard (including history and extent) see the Drought Annex in Volume II.*

## Earthquake

The steering committee determined that the city's vulnerability to earthquakes is **high**, which is higher than the county's vulnerability. There's no past "recent" history of Earthquakes in Jefferson County or Madras; as such the probability of an earthquake event is **moderate**. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake. Madras Elementary School, Madras High School, Westside Elementary School, and are critical facilities within Madras that are identified as having a high, or very high collapse potential. Please see the earthquake hazard annex for further information. Additionally, the City of Madras is susceptible to isolation given that highways 97 and 26 and the Madras Municipal Airport are the only major transportation routes connecting the cities with the rest of the state. Should an earthquake damage these transportation routes, Madras may find itself isolated.

*For more information on the Earthquake Hazard (including history and extent) see the Earthquake Annex in Volume II.*

## Flood

The steering committee determined that the city's vulnerability to flood is **high**, which is higher than the county's vulnerability. A large portion of Madras is located in the Willow Creek floodway, including the County Community Development Department, the County Annex, City Public Works Buildings ("B" Street), the County Library, Madras Elementary School, and Madras High School. Additionally, there are two existing residential trailer parks in the floodplain: City Trailer Court and Sandstone Village. A portion of the city is located on a hill, and will not be impacted by floods. The last time there was any significant flooding was in the winter of 2006 when there was a rain on snow event. The flooding affected the Madras High School stadium, and the intersection of 4<sup>th</sup> and 5<sup>th</sup> streets with A and B Streets. Both north and south lanes of Highway 97 were shut down. The Willow Creek footbridge near the Lutheran Church was knocked off its foundation. Local businesses were also affected by flooding. However, the Community Repetitive Loss record for Madras identified zero repetitive loss buildings (for more information see Section 2 – Risk Assessment). Due to the history of floods in Madras the probability of a flood event is **high**.

The City is partnering with the Army Corp of Engineers to map the floodplain in Madras. The mapping and hydrologic modeling is complete and a preliminary Floodplain boundary has been drafted. The City will file a LOMAR with FEMA to formally adopt a new regulatory Floodplain map after the Willow Creek/J Street is expanded in 2022.

*For more information on the Flood Hazard (including history and extent) see the Flood Annex in Volume II.*

## Landslide

The steering committee determined that the city's vulnerability to landslide is **low**, which is the same as the county's vulnerability. There are no steep slopes that would directly affect the City of Madras. Landslide events would most likely impact Madras if a landslide closed Highway 97, Highway 26, or SW Culver Highway. Any such landslide would affect commerce

in Madras by delaying traffic and commuters. The probability of a landslide event is **moderate**.

*For more information on the Landslide Hazard (including history and extent) see the Landslide Annex in Volume II.*

## **Volcanic Event**

The steering committee determined that the city's vulnerability to a volcanic event is **high**, which is the same as the county's vulnerability. While a volcanic event may not have a direct impact on the City of Madras, the ash fallout from an event in the Cascades could potentially affect Madras, especially for people with respiratory problems. There is also potential for people in the area to be evacuated should an eruption occur. Considering past history, the probability of a volcanic event is **low**.

*For more information on the Volcanic Hazard (including history and extent) see the Volcanic Annex in Volume II.*

## **Wildfire**

The steering committee determined that the city's vulnerability to wildfire is **high**, which is lower than the county's vulnerability. The City is surrounded by agricultural fields, which are less likely to burn than sagebrush, grasslands, or forested areas. Fires that affect the city are usually human caused and include house fires or brush burning. In areas with limited fuel breaks, wildland fires could impact the city and burn into neighborhoods, causing Structural fires. The probability of a wildfire affecting the city is **moderate**, and may be more economic in nature.

*For more information on the Wildfire Hazard (including history and extent) see the Wildfire Annex in Volume II.*

## **Windstorm**

The steering committee determined that the city's vulnerability to a windstorm is **moderate**, which is higher than the county's vulnerability. Windstorms occur during both the winter and summer months coming either with cold air or, in some cases, with thunderstorms. In rare instances there is the risk of tornado in the area. The last recorded tornado in Jefferson County was a F0 tornado that touched down on June 9, 2004 on the west side of Madras. A storage shed which had been bolted to a concrete slab was picked up by the tornado and sent two to three hundred feet into the air, clearing to fences and landing next to a tree. Windstorms occur frequently in the Madras area as such the probability of a windstorm event is **high**.

During the windstorm event from the spring of 2020, Jefferson County experienced high winds that knocked over power lines in the region. This disrupted a number of residents and businesses including Deschutes Valley Water District. For DVWD customers, water supply was reduced to approximately 3 days of water at that time (customers could only access what was stored within the storage tanks). This identified the vulnerability that Jefferson County and Madras have to windstorms as most of Madras' water is purchased from DVWD.

*For more information on the Windstorm Hazard (including history and extent) see the Windstorm Annex in Volume II.*

## **Winter Storm**

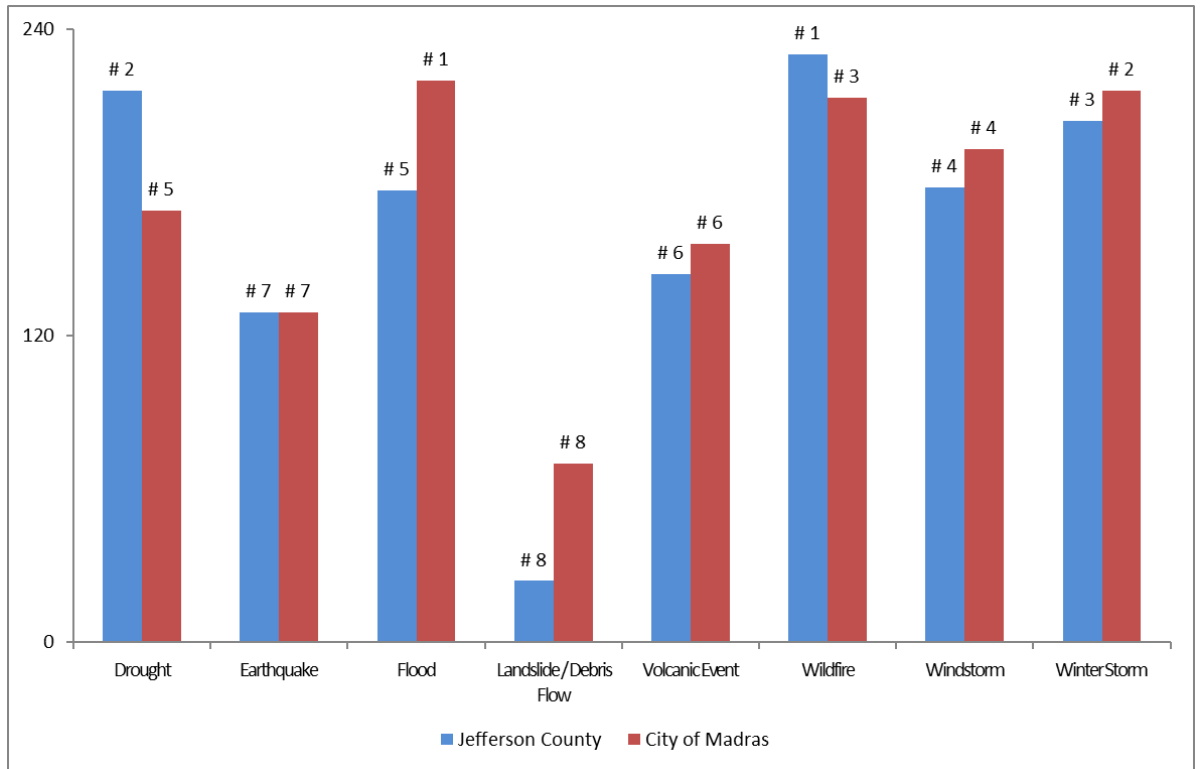
The steering committee determined that the city's vulnerability to a winter storm is **high**, which is the same as the county's vulnerability. In addition to information found in the county's plan, the working group identified other issues specific to Madras. Death rarely results from winter storms, but roadways that are damaged or made temporarily inaccessible can hinder police, fire, and medical responses to urgent calls. Madras is severed from other communities to the North and South when Highway 97 and Highway 26 are closed due to ice or other severe winter weather. Additionally, winter storms can damage property and disrupt utilities. The City does have the capability to clear snow from city streets should heavy snowfall occur. Considering the history of winter storms in the region the probability of a winter storm event is **high**.

*For more information on the Winter Storm Hazard (including history and extent) see the Winter Storm Annex in Volume II.*

## **Summary**

Figure MA-2 presents a summary of the hazard analysis for the City of Madras and compares the results to the assessment completed by the Jefferson County NHMP Steering Committee. In terms of overall rank, the city rated their risk to flood and winter storm higher than the county.

**Figure MA-2 Overall Hazard Analysis Comparison – Madras and Jefferson County**



Source: City of Madras NHMP Steering Committee, 2021.



## Mitigation Plan Mission

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

The mission of the Jefferson County NHMP is to:

***To create a disaster-resilient Jefferson County***

The 2021 local steering committee reviewed the 2021 plan mission statement for the county and agreed it accurately describes the overall purpose and intent of this plan. This is the exact wording that was present in the 2013 and 2008 plans.

## Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jefferson County citizens, 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 particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The Madras Addendum steering committee reviewed and agreed to the 2021 Jefferson County NHMP plan goals. All the plan goals are important and are listed below in no particular order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider to implement first, should funding become available. Below is a list of the 2021 NHMP goals:

***Goal 1:*** Save lives and reduce injuries

***Goal 2:*** Minimize and prevent damage to public and private buildings, infrastructure, and services.

***Goal 3:*** Increase cooperation and coordination among private partners with local, state, tribal and federal entities.

***Goal 4:*** Increase education, outreach and awareness.

***Goal 5:*** Protect natural and cultural resources.

***Goal 6:*** Ensure the plan has direct linkages to efficient and effective recovery strategies.

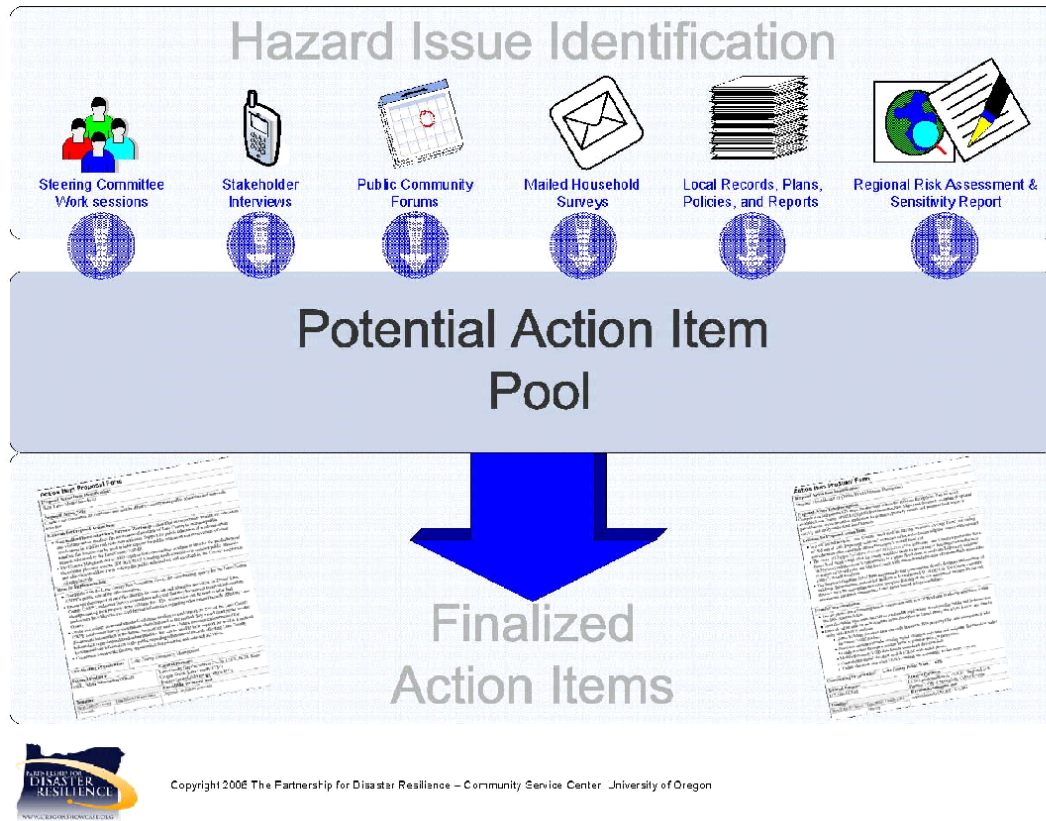
***Goal 7:*** Reduce economic impacts of natural disasters.

(Note: although numbered the goals are not prioritized.)

## Mitigation Plan Action Items

Short- and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. They address both multi-hazard (MH) and hazard-specific issues. Action items can be developed through a number of sources. The figure below illustrates some of these sources. A description of how the plan's mitigation actions were developed is provided below.

**Figure MA-3 Development of Action Items**



Source: Oregon Partnership for Disaster Resilience (2008)

## Action Item Worksheets

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described within Volume I, Section 3 (Mitigation Strategy). The City specific action item worksheets are located at the end of this Addendum.

The City is also a party to several actions described in the County NHMP; each jurisdiction listed on the County Action Item forms as an “Affected Jurisdiction” will contribute to and work towards completion of that action as it pertains to their jurisdiction. For detailed information on each County level action item form see Volume I, Section 3, Mitigation Strategy and Volume IV, Appendix A, Action Item Forms.

## **Action Item Development Process**

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions by the steering committee. A number of actions identified by the county steering committee include the city as an affected jurisdiction; these actions are broad actions that include implementation components at both the county and city level. All actions were reviewed by the committee and revised as necessary before becoming a part of this document.

# ATTACHMENT I: ACTION ITEM FORMS

## Action Item Forms

The action item forms portray the overall action plan framework and identify linkages between the plan goals, partnerships (coordination and partner organizations), and actions. Table MA-4 provides a list of actions for the city. The pages that follow include individual forms for each mitigation action.

**Table MA-4 Action Item Timelines, Status, High Priority and Related Hazards.**

Action Item	Timeline	Status	High Priority	Related Hazard								
				Drought	Earthquake	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm	
MH #1	Long Term	Complete		X	X	X	X	X	X	X	X	X
MH #2	Ongoing	REMOVE			X	X	X		X	X	X	
MH #3	Short Term	Complete		X	X	X	X	X	X	X	X	X
EQ #1	Long Term	Complete			X							
EQ #2	Long Term	Deferred	Yes		X							
EQ #3	Long Term	Complete			X							
EQ #4	Long Term	Deferred	Yes		X							
FL #1	Ongoing	Deferred				X						
FL #2	Long Term	Deferred				X						
FL #3	Long Term	Deferred	Yes			X						
FL #4	Long Term	Deferred				X						
FL #5	Ongoing	Deferred	Yes			X						
FL #6	Long Term	Ongoing	Yes			X						
FL #7	Short Term	Complete	Yes			X						
FL #8	Short Term	Deferred				X						
FL #9	Short Term	New	Yes			X						
WF #1	Ongoing	New							X			
WF #2	Ongoing	New	Yes						X			
WF #3	Short Term	New							X			

Source: City of Madras NHMP Steering Committee, 2021.

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #1 – Obtain reverse 9-1-1 (automated notification system) for hazard warning purposes.		Goal 1	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>Reverse 9-1-1 (an automated notification system) plays a key role in effective communication – not only for general information, but also in times of crisis. Populations with chosen (at-risk) areas can be immediately notified of risk or imminent danger. Reverse 911 users can create lists of individuals with common characteristics (i.e., self-identified ‘at risk’ elderly populations could create a list, or citizen response teams) and contact them with helpful information as needed.</li> <li>30% of Madras is Spanish-speaking. A call recipient on Reverse 9-1-1 can choose which language they prefer for future calls. In addition, a message can be recorded in multiple languages to serve multi-lingual needs.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Decide, as a community, when and how Reverse 9-1-1 should be used.</li> <li>Obtain funding for Reverse 9-1-1.</li> <li>Explore opportunities for reaching cell phones in addition to landlines.</li> </ul>			
<b>Coordinating Organization:</b>		Police Department	
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Council		Oregon Military Department – Office of Emergency Management (OEM); Federal Emergency Management Agency (FEMA); Department of Homeland Security (DHS)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Madras Working Group; Revised and confirmed in 2013.		
<b>Action Item Status:</b>	Complete		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #2 – Encourage private utility companies to underground existing power lines.		Goal 1 Goal 3	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Overhead electric and communication lines along US Hwy 97 are susceptible to vehicle and equipment damage. Hwy 97 is a main freight corridor with thousands of large trucks per day.</li> <li>• The City of Madras has at least one significant wind event each year. Over 19,000 vehicles pass through the City’s downtown each day. 18% of those vehicles are trucks, many carrying hazardous materials. From a public service delivery (electricity, cable, phone) and public safety perspective, it’s good to bury these lines, especially in the more vulnerable areas.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Assessing and evaluating needed improvements for undergrounding utility extensions, can assist a community in determining what further actions are needed to help mitigate a community’s risk to winter storms.</li> <li>• Goal 7 of Oregon’s Land Use Planning Goals requires that local governments “adopt or amend, as necessary, based on the evaluation of risk, planned policies and implementing measures... [that prohibit] the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1) (a)(b)(c) and (e)), in identified hazard areas...”</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Determine undergrounding requirements for utility extension; assess and evaluate for any needed improvements.</li> </ul>			
<b>Coordinating Organization:</b>		City of Madras Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Council; Community Development		Pacific Power; Central Oregon Electric Cooperative	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Madras Working Group; Revised and confirmed in 2013.		
<b>Action Item Status:</b>	Removed in 2021 – cost is too high for residential and it is now required via regulation for all new commercial development.		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #3 – Integrate Madras' NHMP addendum into its comprehensive plan.		Goal 1	Goal 4
		Goal 2	Goal 5
		Goal 3	Goal 6
<b>Alignment with Existing Plans/Policies:</b>			
Madras Comprehensive Plan			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>Comprehensive plans provide the framework for the physical design of a community. They shape overall growth and development while addressing economic, environmental and social issues. Oregon’s statewide goals are accomplished through local comprehensive plans. State Law requires local governments to adopt a comprehensive plan and the zoning and land-division ordinances needed to put the plan into action.</li> <li>Integration of NHMPs into comprehensive plans will help to reduce a community’s vulnerability to natural hazards, support in mitigation activities, help to increase the speed in which action items are implemented and therefore the speed in which communities recover from natural disasters.</li> <li>Integration of NHMPs into comprehensive plans gives the action items identified in the NHMP legal status for guiding local decision-making regarding land use and/ or capital expenditures. .</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Conduct a policy crosswalk of the NHMP and the comprehensive plan to identify areas of possible integration.</li> <li>Integrate natural hazards information and policies into the comprehensive plan.</li> <li>Engage in collaborative planning and integration.</li> <li>Coordinate future NHMP and comprehensive plan reviews and updates.</li> </ul>			
<b>Coordinating Organization:</b>		City of Madras Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Council; Emergency Management		Department of Land Conservation and Development (DLCD); Oregon Military Department – Office of Emergency Management (OEM); Federal Emergency Management Agency (FEMA); Oregon Partnership for Disaster Resilience (OPDR)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
PDM-13			Short Term
<b>Form Submitted by:</b>	2013 NHMP Steering Committee, Madras Working Group		
<b>Action Item Status:</b>	Complete		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>
EQ #1 – Seismically retrofit Madras Elementary School to reduce the facility’s vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.		Goal 1 Goal 2 Goal 5
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<ul style="list-style-type: none"> <li>• Madras Elementary school was built in 1939 and has three buildings ranging as a very high collapse potential per the 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI.</li> <li>• Occupants of the school are primarily elementary school children, aged 5-12 and are vulnerable to potential injury should an event occur</li> <li>• Madras Elementary School has been prioritized by the Steering Committee due to its hazard to children and due to its potential use as an evacuation area.</li> <li>• Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities, including schools. Careful review of this data will assist in developing a strategy to seismically retrofit Madras Elementary School.</li> <li>• Retrofitting of vital infrastructure, such as schools and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</li> <li>• Jefferson County has a low vulnerability for seismic hazards and a low probability of a future seismic event recurring. Retrofitting Madras Elementary School will significantly reduce the school’s vulnerability to seismic hazards and improve the safety of students, teachers, and community members that use the school</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</li> </ul>		
<b>Ideas for Implementation:</b>		
<ul style="list-style-type: none"> <li>• Conduct detailed structural evaluation that outlines recommendations for building deficiencies, and provides a cost estimate, incorporating DOGAMI’s seismic assessment data to assist in retrofitting Madras Elementary School.</li> <li>• Apply for grant funding through the Oregon Seismic Rehabilitation Grant Program (funding was granted in the 2011-2012 funding cycle).</li> <li>• Apply for FEMA project grant funding.</li> <li>• Conduct structural evaluation and make recommendations (structural and non-structural) for fix.</li> <li>• Align project with School District Maintenance Plan</li> </ul>		
<b>Coordinating Organization:</b>	Jefferson County School District 509J	
<b>Internal Partners:</b>	<b>External Partners:</b>	



Jefferson County, City of Madras		Oregon Military Department – Office of Emergency Management (OEM); Department of Geology and Mineral Industries (DOGAMI); Federal Emergency Management Agency (FEMA); Oregon Department of Education (ODE); Business Oregon	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2013 NHMP Steering Committee, Madras Working Group.		
<b>Action Item Status:</b>	Complete		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>
EQ #2 – Seismically retrofit Madras High School to reduce the facility’s vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.		Goal 1 Goal 2 Goal 5
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<ul style="list-style-type: none"> <li>• Madras High school was built in 1962 and has a building rating as a very high collapse potential per the 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI.</li> <li>• Occupants of the school are primarily high school children, aged 14-18 and are vulnerable to potential injury should an event occur</li> <li>• Madras High School has been prioritized by the Steering Committee due to its hazard to children and due to its potential use as an evacuation area.</li> <li>• Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities, including schools. Careful review of this data will assist in developing a strategy to seismically retrofit Madras High School.</li> <li>• Retrofitting of vital infrastructure, such as schools and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</li> <li>• Jefferson County has a low vulnerability for seismic hazards and a low probability of a future seismic event recurring. Retrofitting Madras High School will significantly reduce the school’s vulnerability to seismic hazards and improve the safety of students, teachers, and community members that use the school</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</li> </ul>		
<b>Ideas for Implementation:</b>		
<ul style="list-style-type: none"> <li>• Conduct detailed structural evaluation that outlines recommendations for building deficiencies, and provides a cost estimate, incorporating DOGAMI’s seismic assessment data to assist in retrofitting Madras High School.</li> <li>• Apply for grant funding through the Oregon Seismic Rehabilitation Grant Program (funding was granted in the 2011-2012 funding cycle).</li> <li>• Apply for FEMA project grant funding.</li> <li>• Conduct structural evaluation and make recommendations (structural and non-structural) for fix.</li> <li>• Align project with School District Maintenance Plan</li> </ul>		
<b>Coordinating Organization:</b>	Jefferson County School District 509J	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Jefferson County; City of Madras	Oregon Military Department – Office of Emergency Management (OEM); Department of Geology and Mineral Industries (DOGAMI); Federal Emergency	

	Management Agency (FEMA); Oregon Department of Education (ODE); Business Oregon	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
		Long Term
<b>Form Submitted by:</b>	2013 NHMP Steering Committee, Madras Working Group	
<b>Action Item Status:</b>	Deferred in 2021	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>
EQ #3 – Seismically retrofit Westside Elementary School to reduce the facility’s vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.		Goal 1 Goal 2 Goal 5
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<ul style="list-style-type: none"> <li>● Westside Elementary school was built in 1964 and has buildings ranging from a high to very high collapse potential per the 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI.</li> <li>● Occupants of the school are primarily elementary school children, aged 5-12 and are vulnerable to potential injury should an event occur</li> <li>● Westside Elementary School has been prioritized by the Steering Committee due to its hazard to children and due to its potential use as an evacuation area.</li> <li>● Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities, including schools. Careful review of this data will assist in developing a strategy to seismically retrofit Westside Elementary School.</li> <li>● Retrofitting of vital infrastructure, such as schools and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</li> <li>● Jefferson County has a low vulnerability for seismic hazards and a low probability of a future seismic event recurring. Retrofitting Westside Elementary School will significantly reduce the school’s vulnerability to seismic hazards and improve the safety of students, teachers, and community members that use the school</li> <li>● The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</li> </ul>		
<b>Ideas for Implementation:</b>		
<ul style="list-style-type: none"> <li>● Conduct detailed structural evaluation that outlines recommendations for building deficiencies, and provides a cost estimate, incorporating DOGAMI’s seismic assessment data to assist in retrofitting Westside Elementary School.</li> <li>● Apply for grant funding through the Oregon Seismic Rehabilitation Grant Program (funding was granted in the 2011-2012 funding cycle).</li> <li>● Apply for FEMA project grant funding.</li> <li>● Conduct structural evaluation and make recommendations (structural and non-structural) for fix.</li> <li>● Align project with School District Maintenance Plan</li> </ul>		
<b>Coordinating Organization:</b>	Jefferson County School District 509J	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Jefferson County; City of Madras	Oregon Military Department – Office of Emergency Management (OEM); Department of Geology and	

	Mineral Industries (DOGAMI); Federal Emergency Management Agency (FEMA); Oregon Department of Education (ODE); Business Oregon	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
		Long Term
<b>Form Submitted by:</b>	2013 NHMP Steering Committee, Madras Working Group	
<b>Action Item Status:</b>	Complete	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
EQ #4 – Seismically retrofit St. Charles – Madras Hospital to reduce the facility’s vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.		Goal 1 Goal 2 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>● St. Charles – Madras Hospital was built in 1967 and has buildings rating at a high collapse potential per the 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI.</li> <li>● St. Charles – Madras Hospital has been prioritized by the Steering Committee due to its hazard to the sick, elderly and due to its use as a medical facility and potential use as an evacuation area.</li> <li>● Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities, including hospitals. Careful review of this data will assist in developing a strategy to seismically retrofit St. Charles – Madras Hospital.</li> <li>● Retrofitting of vital infrastructure, such as hospitals and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</li> <li>● Jefferson County has a low vulnerability for seismic hazards and a low probability of a future seismic event recurring. Retrofitting St. Charles – Madras Hospital will significantly reduce the hospitals’ vulnerability to seismic hazards.</li> <li>● The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>● Conduct detailed structural evaluation that outlines recommendations for building deficiencies, and provides a cost estimate, incorporating DOGAMI’s seismic assessment data to assist in retrofitting St. Charles – Madras Hospital.</li> <li>● Apply for grant funding through the Oregon Seismic Rehabilitation Grant Program (funding was granted in the 2011-2012 funding cycle).</li> <li>● Apply for FEMA project grant funding.</li> <li>● Conduct structural evaluation and make recommendations (structural and non-structural) for fix.</li> </ul>			
<b>Coordinating Organization:</b>		St. Charles – Madras Hospital	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Jefferson County; City of Madras		Oregon Military Department – Office of Emergency Management (OEM); Department of Geology and Mineral Industries (DOGAMI); Federal Emergency Management Agency (FEMA); Business Oregon	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>

		Long Term
<b>Form Submitted by:</b>	2013 NHMP Steering Committee, Madras Working Group	
<b>Action Item Status:</b>	Deferred in 2021	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #1 – Conduct education and outreach to teach government staff, elected officials, and homeowners about no adverse impact (NAI) floodplain management practices.		Goal 4	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• “No Adverse Impact (NAI) can be called an attitude or mindset – don’t cause an adverse impact on others. It is important to convey this message to the general public, property owners, decision makers, design professionals, and developers. Your message should be: “know your community’s hazards, know how to protect yourself, and understand how your actions could impact others.”... Through various media, a community can reach out to residents and businesses and advise them of the flood hazard, what the community is doing about it, and what they can do to protect themselves.”</li> <li>• No Adverse Impact floodplain management offers local governments a way to prevent the worsening of flooding and other negative impacts on the community. Most state and local governments have assumed that the federal programs represent an acceptable standard of care. Many have accepted the minimum floodplain management standards of the National Flood Insurance Program as the default standards for communities, even though they were designed for the purpose on an insurance program and not necessarily to control escalating flooding.</li> <li>• No Adverse Impact principles give communities a way to promote responsible floodplain development through community-based decision making. With the No Adverse Impact approach, communities will be able to put federal and state programs to better use—enhancing their local initiatives to their communities’ advantage. No Adverse Impact floodplain management empowers the community (and its citizens) to build better-informed “wise development” stakeholders at the local level. It is a step towards individual accountability because it prevents increases in flood damage to other properties. No Adverse Impact floodplain management helps communities identify the potential impacts of development and implement actions to mitigate them before impact occurs.</li> <li>• No Adverse Impact floodplain management takes place when the actions of one property owner are not allowed to adversely affect the rights of other property owners. <a href="http://www.floods.org/index.asp?menuID=460">http://www.floods.org/index.asp?menuID=460</a></li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Convey information during NHMP plan update meetings and/or Flood Mitigation Plan (FMP) update meetings.</li> <li>• Promote the development of a NAI community via the City’s comprehensive planning process.</li> <li>• Disperse information at local gatherings, through local newspapers, or via water bills.</li> </ul>			
<b>Coordinating Organization:</b>		Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works		Department of Land Conservation and Development (DLCD); Oregon Military Department – Office of	



	Emergency Management (OEM); Federal Emergency Management Agency (FEMA)	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
		Ongoing
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Madras Working Group; Revised and confirmed in 2013.	
<b>Action Item Status:</b>	Deferred in 2021	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #2 – Remove city facilities (e.g., Public Works building) from the special flood hazard area.		Goal 2	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Madras estimates a ‘high’ probability that flooding will occur. Likewise, Madras estimates a ‘high’ vulnerability to flood events.</li> <li>• The Public Works Department provides essential public services. In the event of a flood emergency (or other emergency) this is where the personnel gather for work assignment and dispatch and where various types of equipment comes from.</li> <li>• Oregon State Land Use Planning Goal 7 states that local governments shall avoid “development in hazard areas where the risk to people and property cannot be mitigated; and [prohibit] the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1)(a)(b)(c) and (e)), in identified hazard areas, where the risk to public safety cannot be mitigated...” [Source: Statewide Land Use Planning Goal 7, Areas Subject to Natural Hazards.]</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Convert property to open space parking or green space.</li> <li>• Acquire funding to relocate facility out of the special flood hazard area (100-year floodplain).</li> </ul>			
<b>Coordinating Organization:</b>	Public Works		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development		Federal Emergency Management Agency (FEMA); Oregon Military Department – Office of Emergency Management (OEM); Department of Land Conservation and Development (DLCD) – NFIP Coordinator	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Madras Working Group; Revised and confirmed in 2013.		
<b>Action Item Status:</b>	Deferred in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #3 – Create a city-level incentive program to remove and relocate flood risk properties out of the floodway, and convert the land to open space.		Goal 1 Goal 2	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• The flood overflow channel flows through existing developed neighborhoods and a mobile home park. Less than 30 residential lots are affected but a significant number of commercial and government lots are. Removing properties through an incentive program would result in removing barriers in the natural overflow (high risk) channel, and removing residences from this danger area.</li> <li>• In the City’s mobile home park, trailers are built on top of the special flood hazard zone adjacent to Willow Creek.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Discuss the various incentive program options. What would this look like and how would it be implemented?</li> <li>• Consider the use of fee simple acquisition of land and buyouts to acquire land in a floodplain and restrict development.</li> </ul>			
<b>Coordinating Organization:</b>	Community Development		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Federal Emergency Management Agency (FEMA); Oregon Military Department – Office of Emergency Management (OEM)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
FMA, HMGP			Long Term
<b>Form Submitted by:</b>	2013 NHMP Steering Committee, Madras Working Group		
<b>Action Item Status:</b>	Deferred in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #4 – Elevate the C Street Bridge.		Goal 2	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• The C Street Bridge crosses Willow Creek. During flood events, the bridge has suffered damage. Elevating the bridge would prevent damage to the bridge, and continue to allow safe crossing of the creek.</li> <li>• In heavy floodwaters, the bridge has the potential to break off and dam the water. Additionally, the bridge may hit and damage additional bridges downstream.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Seek funding opportunities to raise bridge.</li> <li>• Determine safe height of bridge, and evaluate costs and benefits.</li> </ul>			
<b>Coordinating Organization:</b>	Public Works		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development		Federal Emergency Management Agency (FEMA); Oregon Military Department – Office of Emergency Management (OEM)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Madras Working Group; Revised and confirmed in 2013.		
<b>Action Item Status:</b>	Deferred in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #5 – Trim large trees and brush along Willow Creek.		Goal 1 Goal 2 Goal 3	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>Vegetation along Willow Creek serves an important role in flood mitigation, and water/habitat quality. Occasionally, tree limbs and brush will dam the water in a downstream location. To prevent the occurrence of flooding due to dammed vegetation, the City conducts a vegetation management program in which limbs and brush are occasionally trimmed and maintained.</li> <li>There are several very large, old trees in and/or overhanging the main channel of Willow Creek. If these trees were undercut by flood currents or dropped major limbs, they would block downstream bridge crossings and cause significant and avoidable flooding.</li> <li>One of the goals of the National Flood Insurance Program is to protect the natural and beneficial functions of floodplains. Natural and beneficial floodplain functions include both the natural infiltration capacities of floodplains, as well as minimizing the pollutants that can enter waters from floodplain development activities.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Acquire funding to implement action.</li> <li>Conduct public education and outreach (to solicit public opinion) prior to move this project forward. Contact property owners with large trees and brush along the creek.</li> </ul>			
<b>Coordinating Organization:</b>	Public Works		
<b>Internal Partners:</b>		<b>External Partners:</b>	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Madras Working Group; Revised and confirmed in 2013.		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #6 – Update the Madras Flood Insurance Rate Maps.		Goal 2	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• The City’s Flood Insurance Rate Map was developed on July 17, 1989. Homeowners have requested updates and/or verification that the map is still correct in its depiction of the City’s flood hazard.</li> <li>• In areas at high risk to flood, updated Flood Insurance Rate Maps can assist a community to accurately predict its risk to a future flooding event. Better predictions can assist a community to better identify mitigation strategies to reduce its flood risk.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify the geographic extent of hazards known to impact the community [201.6(c)(2)(i)]. Updated Flood Insurance Rate Maps can assist the City in better defining the flood hazard within the community given the development that has taken place since the current FIRMS were created.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• The Federal Emergency Management Agency’s (FEMA) Mitigation Directorate maintains and updates the National Flood Insurance Program (NFIP) maps.</li> <li>• Complete the MT-2 Forms Package (Application Forms for Conditional Letters of Map Revision and Letters of Map Revision). The forms and instructions included in this package were designed to assist requesters (community officials or individuals via community officials) in gathering the data that FEMA needs to determine whether the effective NFIP map and Flood Insurance Study report for a community should be revised. These forms should be used by community officials or individuals via community officials for requesting FEMA comments on a proposed project, which are issued in the form of a Conditional Letter of Map Revision. These forms will provide FEMA with assurance that all pertinent data relating to the revision are included in the submittal. They also will ensure that: (a) the data and methodology are based on current conditions; (b) qualified professionals have assembled the data and preformed all necessary computations; and (c) all individuals and organizations affected by proposed changes are aware of the changes and will have an opportunity to comment on them. The MT-2 application forms and instructions can be downloaded from the FEMA Library.</li> </ul>			
<b>Coordinating Organization:</b>		Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Planning Commission		Federal Emergency Management Agency (FEMA); Oregon Military Department - Office of Emergency Management (OEM); U.S. Army Corps of Engineers (ACOE); Silver Jackets; Department of Geology and Mineral Industries; Department of Land Conservation and Development – NFIP Coordinator	

<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
		Long Term
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Burns Working Group; Revised and confirmed in 2013.	
<b>Action Item Status:</b>	Ongoing in 2021	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #7 – Replace the B Street pedestrian footbridge north of the Public Works building.		Goal 1 Goal 2	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>The B Street pedestrian footbridge is the last pedestrian footbridge that needs replacing. This bridge is important for pedestrian and bike use, and could become dislodged during a flooding event, causing avoidable upstream flooding.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Evaluate costs and benefits for replacing the bridge. Seek funding to replace bridge.</li> </ul>			
<b>Coordinating Organization:</b>	Public Works		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Federal Emergency Management Agency (FEMA); Oregon Military Department - Office of Emergency Management (OEM)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Burns Working Group; Revised and confirmed in 2013.		
<b>Action Item Status:</b>	Complete		



<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #8 – Implement and update actions identified in the City of Madras Flood Mitigation Plan.		Goal 1 Goal 2 Goal 3 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• The Madras Flood Mitigation Plan names several action items specific to Willow Creek, but is outdated and needs revision.</li> <li>• Updating and implementing the action items identified in the Madras Flood Mitigation Plan will help tie the Madras NHMP addendum to a local plan.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Update and revise the current Madras Flood Mitigation Plan, making ties to the Madras NHMP addendum.</li> <li>• Seek funding to implement action items.</li> </ul>			
<b>Coordinating Organization:</b>	Community Development		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Silver Jackets	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2013 NHMP Steering Committee, Madras Working Group		
<b>Action Item Status:</b>	Deferred in 2021		

<b>Action Item: Flood #9</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Update City Development Code to comply with NFIP Floodplain Development regulations.		1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
City Flood Goals			
<b>Rationale for Proposed Action Item:</b>			
After re-mapping the Floodplain, the City's development regulations need to be updated to be current with FEMA standards.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
City to obtain consultant assistance to update Code.		New - Added in 2021.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
DLCD, FEMA, OEM	High (more than \$100,000)	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input checked="" type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	City of Madras		
<b>Internal Partners:</b>	<b>External Partners:</b>		
Community Development Department	DLCD, OEM, FEMA		
Form Submitted by:	2021 Steering Committee		
Action Item Status:	NEW		

<b>Action Item: Wildfire #1</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Hire additional firefighter staff to fight wildland fires.		1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
The City of Madras is highly impacted by wildland fires and related issues (e.g. smoke). More firefighting staff is needed to continue protecting the City and the wildland-urban interface from threat of catastrophic fires.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Identify sources of funding to hire additional firefighting staff with assistance from the County, COIC, and State and Federal resources.		New - Added in 2021.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
County, First Responder Act (short term funding), FEMA, OEM, USFS	High (more than \$100,000)	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Jefferson County Fire District #1		
<b>Internal Partners:</b>	<b>External Partners:</b>		
	City of Madras, Jefferson County, PGE, COIC		
<b>Form Submitted by:</b>	2021 Steering Committee		
<b>Action Item Status:</b>	NEW		

<b>Action Item: Wildfire #2</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Identify Wildland Fuel Breaks for juniper clearing, in and around the city limits of Madras along with the county.		1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/>	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
Evaluate and develop a plan to treat areas within the city limit and county, which have a high density of juniper trees. Create fuel breaks to better fight wildland fire in our community.			
<b>Rationale for Proposed Action Item:</b>			
Removing and trimming juniper trees will create fuel break in our community to better fight wildland fires. Treating areas will help with fire and drought. Juniper trees consume 20 gallons of water per day and some that are 18 inches in diameter can consume 30-40 gallons of water per day.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Identify areas to be treated and develop a plan to treat those areas. Remove trees; treat others to have healthier trees. Develop a plan to that once an area has been treated how to remove the trees. Such as burning pile in the winter time or chipping the material.		New - Added in 2021.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
City of Madras, Jefferson County, JCFD # 1, NRCS	High (more than \$100,000)	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	JCFD #1		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Jefferson County, City of Madras, BLM, ODF, FS	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	

<b>Action Item: Wildfire #3</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Include defensible space standards in City development code.		1☒ 2☒ 3☐ 4☒ 5☐ 6☐ 7☒	<input type="checkbox"/> Yes s
<b>Alignment with Existing Plans/Policies:</b>			
City Development Code			
<b>Rationale for Proposed Action Item:</b>			
This Action Item will increase defensible space in the City and wildland-urban interface by enforcing the defensible space standards through City code.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Incorporate the defensible space standards into existing City development code.		New - Added in 2021.	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
City of Madras	Low (less than \$50,000)	<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input checked="" type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	City of Madras		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development Department, Jefferson County		None	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	

## ATTACHMENT 2:

### ACTION ITEM FORM TEMPLATE

Action Item:	Alignment with Plan Goals:	High Priority Action Item?
	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>
		<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)
<b>Coordinating Organization:</b>		
<b>Internal Partners:</b>		<b>External Partners:</b>
<b>Form Submitted by:</b>		
<b>Action Item Status:</b>		

# CITY OF METOLIUS ADDENDUM

## Purpose

This document serves as an update for the City of Metolius' Addendum to the Jefferson County Natural Hazard Mitigation Plan (NHMP). The City of Metolius' original addendum to Jefferson County's NHMP was completed in 2008. The City conducted an update to its original addendum in 2013, which coincided with the final stages of an update to the Jefferson County NHMP. The City's Addendum is considered part of the county's multi-jurisdictional plan, and meets the following requirements: (1) Multi-jurisdictional Plan Adoption §201.6(c)(5), (2) Multi-jurisdictional Participation §201.6(a)(3), (3) Multi-Jurisdictional Risk Assessment §201.6(c)(2) (iii), and (4) Multi-jurisdictional Mitigation Strategy §201.6(c)(3) (iv).

A description of the city specific planning and adoption process follows, along with detailed community specific action items. Information about the city's risk relative to the county's risk to natural hazards is documented in the addendum's Hazard Analysis and Issue Identification section. The section considers how the city's risk differs from or matches that of the county's; additional information on Risk Assessment is provided within the Jefferson County NHMP's Section 2 – Risk Assessment.

Updates to Metolius' city addendum are further discussed throughout the plan and in the Jefferson County NHMP Planning and Public Process Appendix, which provides an overview of alterations to the document that took place during the city addendum update process.

## How was the Plan Developed?

The NHMP was developed by the Jefferson County Natural Hazards Mitigation Plan steering committee, while this addendum was created by the City of Metolius steering committee. The Jefferson County Emergency Manager was designated as the NHMP's convener and will take the lead in implementing, maintaining and updating the plan. Locally, the City of Metolius convened a steering committee for the purpose of developing and updating the city's addendum.

## 2008 Plan Development

In Fall 2005, the Oregon Natural Hazards Workgroup (ONHW, now the Oregon Partnership for Disaster Resilience) at the University of Oregon's Community Service Center partnered with the Department of Geology and Mineral Industries (DOGAMI) and the Southeast Oregon Region (Harney and Malheur as well as Jefferson and Lake) counties to develop a Pre-Disaster Mitigation Planning Grant proposal. Each county joined the Partnership for Disaster Resistance and Resilience (The Partnership) by signing (through their County Commissions) a Memorandum of Understanding for this project. FEMA awarded the Southeast Oregon Region grant to support the development of the natural hazard mitigation plans for the four counties in the region. ONHW, DOGAMI and the communities were

awarded the grant in the Fall of 2005 and local planning efforts in this region began in the Fall of 2006 and county and city meetings proceeding in 2007.

The Jefferson County Multi-jurisdictional NHMP was formally adopted by Jefferson County on November 26, 2008 and approved by FEMA on December 16, 2008. To maintain its compliance with the Disaster Mitigation Act of 2000 (DMA2K), the plan required an update by December 16<sup>th</sup>, 2013.

## **2014 Plan Update**

The City of Metolius created an addendum to the Jefferson County NHMP in 2014, facilitated by Oregon Partnership Disaster Resilience (OPDR). Steering committee members contributed data, reviewed, and provided guidance towards the community profile, risk assessment, mitigation strategy (action items), and implementation and maintenance plan. The Metolius Addendum to the Jefferson County NHMP was adopted on March 25, 2014 and the NHMP and Addendum were approved by FEMA on February 9, 2014. To maintain its compliance with the Disaster Mitigation Act of 2000, the plan required an update by February 9<sup>th</sup>, 2018.

## **2021 Plan Update**

The Jefferson County plan and the City of Metolius addendum were updated in 2021 to maintain compliance with the Disaster Mitigation Act of 2000. The local steering committee was closely involved throughout the 2021 update process of the county plan and served as the local oversight body. The local steering committee met on one occasion: June 16<sup>th</sup>, 2021 to update the city's addendum (see Appendix B for more information). Steering committee members contributed data, reviewed, and provided guidance towards the community profile, risk assessment, mitigation strategy (action items), and implementation and maintenance plan. The addendum reflects effort from the formal meeting and during subsequent informal meetings between members of the steering committee and with Central Oregon Intergovernmental Council (COIC).

## **Public Participation**

An open public involvement process is essential to the development of an effective plan. In order to develop a comprehensive approach to reducing the effects of natural disasters, the planning process should include opportunities for the public, neighboring communities, local and regional agencies, as well as, private and nonprofit entities to comment on the plan. COIC provided a publicly accessible project webpage for the general public in order to make meeting materials and contact information available throughout the 2021 update process.

In addition, COIC administered a public opinion survey to obtain additional input from the public regarding the County's risks, vulnerabilities, hazards history, and mitigation strategies. See Volume IV, Appendix F for more information.

Updating the mitigation plan is a requirement to gain eligibility for the Federal Emergency Management Agency's Pre-Disaster Mitigation, Hazard Mitigation, and Flood Mitigation Assistance grant Programs. This project is funded through the Federal Emergency Management Agency's (FEMA) FY20 Post Fire Mitigation Grant Program (HMGP-PF-FM-5195-OR-4).



The Metolius Addendum to the Jefferson County NHMP was adopted on [DATE] and approved by FEMA on [DATE]. The Jefferson MNHMP was approved by FEMA on [DATE]. the plan is effective for Jefferson County and Metolius through [DATE].

The Jefferson County Natural Hazard Mitigation Plan is the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee and the process see this NHMP's Volume I, Acknowledgements and Executive Summary, and Volume IV, Appendix B.

## **How Were the Action Items Developed?**

The City's action items were originally developed through a two-stage process in 2014. In stage one, OPDR facilitated a work session with the working group to discuss the city's risk and to identify potential issues. In the second stage, OPDR developed potential actions based on the hazards and the issues identified by the working group. During the 2021 process, re-evaluated the Action Items with the local steering committee and updated actions, noting what accomplishments had been made, if the actions were still relevant; and supporting the development of any new action items. The City's actions are listed below. For more detailed information on each action, see the action forms at the end of this memo.

**Table ME-1 City of Metolius Action Items**

2021 Action Item	Priority	Proposed Action Title	Lead Agency	Partner Organization(s)	Timeline	Status
MH #1		Develop a continuity of operations plan for the City of Metolius to ensure continued operation in the event of a natural hazard emergency.	City Manager	City Councilors; City Mayor	Short Term	Deferred
MH #2	Yes	Identify an emergency shelter within the City of Metolius.	City Council	American Red Cross; OEM; DOGAMI	Short Term	Deferred
EQ #1	Yes	Seismically retrofit Metolius Elementary School to reduce the facility's vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.	509J Jefferson County SD	City of Metolius; Jefferson County; OEM; DOGAMI	Long Term	Complete
EQ #2	Yes	Seismically retrofit the Metolius City Hall to reduce the facility's vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.	City Council	City of Metolius; Jefferson County; OEM; DOGAMI	Long Term	Deferred
WD #1		Educate property owners on how to properly maintain trees to prevent power loss on power lines off the right of way in partnership with the County.	Public Works	Central Oregon Electric Cooperative; Jefferson County	Ongoing	NEW

Source: City of Metolius NHMP Steering Committee, 2021.

# PLAN IMPLEMENTATION AND MAINTENANCE

## How Will the Plan be Implemented?

The City Council will be responsible for adopting the City of Metolius addendum to the Jefferson County NHMP. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the city addendum is considered part of the county plan, the city will look for opportunities to partner with the County. The City's working group will convene after re-adoption of the City of Metolius addendum annually in the fall, after the wildfire season. The City will coordinate with the Jefferson County Convener. The City's Public Works Supervisor will serve as the local convener and will be responsible for convening the local steering committee. The convener will also remain active in the County's planning process.

## Implementation through Existing Programs

Many of the Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Metolius will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

The steering committee and the community's leadership have the option to add or implement action items at any time. This allows the steering committee to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest priority. When new actions are identified, they should be documented using the action item form. Once a proposed action form has been submitted to the convener, the action will become part of the city's addendum.

## Continued Public Participation

Keeping the public informed of the city's efforts to reduce the city's risk to future natural hazards events is important for successful plan implementation and maintenance. Metolius is committed to involving the public in the plan review and updated process. The City Addendum along with the County Plan will be posted on-line on COIC's website (<https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/jefferson-county-nhmp/>), as well as the county and city websites, so that the public may view the plan at any time.

In addition, natural hazards information dissemination is conducted throughout the year when opportunities present themselves via the city offices and website.

## **Plan Maintenance**

The Jefferson County Natural Hazard Mitigation Plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

The City of Metolius Natural Hazard Mitigation Addendum includes three sections: 1) a Community Profile and Asset Identification 2) Hazard Identification and Risk Assessment, and 3) Mitigation Strategy section.

# COMMUNITY PROFILE ASSET IDENTIFICATION

This section provides information about city specific asset identification. For information on the characteristics of Metolius, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Appendix C, Community Profile. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

We live in a place with a varied geography and communities. We would like to recognize and acknowledge the indigenous land of the Confederated Tribes of Warm Springs, Molalla, Paiute, Klamath, Modok, Yahooskin Band of Snake Indians, and Tribes of Middle Oregon. We want to recognize the people that came before us and honor their traditions and stewardship of the land. Acknowledgement is a simple, powerful way of showing respect for Indigenous People's history and culture.

## Asset Identification

The following assets identified by the City of Metolius were gathered from the local steering committee during the formal meeting on June 16th, 2021. The City of Metolius has the following assets:

### Critical and Essential Facilities

- Metolius City Hall
- Metolius Wastewater Treatment Plant
- Metolius Public Works

### Metolius School District

- Metolius Elementary

### Social Service Providers

Please see <https://www.thrivecentraloregon.org/services> for a comprehensive list of resource providers throughout Central Oregon, including Metolius.

### Population

Metolius' 2020 PSU certified estimated population estimate is 825 people<sup>1</sup>.

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<sup>1</sup> <https://www.pdx.edu/population-research/population-estimate-reports>

## **Environmental Assets**

- Metolius City Park
- The Little Park That Could
- Rails and Tails Dog Park
- Railway Park

## **Cultural and Historic Resources**

- Metolius Historic Train Depot

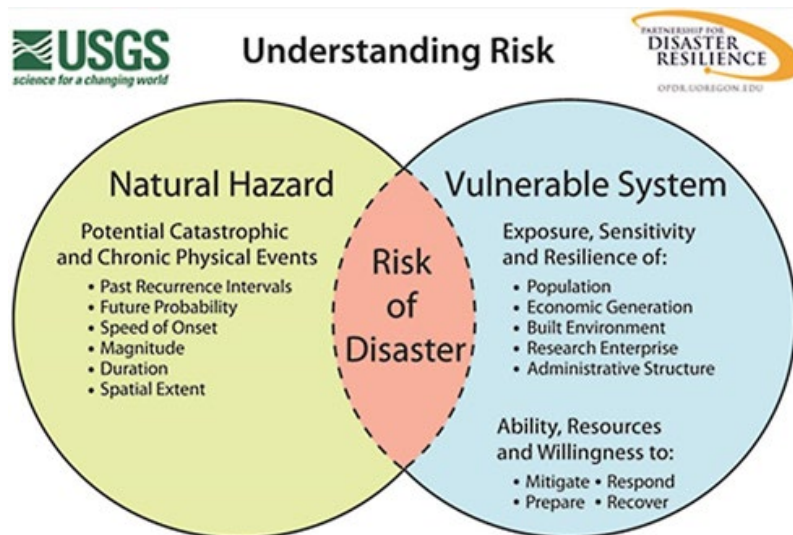
# HAZARD ANALYSIS AND RISK ASSESSMENT

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact 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 information presented below, along with hazard specific information presented elsewhere in this addendum, within the Hazard Annexes (Volume II), and community characteristics presented in the Community Profile (Appendix C), will be used as the local level rationale for the risk reduction actions identified in this addendum. The risk assessment process is graphically depicted in Figure ME-1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards overlap vulnerable systems.

Figure ME-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience

## Hazard Analysis Methodology

This NHMP utilizes a hazard analysis methodology that was first developed by FEMA circa 1983, and gradually refined by the Oregon Military Department's Office of Emergency Management 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 endeavors to reflect 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%.

This method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular 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.

In this analysis, severity ratings, and weight factors, are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario), and probability as shown in the table below. See Volume I, Section 2 (Risk Assessment) for more information.

## Hazard Analysis

On June 16th, 2021, the City of Metolius addendum steering committee developed their hazard vulnerability assessment (HVA), using the County's HVA as a reference. Changes from the County's HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to the City of Metolius, which are discussed throughout this addendum.

Table ME-2 shows the HVA matrix for Metolius showing each hazard listed in order of rank from high to low. 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.



**Table ME-2 Hazard Analysis Matrix – City of Metolius**

Hazard	Maximum				Total Threat Score	Hazard Rank	County Hazard Rank
	History	Vulnerability	Threat	Probability			
Windstorm	14	45	90	63	212	#1	#4
Winter Storm	16	35	80	63	194	#2	#3
Volcanic Event	2	45	90	7	144	#3	#7
Earthquake	2	20	100	7	129	#4	#6
Drought	4	10	50	63	127	#5	#2
Flood	4	25	50	14	93	#6	#5
Wildfire	4	25	50	14	93	#6	#1
Landslide/Debris Flow	4	10	20	14	48	#8	#8

Source: City of Metolius NHMP Steering Committee, 2021.

The following table categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Jefferson County NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings).

**Table ME-3 Probability and Vulnerability Comparison – Metolius and Jefferson County**

Hazard	<i>Metolius</i>		<i>Jefferson County</i>	
	Probability	Vulnerability	Probability	Vulnerability
Drought	High	<b>Low</b>	High	High
Earthquake	Low	Moderate	Low	Moderate
Flood	<b>Low</b>	<b>Moderate</b>	Moderate	High
Landslide/Debris Flow	Low	Low	Low	Low
Volcanic Event	Low	High	Low	High
Wildfire	<b>Low</b>	<b>Moderate</b>	High	High
Windstorm	<b>High</b>	<b>High</b>	Moderate	Moderate
Winter Storm	High	<b>Moderate</b>	High	High

Source: City of Metolius NHMP Steering Committee and Jefferson County NHMP Steering Committee, 2021.

## Drought

The working group determined that the city’s vulnerability to drought is **low**, which is lower than the county’s vulnerability. The city has a dependable water source that is not affected by regional agricultural droughts. The working group noted that drought has become more common in their region, and thus estimated that the probability of a drought event affecting the city is **high**. Droughts impact individual farm owners, the agricultural industry as a whole, and other agricultural related sectors, which Metolius is connected with. Residents within Metolius may be indirectly impacted by a drought, such as experiencing economic hardship from the agricultural and ranching industries. During drought years the fire districts must draw water from greater distances to fight fires, resulting in slower response times.

*For more information on the Drought Hazard (including history and extent) see the Drought Annex in Volume II.*

## **Earthquake**

The working group determined that the city's vulnerability to earthquake is **moderate**, which is the same as the county's vulnerability. There's no past "recent" history of earthquakes in Jefferson County or Metolius; as such the probability of an earthquake event is **low**. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake. Metolius Elementary School is a critical facility within Metolius that is identified as having a moderate, high, or very high collapse potential. There is also concern for the seismic stability of the Metolius City Hall, which is to serve as a command center during an emergency event. Additionally, the City of Metolius is susceptible to isolation given that SW Culver Highway is the only major transportation route connecting the city with the rest of the state. Should an earthquake damage these transportation routes, Metolius may find itself isolated. The Wastewater Treatment Plant is also identified as being at risk in a major seismic event.

*For more information on the Earthquake Hazard (including history and extent) see the Earthquake Annex in Volume II.*

## **Flood**

The working group determined that the city's vulnerability to flood is **moderate**, which is lower than the county's vulnerability. The city is not located near any rivers, streams, or lakes, and has only experienced urban flooding due to heavy rains. When this happens, water rushes down the hill near Mountain View RV Park, damaging gravel roads. In serious cases, homes within the RV park may be damaged. However, due to the history of floods in Metolius the probability of a flood event is **low**.

*For more information on the Flood Hazard (including history and extent) see the Flood Annex in Volume II.*

## **Landslide**

The working group determined that the city's vulnerability to landslide is **low**, which is the same as the county's vulnerability. There are no steep slopes that would directly affect the City of Metolius. During a heavy rain event, the hill near the Mountain View RV Park may experience minor landslides or creeps. Landslide events would most likely impact Metolius if a landslide closed Highway 97, Highway 26, or SW Culver Highway. Any such landslide would affect commerce in Metolius by delaying traffic and commuters. The probability of a landslide event is **low**.

*For more information on the Landslide Hazard (including history and extent) see the Landslide Annex in Volume II.*

## **Volcanic Event**

The working group determined that the city's vulnerability to a volcanic event is **high**, which is the same as the county's vulnerability. While a volcanic event may not have a direct

impact on the City of Metolius, the ash fallout from an event in the Cascades could potentially affect Metolius, especially for people with respiratory problems. There is also potential for people in the area to be evacuated should an eruption occur. The working group acknowledged that because a volcanic event has not happened in the recent past, therefore, the working group determined that the probability of a volcanic event is **low**.

*For more information on the Volcanic Hazard (including history and extent) see the Volcanic Annex in Volume II.*

## **Wildfire**

The working group determined that the city's vulnerability to wildfire is **moderate**, which is lower than the county's vulnerability. The City is surrounded by agricultural fields, which are less likely to burn than sagebrush, grasslands, or forested areas. Fires that affect the city are usually human caused and include house fires or brush burning, not wildfires. The probability of a wildfire affecting the city is **low**.

*For more information on the Wildfire Hazard (including history and extent) see the Wildfire Annex in Volume II.*

## **Windstorm**

The working group determined that the city's vulnerability to a windstorm is **high**, which is higher than the county's vulnerability. Windstorms occur during both the winter and summer months coming either with cold air or, in some cases, with thunderstorms. Of particular note was a windstorm event that occurred on May 30<sup>th</sup>, 2020 that contributed to significant damage in Metolius and the surrounding areas. Wheel lines were tossed, trees toppled and fell on 12 homes, 13 high tension power line towers tops snapped, and one house was destroyed. The city compiled a massive brush pile that took months to either chip or place in dumpsters and dispose of and the city was without electricity for three to four days. In rare instances there is the risk of tornado in the area. The last recorded tornado in Jefferson County was a F0 tornado that touched down on June 9, 2004 on the west side of Madras. A storage shed which had been bolted to a concrete slab was picked up by the tornado and sent two to three hundred feet into the air, clearing to fences and landing next to a tree. Windstorms occur frequently in the Metolius area as such the probability of a windstorm event is **high**.

*For more information on the Windstorm Hazard (including history and extent) see the Windstorm Annex in Volume II.*

## **Winter Storm**

The working group determined that the city's vulnerability to a winter storm is **moderate**, which is lower than the county's vulnerability. In addition to information found in the county's plan, the working group identified other issues specific to Metolius. Death rarely results from winter storms, but roadways that are damaged or made temporarily inaccessible can hinder police, fire, and medical responses to urgent calls. Metolius is severed from other communities to the North and South when SW Culver Highway, Highway 97 and Highway 26 are closed due to ice or other severe winter weather. Additionally,

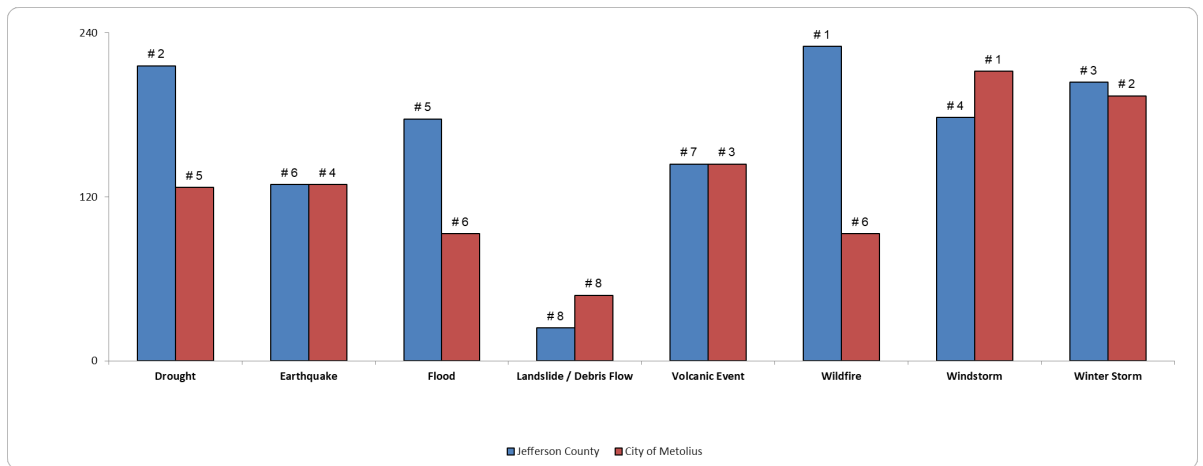
winter storms can damage property and disrupt utilities. The City does have the capability to clear snow from city streets should heavy snowfall occur. Considering the history of winter storms in the region the probability of a winter storm event is **high**.

*For more information on the Winter Storm Hazard (including history and extent) see the Winter Storm Annex in Volume II.*

## Summary

The figure below presents a summary of the hazard analysis for the City of Metolius and compares the results to the assessment completed by the Jefferson County NHMP Steering Committee.

**Figure ME-2 Overall Hazard Analysis Comparison – Metolius and Jefferson County**



Source: City of Metolius NHMP Steering Committee and Jefferson County NHMP Steering Committee, 2021.

## Mitigation Plan Mission

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

The 2021 steering committee reviewed and accepted the 2013 mission statement and agreed that the following statement best describes the over purpose and intent of this plan:

*To create a disaster resilient Jefferson County.*

## Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jefferson County citizens, 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 particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

**Goal 1:** Save lives and reduce injuries

**Goal 2:** Minimize and prevent damage to public and private buildings, infrastructure, and services.

**Goal 3:** Increase cooperation and coordination among private partners with local, state, tribal and federal entities.

**Goal 4:** Increase education, outreach and awareness.

**Goal 5:** Protect natural and cultural resources.

**Goal 6:** Ensure the plan has direct linkages to efficient and effective recovery strategies.

**Goal 7:** Reduce economic impacts of natural disasters.

(Note: although numbered the goals are not prioritized.)

## Mitigation Plan Action Items

Short- and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. They address both multi-hazard (MH) and hazard-specific issues. Action items can be developed through a number of sources. The figure below illustrates some of these sources. A description of how the plan's mitigation actions were developed is provided below.

Figure ME-3 Development of Action Items



Source: Oregon Partnership for Disaster Resilience

## Action Item Worksheets

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described within Volume I, Section 3 (Mitigation Strategy). The City specific action item worksheets are located at the end of this memo.

The City is also a party to several actions described in the County NHMP; each jurisdiction listed on the County Action Item forms as an “Affected Jurisdiction” will contribute to and work towards completion of that action as it pertains to their jurisdiction. For detailed information on each County level action item form see Volume I, Section 3, Mitigation Strategy and Volume IV, Appendix A, Action Item Forms.

## Action Item Development Process

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions by the steering committee. A number of actions identified by the county steering committee include the city as an affected jurisdiction; these actions are broad actions that include implementation components at

both the county and city level. All actions were reviewed by the committee and revised as necessary before becoming a part of this document.

# ATTACHMENT I: ACTION ITEM FORMS

**Table ME-4 Action Item Timelines, Status, High Priority and Related Hazards**

Action Item	Timeline	Status	High Priority	Related Hazard							
				Drought	Earthquake	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm
MH #1	Short Term	Deferred		X	X	X	X	X	X	X	X
MH #2	Short Term	Deferred	Yes	X	X	X	X	X	X	X	X
EQ #1	Long Term	Complete	Yes		X						
EQ #2	Long Term	Deferred	Yes		X						
WD #1	Ongoing	New								X	



<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
<b>MH #1</b> – Develop a continuity of operations plan for the City of Metolius to ensure continued operation in the event of a natural hazard emergency.		Goal 3 Goal 4	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• The City of Metolius is vulnerable to a number of different natural hazards that could affect the administration and management of local government. Developing continuity of operations plans for the City will assist in maintaining a basic level of government to continue to provide needed services within the community.</li> <li>• According to the Florida Division of Emergency Management, continuity of operations is accomplished through the development of plans, comprehensive procedures, and provisions for alternate facilities, personnel, resources, interoperable communication, and vital records/databases. The plan establishes policy and guidance to ensure the execution of the organization’s most essential functions in any event which requires the relocation of selected personnel and functions to an alternate facility.</li> <li>• Research conducted by Richard Wilson has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. It is important to prevent turnover so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can also help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress staff will have to endure.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a continuity of operations plan will diminish the effects of a natural disaster by providing the City of Metolius with a framework for continuing operations in a potentially chaotic situation.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Research and review completed continuity of operations plans to provide a foundation of expected content and issues to review.</li> <li>• Utilize existing OEM Manuals and Templates available on their website (<a href="http://www.oregon.gov/OMD/OEM/pages/plans_train/coop.aspx">http://www.oregon.gov/OMD/OEM/pages/plans_train/coop.aspx</a>)</li> <li>• The COOP should ensure shelter housing for critical staff and family members such as city officials, public works employees, emergency response, and others.</li> <li>• Assess and prioritize critical positions and resources vital to the continuance of important city functions.</li> </ul>			
<b>Coordinating Organization:</b>		City Manager	
<b>Internal Partners:</b>		<b>External Partners:</b>	
City Council; City Mayor			
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>

		Short Term
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Metolius Working Group; Revised and confirmed in 2013.	
<b>Action Item Status:</b>	Deferred in 2021	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #2 – Identify an emergency shelter within the City of Metolius.		Goal 1	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>Currently, the City of Metolius does not have a designated emergency shelter for the community. Based on the City’s assessment of its vulnerabilities to natural hazards, the Metolius Working Group agreed that more attention to emergency protocols and post-disaster resources is required. The City recognizes the importance of this action, despite its deviation from the mitigation-emphasis of this Plan.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Obtain emergency shelter construction guidelines; determine the best community building to ‘designate’ as a shelter, and work toward building a new shelter, if needed. Evaluate building’s design, and determine whether it’s safe for probable hazards.</li> <li>Determine the ‘type’ of shelter most needed within the community. Utilize FEMA’s publicized resources to do so.</li> </ul>			
<b>Coordinating Organization:</b>		City Council	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Police Department		Oregon Military Department – Office of Emergency Management (OEM); American Red Cross; Department of Geology and Mineral Industries (DOGAMI)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2008 NHMP Steering Committee, Metolius Working Group; Revised and confirmed in 2013.		
<b>Action Item Status:</b>	Deferred in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>
EQ #1 – Seismically retrofit Metolius Elementary School to reduce the facility’s vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.		Goal 1 Goal 2 Goal 5
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<ul style="list-style-type: none"> <li>• Metolius Elementary school was built in 1949 and has buildings rating a as high collapse potential per the 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI.</li> <li>• Occupants of the school are primarily elementary school children, aged 5-12 and are vulnerable to potential injury should an event occur</li> <li>• Metolius Elementary School has been prioritized by the Steering Committee due to its hazard to children and due to its potential use as an evacuation area.</li> <li>• Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities, including schools. Careful review of this data will assist in developing a strategy to seismically retrofit Metolius Elementary School.</li> <li>• Retrofitting of vital infrastructure, such as schools and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</li> <li>• Jefferson County has a low vulnerability for seismic hazards and a low probability of a future seismic event recurring. Retrofitting Metolius Elementary School will significantly reduce the school’s vulnerability to seismic hazards and improve the safety of students, teachers, and community members that use the school</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</li> </ul>		
<b>Ideas for Implementation:</b>		
<ul style="list-style-type: none"> <li>• Conduct detailed structural evaluation that outlines recommendations for building deficiencies, and provides a cost estimate, incorporating DOGAMI’s seismic assessment data to assist in retrofitting Metolius Elementary School.</li> <li>• Apply for grant funding through the Oregon Seismic Rehabilitation Grant Program (funding was granted in the 2011-2012 funding cycle).</li> <li>• Apply for FEMA project grant funding.</li> <li>• Conduct structural evaluation and make recommendations (structural and non-structural) for fix.</li> <li>• Align project with School District Maintenance Plan</li> </ul>		
<b>Coordinating Organization:</b>	Jefferson County School District 509J	
<b>Internal Partners:</b>	<b>External Partners:</b>	

Jefferson County; City of Metolius		Oregon Military Department - Office of Emergency Management (OEM); Oregon Department of Geology and Mineral Industries (DOGAMI); Federal Emergency Management Agency (FEMA); Business Oregon	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2013 NHMP Steering Committee, Metolius Working Group.		
<b>Action Item Status:</b>	Complete		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
EQ #2 – Seismically retrofit Metolius City Hall to reduce the building’s vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.		Goal 1 Goal 2 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• There is concern for the seismic stability of Metolius City Hall. The building was not analyzed during the 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI.</li> <li>• Metolius City Hall has been prioritized by the Steering Committee due to its identification as headquarters for emergency response during a disaster.</li> <li>• Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities. Metolius City Hall was not evaluated.</li> <li>• Retrofitting of vital infrastructure, such as city halls and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</li> <li>• Jefferson County has a low vulnerability for seismic hazards and a low probability of a future seismic event recurring. Retrofitting Metolius City Hall will significantly reduce the building’s vulnerability to seismic hazards.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Conduct detailed structural evaluation that outlines recommendations for building deficiencies, and provides a cost estimate, incorporating DOGAMI’s seismic assessment data to assist in retrofitting Metolius City Hall.</li> <li>• Apply for grant funding through the Oregon Seismic Rehabilitation Grant Program (funding was granted in the 2011-2012 funding cycle).</li> <li>• Apply for FEMA project grant funding.</li> <li>• Conduct structural evaluation and make recommendations (structural and non-structural) for fix.</li> </ul>			
<b>Coordinating Organization:</b>		City Council	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Jefferson County; City of Metolius		Oregon Military Department - Office of Emergency Management (OEM); Oregon Department of Geology and Mineral Industries (DOGAMI); Federal Emergency Management Agency (FEMA); Business Oregon	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>

		Long Term
<b>Form Submitted by:</b>	2013 NHMP Steering Committee, Metolius Working Group	
<b>Action Item Status:</b>	Deferred in 2020	

<b>Action Item: Windstorm #1</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Educate property owners on how to properly maintain trees to prevent power loss on power lines off the right of way in partnership with the County.		1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>			
N/A			
<b>Rationale for Proposed Action Item:</b>			
Windstorms occur frequently in Metolius and pose a risk for property damage for property owners. Strong winds build in the western side of the Cascade Mountain range. When pressure changes, the winds rush into the basin areas of Central Oregon's high desert. The speed and power of the winds can easily exceed 40MPH, causing damage to buildings and infrastructure.			
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>	
Work to coordinate with County efforts		New in 2021	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
	Low	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Public Works		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Central Oregon Electric Cooperative, Jefferson County	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	



## ATTACHMENT 2:

### ACTION ITEM FORM TEMPLATE

Action Item:	Alignment with Plan Goals:	High Priority Action Item?
	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/>	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<b>Ideas for Implementation:</b>		<b>Action Item Status</b>
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>
		<input type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)
<b>Coordinating Organization:</b>		
<b>Internal Partners:</b>		<b>External Partners:</b>
<b>Form Submitted by:</b>		
<b>Action Item Status:</b>		

# Appendix A: Action Item Forms

**Table A-I Action Item timelines, status, priority and related hazards.**

Action Item	Timeline	Status	Priority	Jurisdiction				Related Hazard								
				Jefferson County	Madras	Culver	Metolius	Drought	Earthquake	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm	
MH #1	Ongoing	Ongoing		X				X	X							
MH #2	Ongoing	Ongoing		X	X		X	X	X	X	X	X	X	X	X	X
MH #3	Ongoing	Ongoing		X	X	X	X		X	X	X	X	X	X	X	X
MH #4	Long Term	Ongoing		X			X	X	X	X	X	X	X	X	X	X
MH #5	Ongoing	Deferred	Yes	X			X	X	X	X	X	X	X	X	X	X
MH #6	Short Term	REMOVE		X			X	X	X	X	X	X	X	X	X	X
MH #7	Ongoing	Ongoing		X				X	X	X	X	X	X	X	X	X
MH #8	Ongoing	Ongoing		X				X	X	X	X	X	X	X	X	X
MH #9	Ongoing	Ongoing	Yes	X					X	X			X	X	X	
MH #10	Long Term	Deferred	Yes	X										X	X	
MH #11	Ongoing	Ongoing		X						X	X		X	X	X	
MH #12	Short Term	Ongoing	Yes	X					X	X	X	X	X	X	X	X
MH #13	Short Term	Ongoing	Yes	X					X	X	X	X	X	X	X	X
MH #14	Short Term	Ongoing	Yes	X						X	X			X	X	
MH #15	Long Term	REMOVE		X				X	X	X	X	X	X	X	X	X
MH #16	Long Term	New	Yes	X	X	X	X		X	X		X	X			
MH #17	Ongoing	New	Yes	X	X	X	X	X	X	X	X	X	X	X	X	X
DR #1	Short Term	Ongoing		X				X								
DR #2	Ongoing	New	Yes	X	X	X	X	X								
DR #3	Ongoing	New		X	X	X	X	X								
EQ #1	Long Term	Deferred	Yes	X					X							
EQ #2	Long Term	REMOVE		X					X							
EQ #3	Long Term	Deferred		X					X							
FL #1	Long Term	Ongoing		X						X						
FL #2	Long Term	Ongoing		X						X						
FL #3	Ongoing	Ongoing		X			X			X						
FL #4	Ongoing	Ongoing		X			X			X						
FL #5	Ongoing	Ongoing		X						X						
FL #6	Long Term	Deferred	Yes	X						X						
FL #7	Long Term	Ongoing	Yes	X						X						
FL #8	Short Term	Ongoing		X						X						
FL #9	Ongoing	Ongoing	Yes	X	X					X						
FL #10	Long Term	Ongoing		X						X						
FL #11	Long Term	Ongoing		X						X						

**Table A-I Action Item timelines, status, priority and related hazards (Continued)**

				Jurisdiction			Related Hazard						
				Jefferson County	Madras	Culver	Metolius	Drought	Earthquake	Flood	Landslide	Volcanic Event	Wildfire
Action Item	Timeline	Status	Priority										
LS #1	Ongoing	Ongoing		X					X				
LS #2	Long Term	Ongoing		X				X					
VE #1	Long Term	Ongoing		X			X						
WF #1	Ongoing	Ongoing	Yes	X						X			
WF #2	Long Term	Ongoing	Yes	X						X			
WF #3	Long Term	New		X						X			
WD #1	Ongoing	Ongoing		X								X	
WD #2	Long Term	New										X	
WT #1	Ongoing	Deferred		X									X
WT #2	Ongoing	Ongoing	Yes	X									X
WT #3	Long Term	REMOVE		X									X

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
<b>MH #1</b> – Coordinate with Oregon Department of Environmental Quality (DEQ) to monitor blue-green algae in reservoirs and other bodies of water in drought conditions to avoid harm to recreation and the environment.		Goal 1 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Recreation is a vital sector of Jefferson County’s economy; ensuring blue-green algae does not accumulate in reservoirs is essential in maintaining this economy.</li> <li>• Certain species of blue-green algae are hazardous to people, pets and livestock.</li> <li>• Blue-green algae outbreaks alter the oxygen level of the water, which can have adverse effects on fish and other aquatic life, and can even result in fish kills.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions and projects that reduce the effects of a hazard on the community [201.6(c)(3)(ii)].</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Coordinate with the community to monitor blue-green algae in reservoirs and other bodies of water.</li> <li>• Implement a public outreach campaign to educate Jefferson County citizens about the effects of blue-green algae.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Department of Environmental Quality (DEQ), Water/Irrigation Districts, Deschutes Valley Water District	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #2 – Identify and coordinate natural hazard mitigation activities and incentive programs		Goal 1 Goal 4	
<b>Alignment with Existing Plans/Policies:</b>			
Jefferson County CWPP, Greater Sisters CWPP, Emergency Operations Plan			
<b>Rationale for Proposed Action Item:</b>			
Incentive programs have been successful in the past in improving participation in wildfire risk mitigation activities, especially on private land. One example of this is the Jefferson County Defensible Space Program which offers a flat rate reimbursement to homeowners that conduct fuels reduction projects on their property to SB-360 standards. More programs like this can support involving community members in mitigation efforts for wildfire (and other hazards), while offsetting costs for the individual to conduct mitigation activities, like fuels reduction and defensible space.			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Jefferson County can learn from work happening in other areas, build on the current defensible space program, and build a robust suite of programs that supports mitigation efforts to reduce structural and individual risk to wildfire</li> </ul>			
<b>Coordinating Organization:</b>		Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Local (Title III)		Low	Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2021		
<b>Action Item Status:</b>	Ongoing		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
<p><b>MH #3</b> – Develop and deliver outreach and education programs on natural hazard mitigation activities and incentive programs for the residents of Jefferson county.</p>		<p>Goal 1 Goal 4</p>	
<b>Alignment with Existing Plans/Policies:</b>			
Jefferson County CWPP, Greater Sisters CWPP, Emergency Operations Plan			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Several natural hazards, such as severe weather, earthquakes, and floods, have the potential for disrupting transportation services and isolating rural residents from basic services and needs. Jefferson County has a high number of rural residents, and they need to be educated about the dangers that natural hazards pose and what actions they can take to mitigate the impact hazards on the community.</li> <li>• Conducting public outreach campaigns raises awareness about natural hazards and helps illustrate what residents and businesses can do to reduce the impact of a natural disaster on their properties, therefore significantly reducing the impact of a natural disaster in Jefferson County.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions and projects that reduce the effects of a hazard on the community [201.6(c)(3)(ii)]. Educating Jefferson County residents about all the natural hazard events within the County can reduce the effects of natural hazards on the community.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Conduct public outreach campaigns, such as articles in the newspaper or through brochures instructing residents and businesses about the risks natural hazards pose and mitigation actions they can implement.</li> <li>• Coordinate with other groups conducting other emergency management activities to assist in conducting public outreach campaigns, developing emergency kits, and educating residents and businesses about other mitigation activities</li> <li>• Develop handouts that inform residents and businesses about natural hazard risk, appropriate mitigation actions that can be implemented, and where citizens can further obtain information.</li> <li>• Create an online informational website where residents and businesses can be educated about appropriate mitigation actions residents and businesses can implement to reduce the impact of natural hazards</li> <li>• Work with local real estate trade associations to prepare informational handouts advising property owners of natural hazard risks in their area and measures they can implement to reduce their risk of exposure.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Jefferson County Extension Office		Project Wildfire; OSU-Extension; Jefferson County Extension Office; FEMA; ODF; Emergency	

	Management; COIC; COFMS; USFS; NRCS	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
		Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2021	
<b>Action Item Status:</b>	Ongoing	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>
<b>MH #4</b> – Inventory historic and cultural resources, with an emphasis on unreinforced masonry buildings, and identify their vulnerabilities to natural hazards to develop mitigation actions for their protection.		Goal 1 Goal 2 Goal 5
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<ul style="list-style-type: none"> <li>Unreinforced masonry buildings are particularly vulnerable to seismic events. Many older commercial buildings in Jefferson County are unreinforced masonry and are vulnerable to damage in the event of an earthquake. This could have significant impacts on local economies in the event of an earthquake. Identifying mitigating measures for retrofitting masonry buildings will reduce the vulnerability of the buildings to an earthquake event and improve the resiliency of the local economy.</li> <li>The National Register of Historic Places indicates that Jefferson County has 3 buildings listed on the National Register. These sites serve as important cultural and historic resources for Jefferson County and are worthy of additional protection. Identifying mitigation measures for resources listed on the National Register will help protect Jefferson County’s historical heritage and ensure their long-term viability.</li> <li>Tourism is a significant component of Jefferson County’s economy and many tourists come to visit Jefferson County’s historic and cultural resources. Identifying mitigating actions to help preserve these historic and cultural resources from damaging hazard events will preserve the cultural heritage of the County and maintain heritage tourism as a significant component in the County’s economy.</li> <li>The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Inventorying important historic and cultural resources and identifying their vulnerability to natural hazards will help to develop mitigation actions that reduce their overall vulnerability to natural hazards.</li> </ul>		
<b>Ideas for Implementation:</b>		
<ul style="list-style-type: none"> <li>Work with the State Historic Preservation Office to determine vulnerabilities of community structures to natural hazards.</li> <li>Identify appropriate mitigation measures to help preserve structures within the community that are at risk for each hazard type.</li> <li>Create an online data base which illustrates an inventory of the number and type of structures within the community that are at risk for each hazard type.</li> <li>Identify significant cultural and historic resources, whether on the national register or not, that are worthy of additional protection.</li> </ul>		
<b>Coordinating Organization:</b>	Jefferson County Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>



		Economic Development of Central Oregon, State Historic Preservation Officer, Jefferson County School Districts	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #5 – Explore emergency response and preparedness measures to address needs for action items identified in the 2013 (and 2021) NHMP update.		Goal 1 Goal 6	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• There are a number of emergency response and preparedness measures available to Jefferson County, such as: reverse 9-1-1, educating hazardous materials teams, responders and community leaders in basic communication and response activities, and training on natural hazards and how to respond to them effectively. Exploring the effectiveness of these emergency response and preparedness measures will allow the County to more effectively respond to a natural disaster event.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions and projects that reduce the effects of a hazard on the community [201.6(c)(3)(ii)]. Developing emergency response and preparedness measures will reduce the effects of a hazard on Jefferson County.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Identify shelters to receive displaced persons and create a way to provide food, water, bedding and personal hygiene supplies.</li> <li>• Identify how supplies could be shipped to our community in the event some roads are damaged.</li> <li>• Send a representative to workshops and trainings to explore emergency response and preparedness measures.</li> <li>• Research and review what adjacent counties are doing as per emergency response and preparedness measures.</li> <li>• Convene the Hazard Mitigation Coordinating Body on a regular basis to discuss emergency response and preparedness measures.</li> <li>• After natural hazard events occur, convene the Hazard Mitigation Coordinating Body to discuss adequacy of emergency response and preparedness measures and how they can be altered to better respond to natural hazards.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Emergency Services	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Cities of Madras and Metolius, Crooked River Ranch, Three Rivers,		Oregon Military Department – Office of Emergency Management (OEM), Oregon Department of Humans Services (DHS), Federal Emergency Management Agency (FEMA), Silver Jackets, State Fire Marshal	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		

<b>Action Item Status:</b>	Ongoing in 2021
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<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #6 – Work with local businesses to develop business continuity plans.		Goal 2 Goal 4 Goal 5 Goal 6	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• According to Daniel Alesch from the Public Entity Risk Institute, business continuity plans assist businesses in planning for future recovery efforts. In addition, research has shown that most small businesses are unable to recover after a disaster. Business continuity plans allow businesses and their employees to be better prepared for a disaster. Having plans in place may reduce the impact on the business, allowing employees to continue to work or get back to work faster.</li> <li>• Many small business owners and farmers in Jefferson County are located in areas that are susceptible to natural hazards. Preparing business continuity plans for these small enterprises can significantly reduce the impact of a natural hazard and help businesses to recover from a disaster.</li> <li>• Ranchers in Jefferson County can be particularly susceptible to severe weather events. A winter storm can make it difficult for cattle to find feed and can harm a rancher’s livestock. Incorporating these hazards into a business continuity plan, and developing steps to continue business activities, will help a business recover faster from a natural disaster.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Coordinate with local Chambers of Commerce to help develop business continuity plans.</li> <li>• Use the monthly Chamber of Commerce meetings as an informational forum to teach businesses the importance of developing business continuity plans.</li> <li>• Utilize IBHS as a resource to help conduct workshops with local businesses and farmers develop business continuity plans.</li> <li>• Utilize chamber websites to disseminate information regarding business continuity planning.</li> </ul>			
<b>Coordinating Organization:</b>		Madras – Jefferson Chamber of Commerce	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Crooked River Ranch-Terrebonne Chamber of Commerce		Institute for Business and Home Safety (IBHS)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Removed in 2021 – no longer relevant		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #7 – Develop a continuity of operations plan for Jefferson County to ensure continued operation in the event of a natural hazard emergency.		Goal 1 Goal 2 Goal 6	
<b>Alignment with Existing Plans/Policies:</b>			
Jefferson County Emergency Operations Plan Greater Sisters Area Emergency Operations Plan			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Jefferson County is vulnerable to a number of different natural hazards that could affect the administration and management of local government. Developing continuity of operations plans for the County will assist in maintaining a basic level of government to continue to provide needed services within the community.</li> <li>• According to the Florida Division of Emergency Management, continuity of operations is accomplished through the development of plans, comprehensive procedures, and provisions for alternate facilities, personnel, resources, interoperable communications, and vital records/databases. The plan establishes policy and guidance to ensure the execution of the organization’s most essential functions in any event which requires the relocation of selected personnel and functions to an alternate facility.</li> <li>• Research conducted by Richard Wilson has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. It is important to prevent turnover so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can also help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress staff will have to endure.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a continuity of operations plan will diminish the effects of a natural disaster by providing Jefferson County with a framework for continuing operations in a potentially chaotic situation.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Research and review completed continuity of operations plans to provide a foundation of expected content and issues to review.</li> <li>• Utilize existing OEM Manuals and Templates available on their website (<a href="http://www.oregon.gov/OMD/OEM/pages/plans_train/coop.aspx">http://www.oregon.gov/OMD/OEM/pages/plans_train/coop.aspx</a>)</li> <li>• The COOP should ensure shelter housing for critical staff and family members such as County officials, public works employees, emergency response, and others.</li> <li>• Assess and prioritize critical positions and resources vital to the continuance of important County functions.</li> <li>• Incorporate COOP into the existing Emergency Operations Plans where applicable.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Emergency Services	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development, Public Works, Assessor, Treasurer, Clerk, County		Oregon Military Department – Office of Emergency	

Commissioners		Management (OEM)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #8 – Coordinate existing mitigation activities with existing planning activities, to avoid duplicating efforts.		Goal 3 Goal 4 Goal 6	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>There are a number of organizations in Jefferson County that conduct activities related to emergency management or public health and safety. These organizations include the St. Charles – Madras Hospital, the Jefferson County Department of Health, the US Forest Service, the Bureau of Land Management, the US Fish and Wildlife Service, the Jefferson County office of Emergency Management, and the Community Wildfire Protection Program (CWPP) among others. Coordinating mitigation planning activities with other emergency management or public health and safety activities will avoid duplicating efforts and increase cooperation among different entities striving to improve disaster resilience in Jefferson County.</li> <li>The Disaster Mitigation Act of 2000 requires communities to maintain the Hazard Mitigation Plan by having local governments incorporate the requirements of the mitigation plan into other planning mechanisms {201.6(c)(4)(ii)}. Coordinating mitigation activities with other emergency management or public health and safety planning activities will help local governments incorporate mitigation into other plans and policies currently being developed. Coordination will also reduce duplication of planning efforts, strengthening the overall mitigation planning process.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Include representatives from the NHMP Steering Committee in other emergency management and public health and safety planning efforts to ensure a link between mitigation and other planning activities.</li> <li>Invite members of other committees to NHMP Steering Committee meetings.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Emergency Services	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development, Public Works		Oregon Military Department - Office of Emergency Management (OEM); Department of Land Conservation and Development (DLCD); Department of Human Services (DHS); Oregon Partnership for Disaster Resilience (OPDR)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #9 – Develop strategies for collaborating and coordinating with other entities to improve mitigation and emergency management activities in Jefferson County.		Goal 3 Goal 6	
<b>Alignment with Existing Plans/Policies:</b>			
Oregon NHMP			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>There are a number of organizations in Jefferson County that conduct activities related to emergency management or public health and safety. These organizations include the St. Charles – Madras Hospital, the Jefferson County Department of Health, the US Forest Service, the Bureau of Land Management, the US Fish and Wildlife Service, the Jefferson County office of Emergency Management, and the Community Wildfire Protection Program (CWPP) Core Team, among others. Coordinating mitigation planning activities with other emergency management or public health and safety activities will avoid duplicating efforts and increase cooperation among different entities striving to improve disaster resilience in Jefferson County.</li> <li>The Disaster Mitigation Act of 2000 requires communities to maintain the Hazard Mitigation Plan by having local governments incorporate the requirements of the mitigation plan into other planning mechanisms [201.6(c)(4)(ii)]. Coordinating mitigation activities with other emergency management or public health and safety planning activities will help local governments incorporate mitigation into other plans and policies currently being developed. Coordination will also reduce duplication of planning efforts, strengthening the overall mitigation planning process.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Include representatives from the NHMP Steering Committee in other emergency management and public health and safety planning efforts to ensure a link between mitigation and other planning activities.</li> <li>Invite members of other committees to Hazard Mitigation Coordinating Body meetings.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Emergency Services	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Jefferson County Department of Health		St. Charles – Madras Hospital; United States Forest Service (USFS); Bureau of Land Management (BLM); United States Fish and Wildlife Service (USFWS); CWPP Core Team; Silver Jackets; Oregon Military Department - Office of Emergency Management (OEM)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing		



<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
<b>MH #10</b> – Coordinate with managing agencies to ensure sufficient back-up energy sources exist for all critical infrastructure facilities.		Goal 1 Goal 2 Goal 3 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>When electric power goes out during an emergency, back-up energy is often necessary for critical facilities to carry out their functions to serve the community.</li> <li>Currently, Public Works and the Wastewater Treatment Plant off of Shitike Creek do not have reliable back up power.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Further research and prioritization of critical facilities in need of emergency backup energy sources.</li> <li>Apply for funding.</li> </ul>			
<b>Coordinating Organization:</b>		Buildings and Grounds	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development; Public Works			
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Deferred in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #11 – Shorten spans between power line poles and add anchors in areas prone to windstorm and winter storm.		Goal 1	Goal 2
		Goal 3	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• High windstorms or winter icing storms can cause damage to long spans between power poles and create power outages during storms. If poles are inserted between spans this reduces the risk of outages. Also, by anchoring certain poles this can reduce the amount of line, which would go down in a storm. Both items reduce the cost of repair and replacement.</li> <li>• Winter storms have a significant impact on the electric cooperatives, causing power outages when ice forms on the power lines. This is especially a problem with older power lines that have a larger line span between poles. Placing intermediary poles between these spans cuts the span in half and reduces the likelihood of a power line breaking.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards, with an emphasis on new and existing buildings and infrastructure. [201.6(c)(3)(ii)] Shortening the spans between long lines and anchoring poles will reduce the likelihood of lines breaking during wind and winter icing storms.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Identify power lines in need of anchors with Central Electric Cooperative and Wasco Electric.</li> <li>• Seek funding.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Central Oregon Electric Cop, Wasco Electric Cooperative	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
<b>MH #12</b> – Identify strategies to improve access to communities listed as at extreme or high risk to wildfire, flood, landslides, or winter storms (including creating/improving evacuation routes to ‘one-way in/out’ communities), paying particular attention to the communities of Crooked River Ranch, Camp Sherman, and Three Rivers.		Goal 1 Goal 3 Goal 4 Goal 6	
<b>Alignment with Existing Plans/Policies:</b>			
<ul style="list-style-type: none"> <li>Jefferson County Community Wildfire Protection Plan (CWPP)</li> </ul>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>A number of communities in Jefferson County, particularly unincorporated communities such as Crooked River Ranch, are home to a significant concentration of the population, and have only a few (or in some cases) one active entrance/exit for the entire community.</li> <li>Identifying strategies to improve access to these communities will allow quicker and easier evacuation for residents and mobility for emergency services in the event of a natural hazard.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Identify organizations that will need to be involved.</li> <li>Identify possible escape routes and seek funding to create or improve them.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Commissioners	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Emergency Services, Public Works, Unincorporated Communities		Bureau of Land Management (BLM), Oregon Department of Transportation (ODOT)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
<b>MH #13</b> – Create Mutual Aid Agreement between city, county, state, tribal and federal road and highway maintenance crews for effective road management during natural hazard events.		Goal 2 Goal 3 Goal 6	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Many important roadways in Jefferson County act as the single access point for isolated communities. Damage to or blockage of these roadways from a natural hazard can impede response and recovery efforts.</li> <li>• Need for a Mutual Aid Agreement for road maintenance crews was identified during Steering Committee interviews.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Coordinate with necessary agencies to develop a plan.</li> </ul>			
<b>Coordinating Organization:</b>		County Public Works, Jefferson County Commissioners	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Crooked River Ranch Special Road District, Warm Springs Road District; incorporated cities		Oregon Department of Forestry (ODF), Bureau of Land Management (BLM), Oregon Department of Transportation (ODOT)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
<b>MH #14</b> –Upgrade emergency radio systems to ensure reliable communication among emergency services, specifically targeting communication towers, radio repeaters, and personal communication devices.		Goal 1 Goal 2 Goal 3	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>Identifying strategies to improve and upgrade emergency service communication (especially Communication Towers, repeaters and radios) would ensure easier evacuation for residents and efficient communication between emergency services in the event of a natural hazard.</li> <li>The 2013 Natural Hazard Mitigation Steering Committee identified communication upgrade as a high priority.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Identify funding and apply for grants.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Emergency Services	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Emergency Management, Fire Districts, Jefferson County Fire Defense Board, Police Department, County Commissioners.		Oregon Military Department - Office of Emergency Management (OEM), Federal Emergency Management Agency (FEMA)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
MH #15 – Seek National Weather Service StormReady® community certification.		Goal 4	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• NOAA StormReady® community certification will help to increase awareness about natural hazards among the community and will improve storm notification systems.</li> <li>• StormReady® helps with providing communication and safety skills needed to save lives and property--before and during hazard events by assisting community leaders and emergency managers to strengthen local safety programs.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Review requirements via the NOAA National Weather Service StormReady® website: <a href="http://www.stormready.noaa.gov/index.html">http://www.stormready.noaa.gov/index.html</a></li> <li>• Meet StormReady® requirements and apply for certification</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Emergency Manager	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Fire Districts,		National Weather Service (NWS), Federal Emergency Management Agency (FEMA)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Removed in 2021 – no longer relevant		

<b>Action Item: Multi Hazard #16</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Support the development and coordination of the Regional Emergency Services Training and Coordination Center (RESTCC)		Goal 1 Goal 3	<input checked="" type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
Jefferson County			
<b>Alignment with Existing Plans/Policies:</b>			
State EOP, County EOP, State Recovery Plan			
<b>Rationale for Proposed Action Item:</b>			
<p>Central Oregon, Oregon, and the Pacific Northwest are facing growing threats from natural disasters that severely impact our households, communities, and economies – including large-scale wildfire, flooding and landslides, future pandemics and public health crises, and the Cascadia Subduction Zone.</p> <p>Central Oregon has insufficient facilities to meet existing, mandatory training needs of local, state, and federal public safety personnel. In a rapidly growing region, the need for trained public safety and emergency services professionals is increasing. Furthermore, the region lacks a dedicated, multi-agency coordination center for emergency operations, nor does it have an adequate backup 911-center with redundant emergency dispatch capabilities. And in the event of a major natural disaster such as a Cascadia Subduction Zone event, Redmond and the Redmond Airport have been envisioned as a primary staging ground for statewide rescue and recovery operations.</p> <p>The RESTCC would include all the high-priority training needs and props to ensure that critical law enforcement, fire/EMS, and other emergency and preparation needs (e.g train derailment, airport emergencies, etc.) are met. The facility will also offer a turnkey Emergency Operations Center (EOC) in the event of a major regional, statewide or larger-scale disaster (e.g. Cascadia or future pandemics).</p>			
<b>Ideas for Implementation:</b>		<b>Action Status Report</b>	
<ul style="list-style-type: none"> <li>- Build a Master Plan</li> <li>- Initiate UGB Expansion Process</li> <li>- Create an MOU for regional partners</li> <li>- Design/Engineering</li> <li>- Capital funding: Phase 1 Capital = \$25-30 million</li> </ul>		<p>The Strategic Business Plan for this facility was completed in September 2020, and since then COIC and partners have met to discuss the outcomes of the plan and identify next steps for this project over the coming 12-18 months. The highest priorities for the next phase of this project are securing a site, addressing land use and infrastructure issues, and completing design/engineering for the first phase.</p>	
<b>Potential Funding Sources:</b>		<b>Estimated Cost:</b>	<b>Timeline:</b>

Local, state, and federal sources (planning and capital)	\$100,000,000 HIGH	Long term (6+ years)
<b>Coordinating Organization:</b>	COIC	
<b>Internal Partners:</b>	<b>External Partners:</b>	
JCSO, Board of County Commissioners, Cities, Special Service Districts	OEM, OSFM, ODF, OSP, DPSST, Governor's Office Regional Solutions, Central Oregon Fire Management Services (COFMS), Crook County, Jefferson County, Central Oregon Fire Chief's Association (COFCA), Central Oregon Law Enforcement Services (COLES)	
Form Submitted by:	2021 Steering Committee	
Action Item Status:	NEW	



<b>Action Item: Multi Hazard #17</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Adopt and integrate the new OR Alert Emergency System in Jefferson County		Goal 1 Goal 3	<input checked="" type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
Jefferson County, Culver, Madras, Metolius			
<b>Alignment with Existing Plans/Policies:</b>			
Jefferson County Sheriff's Office Policy 317.2 Public Alerts. Jefferson County Emergency Operations Plan ESP 2 Communications, 4.4 Alerts & Warnings.			
<b>Rationale for Proposed Action Item:</b>			
Currently the Jefferson County Sheriff's Office in cooperation with Frontier 911 and other local entities provides a Public Alerts system through a contractor known as Everbridge. This system is used to alert the public in cases of emergency. Jefferson County Sheriff's Office is entering into an agreement with the Office of Oregon Emergency Management in a project called OR Alert which is a statewide public alert system with updated capacity. This system is provided by the same contractor so it should be a enhanced continuation of public safety within Jefferson County.			
<b>Ideas for Implementation:</b>		<b>Action Status Report</b>	
Implementation is in progress.		NEW	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
Oregon Emergency Management Oregon Dept. of Administrative Services	No cost to Jefferson County.	Ongoing.	
<b>Coordinating Organization:</b>	OEM / DAS and Jefferson County Sheriff's Office		
<b>Internal Partners:</b>		<b>External Partners:</b>	
JCSO, F911		OEM, DAS	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
DR #1 – Coordinate with local irrigation and water purveying districts to identify areas in need of additional water resources.		Goal 1 Goal 2 Goal 3 Goal 5 Goal 6	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>The average recurrence interval for severe droughts in Jefferson County is between 8-12 years. Drought incurs significant environmental and economic consequences – especially for Jefferson County’s agricultural and recreational employment sectors</li> <li>The agriculture economy depends on well water and irrigated water from reservoirs and rivers for watering crops, and the lower water levels that result from drought means less water available for agriculture. Often, farmers have to choose between spending more money for water, or suffer from a reduced yield.</li> <li>Availability of water is essential to effectively suppress wildfires in Jefferson County.</li> <li>Forests in Jefferson County are more vulnerable to wildfires in drought conditions because trees become more stressed and their resistance to wildfires and disease is diminished. Dead fuel in forests is also higher than in the past, resulting in more available fuel that can lead to larger wildfire events.</li> <li>The Disaster Mitigation Act of 2000 requires communities to create actions that will reduce the impact <sup>[1]</sup><sub>SEP</sub> of natural hazards on the community [201.6(c)(3)(ii)]. Providing supplemental water supply tanks in key locations will enhance fire-fighting capabilities to reduce the impact of a wildfire on the community.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Prioritize water needs based on local fire vulnerability and current water capacity.</li> <li>Seek funding opportunities for pay for supplemental water storage tanks.</li> <li>Explore common valves with irrigation wells, as used in some areas in Nevada, to allow for quickwater access in the event of a fire.</li> </ul>			
<b>Coordinating Organization:</b>		North Unite Irrigation District (north); Central Oregon Irrigation District (south)	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works; Emergency Services		Oregon Department of Fish and Wildlife (ODFW); Oregon Department of Forestry (ODF); Bureau of Land Management (BLM); Deschutes Valley Water District	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		

<b>Action Item Status:</b>	Ongoing in 2021
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<b>Action Item: Drought #2</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Seeking and instituting alternative and more reliable agricultural irrigation water source(s).		Goal 3 Goal 5 Goal 7	<input checked="" type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
Jefferson County, Culver, Madras, Metolius			
<b>Alignment with Existing Plans/Policies:</b>			
Upper Deschutes River Basin Study, October 2019.			
<b>Rationale for Proposed Action Item:</b>			
Currently, NUID irrigation water is source from the Wikiup and Haystack Reservoirs and the Crooked River. Districts with junior water rights are relatively less secure in their water supply. Basin Study assessments of supply and demand for the Upper Deschutes basin overall indicate median annual shortages totaling 135,000 acre-feet, increasing to 350,000 acre-feet for dry years. Dry years significantly affect Jefferson Co. farmers. For example, 2021 will be the fourth consecutive year Jefferson Co. farmers will not be permitted to utilize their full irrigation water rights. Therefore, seeking and instituting an alternative water source will provide a sustainable while balancing environmental and other stakeholder needs.			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2013</b>	
<ol style="list-style-type: none"> <li>1. Conduct necessary study to consider alternative water sources.</li> <li>2. Complete outreach to stakeholders to discuss alternatives.</li> <li>3. Select preferred alternative through collaboration amongst basin stakeholders</li> <li>4. Obtain necessary permits to construct system improvements to utilize alternative water source(s).</li> <li>5. Obtain necessary funding to construct system improvements.</li> </ol>		NEW	
<b>Potential Funding Sources:</b>		<b>Estimated Cost:</b>	<b>Timeline:</b>
<ol style="list-style-type: none"> <li>1. USDA</li> <li>2. Bureau of Reclamation</li> <li>3. State and Federal legislative earmarks</li> <li>4. Jefferson Co. farmers.</li> </ol>		NUID to estimate cost.	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)
<b>Coordinating Organization:</b>		NUID	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Jefferson County Public Works, Jefferson County Planning Department		- USDA - Bureau of Reclamation	

Form Submitted by:	2021 Steering Committee
Action Item Status:	NEW

<b>Action Item: Drought #3</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Improve irrigation efficiency by piping existing canals.		Goal 5 Goal 6 Goal 7	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
Jefferson County, Culver, Madras, Metolius			
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
Reduce water loss from ground water absorption and evaporation from canals. Piping increases water available for agricultural users.			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2013</b>	
<ol style="list-style-type: none"> <li>1. NUID to identify, prioritize, scope, and provide cost estimate for individual piping projects.</li> <li>2. Secure funding to pipe canals (construction).</li> </ol>		NEW	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
<ol style="list-style-type: none"> <li>1. USDA</li> <li>2. Bureau of Reclamation</li> <li>3. Federal earmark</li> <li>4. State of Oregon (legislative request)</li> </ol>	Individual project costs to be determined. Overall cost to pipe canals is estimated to be \$10-40 million.	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Long (6+ years) <input type="checkbox"/> Medium (2-5 years) <input type="checkbox"/> Short (0-2 years)	
<b>Coordinating Organization:</b>	Jefferson County		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		<ul style="list-style-type: none"> <li>- USDA</li> <li>- Central Oregon Irrigation Districts</li> <li>- Deschutes Water Alliance</li> <li>- Confederated Tribes of Warm Springs</li> </ul>	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
EQ #1 – Seismically retrofit Culver High School to reduce the facility’s vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.		Goal 1 Goal 2 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Culver High school was built in 1963 and has buildings ranging from a high to very high collapse potential per the 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI.</li> <li>• Occupants of the school are primarily high school children, aged 14-18 and are vulnerable to potential injury should an event occur</li> <li>• Culver High School has been prioritized by the Steering Committee due to its hazard to children and due to its potential use as an evacuation area.</li> <li>• Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities, including schools. Careful review of this data will assist in developing a strategy to seismically retrofit Culver High School.</li> <li>• Retrofitting of vital infrastructure, such as schools and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</li> <li>• Jefferson County has a low vulnerability for seismic hazards and a low probability of a future seismic event recurring. Retrofitting Culver High School will significantly reduce the school’s vulnerability to seismic hazards and improve the safety of students, teachers, and community members that use the school</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Conduct detailed structural evaluation that outlines recommendations for building deficiencies, and provides a cost estimate, incorporating DOGAMI’s seismic assessment data to assist in retrofitting Culver High School.</li> <li>• Apply for grant funding through the Oregon Seismic Rehabilitation Grant Program (funding was granted in the 2011-2012 funding cycle).</li> <li>• Apply for FEMA project grant funding.</li> <li>• Conduct structural evaluation and make recommendations (structural and non-structural) for fix.</li> <li>• Align project with School District Maintenance Plan</li> </ul>			
<b>Coordinating Organization:</b>		Culver School District 4	
<b>Internal Partners:</b>		<b>External Partners:</b>	

Jefferson County, City of Culver		Oregon Military Department - Office of Emergency Management (OEM), Oregon Department of Geology and Mineral Industries (DOGAMI), Federal Emergency Management Agency (FEMA), Oregon Department of Education (ODE); Business Oregon	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Seismic Rehabilitation Grant Program			Long Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Deferred in 2021		



<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>
EQ #2 – Seismically retrofit Culver Police Department to reduce the facility’s vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.		Goal 1 Goal 2 Goal 5
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposed Action Item:</b>		
<ul style="list-style-type: none"> <li>• Culver Police Department was built in 1977 and the building has a high collapse potential per the 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI.</li> <li>• Occupants of the Police Department would be some of the first to respond during a natural disaster event.</li> <li>• Culver Police Department has been prioritized by the Steering Committee due to its role during a disaster event.</li> <li>• Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities, including critical facilities such as police departments. Careful review of this data will assist in developing a strategy to seismically retrofit Culver Police Department</li> <li>• Retrofitting of vital infrastructure, such as police departments and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</li> <li>• Jefferson County has a low vulnerability for seismic hazards and a low probability of a future seismic event recurring. Retrofitting Culver Police Department will significantly reduce the department’s vulnerability to seismic hazards and improve recovery time during and after a natural disaster.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</li> </ul>		
<b>Ideas for Implementation:</b>		
<ul style="list-style-type: none"> <li>• Conduct detailed structural evaluation that outlines recommendations for building deficiencies, and provides a cost estimate, incorporating DOGAMI’s seismic assessment data to assist in retrofitting Culver Police Department.</li> <li>• Apply for grant funding through the Oregon Seismic Rehabilitation Grant Program (funding was granted in the 2011-2012 funding cycle).</li> <li>• Apply for FEMA project grant funding.</li> <li>• Conduct structural evaluation and make recommendations (structural and non-structural) for fix.</li> </ul>		
<b>Coordinating Organization:</b>	City of Culver – Administration and Police	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Jefferson County	Oregon Military Department - Office of Emergency	

	Management (OEM), Oregon Department of Geology and Mineral Industries (DOGAMI), Federal Emergency Management Agency (FEMA), Business Oregon	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
Seismic Rehabilitation Grant Program		Long Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee	
<b>Action Item Status:</b>	Removed in 2021 – police station no longer exists	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
EQ #3 – Seismically retrofit Jefferson County Fire District #1 to reduce the facility’s vulnerability to seismic hazards. Consider both structural and non-structural retrofit options.		Goal 1	Goal 2
		Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Jefferson County Fire District #1 was built in 1997 and the building has a low collapse potential per the 2007 Statewide Seismic Needs Assessment Study conducted by DOGAMI. The county values the fire district facility due to its nature as a critical facility and due to its importance during a hazard event; as such the county would like to further evaluate the facility and retrofit as needed.</li> <li>• Occupants of the Fire District would be some of the first to respond during a natural disaster event.</li> <li>• Jefferson County Fire District #1 has been prioritized by the Steering Committee due to its role during a disaster event.</li> <li>• Oregon Senate Bill 2 (2005) directed DOGAMI to develop a statewide seismic needs assessment that includes a FEMA 154 Rapid Visual Screening survey of specific critical facilities, including critical facilities such as police departments. Careful review of this data will assist in developing a strategy to seismically retrofit the Jefferson County Fire District #1 facility.</li> <li>• Retrofitting of vital infrastructure, such as police departments and community buildings, provides important improvements that reduce hazard exposure and the cost and time associated with recovery (Source: American Planning Advisory Service Report Number 483/484).</li> <li>• Jefferson County has a low vulnerability for seismic hazards and a low probability of a future seismic event recurring. Retrofitting the Jefferson County Fire District #1 facility will significantly reduce the department’s vulnerability to seismic hazards and improve recovery time during and after a natural disaster.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Identifying critical and essential facilities for seismic retrofit will help to identify major seismic issues and appropriate mitigation actions to protect critical and essential facilities.</li> </ul>			
<b>Ideas for Implementation:</b>			
<b>Coordinating Organization:</b>		Jefferson County - Fire	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Jefferson County Administration		Oregon Military Department - Office of Emergency Management (OEM), Oregon Department of Geology and Mineral Industries (DOGAMI), Federal Emergency Management Agency (FEMA), Business Oregon	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>

Seismic Rehabilitation Grant Program		Long Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee	
<b>Action Item Status:</b>	Deferred in 2021	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #1 – Develop flood mitigation strategies for critical facilities and infrastructure located in the floodplain.		Goal 1 Goal 2 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<ul style="list-style-type: none"> <li>• Madras Flood Mitigation Plan</li> <li>• Jefferson County Comprehensive Plan</li> </ul>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Many critical facilities in Jefferson County, such as the County offices and the County Courthouse, are located in the floodplain or the floodway.</li> <li>• Goal 7 of Oregon's Land Use Planning Goals requires that local governments "adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures...[that prohibit] the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1) (a)(b)(c) and (e)), in identified hazard areas..." Relocating many of the critical facilities in Jefferson County will help fulfill Goal 7 and improve mitigation in Jefferson County.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Developing flood mitigation strategies for critical facilities will help to reduce the impact of flooding events when they occur in the County.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Move critical facilities, such as the County administrative offices and County courthouse, to areas outside the floodplain/floodway.</li> <li>• Mitigation activities include raising buildings at or above the 100-year flood plain level, discouraging placement of critical facilities in the floodplain, flood-proofing structures that can't be moved, and limiting development in floodplain areas.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works; Cities of Madras and Metolius; Crooked River Ranch		Federal Emergency Management Agency (FEMA); Oregon Military Department - Office of Emergency Management (OEM); Silver Jackets	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #2 – Explore coordination and support strategies to minimize the negative impact of upstream development on rivers and streams.		Goal 2 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<ul style="list-style-type: none"> <li>Jefferson County Comprehensive Plan</li> </ul>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>Steering Committee members identified upstream development on creeks in Jefferson County as having a negative impact on development downstream, especially with the increase in water runoff due to new developments.</li> <li>Implementing strategies to minimize development on rivers and streams reduces the chances of flooding on downstream developments.</li> <li>There is a direct link between upstream development and downstream flooding. As a community develops, the impervious surfaces that are created increase the amount of runoff during rainfall events, disrupting the natural hydrologic cycle. Without control, these conditions erode stream channels and prevent groundwater recharge, increasing the probability of flooding.</li> <li>The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of natural hazards on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Minimizing upstream development reduces the potential for flooding at new and existing buildings located downstream.</li> <li>Goal 7 of Oregon’s Statewide Planning Goals states that local governments shall “adopt or amend, as necessary...plan policies and implementing measures [to]...avoid development in hazard areas where the risk to people and property cannot be mitigated...” Incorporating flood mitigation regulations into the floodplain ordinance will regulate development in the floodplain to ensure it damage from floods is minimized.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Work with developers, community members and neighborhood groups to discuss the benefits of minimizing development on rivers and streams.</li> <li>Explore the potential for developer exactions, such as land dedication or off-site improvements in areas where development has a direct impact on rivers and streams.</li> <li>Reduce the allowed density in areas where development has a direct impact on rivers and streams.</li> <li>Conduct a public awareness campaign targeting residents in the floodplain to educate them about how to reduce the potential for flooding.</li> <li>Incorporate No Adverse Impacts (NAI) practices as outlined by the Association of State Floodplain Managers into local floodplain ordinances to maintain the natural flow of rainwater and reduce the impact of flooding on existing buildings.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works; County GIS		Federal Emergency Management Agency (FEMA);	

		Department of Land Conservation and Development (DLCD)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #3 – Upgrade culverts in unincorporated areas in Jefferson County to reduce flooding events on roads and bridges.		Goal 1 Goal 2	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Culverts in the Grizzly Road area, Rams Road area, and areas around the Railroad are easily clogged with debris during high flows. Backups cause flooding on roads and bridges in Jefferson County.</li> <li>• Wider culverts enhance the ability of the storm water system to convey accumulated surface waters.</li> <li>• Maintaining open roads and bridges is essential during a flooding event that requires evacuation of Jefferson County residents. Additionally, continued operation of highways and roads facilitates a functioning economy.</li> <li>• The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of natural hazards on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Upgrading culverts in unincorporated areas in Jefferson County will reduce flooding events on vital infrastructure such as roads and bridges.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Prioritize replacement of problem culverts, focusing first on those with repeat clogging and flooding.</li> <li>• Coordinate with Oregon Fish and Wildlife and local Watershed Council to ensure proper stream and fish habitat quality in areas surrounding culverts.</li> <li>• Review the County’s Transportation System Plan to incorporate mitigation (i.e., culvert expansions) into planned upgrades, developments, or improvements.</li> <li>• Coordinate with Oregon Department of Transportation and Jefferson County Public Works to secure funding.</li> <li>• Seek state and/or federal funding.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Oregon Department of Fish and Wildlife (ODFW); Oregon Department of Transportation (ODOT)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		



<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #4 – Implement erosion prevention strategies for gravel roads in Jefferson County.		Goal 2	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• The Crooked River Ranch and Three Rivers developments have gravel roads that suffer from erosion during heavy rain events.</li> <li>• Erosion from gravel roads accumulates in rivers and streams increasing the probability of flooding in surrounding areas.</li> <li>• Maintaining open roads is essential during a flooding event which requires evacuation of Jefferson County residents.</li> <li>• The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of natural hazards on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Implementing erosion prevention strategies will reduce the chances of flooding downstream of an erosion site.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Prioritize erosion prevention projects, focusing first on areas most prone to erosion.</li> <li>• Coordinate with property owners to develop erosion prevention projects on private lands.</li> <li>• Coordinate with ODOT and Jefferson County Public Works to secure funding for erosion prevention projects.</li> <li>• Seek state and federal funding.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development		Oregon Department of Fish and Wildlife (ODFW); Oregon Department of Transportation (ODOT)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #5 – Educate citizens in Jefferson County about flood issues and actions they can implement to mitigate flood risk.		Goal 1 Goal 2 Goal 4	
<b>Alignment with Existing Plans/Policies:</b>			
Madras Flood Mitigation Plan			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>Residents are often unaware of how to reduce their risk of flood related damage. Readily available and user-friendly educational materials and workshops would be beneficial, especially for residents in vulnerable areas.</li> <li>The County could increase its resiliency towards flooding by organizing an effort to educate citizens about mitigation and preparedness activities that businesses and the public can implement to reduce the impact of flooding.</li> <li>The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of natural hazards on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Educating Jefferson County residents about actions they can implement to mitigate flood risk can greatly reduce the impact of a natural hazard event.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Coordinate public outreach campaigns with current events, such as Fire Prevention Week and EMS week. [National Emergency Medical Services Week brings together local communities and medical personnel to publicize safety and honor the dedication of those who provide the day-to-day lifesaving services of medicine's "front line."]</li> <li>Include floodplain information in local newspapers and online so it is readily available to the public.</li> <li>Conduct a public awareness campaign targeting residents in the floodplain to educate them about the [SEP] mitigation strategies they can implement to further reduce their risk of sustaining flood damages (i.e., [SEP] property elevations, landscaping techniques, flood-proofing strategies, etc.)</li> <li>Make floodplain information available at the Jefferson County building permit counter and at the cities [SEP] of Madras, Metolius, and Culver.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development		Federal Emergency Management Agency (FEMA); Oregon Military Department - Office of Emergency Management (OEM); U.S. Army Corps of Engineers (ACOE); Silver Jackets	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>	<b>Alignment with Plan Goals:</b>
<p><b>FL #6</b> – Update the County’s FEMA Flood Insurance Rate Maps.</p>	<p>Goal 1 Goal 2 Goal 3 Goal 4 Goal 5</p>
<b>Alignment with Existing Plans/Policies:</b>	
<p>Madras Flood Mitigation Plan</p>	
<b>Rationale for Proposed Action Item:</b>	
<ul style="list-style-type: none"> <li>• The Floodplain Insurance Rate Maps (FIRMS) for Jefferson County were created in the 1980’s and may not reflect current floodplain patterns, especially around the population centers of Madras, Metolius and Culver.</li> <li>• In areas at high risk to flood, updated Flood Insurance Rate Maps can assist a community to accurately predict its risk to a future flooding event. Better predictions can assist a community to better identify mitigation strategies to reduce its flood risk.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify the geographic extent of hazards known to impact the community [201.6(c)(2)(i)]. Updated Flood Insurance Rate Maps can assist the County in better defining the flood hazard within the community given the development that has taken place since the current FIRMS were created.</li> <li>• The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Updating the FIRM flood maps is the first step to understanding the flood hazard in Jefferson County and implementing appropriate mitigation actions to reduce the potential impact of a flood.</li> </ul>	
<b>Ideas for Implementation:</b>	
<ul style="list-style-type: none"> <li>• The Federal Emergency Management Agency’s (FEMA) Mitigation Directorate maintains and updates the National Flood Insurance Program (NFIP) maps.</li> <li>• Complete the MT-2 Forms Package (Application Forms for Conditional Letters of Map Revision and Letters of Map Revision) The forms and instructions included in this package were designed to assist requesters (community officials or individuals via community officials) in gathering the data that the FEMA needs to determine whether the effective NFIP map and Flood Insurance Study report for a community should be revised. These forms also should be used by community officials or individuals via community officials for requesting FEMA comments on a proposed project, which are issued in the form of a Conditional Letter of Map Revision. These forms will provide FEMA with assurance that all pertinent data relating to the revision are included in the submittal. They also will ensure that: (a) the data and methodology are based on current conditions; (b) qualified professionals have assembled the data and performed all necessary computations; and (c) all individuals and organizations affected by proposed changes are aware of the changes and will have an opportunity to comment on them. The MT-2 application forms and instructions can be downloaded from the FEMA Library.</li> </ul>	
<b>Coordinating Organization:</b>	Jefferson County Community Development

<b>Internal Partners:</b>		<b>External Partners:</b>	
Jefferson County GIS		Federal Emergency Management Agency (FEMA); Oregon Military Department - Office of Emergency Management (OEM); U.S. Army Corps of Engineers (ACOE); Silver Jackets; Department of Geology and Mineral Industries (DOGAMI); Department of Land Conservation and Development – NFIP Coordinator	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Deferred in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #7 – Encourage ODOT to develop an emergency bypass route through Madras.		Goal 1 Goal 3	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• A bypass would help in rerouting traffic on highway 97 especially during a flooding event.</li> <li>• Maintaining open roads is essential for evacuation of residents during a flooding event in Jefferson <sup>[[SEP]]</sup>County.</li> <li>• Maintaining open roads is essential to emergency services. Additionally, continued operation of <sup>[[SEP]]</sup>highways and roads facilitates a functioning economy.</li> <li>• The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that <sup>[[SEP]]</sup>reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. A bypass will allow emergency services to access new and existing buildings in the event of a flooding event, potentially reducing damages to vital infrastructure.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Work with Oregon Emergency Management and the Interagency Hazard Mitigation Team (IHMT) to forward this information to the Oregon Department of Transportation (ODOT).</li> <li>• Coordinate bypass project with regional Oregon Department of Transportation Area Commission on Transportation.</li> <li>• Coordinate and gather support for bypass project from City and County representatives.</li> <li>• Work with FEMA and ODOT to find funding sources.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Commissioners	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Community Development, Emergency Services		Oregon Military Department - Office of Emergency Management (OEM); Oregon Department of Transportation (ODOT); Interagency Hazard Mitigation Team (IHMT)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #8 – Take steps to participate in the National Flood Insurance Program’s (NFIP) Community Rating System to reduce NFIP premiums and to focus on community flood mitigation efforts.		Goal 1 Goal 2 Goal 3	
<b>Alignment with Existing Plans/Policies:</b>			
Madras Flood Mitigation Plan			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, insurance premiums under the NFIP are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance.</li> <li>• Implementing mitigation activities through the NFIPs CRS program will diminish the impact of flooding events on these properties and reduce total property losses.</li> <li>• The Community Rating System rewards communities that undertake floodplain activities beyond the requirements of the National Flood Insurance Program. The CRS is a point system program that reduces flood insurance premiums for the citizens of participating communities.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing buildings and infrastructure [201.6(c)(3)(ii)]. Improving Jefferson County’s CRS rating helps decrease vulnerability to floods.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Visit CRS website to find out specifics on what Jefferson County can do to improve their CRS rating. CRS website: <a href="http://training.fema.gov/EMIWeb/CRS/">http://training.fema.gov/EMIWeb/CRS/</a></li> <li>• Work towards obtaining higher CRS class ratings (1 being the highest rating obtainable; 10 being a non-participating community). Activities that reduce flood insurance premiums fall under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works		Federal Emergency Management Agency (FEMA); Department of Land Conservation and Development (DLCD); DLCD - NFIP Coordinator	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Short Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #9 – Continue compliance with the National Flood Insurance Program (NFIP).		Goal 1 Goal 2	
<b>Alignment with Existing Plans/Policies:</b>			
Jefferson County Comprehensive Plan			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• The National Flood Insurance Program (NFIP) provides communities with federally backed flood insurance, provided that communities develop and enforce adequate floodplain management measures. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.</li> <li>• The Biggert-Waters Flood Insurance Reform Act of 2012 reforms the NFIP, key provisions include (see Appendix G for a full list of key provisions): <ul style="list-style-type: none"> <li>○ Increasing the amount of flood insurance coverage for multi-family properties;</li> <li>○ Phasing out subsidies for severe repetitive loss properties, second homes, business properties, homes substantially damaged or improved and homes sold to new owners;</li> <li>○ Allow insurance premium rates to increase 20% annually, allow for deductibles, and require that premiums be calculated based upon “average historical loss year”, including “catastrophic loss years”; and</li> <li>○ Allow for private insurance, consistent with NFIP policies, to satisfy insurance requirements needed to obtain federally backed mortgages.</li> </ul> </li> <li>• The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will diminish flood damage to new and existing buildings in communities while providing homeowners, renters, and business owners additional flood insurance protection.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Actively participate with DLCDD and FEMA during Community Assistance Visits. The Community Assisted Visit (CAV) is a scheduled visit to a community participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community’s floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered.</li> <li>• Coordinate with DLCDD and OEM to provide educational materials to public officials and decision makers, residents, property owners, insurance agents and realtors about changes to the NFIP per the Biggert-Waters Flood Insurance Reform Act of 2012.</li> <li>• Conduct an assessment of Jefferson County floodplain ordinances to ensure they reflect current flood hazards.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Community Development	

<b>Internal Partners:</b>		<b>External Partners:</b>	
County Commissioners; Public Works		Federal Emergency Management Agency (FEMA); Department of Land Conservation and Development (DLCD)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		



<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #10 – Address risk of flooding to back-up fuel stored below ground at Jefferson County Public Works.		Goal 1 Goal 2 Goal 3	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>A portion of the existing backup fuel for Jefferson County Public works is stored below ground. In the event of a high flood event of Willow Creek, this fuel will be inaccessible. If there is a simultaneous power outage, Jefferson County will not have power or backup.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Find alternative locations for backup fuel storage.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Fire Department, Police Department, Jefferson County Schools, Emergency Services			
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
FL #11 – Identify authority and funding to mitigate flood risks of the Willow Creek flood channel to reduce flooding damage.		Goal 1	Goal 2
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>A number of communities across Jefferson County lie within FEMA recorded flood plains, including the City of Madras. This puts most of Madras’ County buildings and other private buildings in danger of flooding.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>The Silver Jackets organization can help Jefferson County bridge jurisdictional gaps, and bring together city, state, and federal resources to coordinate funding and mitigation strategy efforts.</li> </ul>			
<b>Coordinating Organization:</b>	Jefferson County Community Development		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, Emergency Services		U.S. Army Corps of Engineers (ACOE), Silver Jackets, DLCD – NFIP Coordinator	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Time
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
LS #1 – Identify and map areas vulnerable to landslides and develop mitigation strategies to reduce the likelihood of potential hazardous events.		Goal 1 Goal 2 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Areas suspected to be at risk to landslides include 1) Pelton Reservoir; 2) Northwest roads leading to Crooked River Ranch; 3) Camp Sherman’s southern access routes; 4) Jordan Road, near the bridge to Three Rivers; 5) Highway 26 as the road descends into the canyon and on the approach into Warm Springs; (6) Road to Lake Billy Chinook.</li> <li>• Depending on the type, location, severity and area affected, severe property damage, injuries and loss of life can be caused by landslide hazards.</li> <li>• Landslides can damage or temporarily disrupt utility services, roads, and other transportation / communication systems, including emergency response, fire, medical, police, etc.</li> <li>• Rock falls have occurred near Pelton Reservoir in the Warm Springs Reservation.</li> <li>• Camp Sherman wildfires in 2003 led to a series of landslides in the County.</li> <li>• Poor road conditions and wildfire events frequently lead to slides along potential evacuation routes.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Identifying areas vulnerable to landslides can reduce the impacts of landslides on new and existing developments and infrastructure.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Improve knowledge of debris flow (rapid moving) landslide hazard areas.</li> <li>• Map steep slope areas.</li> <li>• Research existing community ordinances related to steep slope development.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Geographic Information Systems (GIS)	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development; Public Works		Central Oregon Electric Cooperative; Wasco Electric Cooperative; Oregon Department of Geology and Mineral Industries (DOGAMI); Oregon Department of Transportation (ODOT)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
LS #2 – Adopt development standards that specify maximum cuts and fills and do not allow major alterations of drainage patterns.		Goal 1 Goal 2 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Areas suspected to be at risk to landslides include 1) Pelton Reservoir; 2) Northwest roads leading to Crooked River Ranch; 3) Camp Sherman’s southern access routes; 4) Jordan Road, near the bridge to Three Rivers; 5) Highway 26 as the road descends into the canyon and on the approach into Warm Springs; (6) Road to Lake Billy Chinook.</li> <li>• Depending on the type, location, severity and area affected, severe property damage, injuries and loss of life can be caused by landslide hazards.</li> <li>• Landslides can damage or temporarily disrupt utility services, roads, and other transportation / communication systems, including emergency response, fire, medical, police, etc.</li> <li>• Rock falls have occurred near Pelton Reservoir in the Warm Springs Reservation.</li> <li>• Camp Sherman wildfires in 2003 led to a series of landslides in the County.</li> <li>• Poor road conditions and wildfire events frequently lead to slides along potential evacuation routes.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Identifying areas vulnerable to landslides can reduce the impacts of landslides on new and existing developments and infrastructure.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Maintain plan submittal requirements and recommended measures to prevent erosion and control sediments on construction sites and other properties.</li> <li>• Support Jefferson County staff in the dissemination of information and updating of landslide prevention related code.</li> <li>• Restrict construction activity during rainy times of the year to control erosion on construction sites.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Community Development	
<b>Internal Partners:</b>		<b>External Partners:</b>	
County Commission		Department of Land Conservation and Development (DLCD)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
VE #1 – Include volcanic ash fall in the Health Department’s public outreach efforts to address respiration hazards, targeting specific vulnerable populations such as the elderly and young.		Goal 1 Goal 4	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Cascade volcanoes tend to erupt explosively, and have occurred at an average rate of 1 – 2 per century during the last 4,000 years. Future eruptions are certain.</li> <li>• Explosive eruptions blast solid and molten rock fragments (tephra) and volcanic gases into the air with tremendous force. Volcanic ash poses a serious hazard to aviation. Ash fall can extend hundreds of miles downwind.</li> <li>• Volcanic ash can lead to respiratory problems for vulnerable sectors of Jefferson County’s residents such as the elderly and youth. Increasing awareness through public outreach reduces the impact of a volcano on vulnerable groups residing in Jefferson County.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Evaluate current outreach efforts and modify as necessary. Determine methods for protecting respiratory health in the event of a volcanic eruption.</li> <li>• Support Health Department staff in the dissemination of information regarding respiration hazards in the event of a volcano.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Health	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Emergency Services; Law Enforcement		United States Geological Survey (USGS); Cascades Volcano Observatory	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>
<b>WF #1</b> – Implement actions identified within the Jefferson County Community Wildfire Protection Plan (CWPP) and within the Greater Sisters Country CWPP for communities within Jefferson County.		Goal 1 Goal 2 Goal 3 Goal 4 Goal 5 Goal 6
<b>Alignment with Existing Plans/Policies:</b>		
Jefferson County Community Wildfire Protection Plan (CWPP); Greater Sisters Country Community Wildfire Protection Plan (CWPP) Jefferson County Wildfire Preparedness Plan (2012)		
<b>Rationale for Proposed Action Item:</b>		
<ul style="list-style-type: none"> <li>• Jefferson County updated its Community Wildfire Protection Plan (CWPP) in May, 2011. The CWPP is meant to serve as the wildfire chapter for the Jefferson County NHMP. Implementing actions identified in the CWPP can assist in reducing the impact of wildfire on Jefferson County.</li> <li>• The Greater Sisters Country CWPP includes Camp Sherman within its boundary and identifies actions specific to this area.</li> <li>• The entire county is susceptible to wildfire. The Jefferson County Community Wildfire Protection Plan identifies the following communities as “at risk” to the effects of wildfire: Three Rivers, Crooked River Ranch, Ashwood, Gateway, Round Butte, North Madras Heights, Juniper Crest, Madras Ranchos / Canyon View, High Chaparral, Forest, Rim &amp; Air Parks, Shamrock Estates, Juniper Butte, High Chaparral, See’s, Warm Springs, County Line.</li> <li>• Per the Greater Sisters Country CWPP Camp Sherman is rated as an “extreme risk priority community”.</li> <li>• “At-risk” infrastructure includes: Lake Simtustus RV Park, Lake Billy Chinook Campground, Haystack Reservoir, The Cove State Park, Pelton Park, Montgomery Shores / Robinson Headwaters / Monty Campground area, Cyrus Horse Camp, Skull Hollow Camp, Transmission lines from Pelton / Round Butte hydroelectric facilities, Madras Natural Gas compressor station, Grizzly Electric Substation, Opal Springs domestic water source</li> <li>• Goal 7 of Oregon’s Land Use Planning Goals requires that local governments “adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures...[that avoid] development in hazard areas where the risk to people and property cannot be mitigated.” Including mitigation measure in subdivision and partition ordinances can reduce the impact of wildfires on new development and help to prevent future wildfire losses.</li> </ul>		
<b>Ideas for Implementation:</b>		
<ul style="list-style-type: none"> <li>• Coordinate with responsible agencies listed in the Jefferson County CWPP and the Greater Sisters Country CWPP to implement action items.</li> <li>• Seek funding to help pay for wildfire mitigation projects within the county.</li> </ul>		
<b>Coordinating Organization:</b>	Jefferson County Fire Defense Board	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Community Development; GIS, Three Rivers Volunteer Fire Department; Crooked River	Oregon Department of Forestry (ODF); State Fire Marshall ; U.S. Forest Service, Bureau of Land	

Ranch Rural Fire District; The Confederated Tribes of Warm Springs; Camp Sherman Fire Protection District		Management (BLM); Oregon Parks and Recreation Department (OPRD); Oregon Department of Fish and Wildlife (ODFW); private land owners; Central Oregon Fire Management Service	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
WF #2 – Improve wildfire detection with addition of remote detection systems, specifically in Round Butte.		Goal 1 Goal 2 Goal 3 Goal 5	
<b>Alignment with Existing Plans/Policies:</b>			
Jefferson County Community Wildfire Protection Plan (CWPP); Greater Sisters Country Community Wildfire Protection Plan (CWPP)			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>Improvement to the existing wildfire detection system, including addition of remotely accessible cameras, will allow emergency services and fire districts more timely knowledge of conflagration events.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Seek funding and apply for grants.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Fire Defense Board	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Rural Fire Protection Agencies, Emergency Services		Oregon Department of Forestry (ODF), US Forest Service, Bureau of Land Management (BLM), Oregon Military Department - Office of Emergency Management (OEM), Oregon Department of Fish and Wildlife (ODFW)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Ongoing in 2021		



<b>Action Item: Wildfire #3</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Madras Airport Helicopter Base for Wildland Fire Response		Goal 1 Goal 2 Goal 3 Goal 7	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
Jefferson County, Madras			
<b>Alignment with Existing Plans/Policies:</b>			
Consistent with City of Madras Airport Master Plan.			
<b>Rationale for Proposed Action Item:</b>			
Increased wildfire activity has increased helicopter activity at the Madras Airport. This action seeks to separate fixed-wing and rotary aviation uses and construct the necessary improvements to the Airport that will enable 16 helicopters to conduct wildland fire suppression activities safely.			
<b>Ideas for Implementation:</b>		<b>Actions Taken Since 2013</b>	
<ol style="list-style-type: none"> <li>1. Install 16 paved helicopter landing pads</li> <li>2. Construct 12,000 sq. ft. Helicopter maintenance with foam fire suppression system and meeting/event coordination space in hangar.</li> </ol>		NEW	
<b>Potential Funding Sources:</b>		<b>Estimated Cost:</b>	<b>Timeline:</b>
<ol style="list-style-type: none"> <li>1. FEMA</li> <li>2. FAA</li> </ol>		- Landing Pads: \$3.2 million - Hangar: \$3.5 million	Long term (6+ years)
<b>Coordinating Organization:</b>		Madras Airport	
<b>Internal Partners:</b>		<b>External Partners:</b>	
		- US Forest Service - Oregon Dept. of Forestry - Jefferson Co. Fire District No. 1 - Jefferson Co. Sherriff - City of Madras	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
WD #1 – Educate property owners on how to properly maintain trees to prevent power loss on power lines off the right of way.		Goal 2 Goal 4	
<b>Alignment with Existing Plans/Policies:</b>			
Active Tree Removal Plan (Public Utilities)			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Educating property owners about how to prevent power outages on their private property can help reduce impacts of windstorm events on these homeowners.</li> <li>• Overhead electrical lines are subject to high winds and winter storm damage. The risk is higher on the lines going to a mountaintop or peak.</li> <li>• All of Jefferson County is at risk for winter storms. Due to the multitude of variables, such as wind speed, direction, and temperature, each storm is capable of causing extensive damage in any part of the County.</li> <li>• High winds can topple trees and break limbs which in turn can result in power outages and disrupt telephone, computer, and TV and radio service.</li> <li>• Windstorms affect Jefferson County on nearly a yearly basis, especially in the Crooked River Ranch area where winds can reach 65 mph.</li> <li>• During winter storm access to the line by the utility is difficult. This difficulty delays the time for restoration of power to Jefferson County residents.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards. [201.6(c)(3)(ii)] Educating property owners on how to properly maintain trees to prevent power loss on power lines off the right of way will reduce the impact of severe weather on Jefferson County.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Gather information about the maintenance and removal of hazardous trees.</li> <li>• Work with the community and partners to identify areas that are prone to damage from nearby trees and perform the necessary maintenance or removal of those trees.</li> <li>• Create a hazardous tree inventory.</li> <li>• Work with the community and Jefferson County Public Works Department to identify high wind and icing areas from previous outages and apply for grants to underground utilities in those areas.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Central Oregon Electric Cooperative; Wasco Electric Cooperative	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing

<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013
<b>Action Item Status:</b>	Ongoing in 2021

<b>Action Item: Windstorm #2</b>		<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Develop advanced alert systems and building codes sufficient to withstand and avoid damage from windstorms		Goal 1 Goal 2 Goal 6 Goal 7	<input type="checkbox"/> Yes
<b>Affected Jurisdictions:</b>			
Jefferson County, Culver, Madras, Metolius			
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
Strong winds build in the western side of the Cascade Mountain range. When pressure changes, the winds rush into the basin areas of Central Oregon's high desert. The speed and power of the winds can easily exceed 40MPH, causing damage to buildings and infrastructure.			
<b>Ideas for Implementation:</b>		<b>Action Status Report</b>	
Develop advanced alert systems and building codes sufficient to withstand and avoid damage		NEW	
<b>Potential Funding Sources:</b>	<b>Estimated Cost:</b>	<b>Timeline:</b>	
DHS-FEMA	Not sure	Long term (6+ years)	
<b>Coordinating Organization:</b>	Jefferson County Planning Department		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Community Development		Cities, Fire Departments, Oregon Building Codes Division	
Form Submitted by:		2021 Steering Committee	
Action Item Status:		NEW	

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
WT #1 – Explore Improvements for adequately heating schools and other critical facilities in extreme cold events by improving insulation and heating systems.		Goal 1 Goal 5 Goal 6	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>Existing heating systems in Jefferson County schools are insufficient during extreme cold weather events.</li> <li>Destructive winter storms that produce heavy snow, ice, rain and freezing rain, and high winds have a [SEP] long history in Oregon. Severe storms affecting Oregon with snow and ice typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March.</li> <li>The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions and projects that reduce the effects of a hazard on the community [201.6(c)(3)(ii)].</li> <li>Schools are identified as potential shelters in the event of a natural disaster.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>Determine appropriate solutions for adequately heating schools.</li> <li>Seek funding sources for the purchase of power generators and plowing and pumping equipment.</li> <li>Coordinate with local equipment rental businesses on possibility of utilizing power generators and [SEP] heaters in the event of a winter storm.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County School Districts (Jefferson County School District 509J, Ashwood School District 8, Black Butte School District 41, Culver School District 4)	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works		Central Oregon Electric Cooperative; Wasco Electric Cooperative	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Deferred in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
WT #2 – Explore funding options to obtain equipment, such as power generators and plowing and pumping equipment, to help respond to winter storm events.		Goal 1 Goal 2	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• Destructive winter storms that produce heavy snow, ice, rain and freezing rain, and high winds have a long history in Oregon. Severe storms affecting Oregon with snow and ice typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March.</li> <li>• Winter power outages are a problem for the County due to freezing of power lines (freezing fog). Obtaining backup power generators and plowing and pumping equipment will help the County improve their response in the event of a winter storm.</li> <li>• The County has vulnerable youth and elderly populations, many of whom are especially vulnerable to power outages and lack backup sources of heat and water.</li> <li>• The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards. [201.6(c)(3)(ii)] Acquiring additional generator power for Jefferson County will reduce its vulnerability to power outages in the event of a winter storm.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Seek funding sources for the purchase of power generators and plowing and pumping equipment.</li> <li>• Coordinate with school districts that own and operate snowplow equipment.</li> <li>• Coordinate effort with the utility company, ODOT, and Jefferson County Public Works.</li> <li>• Coordinate with local equipment rental businesses on possibility of utilizing power generators and plowing and pumping equipment in the event of a winter storm.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
School Districts; Churches; Cities of Madras, Culver, and Metolius		Central Oregon Electric Cooperative; Wasco Electric Cooperative; American Red Cross	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Ongoing
<b>Form Submitted by:</b>	2008 Jefferson County Steering Committee, revised and confirmed in 2013		
<b>Action Item Status:</b>	Ongoing in 2021		

<b>Proposed Action Item:</b>		<b>Alignment with Plan Goals:</b>	
WT #3 – Increase sanding of all stretches of roads (County-wide) during winter storms.		Goal 1 Goal 2 Goal 3	
<b>Alignment with Existing Plans/Policies:</b>			
<b>Rationale for Proposed Action Item:</b>			
<ul style="list-style-type: none"> <li>• During winter storm events, accumulation of ice or snow makes roads hazardous to motor vehicle traffic.</li> <li>• Sanding roads during winter storm events reduces risk of motor vehicle accidents.</li> <li>• Due to lack of funding resources, Jefferson County roads currently receive limited sanding during winter storm events.</li> </ul>			
<b>Ideas for Implementation:</b>			
<ul style="list-style-type: none"> <li>• Seek funding for increased sanding during winter storm events.</li> </ul>			
<b>Coordinating Organization:</b>		Jefferson County Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
City of Culver, City of Madras, City of Metolius		Oregon Department of Transportation (ODOT)	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
			Long Term
<b>Form Submitted by:</b>	2013 Jefferson County Steering Committee		
<b>Action Item Status:</b>	Removed in 2021 – Board of County Commissioners has approved a limited list of roads to be sanded		

# APPENDIX B: PLANNING AND PUBLIC PROCESS

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## Memo

**To:** Federal Emergency Management Agency  
**From:** Central Oregon Intergovernmental Council  
**Date:** March 11, 2022  
**Re:** List of changes to the 2013 Jefferson County NHMP for the 2022 Plan Update

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### Purpose

This memo describes the changes made to the 2013 Jefferson County Natural Hazards Mitigation Plan (NHMP) during the 2021 plan update process. Major changes are documented by plan section in table B-1 below.

### Project Background

Jefferson County partnered with the Central Oregon Intergovernmental Council (COIC) to update the 2013 Jefferson County Natural Hazards Mitigation Plan (NHMP). The Disaster Mitigation Act of 2000 requires communities to update their mitigation plans every five years to remain eligible for Pre-Disaster Mitigation (PDM) program funding, Flood Mitigation Assistance (FMA) program funding, and Hazard Grant Mitigation Program (HMGP) funding. COIC met with members of the Jefferson County steering committee in December, January, February, and March to update portions of the county's NHMP. During this update cycle the cities of Culver, Madras, and Metolius opted to participate; as such the 2022 plan is multi-jurisdictional. Formal meetings with the steering committees for the three participating cities occurred during May through July, with one community meeting per month. All meetings were held virtually via Zoom given local, regional, and state COVID-19 guidelines and restrictions. Lake Chinook Fire District developed their first addendum to the Jefferson County NHMP in spring 2022. One formal meeting of the Lake Chinook steering team was held in May 2022. The meeting was hybrid (virtual and in-person), held at the Jefferson County Fire District building in Madras. COIC and the committees made several changes to the 2013 NHMP. Major changes are documented and summarized in this memo.

### 2021 Plan Update Changes

The sections below only discuss *major* changes made to the 2013 Jefferson County NHMP during the 2021 plan update process. Major changes include the replacement or deletion of large portions of text, changes to the plan's organization, and new, updated, or removed mitigation action items. If a section is not addressed in this memo, then it can be assumed that no significant changes occurred.

The plan’s format and organization were altered to fit within Oregon Partnership for Disaster Resilience’s plan templates in 2013. The steering committee opted to continue using this template and format in 2021.

**Table B-I Significant Changes from 2013 to 2021**

Jefferson County Multi-jurisdictional NHMP Sections	Significant Updates in 2021
Acknowledgements	Steering committee and partner lists updated with 2021 participants
Approval Letters and Resolutions	Replaced OPDR information with COIC Approval letters for 2021 included
Table of Contents	N/A
<b>Volume I: Basic Plan</b>	
Executive Summary	Participants list updated with 2021 steering committee representation Risk assessment summary table updated with 2021 scores Mitigation plan mission and goals updated with 2021 steering committee mission and goals Plan adoption dates updated for 2021
Section 1: Introduction	How the plan was developed was updated to reflect the 2021 process
Section 2: Risk Assessment	Hazard identification table to include 2020 State of Oregon NHMP identified hazards for Region 6 Extreme heat omitted justification Federal disaster declarations added through 2021 Updated flood insurance detail table Vulnerability and probability ratings updated with 2021 scores Hazard analysis matrix updated with 2021 scores
Section 3: Mitigation Strategy	Steering committee updated goals Six new action items were developed and included (MH#16 and 17, DR#2 and 3, WF#3, and WD#3), and one existing was updated for clarity (MH#2, which was split into MH#2 and #3) All existing action items were given a status update Four actions were removed (MH#6, MH#15, EQ#2, and WT#3) Priority action items were identified and agreed upon Action item worksheets were updated to reflect 2021 worksheets Action item process updated to include 2021 process
Section 4: Plan Implementation and Maintenance	Members coordinating body list updated to reflect 2021 committee Jefferson county bi-annual update meeting schedule updated to include schedule for each of the three city meetings as well Public involvement process updated to reflect 2021 process
<b>Volume II: Hazard Annexes</b>	
Drought	See "significant changes" box at beginning of section
Earthquake	See "significant changes" box at beginning of section
Flood	See "significant changes" box at beginning of section

Landslide	See "significant changes" box at beginning of section
Volcano	See "significant changes" box at beginning of section
Wildfire	See "significant changes" box at beginning of section
Windstorm	See "significant changes" box at beginning of section
Winter Storm	See "significant changes" box at beginning of section
<b>Volume III: Jurisdictional Addenda</b>	
City of Culver	This addendum was a new addition in 2021, thus all information is new in 2021.
City of Madras	<p>How the plan was developed was updated to include 2021 process</p> <p>Four new action items were added (FL#9, WF#1, WF#2, and WF#3)</p> <p>One action item was removed (MH#2)</p> <p>A status updated was provided for all existing action items</p> <p>The implementation process was updated to reflect the new county 2021 schedule</p> <p>A tribal land acknowledgement statement was added to the Community Profile and Asset Identification section</p> <p>Community asset lists and tables were updated</p> <p>The Hazard Analysis Matrix and the vulnerability and probability comparisons with the county's ratings were updated to reflect 2021 scores and ratings</p> <p>Each hazard description includes at least one update to reflect new understanding of risks and vulnerabilities in 2021</p> <p>All hazard ratings were updated within the hazard narratives to reflect 2021 ratings</p> <p>The mitigation plan goals were updated to reflect adoption of the 2021 county goals</p> <p>Action item forms were updated to reflect status changes and new action item forms were added for FL#9, WF#1, WF#2, WF#3</p>
City of Metolius	<p>How the plan was developed was updated to include 2021 process</p> <p>One new action item was added (WD#1)</p> <p>A status updated was provided for all existing action items</p> <p>The implementation process was updated to reflect the new county 2021 schedule</p> <p>A tribal land acknowledgement statement was added to the Community Profile and Asset Identification section</p> <p>Community asset lists and tables were updated</p> <p>The Hazard Analysis Matrix and the vulnerability and probability comparisons with the county's ratings were updated to reflect</p>

	<p>2021 scores and ratings</p> <p>Each hazard description includes at least one update to reflect new understanding of risks and vulnerabilities in 2021</p> <p>All hazard ratings were updated within the hazard narratives to reflect 2021 ratings</p> <p>The mitigation plan goals were updated to reflect adoption of the 2021 county goals</p> <p>Action item forms were updated to reflect status changes and a new action item form was added for WD#1</p>
Lake Chinook Fire District	<p>This addendum was a new addition in 2022, thus all information is new in 2022.</p>
<b>Volume IV: Mitigation Resources</b>	
Appendix A: Action Item Forms	<p>All existing action items were updated to reflect status changes in 2021</p> <p>Six new action item forms were included (MH#15, MH#16, DR#2, DR#3, WF#3, WD#2)</p> <p>Existing action item MH#2 was updated for clarity and split into two actions - MH#2 and MH#3</p>
Appendix B: Planning and Public Process	<p>The full appendix was updated to reflect the planning and public process</p>
Appendix C: Community Profile	<p>The following tables and their affiliated narratives were updated: Tables C-1 to 11, 13, 14, 16-18, 20-23, 25, 26, 28-30, 32-37, 40-43</p>
Appendix D: Economic Analysis of Natural Hazard Mitigation Projects	<p>The newest template was added from OPDR (2020)</p>
Appendix E: Grant Programs and Resources	<p>The newest template was added from OPDR (2020) and additional resources were identified and included by the local committee</p>
Appendix F: Jefferson County Natural Hazards Community Survey	<p>The 2007 household preparedness survey results were replaced with the results from the 2021 survey</p>

# 2021 NHMP PUBLIC PARTICIPATION PROCESS

## 2021 NHMP Update

Jefferson 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 Jefferson County, Culver, Madras, and Metolius are also given the opportunity to provide feedback about the Plan. The Plan will undergo a full review every five years.

Jefferson County made the Plan available via the Central Oregon Intergovernmental Council's website for public comment from October 25<sup>th</sup>, 2021 through the FEMA review period. Additionally, a public input session was held (virtually) on September 30<sup>th</sup>, 2021 during a County Planning Commission Meeting. Materials and comments from the public input session on September 30<sup>th</sup>, 2021 are included as Attachment B in this Appendix.

## Public Involvement Summary

COIC and Jefferson County issued a community preparedness survey in both English and Spanish in March 2021 to gauge household knowledge of mitigation tools and techniques to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness. COIC and Jefferson County received a total of 38 responses to the survey in English, and no responses to the survey in Spanish. A detailed report of responses is provided in Appendix F of this NHMP.

During the public review period of September 30<sup>th</sup> – December 31<sup>st</sup>, 2021 there were zero comments received via the COIC project page for the Jefferson County NHMP update. Members of the steering committee provided edits and updates to the NHMP during this period as reflected in the final document.

There were no public attendees and comments at the virtual public input session on September 30<sup>th</sup>, 2021. However, The Jefferson County Planning Commission offered minor formatting suggestions. These changes have been incorporated into the Plan.

COIC sent quarterly updates to emergency management staff in the neighboring communities of Wheeler County, Wasco County, Marion County, Linn County, Crook County, and the Confederated Tribes of Warm Springs. Additionally, these neighboring communities were invited to participate in steering committee meetings, as well as the public input meeting on September 30<sup>th</sup>, 2021. No comments were received from neighboring communities throughout the update period.

In August of 2022, COIC worked with Lake Chinook Fire District to distribute a survey for community members to provide input on the Lake Chinook Addendum. Only one comment was received, which did not directly impact the Addendum.

## Attachment A: Press Releases

# COIC

Central Oregon Intergovernmental Council

FOR IMMEDIATE RELEASE:

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



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

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

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

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

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



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

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

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

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



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

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

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

#### El Condado Deschutes

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

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



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

#### El Condado Jefferson

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

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



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

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



## Attachment B:

# Public Input Meeting Materials and Summary



## Jefferson NHMP Public Input Meeting

September 30th, 2021 – 5:30 - 6:30pm



Zoom Meeting Link:

<https://us06web.zoom.us/j/83838790562?pwd=MEpqcGpENFNrdFpNSERiTHFwa0N1dz09>

Meeting ID: 838 3879 0562 | Passcode: 425082 | Call-in #: +1 669 900 6833

TIME	TOPIC
5:30 – 5:45p (15 mins)	<p><b>Welcome and Process Overview</b></p> <ul style="list-style-type: none"> <li>Welcome/Agenda Overview/Zoom Overview <i>Shelby Knight, COIC Resilience Planner</i></li> <li>Process Overview <i>David Pond, Jefferson County Sheriff's Office Emergency Manager</i> <ul style="list-style-type: none"> <li>What is the NHMP?</li> <li>Why is it important?</li> <li>What was our process for updating the document?</li> <li>How can the public review and comment?</li> </ul> </li> </ul>
5:45-6:05p (20 mins)	<p><b>Review of Draft Plan</b></p> <ul style="list-style-type: none"> <li>Elements of the NHMP <i>Shelby Knight, COIC Resilience Planner</i></li> <li>Key Changes &amp; Updates to the Plan <i>Shelby Knight, COIC Resilience Planner</i> <i>David Pond, Jefferson County Sheriff's Office Emergency Manager</i> <i>Phil Stenbeck, Jefferson County Community Development Director</i></li> </ul>
6:05 – 6:25p (20 mins)	<p><b>Discussion and Q&amp;A</b></p> <ul style="list-style-type: none"> <li>Facilitated Public Comments and Q&amp;A <i>Shelby Knight, COIC Resilience Planner</i> <i>David Pond, Jefferson County Sheriff's Office Emergency Manager</i> <i>Phil Stenbeck, Jefferson County Community Development Director</i></li> </ul>

6:25 – 6:30p (5 mins)	<b>Closing Comments</b> <i>Shelby Knight, COIC Resilience Planner</i> <i>David Pond, Jefferson County Sheriff's Office Emergency Manager</i> <i>Phil Stenbeck, Jefferson County Community Development Director</i>
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## Jefferson County NHMP Public Input Meeting (Planning Commission Meeting)

*September 30, 2021 | Outcomes*

**Attendees from the NHMP Update Team:** Sergeant David Pond (Jefferson County Emergency Manager), Phil Stenbeck (Community Development Director), Donna McCormack (City Recorder for Culver), Shelby Knight (COIC Resilience Planner), and Sienna Fitzpatrick (COIC Program Assistant).

**Summary:**

Phil Stenbeck opened the meeting with a brief overview of the purpose of this meeting, which is to review the Natural Hazard Mitigation Plan and allow the public and the Planning Commission an opportunity to provide feedback. Sergeant David Pond provided some additional background on the process of the NHMP update so far, and then Shelby Knight conducted a presentation of what the NHMP contains and an overview of the major changes to the document. The presentation can be found on the project website (<https://www.coic.org/emergency-preparedness/natural-hazard-mitigation-plans/jefferson-county-nhmp/>) or by contacting Shelby Knight ([sknight@coic.org](mailto:sknight@coic.org)).

At the conclusion of the presentation, the Commissioners complimented the work of the NHMP Project Management Team (PMT) and the first draft of the document. The Commissioners also provided some minor edits to the document.

**Feedback on the NHMP:**

- Change Don Colfels contact info for Lake Billy Chinook (he was initially part of the update process before leaving his position, so he will still be included in the acknowledgements).
- Pages MA-8 and 9; the Fairgrounds should be moved from Cultural and Historic Resources to Essential Facilities as it functions as a Red Cross Facility in the event of disaster.
- Table VE-1 – Volcano distances are listed relative to Harney County; this should be changed to Jefferson County or updated.
- The attachment of the Public Notice for this project lists Jefferson County twice instead of Deschutes and Jefferson County.

The Jefferson County NHMP Project Management Team will take this feedback and revise the draft document; it will be available for comment on the COIC website through December 2021. The Project Management Team expects the document to be finalized by early next year.

## Steering Committee Process

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

- **Kickoff Meeting:** December 14<sup>th</sup>, 2020
- **Meeting #1, Hazard Annexes and Risk Assessment:** January 19<sup>th</sup>, 2021
- **Meeting #2, Hazard Annexes and Risk Assessment Continued:** February 16<sup>th</sup>, 2021
- **Meeting #3, Mitigation Strategy:** March 17<sup>th</sup>, 2021
- **Meeting #4, Mitigation Strategy Continued and Plan Implementation and Maintenance:** April 20<sup>th</sup>, 2021

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

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

- **Meeting #1:** December 30<sup>th</sup>, 2020
- **Meeting #2:** January 26<sup>th</sup>, 2021
- **Meeting #3:** February 24<sup>th</sup>, 2021

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

- **Meeting #1, Madras Addendum:** May 18<sup>th</sup>, 2021
- **Meeting #2, Metolius Addendum:** June 16<sup>th</sup>, 2021
- **Meeting #3, Culver Addendum:** July 20<sup>th</sup>, 2021
- **Meeting #4, Lake Chinook Addendum:** May 4<sup>th</sup>, 2022

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

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

## Attachment C:

# Steering Committee Attendance and Materials

### Meeting Agenda Jefferson County NHMP Kickoff Meeting December 14, 2020 10a-11a

Zoom Link: <https://zoom.us/j/93836378558?pwd=aUFCanNDcjNsYXozU3VuUXI5M0xYQT09> |  
Meeting ID: 938 3637 8558 | Password: 382062 | Phone: +1 669 900 6833

Time	Agenda Item
10a – 10:10a	Welcome and Introductions – <i>Shelby Knight, COIC</i>
10:10a – 10:20a	Purpose – <i>David Pond, Jefferson County Emergency Manager</i>
10:20a – 10:30a	Roles and Responsibilities – <i>Shelby Knight, COIC; David Pond, Jefferson County Emergency Manager</i> <ul style="list-style-type: none"> <li>• COIC</li> <li>• Jefferson County</li> <li>• Steering Committee</li> <li>• Project Management Team</li> </ul>
10:30a – 10:40a	Timeline and Scope of Work – <i>Shelby Knight, COIC</i>
10:40a – 10:50a	Match Tracking Process and Request – <i>Sienna Fitzpatrick, COIC; Scott Aycock, COIC</i>
10:50a – 10:55a	Follow Up and Next Steps – <i>Shelby Knight, COIC</i>

## Zoom Attendance Report for December 14<sup>th</sup>, 2020

<b>Topic</b>	<b>Participants</b>
Jefferson County NHMP Kickoff Meeting	14
<b>Name (Original Name)</b>	<b>User Email</b>
Kim (City of Culver)	
Frank Jones ODF (FBJONES)	
Roger Johnson	
Matt Powlison	
Gordon Foster (GRFOSTER)	
Kasey Skaar	ks@jcfcd-1.org
Nathan Garibay	
Jeff McCaulou	jeff.mccaulou@co.jefferson.or.us
Nicholas Snead	nsnead@ci.madras.or.us
David Pond	
Harry Ward	
Jeff Hurd	
Phil Stenbeck	
Dan Martinez (dan-m)	

# Jefferson County NHMP Steering Committee Meeting 1

January 19, 2021 – 3:00 - 5:00pm

**Zoom Link:** <https://zoom.us/j/95942474789?pwd=eitJZlFeVcrTVp2d3lUazFDcXY2QT09>

**Meeting ID:** 959 4247 4789 | **Passcode:** 079016 | **Call-in #:** +1 669 900 6833

## AGENDA

TIME	TOPIC
3:00 – 3:10p	<b>Introductions &amp; Agenda Review</b> <i>Shelby Knight, COIC</i>
3:10 – 3:20p	<b>Review Timeline and Match Tracking</b> <i>Shelby Knight, COIC ; Sienna Fitzpatrick, COIC</i> <ul style="list-style-type: none"> <li>• Review timeline</li> <li>• Scheduling jurisdictional meetings</li> <li>• Public meeting process</li> <li>• Match tracking update – <i>Sienna</i></li> </ul>
3:20 – 3:30p	<b>Discuss general roles / responsibilities &amp; format of meetings / updates</b> <i>Shelby Knight, COIC</i>
3:30 – 4:00p	<b>Review and Update Section 2: Risk Assessment</b> <ul style="list-style-type: none"> <li>• Hazard Profile and ID <ul style="list-style-type: none"> <li>▪ New hazards?</li> <li>▪ Review/Assign</li> </ul> </li> <li>• Vulnerability Assessment and Community Profile <ul style="list-style-type: none"> <li>▪ Review/Assign</li> </ul> </li> </ul>
4:00 – 4:45p	<b>Risk Analysis – Group Scoring Exercise</b>
4:45 – 5:00p	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> <li>• Next Meeting: February 16<sup>th</sup></li> </ul>

## Zoom Attendance Report for January 19<sup>th</sup>, 2021

Topic	Participants
Jefferson County NHMP Steering Committee Meeting 1	16
Name (Original Name)	User Email
Pat Hanenkrat (Public Works)	
Shelby Knight (she/her)	sknight@coic.org
Kasey Skaar	ks@jcfed-1.org
Matt Powlison	
Sienna F. (they/them)	sfitzpatrick@coic.org
jeff.mccaulou@co.jefferson.or.us	jeff.mccaulou@co.jefferson.or.us
Scott Aycock	
Frank Jones ODF	
Mandy (PGE) (E06477)	
Ariel Cowan- OSU Extension (Cowan# Ariel)	cowana@oregonstate.edu
David Pond	
Kyle Gorman (OWRD)	kyle.g.gorman@oregon.gov
Jeff Hurd	
nsnead	
judyl	
Donna	

# Jefferson NHMP Steering Committee Meeting 2

February 16, 2021 – 3:00 - 5:00pm

**Zoom Link:** <https://zoom.us/j/95942474789?pwd=eitJZlFeVcrTVp2d3lUazFDcXY2QT09>  
**Meeting ID:** 959 4247 4789 | **Passcode:** 079016 | **Call-in #:** +1 669 900 6833 US

## AGENDA

TIME	TOPIC
3:00 – 3:15p (15 mins)	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>
3:15-3:30 (15 mins)	<b>Housekeeping Items</b> <ul style="list-style-type: none"> <li>• <u>Action</u> - approve notes</li> <li>• Scheduling jurisdictional meetings</li> <li>• Match tracking/tracking individual hours</li> </ul>
3:30 – 4:00p (30 mins)	<b>Section 2: Risk Assessment Changes Review</b> <ul style="list-style-type: none"> <li>• HVA discussion</li> <li>• “Extreme Heat” and “Climate Change” updates</li> <li>• Review and approve changes</li> <li>• Discuss information still needed/assign</li> </ul>
4:00 – 4:45p (45 mins)	<b>Section 3: Mitigation Strategy Review</b> <ul style="list-style-type: none"> <li>• Mission and goals</li> <li>• Update status of existing actions</li> <li>• Brainstorm new actions</li> <li>• Prioritize actions</li> </ul>
4:45 – 5:00p (15 mins)	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> <li>• Next Meeting: March 16<sup>th</sup> <ul style="list-style-type: none"> <li>○ Section 4: Plan Implementation and Maintenance</li> <li>○ Volume IV: Mitigation Resources of the 2016 NHMP</li> </ul> </li> </ul>



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

Topic	Participants
Jefferson County NHMP Steering Committee Meeting #2	18
Name (Original Name)	User Email
Shelby Knight (she/her)	sknight@coic.org
Sam VanLaningham	
jeff.mccaulou@co.jefferson.or.us	jeff.mccaulou@co.jefferson.or.us
Pat Hanenkrat (Public Works)	
Frank Jones ODF	
Roger Johnson	
Matt Powlison	
Don Colfels	
Sienna F. (they/them)	sfitzpatrick@coic.org
David Pond	
Jeff Hurd	
Ariel Cowan (Cowan# Ariel)	cowana@oregonstate.edu
Jeremy Giffin	
Harry Ward	
Marc Austin - National Weather Service	
Nick Snead	nsnead@ci.madras.or.us
15412219792	
Phil Stenbeck	

# Jefferson NHMP Steering Committee

## Meeting 3 Agenda

March 16, 2021 – 3:00 - 5:00pm

**Zoom Link:** <https://zoom.us/j/95942474789?pwd=eitJZlFeVcrTVp2d3lUazFDcXY2QT09>

**Meeting ID:** 959 4247 4789 | **Passcode:** 079016 | **Call-in #:** 1 669 900 6833

TIME	TOPIC
3:00 – 3:15p <i>(15 mins)</i>	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>
3:15-3:30 <i>(15 mins)</i>	<b>Housekeeping Items</b> <ul style="list-style-type: none"> <li>• <u>Action</u> - approve notes</li> <li>• Jurisdictional meetings</li> <li>• Public survey</li> </ul>
3:30 – 3:50p <i>(30 mins)</i>	<b>Section 2: Risk Assessment</b> <ul style="list-style-type: none"> <li>• <u>Action</u> - HVA review and approve</li> <li>• Discuss info still needed/assign</li> </ul>
3:50 – 4:50p <i>(60 mins)</i>	<b>Section 3: Mitigation Strategy</b> <ul style="list-style-type: none"> <li>• Review Changes/Discuss info still needed for action item matrix</li> <li>• Brainstorm and develop new action items</li> <li>• Prioritize actions</li> </ul>
4:50 – 5:00p <i>(10 mins)</i>	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• Review “homework” assignments for COIC and Committee Members</li> <li>• Next Meeting: April 20<sup>th</sup> <ul style="list-style-type: none"> <li>○ Finalize all sections</li> <li>○ Review and complete Section 4 and Appendix E</li> <li>○ Prep for jurisdictional meetings May – July</li> </ul> </li> </ul>

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

Topic	Participants
Jefferson County NHMP Steering Committee Meeting #3	16
Name (Original Name)	User Email
Shelby Knight (she/her)	sknight@coic.org
Frank Jones ODF	
Harry Ward	
Roger Johnson	
Donna McCormack	
Kasey Skaar	ks@jcf-d-1.org
Mandy (PGE)	
Sienna F. (they/them)	sfitzpatrick@coic.org
Matt Powlison	
Cowan# Ariel	cowana@oregonstate.edu
David Pond	
Nick Snead	nsnead@ci.madras.or.us
15412219792	
Phil Stenbeck	
Marc Austin	
Sam VanLaningham	

# Jefferson NHMP Steering Committee

## Meeting 4 Agenda

April 20, 2021 – 3:00 - 5:00pm

**Zoom Link:** <https://zoom.us/j/95942474789?pwd=eitJZlFeVcrTVp2d3lUazFDcXY2QT09>

**Meeting ID:** 959 4247 4789 | **Passcode:** 079016 | **Call-in #:** 1 669 900 6833

TIME	TOPIC
3:00 – 3:15p (15 mins)	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>
3:15- 3:40p (25 mins)	<b>Housekeeping Items</b> <ul style="list-style-type: none"> <li>• <u>Action</u> - approve notes</li> <li>• Public survey results discussion</li> <li>• Timeline check-in and discussion                             <ul style="list-style-type: none"> <li>○ Jurisdictional meetings reminders</li> </ul> </li> </ul>
3:40 – 4:20p (40 mins)	<b>Sections 2 and 3: Review Changes Memo</b> <ul style="list-style-type: none"> <li>• Review changes and discuss info still needed for Section 2: Risk Assessment</li> <li>• Review changes and discuss info still needed for Section 3: Mitigation Strategy</li> <li>• Review action item worksheet</li> </ul>
4:20 – 4:50p (30 mins)	<b>Section 4: Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>• Review/update/assign</li> </ul> <b>Appendices D &amp; E: Economic Analysis and Grant Programs and Resources</b> <ul style="list-style-type: none"> <li>• Review and approve</li> </ul> <b>Table C-37 Community Resources</b> <ul style="list-style-type: none"> <li>• Review/update/assign</li> </ul>
4:50 – 5:00p (10 mins)	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• Review “homework” assignments for COIC and Committee Members</li> <li>• Next Meetings: Jurisdictional                             <ul style="list-style-type: none"> <li>○ Madras: May 18<sup>th</sup> 2-5</li> <li>○ Metolius: June TBD</li> <li>○ Culver: July 20<sup>th</sup> 2-5</li> </ul> </li> <li>• Next SC Meeting: Schedule for August</li> <li>• Public Meetings: September</li> </ul>

## Zoom Attendance Report for April 20<sup>th</sup>, 2021

Topic	Participants
Jefferson County NHMP Steering Committee Meeting #4	13
Name (Original Name)	User Email
Sienna F. (they/them)	sfitzpatrick@coic.org
Pat Hanenkrat (Public Works)	
Kasey Skaar	ks@jcfcd-1.org
Shelby Knight (she/her)	sknight@coic.org
Don Colfels	
David Pond	
Nick Snead	nsnead@ci.madras.or.us
Matt Powlison	
Phil Stenbeck	
Mandy (PGE)	
Ariel Cowan (Cowan# Ariel)	cowana@oregonstate.edu
Donna McCormack - Culver	
Public Works	

# Madras NHMP Addendum Update

## Meeting Agenda

May 18, 2021 – 2:00 - 5:00pm

**Zoom Link:** <https://zoom.us/j/94013105272?pwd=NE5QUEp5VDZjeXV3bTQxWTdiaHhGQT09>

**Meeting ID:** 940 1310 5272 | **Passcode:** 058864 | **Call-in #:** +1 669 900 6833

TIME	TOPIC
2:00 – 2:15p <i>(15 mins)</i>	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>
2:15-2:30p <i>(15 mins)</i>	<b>Process Overview</b> <ul style="list-style-type: none"> <li>• Purpose <i>(David)</i></li> <li>• Roles</li> <li>• Timeline and Scope of Work</li> </ul>
2:30-2:50p <i>(20 mins)</i>	<b>Community Profile Asset Identification</b> <ul style="list-style-type: none"> <li>• Critical and Essential facilities</li> <li>• Cultural and Historic Resources</li> <li>• Economy</li> <li>• Environmental Assets</li> <li>• Population</li> </ul>
2:50 – 3:35p <i>(45 mins)</i>	<b>Risk Assessment</b> <ul style="list-style-type: none"> <li>• Hazard Analysis Matrix: Update and Approve</li> <li>• Review/Update Hazard Profiles                             <ul style="list-style-type: none"> <li>○ Drought</li> <li>○ Earthquake</li> <li>○ Flood</li> <li>○ Landslide</li> <li>○ Volcanic Event</li> <li>○ Wildfire</li> <li>○ Windstorm</li> <li>○ Winter Storm</li> </ul> </li> </ul>
3:35 – 3:45 <i>(10 mins)</i>	<b><i>10 Minute Break</i></b>
3:45 – 4:30p <i>(45 mins)</i>	<b>Mitigation Strategy</b> <ul style="list-style-type: none"> <li>• Review and approve mission and goals</li> <li>• Status update for existing mitigation actions</li> <li>• Finalize new action items</li> </ul>
4:30 – 4:45 <i>(15 mins)</i>	<b>Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>• Review and update</li> </ul>
4:45 – 5:00p <i>(15 mins)</i>	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> </ul>

## Zoom Attendance Report for May 18<sup>th</sup>, 2021

Topic	Participants
Madras NHMP Meeting	10
Name (Original Name)	User Email
Sam VanLaningham	sam.j.vanlaningham@oregon.gov
Shelby Knight (she/her)	sknight@coic.org
Kasey Skaar	ks@jcfcd-1.org
Frank Jones ODF	
David Pond	
Sienna F. (they/them)	
Marc Austin	
Nick Snead	nsnead@ci.madras.or.us
Cowan# Ariel	cowana@oregonstate.edu
Gus Burrell# Madras City Administrator	

# Metolius NHMP Addendum Update

## Meeting Agenda

June 16, 2021 – 1:00 - 4:00pm

**Zoom Link:** <https://zoom.us/j/96604928106?pwd=VIM0TTBsT2F0UkI0ZFowYThBdVBKQT09>

**Meeting ID:** 966 0492 8106 | **Passcode:** 348082 | **Call-in #:** +1 669 900 6833

TIME	TOPIC
1:00 – 1:15p (15 mins)	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>
1:15-1:30p (15 mins)	<b>Process Overview</b> <ul style="list-style-type: none"> <li>• Purpose (David)</li> <li>• Roles</li> <li>• Timeline and Scope of Work</li> </ul>
1:30-1:50p (20 mins)	<b>Community Profile Asset Identification</b> <ul style="list-style-type: none"> <li>• Critical and Essential facilities</li> <li>• Cultural and Historic Resources</li> <li>• Economy</li> <li>• Environmental Assets</li> <li>• Population</li> </ul>
1:50 – 2:35p (45 mins)	<b>Risk Assessment</b> <ul style="list-style-type: none"> <li>• Hazard Analysis Matrix: Update and Approve</li> <li>• Review/Update Hazard Profiles               <ul style="list-style-type: none"> <li>○ Drought</li> <li>○ Earthquake</li> <li>○ Flood</li> <li>○ Landslide</li> <li>○ Volcanic Event</li> <li>○ Wildfire</li> <li>○ Windstorm</li> <li>○ Winter Storm</li> </ul> </li> </ul>
2:35 – 2:45 (10 mins)	<b>10 Minute Break</b>
2:45 – 3:30p (45 mins)	<b>Mitigation Strategy</b> <ul style="list-style-type: none"> <li>• Review and approve mission and goals</li> <li>• Status update for existing mitigation actions</li> <li>• Finalize new action items</li> </ul>
3:30 – 3:45 (15 mins)	<b>Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>• Review and update</li> </ul>
3:45 – 4:00p (15 mins)	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> </ul>



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

<b>Topic</b>	<b>Participants</b>
Metolius NHMP Meeting	7
<b>Name (Original Name)</b>	<b>User Email</b>
Phil Stenbeck	
Sam VanLaningham	
David Pond	
Shelby Knight (she/her)	sknight@coic.org
Tasha Alegre	metolius1911@gmail.com
Pat Hanenkrat	
Sienna F. (they/them)	

# Culver NHMP Addendum Update

## Meeting Agenda

July 20, 2021 – 2:00 - 5:00pm

**Zoom Link:** <https://zoom.us/j/93417763849?pwd=RVpOWEVtbXJBdXdLamppNHOrRW40UT09>

**Meeting ID:** 934 1776 3849 | **Passcode:** 988351 | **Call-in #:** +1 669 900 6833

TIME	TOPIC
2:00 – 2:15p <i>(15 mins)</i>	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>
2:15-2:30p <i>(15 mins)</i>	<b>Process Overview</b> <ul style="list-style-type: none"> <li>• Purpose <i>(David)</i></li> <li>• Roles</li> <li>• Timeline and Scope of Work</li> </ul>
2:30-2:50p <i>(20 mins)</i>	<b>Community Profile Asset Identification</b> <ul style="list-style-type: none"> <li>• Critical and Essential facilities</li> <li>• Cultural and Historic Resources</li> <li>• Economy</li> <li>• Environmental Assets</li> <li>• Population</li> </ul>
2:50 – 3:35p <i>(45 mins)</i>	<b>Risk Assessment</b> <ul style="list-style-type: none"> <li>• Hazard Analysis Matrix: Score Each</li> <li>• Develop Hazard Profiles                             <ul style="list-style-type: none"> <li>○ Drought</li> <li>○ Earthquake</li> <li>○ Flood</li> <li>○ Landslide</li> <li>○ Volcanic Event</li> <li>○ Wildfire</li> <li>○ Windstorm</li> <li>○ Winter Storm</li> </ul> </li> </ul>
3:35 – 3:45 <i>(10 mins)</i>	<b><i>10 Minute Break</i></b>
3:45 – 4:30p <i>(45 mins)</i>	<b>Mitigation Strategy</b> <ul style="list-style-type: none"> <li>• Review and approve mission and goals</li> <li>• Brainstorm and develop new action items</li> </ul>
3:30 – 3:45 <i>(15 mins)</i>	<b>Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>• Develop implementation and maintenance strategy</li> </ul>
4:45 – 5:00p <i>(15 mins)</i>	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> </ul>

## Zoom Attendance Report for July 20<sup>th</sup>, 2021

<b>Topic</b>	<b>Participants</b>
Culver NHMP Meeting	6
<b>Name (Original Name)</b>	<b>User Email</b>
Donna McCormack - Culver	
Sienna F. (they/them)	sfitzpatrick@coic.org
Shelby Knight (she/her)	sknight@coic.org
David Pond (David Pond (hunt/fish))	
Phil Stenbeck	
Sam VanLaningham	

# Lake Chinook NHMP Addendum Build

## Meeting Agenda

May 4<sup>th</sup>, 2022 | 2-5pm | Jefferson County Rural Fire, 765 5<sup>th</sup> Street, Madras OR

**Zoom Link:** <https://us06web.zoom.us/j/87582589421?pwd=cDk2SU1xbU5YSDdwa1ZQU GhQRzJsdz09>  
**Meeting ID:** 875 8258 9421 | **Passcode:** 066508 | **Call-in #:** +1 669 900 6833

All shared Google Docs can be found here: <https://drive.google.com/drive/folders/1fwUde8zaz05Dgnj-lr34Wn8lzpUtFD1W?usp=sharing>

TIME	TOPIC	ATTACHMENTS
2:00 – 2:15p <i>(15 mins)</i>	<b>Introductions &amp; Agenda Review</b> <ul style="list-style-type: none"> <li>• Attendance</li> <li>• Review agenda</li> </ul>	<u>Attachment A:</u> Agenda
2:15-2:30p <i>(15 mins)</i>	<b>Process Overview</b> <ul style="list-style-type: none"> <li>• Purpose <i>(David)</i></li> <li>• Roles</li> <li>• Match Tracking</li> <li>• Timeline and Scope of Work</li> </ul>	<u>Attachment B:</u> Timeline and SOW
2:30-2:50p <i>(20 mins)</i>	<b>Community Profile Asset Identification</b> <ul style="list-style-type: none"> <li>• Critical and Essential facilities</li> <li>• Cultural and Historic Resources</li> <li>• Economy</li> <li>• Environmental Assets</li> <li>• Land Use</li> <li>• Population</li> </ul>	<u>Google Doc 1:</u> Lake Chinook Addendum
2:50 – 3:40p <i>(50 mins)</i>	<b>Risk Assessment</b> <ul style="list-style-type: none"> <li>• Hazard Analysis Matrix: Review &amp; Discuss</li> <li>• Review &amp; Edit Hazard Profiles               <ul style="list-style-type: none"> <li>○ Drought</li> <li>○ Earthquake</li> <li>○ Flood</li> <li>○ Landslide</li> <li>○ Volcanic Event</li> <li>○ Wildfire</li> <li>○ Windstorm</li> <li>○ Winter Storm</li> </ul> </li> </ul>	<u>Google Sheet 2:</u> Lake Chinook Hazard Analysis Matrix <u>Google Doc 1:</u> Lake Chinook Addendum
3:40 – 3:50	<b><i>10 Minute Break</i></b>	
3:50 – 4:30p <i>(40 mins)</i>	<b>Mitigation Strategy</b> <ul style="list-style-type: none"> <li>• Review and approve mission and goals</li> <li>• Brainstorm and develop new action items</li> </ul>	<u>Google Doc 1:</u> Lake Chinook Addendum <u>Google Sheet 3:</u> Lake Chinook Mitigation Action Plan

		<u>Attachment C: Action Item Worksheet</u>
4:30 – 4:45 (15 mins)	<b>Plan Implementation and Maintenance</b> <ul style="list-style-type: none"> <li>• Develop implementation and maintenance strategy</li> </ul>	<u>Google Doc 1: Lake Chinook Addendum</u>
4:45 – 5:00p (15 mins)	<b>Wrap-Up and Action Items</b> <ul style="list-style-type: none"> <li>• “Homework” assignments for COIC and Committee Members</li> </ul>	

## Zoom Attendance Report and Attendance for May 4<sup>th</sup>, 2022

Topic	Participants
Lake Chinook NHMP Meeting	4
Name (Original Name)	User Email
Steve Memminger NCD	
Sienna F. (they/them)	sfitzpatrick@coic.org
Shelby Knight (she/her)	sknight@coic.org
Steve.Bifano	

### In Person Attendance (per the meeting notes)

Attendance:

Staff – Sienna, Shelby (COIC)

Virtual – Steve Memminger, NCD; Steve Bifano, Cove Palisades State Park.

In Person – Thad Fitzhenry, PGE; Chief Don Colfels, Lake Chinook Fire & Rescue; Laurel Zivosky, Community Member; Sgt. David Pond, Jefferson County Sheriff's Office;

## Lake Chinook Public Input August 2022

Anonymous Community Member Comment: Why are Property owners being penalized on fire risk based on what happened with the Beachie Fire? That was a total black mark for the State of Oregon not property owners. You are putting property owner at risk with loosing their insurance or making the cost so high they can not afford it.

Lake Chinook Fire District Response: I believe you are referring to the statewide wildfire risk map. That map was not part of this Jefferson County Natural Hazard Mitigation Plan and only referenced in the County wide Community Wildfire Protection Plan (CWPP). Additionally, the State Forester has withdrawn the initial map and notifications which makes it mute at this time. Jefferson County has been rated High Fire Danger since 2016. Most of Lake Chinook Fire district has been rated Extreme since then. So, insurance companies have understood the risk to this area for years. The best way to ensure the best possible insurance rates is to do defensible space work around your property. Three out of the four subdivisions in our district are Firewise communities. If you live in one of those communities, be sure to let your insurance company know. Some insurance companies give Firewise credits.

# Appendix C:

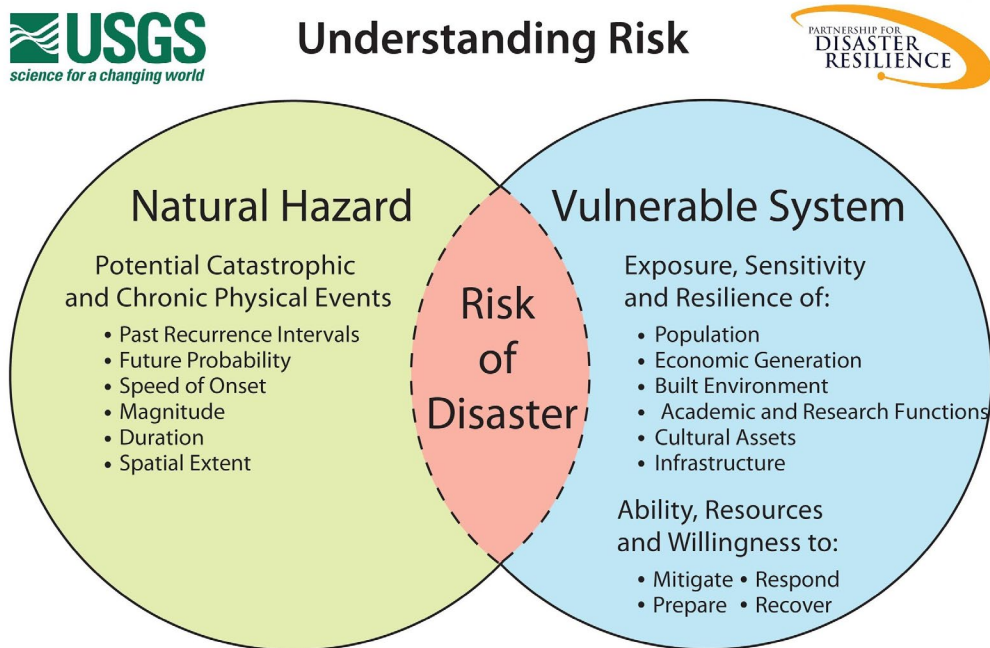
## Community Profile

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

- **Natural Environment**
- **Socio-Demographic**
- **Regional Economic**
- **Built (or Infrastructure)**
- **Community Connectivity**
- **Political**

The Community Profile describes the sensitivity and resilience to natural hazards of Jefferson County, and its incorporated cities, as they relate to each capacity. It provides a snapshot in time when the plan was developed and will assist in preparation for a more resilient county. The information in this section, along with the hazard assessments located in Volume II - *Hazard Annexes*, should be used as the local level rationale for the risk reduction actions identified in Section 3 – *Mitigation Strategy*. The identification of actions that reduce the county’s sensitivity and increase its resiliency assist in reducing overall risk of disaster, the intersection in Figure C-1 below.

**Figure C-1 Understanding Risk**



Source: USGS- Oregon Partnership for Disaster Resilience Research Collaboration, 2006



## Natural Environment Capacity

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

The following assets were identified by the NHMP Steering Committee in 2008 and reconfirmed in 2022:

**Table C-1 Natural Resource Asset Identification**

<b>Natural Resource Assets</b>
<b>Forests, Grasslands, and Parks</b>
Crooked River Golf Course
Crooked River National Grassland
Deschutes National Forest
Mount Hood National Forest
Willamette National Forest
<b>Impoundments &amp; Water Resources</b>
Brewer Reservoir
Haystack Reservoir
Hot Springs throughout county
Lake Billy Chinook
Little Willow Creek Reservoir
Suttle Lake
<b>Energy Resources</b>
Geothermal
Mineral deposits
Solar
Wind

Source: Jefferson County NHMP Steering Committee, 2022

## Geography

Jefferson County covers 1,791 square miles of central Oregon. The county is considered high desert and characterized by hilly and broken terrain covered in sagebrush and grassland. Mount Jefferson is a prominent volcano in the region, reaching an elevation of 10,495 feet above sea level. It is located within the west central portion of the county and is part of the Cascade Mountain Range. Moving east from the Cascades, the elevation drops and at 3,000 feet, the vegetation turns from forest into juniper, grass, and sagebrush.

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

Other natural areas include the Crooked River National Grasslands, the Deschutes National Forest, the Mount Hood National Forest, and the Willamette National Forest. The largest water body in the county is the Lake Billy Chinook Reservoir, west of Metolius and covering 6.2 square miles. Major rivers and streams within the county include the Metolius River, Deschutes River, Trout Creek, and Willow Creek.

## Climate

Winter rainfall and storms, and hot, dry summers with occasional thunderstorms characterize Jefferson County climate. The central and eastern parts of the county are considered high desert, while the western third of the county along the Cascades typically receives more rainfall than the rest of the county. With a typical high desert climate, the county experiences over 300 days of sunshine per year. Windstorms are common in the region; power outages and debris carried by the wind significantly threaten life and property. Winter storms that can occur November through March bring heavy snows, rains, and ice. Winter storms can cause traffic accidents, flooding, and health threats brought about by inadequate household heating. Ice storms are frequent and can inflict structure damage, especially to utilities. Summer precipitation is very low, increasing the risk of wildfire and requiring irrigation for crops.

### Precipitation and Snowpack

Total precipitation in the Pacific Northwest region may remain similar to historic levels but climate projections indicate the likelihood of increased winter precipitation and decreased summer precipitation.<sup>2</sup>

Increasing temperatures affects hydrology in the region. Spring snowpack has substantially decreased throughout the West, particularly in areas with milder winter temperatures, such as the Cascade Mountains. In other areas of the West, such as east of the Cascades Mountains, snowfall is affected less by the increasing temperature, because temperatures are already cold, and more by precipitation patterns.<sup>3</sup>

While there are not yet specific precipitation and snowpack projects available for Jefferson County, information available about the Pacific Northwest provides insight about the kinds of future patterns Jefferson County could experience.

The average annual precipitation ranges from around 10 inches for the lower elevations to more than 50 inches at some higher elevations in the extreme west of Jefferson County. See Table C-2 for average precipitation (inches) and C-3 for average monthly snow (inches). Figure C-2 shows the mean annual precipitation by elevation.

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<sup>2</sup> Ibid.

<sup>3</sup> Mote, Philip W., et. al., "Variability and trends in Mountain Snowpack in Western North America," <http://cses.washington.edu/db/pdf/moteetalvarandtrends436/pdf>, accessed February 2013.

**Table C-2 Average Precipitation (inches)**

Month	Antelope 1 NW	Grizzly	Madras	Pelton Dam
January	1.28	1.22	1.16	1.10
February	1.42	1.01	0.74	0.97
March	1.19	1.02	0.55	0.74
April	1.46	1.28	1.01	0.83
May	1.84	1.70	1.05	0.92
June	0.98	1.26	0.77	0.79
July	0.28	0.28	0.21	0.22
August	0.37	0.48	0.32	0.20
September	0.92	0.73	0.21	0.31
October	1.41	1.17	0.72	0.77
November	1.30	1.39	1.01	1.06
December	1.85	1.93	2.37	1.77
<i>Annual</i>	<i>14.85</i>	<i>12.64</i>	<i>9.54</i>	<i>9.63</i>

Source: The Oregon Climate Service, NOAA Climate Stations. "2001-2021 Climate of Jefferson County"

**Table C-3 Average Snowfall (inches)**

Month	Antelope 1 NW	Grizzly	Madras	Pelton Dam
January	2.0	8.6	5.0	1.8
February	2.0	4.5	3.0	0.1
March	1.0	3.2	1.0	0.1
April	1.0	1.5	0.0	0.0
May	0.0	0.3	0.0	0.0
June	0.0	0.0	0.0	0.0
July	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0
September	0.0	0.2	0.0	0.0
October	0.0	0.5	0.0	0.0
November	2.0	3.4	1.0	0.5
December	5.0	7.1	5.0	0.7
<i>Annual</i>	<i>13</i>	<i>29.4</i>	<i>15</i>	<i>3.1</i>

Source: wrcc.dri.edu (1958-2016) and [www.usclimatedata.com](http://www.usclimatedata.com)

**Figure C-2 Mean Annual Precipitation**



Source: The Oregon Climate Service. "Mean Annual Precipitation".  
[http://www.ocs.oregonstate.edu/county\\_climate/fig2/jefferson.jpg](http://www.ocs.oregonstate.edu/county_climate/fig2/jefferson.jpg).

## Temperature

Temperatures in the Pacific Northwest region increased in the 20<sup>th</sup> Century by about 1.5 degrees Fahrenheit and are projected to increasingly rise by an average of 0.2 degrees to 1.0 degrees Fahrenheit per decade. For the 2050s (relative to 1950-1999), temperature is estimated to rise 5.8°F in a high greenhouse gas scenario.<sup>4</sup>

Table C-4 shows average, maximum and minimum monthly temperatures for the City of Madras.

<sup>4</sup> Climate Impacts Group, "Climate Change," <http://cses.washington.edu/cig/pnwc/cc.shtml#anchor6>, accessed February 2013.

**Table C-4 Temperature (F) City of Madras**

Month	Mean Maximum	Mean Minimum	Mean Temperature	Extreme Maximum	Extreme Minimum
January	58.0	12.0	34.4	62.0	-4.0
February	60.0	14.0	36.4	69.0	-6.0
March	70.0	20.0	42.0	79.0	16.0
April	78.0	23.0	45.5	85.0	18.0
May	87.0	28.0	53.8	97.0	24.0
June	93.0	36.0	60.9	102.0	31.0
July	100.0	42.0	69.2	106.0	38.0
August	98.0	42.0	68.5	104.0	37.0
September	92.0	34.0	60.6	98.0	27.0
October	80.0	24.0	50.0	87.0	7.0
November	63.0	15.0	38.7	75.0	1.0
December	58.0	8.0	32.9	65.0	-15.0
<i>Annual</i>	<i>101</i>	<i>34.1</i>	<i>49.9</i>	<i>106</i>	<i>-15</i>

Source: [www.weather.gov](http://www.weather.gov) (2000-2022)

## Hazard Severity

Dynamic weather and relatively flat, arid land make Jefferson County particularly vulnerable to weather related hazards that are particularly sensitive to climate variability. Both wet winter and dry summer cycles are likely to last longer and be more extreme, leading to periods of deeper drought and more frequent flash flooding. Less snowpack in the summers and subsequently lower soil moisture with hotter temperatures will likely increase the amount of vegetation consumed by wildfire. Such events would indicate a concern for extreme heat events and need for related mitigation activities.

## Land Cover

Vegetation throughout the county is diverse and varies from ponderosa pine forest in the west to sagebrush shrub lands and grasslands in the east. Isolated county parcels and outlying areas are used primarily as ranch, farmlands and natural areas administrated by the BLM and USFS. New development growth is occurring in the east and south of Madras. Widely dispersed rural ranches and populations present challenges for the county's resilience and will be discussed further in section Community Connectivity Capacity.

## Land Use

A large percentage of land in Jefferson County is owned by the Confederated Tribes of Warm Springs or by government agencies. The total number of land acres in the county is over 1.14 million, including public and privately owned land. The USDA owns the largest percentage of land in the county, 276,496 acres or 24%. The Confederated Tribes of Warm

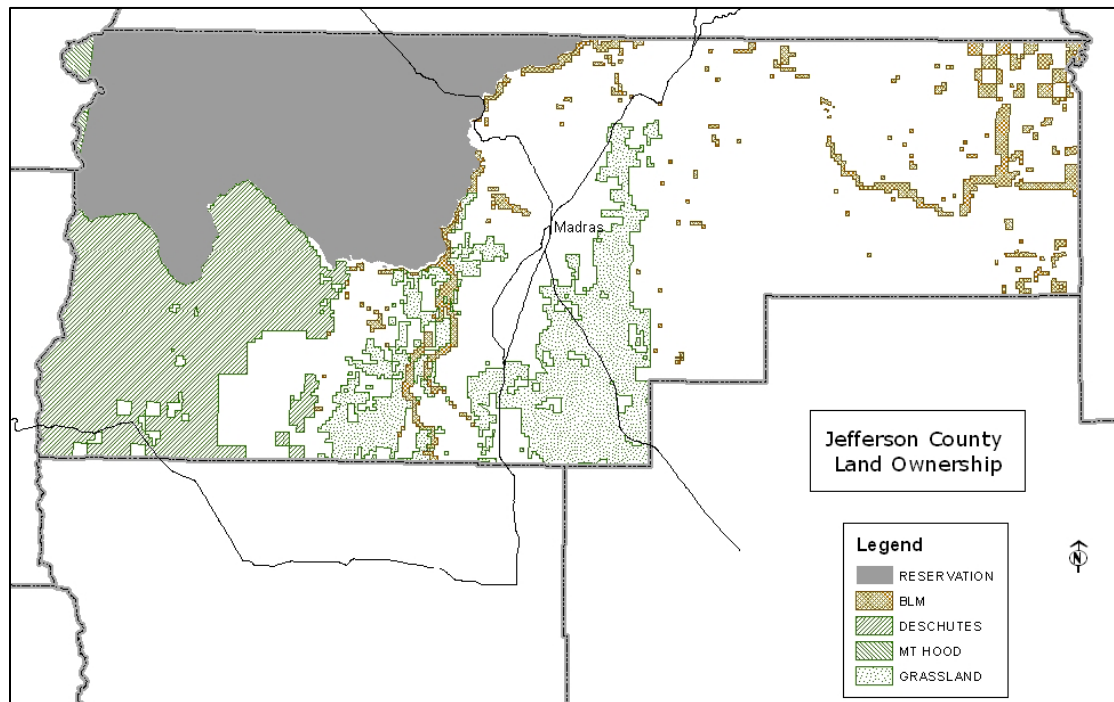
Springs own approximately 23% of county land. Table C-5 below summarizes the land holdings within Jefferson County.

**Table C-5 Jefferson County Publicly Owned Lands**

Agency	Acres	Percent
<i>Federal</i>		
BLM	42,534	4.0%
USDA	276,496	24.0%
<i>Tribal</i>		
Warm Springs	257,109	23.0%
<i>State</i>		
	1,783	0.2%
<i>Private</i>		
	562,078	49.0%
<b>Total</b>	<b>1,140,000</b>	<b>100%</b>

Source: Jefferson County CWPP

**Figure C-3 Land Ownership**

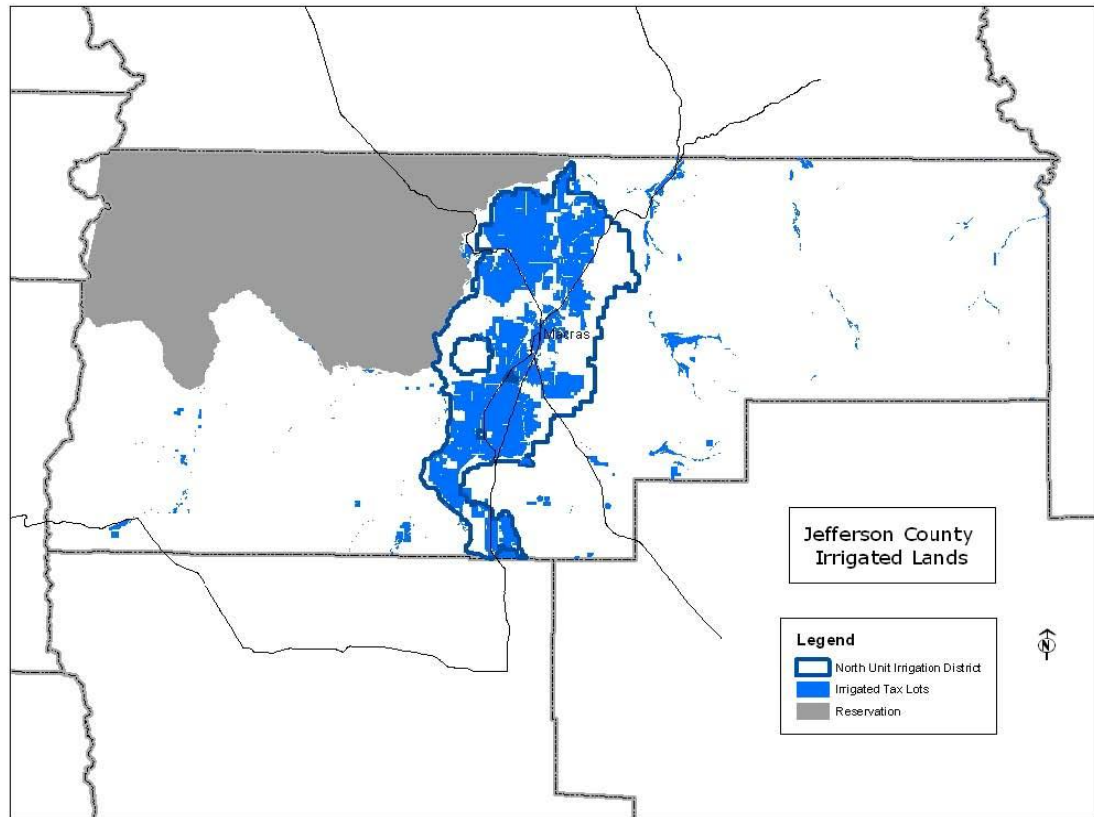


Source: Jefferson County CWPP

The western third of the county consists primarily of forested lands within the Deschutes and Mt. Hood National Forests and the Warm Springs Reservation. The forested lands are used for timber harvesting, recreation, and as preserved wilderness. The central third of the county is primarily irrigated farmland, and contains the major population centers of Culver, Madras and Metolius. The amount of irrigated farmland is extensive, as shown in Figure C-3 below, and is responsible for the majority of the agriculture production in Jefferson County.

The eastern third of the county is primarily dry, non-irrigated land, and is used for grazing and dry-land wheat farming.

**Figure C-4 Jefferson County Irrigated Lands**



Source: Jefferson County Comprehensive Plan

## 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. Climate change variability also has the potential to increase the effects of hazards in the area. 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.

## Socio Demographic Capacity

Socio demographic capacity characterizes the community population in terms of language, race and ethnicity, age, income, educational attainment, and health. These attributes can significantly influence the community's ability to cope, adapt to and recover from natural disasters. Additionally, the current status of other socio-demographic capacity indicators in Jefferson County such as graduation rate, quality of schools and median household income can have long term impacts on the economy and stability of the community ultimately affecting future resilience. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning.

The following assets were identified by the NHMP Steering Committee in 2008 and reconfirmed in 2022:

**Table C-6 Land Use and Development Asset Identification**

Sector and Assets
<b>Population</b>
Assisted living residents
Disabled populations
Elderly populations (particurally in rural areas)
Mobile home occupants
New county residents
Populations in poverty
Populations living within the Wildland Urban Interface (WUI)
Ranchers and agricultural workers
Rural populations
School aged children (particurally in rural schools)
Tourists: recreational visitors
Young families

Source: Jefferson County NHMP Steering Committee, 2022

### Population

The county's total population as of 2018 was 23,447. Table C-7 shows the population growth in Oregon, Jefferson County, and adjacent counties. Between 2000 and 2012, the population of Jefferson County increased approximately 14.3%. This represents slightly higher population growth than the 12.0% population growth for the State of Oregon during the same time period.



**Table C-7 Jefferson County and Sub-Areas – Historical and Forecast Population, and Average Annual Growth Rates (AAGR)**

	Historical			Forecast					
	2000	2010	AAGR (2000-2010)	2018	2043	2068	AAGR (2010-2018)	AAGR (2018-2043)	AAGR (2043-2068)
<b>Jefferson County</b>	<b>19,009</b>	<b>21,720</b>	<b>1.3%</b>	<b>23,447</b>	<b>28,553</b>	<b>32,191</b>	<b>0.9%</b>	<b>0.8%</b>	<b>0.2%</b>
Culver	802	1,357	5.4%	1,440	1,898	2,292	0.7%	1.1%	0.8%
Madras	6,470	6,987	0.8%	7,163	9,245	11,221	0.3%	1.0%	0.8%
Metolius	646	732	1.3%	1,076	1,349	1,500	4.8%	0.9%	0.4%
Outside UGBs	11,091	12,644	1.3%	13,767	16,060	17,178	1.0%	0.6%	0.3%

Sources: U.S. Census Bureau, 2000 and 2010 Censuses; Forecast by Population Research Center (PRC).

Note: For simplicity each UGB is referred to by its primary city's name.

Source: Portland State University, "Population estimates: 2018".

**Table C-8 Population Projections 2015-2065 – Jefferson County and Surrounding Counties**

Jurisdiction	2015 Population	2065 Population Forecast	2012-2050 Population Change	Percent Change	Average Annual Growth Rate
Oregon	3,883,735	5,588,500	1,704,765	44%	3.6%
Jefferson County	22,806	33,779	10,973	48%	3.9%
Crook County	21,135	25,640	4,505	21%	1.9%
Deschutes County	187,621	432,930	245,309	131%	8.4%
Wasco County	26,553	37,093	10,540	40%	3.3%
Wheeler County	1,363	1,161	-202	-15%	-1.6%

Source: Portland State University, "Population Projections" <http://www.oregon.gov>

The three incorporated cities of Culver, Madras and Metolius account for 40% of the total population. Between 2000 and 2012, there was an increase in population for non-incorporated areas at a rate of 1.0%, and a population growth rate totaling 5.8% in incorporated cities during the same period.

Urban and Rural growth patterns can impact how agencies, cities and counties prepare for emergencies, because changes in development can increase risk associated with hazards. As indicated by Table C-9, Jefferson County is becoming more urban, however unincorporated populations are growing as well. The county largest population is those living in unincorporated areas.

**Table C-9 Jefferson County and Sub-areas – Total Population and Average Annual Growth Rate (AAGR) (2000 and 2010)**

	2000	2010	AAGR (2000-2010)	Share of County 2000	Share of County 2010	Change (2000-2010)
<i>Jefferson County</i>	19,009	21,720	1.3%	100.0%	100.0%	0.0%
Culver	802	1,357	5.4%	4.2%	6.2%	2.0%
Madras	6,470	6,987	0.8%	34.0%	32.2%	-1.9%
Metolius	646	732	1.3%	3.4%	3.4%	0.0%
Outside UGBs	11,091	12,644	1.3%	58.3%	58.2%	-0.1%

Sources: U.S. Census Bureau, 2000 and 2010 Censuses.

Note: For simplicity each UGB is referred to by its primary city's name.

Population size itself is not an indicator of vulnerability. More important is the location, composition, and capacity of the population within the community. Research by social scientists demonstrates that human capital indices such as language, race, age, income, education and health can affect the integrity of a community. Therefore, these human capitals can impact community resilience to natural hazards. As an example, the rural lifestyle of most of Jefferson County’s suggests that the population may be relatively less reliant on external goods and services. However, the significant increase in the age dependency ratio may pose significant challenges for the county in terms of natural disaster resilience and should not be overlooked.

## Language

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

There are various languages spoken across Jefferson County. The three primary languages are English, Spanish, and other Indo-European languages. Even though the vast majority of the county’s population is reported as proficient in English, 52.8% of Spanish speakers and 15.0% of Asian and Pacific Islander languages speakers are not proficient in English. These populations would stand to benefit from specialized emergency planning outreach, with attention to cultural, visual and technology sensitive materials. Table C-10 shows the percentage of people not proficient in English by primary language.

**Table C-10 Jefferson County Language Barriers**

Language	Total Number of Speakers	Number of People <i>not</i> Proficient in English	Percent of People <i>not</i> Proficient in English by Language
English	20,205	0	0%
Spanish	2,942	1,554	52.8%
Other Indo-European	66	2	3.0%
Asian and Pacific Islander	165	25	15.2%
Other	437	1	0.2%
<b>Total</b>	<b>21,810</b>	<b>1,582</b>	<b>7.3%</b>

Source: U.S. Census Bureau, 2006-2010 American Community Survey, DP02: Selected Social Characteristics in the United States, 2006-2010 American Community Survey Selected Population Tables, accessed January 2013

## Race

The impact in terms of loss and the ability to recover may also vary among minority population groups following a disaster. Studies have shown that racial and ethnic minorities can be more vulnerable to natural disaster events. This is not reflective of individual characteristics; instead, historic patterns of inequality along racial or ethnic divides have often resulted in minority communities that are more likely to have inferior building stock, degraded infrastructure, or less access to public services. Table C-11 describes Jefferson County’s population by race and ethnicity.

**Table C-11: Jefferson County and Incorporated Cities – Hispanic and Latino, or Not Hispanic and Latino by Race, 2021**

Race	Oregon	Jefferson County	Culver	Madras	Metolius
Total Population	4,237,256	24,502	1,602	7,456	978
One Race	92.9%	94.0%	89.4%	91.9%	92.6%
White	85.4%	76.9%	85.5%	79.4%	87.5%
Black or African American	2.1%	0.7%	0.4%	0.4%	0.8%
American Indian and Alaska Native	1.2%	15.3%	2.4%	10.1%	2.1%
Asian	5.3%	0.7%	0.7%	1.3%	1.3%
Native Hawaiian and Other Pacific Islander	0.5%	0.1%	0.0%	0.2%	0.5%
Some Other Race	0.6%	0.3%	0.4%	0.5%	0.3%
Two or More Races	7.1%	6.0%	10.6%	8.1%	7.4%
Hispanic or Latino (of any race)	13.9%	20.4%	31.1%	37.5%	37.6%
Not Hispanic or Latino	86.1%	79.6%	68.9%	62.5%	62.4%

Source: U.S. Census Bureau, Table QT-P2 “Hispanic and Latino, or Not Hispanic and Latino by Race”, data.census.gov, accessed February 2022.

Countywide, roughly one-quarter of the population identifies as a race other than white. The county has a large population of American Indians (15.3%) and Hispanics or Latinos (20.4%), as such it is important for the County to identify specific ways to support all portions of the community through hazard preparedness and response. Culturally appropriate, and effective outreach can include both methods and messaging targeted to this diverse audience. 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

The most significant indicator that influences socio-demographic capacity in Jefferson County may be the age dependency ratio of the population. The dependency ratio is a generalized analytical tool that evaluates the population under the age of 15 and over the age of 64. Table C-12 shows that the percentage of persons over the age of 64 in the county in 2010 was 15.3% and that figure is projected to rise to 21.5% by 2040. Additionally, two cities in the county have over 25% of their populations under the age of 15, Culver and Madras. The Jefferson County dependency ratio is 56.8%, which is higher than that of the State of Oregon (48.9%). The dependency ratio indicates a higher percentage of dependent aged people to that of working age. This trend is projected to continue with rates in 2040 of 71.9% for Jefferson County and 61% for Oregon.

**Table C-12 Population by Age Groups and Age Dependency Ratio (2010 and 2040)**

2010		< 15 Years		> 64 Years			
Jurisdiction	Total	Number	Percent	Number	Percent	15 to 64	Age Dependency Ratio
Oregon	3,831,074	717,323	18.7%	533,533	13.9%	2,580,218	48.5%
Jefferson County	21,720	4,533	20.9%	3,331	15.3%	13,856	56.8%
Culver	1,357	400	29.5%	114	8.4%	843	61.0%
Madras	6,046	1570	26.0%	621	10.3%	3855	56.8%
Metolius	710	154	21.7%	69	9.7%	487	45.8%
<b>2040</b>							
Oregon	5,425,408	958,949	17.7%	1,097,519	20.2%	3,368,940	61.0%
Jefferson County	36,094	7,338	20.3%	7,762	21.5%	20,994	71.9%

Source: U.S. Census Bureau, Table QT-P1 "Age Groups and Sex: 2010", <http://factfinder2.census.gov>, accessed Jan. 2013; Office of Economic Analysis, Department of Administrative Services, Long Term County Forecast, "State and County Population Forecasts by Age and Sex, 2000-2040".

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 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 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.<sup>5</sup>

<sup>5</sup> Wood, Nathan. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon. U.S. Geological Survey, Reston, VA, 2007.

Other important considerations for high-risk populations are the number of people over the age of 64 living alone and single parent households with children under 18. There are more than 700 households over 64 years of age living alone in Jefferson County (approximately 9% of all households) and nearly 900 single parent households (approximately 11.2% of all households), these populations will likely require additional support during a disaster. Madras has a higher percentage of heads of households over 64 years of age living alone at 11.2%. While both Madras and Culver have large percentages of single parent households, at around 16%.

**Table C-13 High Risk Householders**

Jurisdiction	Households	> 64 Living Alone	Single Male with Children < 18	Single Female with Children < 18
Oregon	1,518,938	9.7%	2.5%	6.1%
Jefferson County	7,790	9.2%	3.5%	7.7%
Culver	436	7.3%	6.0%	9.9%
Madras	2,198	11.2%	4.4%	11.3%
Metolius	275	8.0%	3.3%	9.1%

Source: U.S. Census Bureau, Table DP-1 "Profile of General Population and Housing Characteristics: 2010", <http://factfinder2.census.gov>, accessed January 2013.

## 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 as a whole, but does not reflect how the income is divided among the area residents.

The median household income in Jefferson County is approximately \$53,000, which is lower than the State of Oregon median income of \$67,000. The household income data for 2000 is adjusted for inflation and shows that with inflation adjusted dollars incomes in 2011 are less than they were in 2000 for Oregon, Jefferson County, Culver and Metolius. Comparing 2011 to 2019, there was a 24.3% increase in median household income. It is significant to note that the COVID-19 pandemic, which resulted in lockdowns and global economic impacts, is not captured by these 2019 numbers. Incomes in 2019 are notably higher in Metolius compared to the other cities. Higher incomes benefit the community across the board, particularly by increasing tax revenue, which can be spent on mitigation efforts.

**Table C-14 Median Household Income\***

Jurisdiction	2000	2011	2019	Percent Change (11-19)
Oregon	\$53,447	\$49,260	\$67,058	36.1%
Jefferson County	\$46,834	\$42,867	\$53,277	24.3%
Culver	\$41,366	\$37,500	\$46,477	23.9%
Madras	\$38,016	\$38,832	\$34,858	-10.2%
Metolius	\$42,290	\$40,313	\$50,000	24.0%

\*Note: 2000 figures are adjusted for inflation based upon the CPI calculator provided by the Bureau of Labor Statistics, [http://www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm)

Source: U.S. Census Bureau, 2019, Table DP03 "Selected Economic Characteristics". Accessed February 2022.

Table C-15 identifies the percentage of individuals and families and children under 18 that are below the poverty level in 2010. It is estimated that 13.5% of families and 23.8% of families with children live below the poverty level across the County. This percentage is affected by the extremely high percentage of families with children living in poverty in the City of Culver at 42.1%. Culver also has more than half of its population under 18 years old living below the poverty level. The City of Metolius has a much lower percentage than Culver, Madras or the County as a whole at 9%. Most of these poverty estimates are much higher with statistics from the State and Nation.

**Table C-15 People Below Poverty Level, 2000-2010**

Jurisdiction	All People	People < 18	Families	Families with Children < 18
Oregon	14%	18.3%	9.6%	15.5%
Jefferson County	20.1%	33.6%	13.5%	23.8%
Culver	42.5%	52.9%	33.9%	42.1%
Madras	16.7%	23.2%	13.7%	20%
Metolius	9.3%	4.8%	8.1%	9%

Source: U.S. Census Bureau, 2006-2010 American Community Survey, Table DP03 "Selected Economic Characteristics", <http://factfinder2.census.gov>, accessed January 2013.

Income is a resiliency indicator, as higher incomes are often associated with increased self-reliance, and ability to prepare oneself if an emergency does occur. The higher the poverty rate, the more assistance the community will likely need in the event of a disaster in the form of sheltering, medical assistance, and transportation. Conversely, higher income populations often have less mobility following significant hazard events because their assets may be rooted in the local community and lower income members of the population may find it easier to relocate.

## Education

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

**Table C-16 Educational Attainment, 2019**

Jurisdiction	Oregon	Jefferson County	Culver	Madras	Metolius
Total Population > 18 Years	3,354,921	18,049	1,212	5,036	644
Less than 9th Grade	2.9%	3.6%	7.3%	6.9%	8.9%
9th -12th Grade, No Diploma	6.2%	9.4%	6.7%	10.3%	17.5%
High School Graduate, GED, or Equivalent	23.9%	32.0%	37.5%	34.3%	42.1%
Some College, No Degree	31.9%	25.5%	24.2%	20.0%	16.1%
Associate's Degree	8.0%	12.1%	13.4%	13.5%	9.5%
Bachelor's Degree	19.9%	11.6%	7.4%	9.8%	3.1%
Graduate or Professional Degree	12.1%	5.8%	3.5%	5.1%	2.8%
<i>Sub-Total (No Highschool Degree)</i>	<i>12.1%</i>	<i>13.0%</i>	<i>13.9%</i>	<i>17.2%</i>	<i>26.4%</i>
<i>Sub-Total (High School Graduate and beyond)</i>	<i>87.9%</i>	<i>87.0%</i>	<i>86.1%</i>	<i>82.8%</i>	<i>73.6%</i>
<i>Sub-Total (College Graduate and beyond)</i>	<i>33.7%</i>	<i>29.5%</i>	<i>24.3%</i>	<i>28.4%</i>	<i>15.4%</i>

Source: U.S. Census Bureau, 2019 American Community Survey, Table S1501 "Educational Attainment", <http://census.gov>, accessed February 2022.

According to the U.S. Census, 87% of the Jefferson County population over 18 years of age has graduated from high school or received a high school equivalency, with approximately 29.5% receiving a college degree.

## 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 wellbeing. These factors translate to a community's ability to prepare, respond and cope with the impacts of a disaster.

The Resilience Capacity Index recognizes those who lack health insurance or are impaired with sensory, mental or physical disabilities, have higher vulnerability to hazards and will likely require additional community support and resources. The following two tables identify health insurance coverage and disability status across Jefferson County. It is important to note in Table C-18, that the percentage of population in Jefferson County without health insurance (19%, 4,188 people) is higher than that of the State, and is third highest compared to neighboring counties. For planning purposes, the population without health insurance (Table C-17) and the lower median income (Table C-15) should be taken into consideration. The county may be obligated to provide services to the dependent aged population if their families do not have insurance, or cannot afford to care for them following a natural disaster.

**Table C-17 Health Insurance Coverage**

Jurisdiction	Population	With Health Insurance	Without Health Insurance	Population without Health Insurance
Oregon	4,175,002	93%	7%	299,420
Jefferson County	22,539	91%	9%	2,099
Crook County	22,949	93%	7%	1,606
Deschutes County	196,991	93%	7%	13,713
Wasco County	25,712	92%	8%	2,005
Wheeler County	1,415	95%	5%	74

Source: U.S. Census Bureau, 2019 American Community Survey, Table B01003 "Selected Characteristics of Health Insurance Coverage in the United States", accessed February 2022

Table C-18 describes disability status of the population. As of 2019, 19% of the county population over the age of five (3,496 people) identifies with one or more disabilities; this rate is above the State and the third highest rate compared to neighboring counties.

**Table C-18 Jefferson County Disability Status, 2019**

Jurisdiction	Population 5 years and over	With a Disability	Percent
Oregon	4,175,002	614,059	15%
Jefferson County	22,539	4,188	19%
Crook County	22,949	4,597	20%
Deschutes County	196,991	22,482	11%
Wasco County	25,712	4,678	18%
Wheeler County	1,415	344	24%

Source: U.S. Census Bureau, 2019, census.gov, Table S1810 "Disability Characteristics," accessed February 2022.

On a similar note, a community with high percentages of drug dependency and violent crimes may experience increased issues with the disruption of normal social systems. It is likely that the continuity of addiction and mental health services will be interrupted by a disaster and in combination with a high stress environment, an increase in crime incidents may result. Table C-19 and Table C-20 illustrate drug dependencies and crime rates in Jefferson County.

**Table C-19 Estimated Substance Abuse and Dependencies**

Abuse or Dependence	Number of Persons 12 years or older	Percent of Total Population
Alcohol	1,439	7.2%
Drug	586	2.9%

Source: Oregon Health Authority, Addictions Services "Oregon's Epidemiological Data on Alcohol, Drug, mental Health and Gambling 2000 to 2010". Data represents figures from 2006-2008.

<http://www.oregon.gov/oha/amh/ad/data/jefferson.pdf>. 2. U.S. Census Bureau, 2005-2009 American Community Survey, B01003 TOTAL POPULATION, accessed January 2013.



Table C-20 describes the crime rate status of the county. As of 2019, the county has a higher violent crime rate than every neighboring county except Crook County, and a lower rate than the state. The table also shows that Jefferson County Violent Crime Rate is more than twice the national benchmark.

**Table C-20 Violent Crime Rate, 2019**

Jurisdiction	Violent Crime Rate
<i>National Benchmark</i>	100
Oregon	249
Jefferson County	222
Crook County	346
Deschutes County	169
Wasco County	159
Wheeler County	184

Source: County Health Rankings and Roadmaps, "Violent Crime Rates," 2019.  
<http://www.countyhealthrankings.org>. Accessed February 2022.

## Synthesis

For planning purposes, it is essential Jefferson County consider both immediate and long-term socio-demographic implications of hazard resilience. Immediate concerns regard the large presence of an elderly population and the age dependency ratio. Even though the vast majority of the population is reported as proficient in English, the census data reports that over half of Spanish speakers are not proficient in English. These populations would serve to benefit from mitigation outreach, with special attention to cultural, visual and technology sensitive materials. The current status of other socio-demographic capacity indicators such as populations without health insurance and median household income can have long-term impacts on the economy and stability of the community ultimately affecting future resilience.

## Regional Economic Capacity

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

Considering the high regional unemployment, high rental housing cost burden, and an economy heavily dependent on a single or few key industries, Jefferson County may experience a more difficult time in recovering after a disaster than one with a more diverse economic base. It is imperative that Jefferson County recognizes that economic diversification is a long-term goal; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.<sup>6</sup>

## Regional Affordability

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

### Income Equality

Income equality is a measure of the distribution of economic resources, as measured by income, across a population. It is a statistic defining the degree to which all persons have a similar income. Table C-21 illustrates the county and cities level of income inequality. The Gini index is a measure of income inequality. The index varies from zero to one. A value of one indicates perfect inequality (only one household has any income). A value of zero indicates perfect equality (all households have the same income).<sup>7</sup> Jefferson County's income distribution is slightly more equal than the State as a whole. Additionally, the cities of Culver and Metolius have greater income equality than the State; however Madras has less income equality than the county.

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<sup>6</sup> Ibid.

<sup>7</sup> University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. <http://brr.berkeley.edu/rci/>.

**Table C-21 Income Inequality**

Jurisdiction	Income Inequality Coefficient
Oregon	0.450
Jefferson County	0.436
Culver	0.369
Madras	0.439
Metolius	0.363

Source: U.S. Census Bureau, American Community Survey, 2019, Table B19083 “Gini Index of Income Inequality”, <http://census.gov>, accessed February 2022.

## Housing Affordability

Housing affordability is a measure of economic security gauged by the percentage of a metropolitan area’s households paying less than 35% of their income on housing.<sup>8</sup> Households spending more than 35% are considered housing cost burdened. Table C-22 displays the percentage of homeowners and renters reflecting housing cost burden across the region. There are no homeowners in Jefferson County and its city that spends more than about 31% of their income on housing. Renters in the cities of Madras and Metolius pay more than 35% on housing, with Culver and the County overall coming in just under 35%. Only renters in the City of Metolius spend more on housing than the state of Oregon overall. In general, the population that spends more of their income on housing has proportionally fewer resources and less flexibility for alternative investments in times of crisis.<sup>9</sup>

**Table C-22 Households Spending >35% of Income on Housing\***

Jurisdiction	Owners		Renters
	With Mortgage	Without Mortgage	
Oregon	21.4%	11.0%	40.0%
Jefferson	22.3%	9.0%	34.3%
Culver	30.9%	12.4%	33.8%
Madras	14.5%	10.4%	39.8%
Metolius	21.8%	6.0%	42.3%

Source: U.S. Census Bureau, 2019, American Community Survey, Table DP04 “Selected Housing Characteristics”, accessed February 2022.

This disparity imposes challenges for a community recovering from a disaster as housing costs may exceed the ability of local residents to repair or move to a new location. These populations may live paycheck to paycheck and are extremely dependent on their employer, in the event their employer is also impacted it will further the detriment experienced by these individuals and families.

<sup>8</sup> University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. <http://brr.berkeley.edu/rci/>.

<sup>9</sup> Ibid.

## Economic Diversity

Economic diversity is a general indicator of an area’s fitness for weathering difficult financial times. The following assets were identified by the NHMP Steering Committee in 2008 and reconfirmed in 2022:

**Table C-23 Land Use and Development Asset Identification**

Economic Assets
Agriculture
Education System
Government agencies: Federal, County and Local
Infrastructure (Highways 97, 26, and SW Culver Hwy
Manufacturing Industry
Small Businesses
St. Charles - Madras Hospital
Wildfire: Tourist, bird watchers, hunters

Source: Jefferson County Steering Committee, 2022

One method for measuring economic diversity is through use of the Hachman Index, a formula that compares the composition of county and regional economies with those of states or the nation as a whole. Using the Hachman Index, a diversity ranking of 1 indicates the most diverse economic activity compared to the state as a whole, while a ranking of 36 corresponds with the least diverse county economy. Jefferson County ranked 34th out of the 36 counties in the state overall. Table C-24 displays the Hachman Index Scores for counties in the region.

**Table C-24 Regional Hachman Index Scores**

County	Hachman Index Score - 2009	Percent Change from 1999	State Rank 2009
Jefferson County	0.072	-63.3%	34
Crook County	0.293	4.0%	24
Deschutes County	0.755	-3.7%	4
Wasco County	0.357	-10.2%	17
Wheeler County	0.148	-5.7%	29

Source: Oregon Employment Department, Hachman Index, 2009

While illustrative, economic diversity is not a guarantee of economic vitality or resilience. For example, as of 2010, though Multnomah County and Clackamas County are ranked 1 and 2 in the state for economic diversity, they are both listed as “economically distressed” by the Oregon Business Development Commission. However, Jefferson County, which is ranked 34 in terms of economic diversity, is not<sup>10</sup>. The economic distress measure is based

<sup>10</sup> Moore, Eric. “Measuring Economic Diversification” Oregon Employment Department

on indicators of decreasing new jobs, average wages and income, and is associated with an increase of unemployment.

## Employment and Wages

According to the Oregon Employment Department, Jefferson County unemployment has decreased since 2013 when it was 10.3% to 5.0% in 2019<sup>11</sup>. The COVID-19 pandemic in 2020 increased unemployment to 8.2%, but declined by 2021 to 6.1%. The change in unemployment rate in Crook and Deschutes counties were similar, showing an overall decrease in unemployment rates from 2013 levels despite the pandemic. The unemployment rates for Jefferson County is higher than the State as a whole and neighboring Wasco County and Wheeler County. Table C-25 shows that the unemployment rate is improving in Oregon, Jefferson, Crook, Deschutes, Wasco and Wheeler County.

**Table C-25 Regional Unemployment Rates, 2007-2011**

Jurisdiction	Unemployment Rate								
	2013	2014	2015	2016	2017	2018	2019	2020	2021
Oregon	7.8%	6.7%	5.5%	4.7%	4.1%	4.0%	3.7%	7.6%	5.1%
Jefferson County	10.3%	8.7%	7.1%	6.5%	5.5%	5.3%	5.0%	8.2%	6.1%
Crook County	12.0%	9.6%	8.2%	6.8%	6.2%	5.8%	5.1%	8.8%	6.6%
Deschutes County	9.4%	7.6%	5.7%	4.8%	4.2%	4.1%	3.9%	7.9%	5.2%
Wasco County	7.5%	6.4%	5.5%	4.7%	4.1%	4.1%	4.0%	7.1%	5.1%
Wheeler County	6.2%	6.1%	5.1%	4.1%	3.8%	3.3%	4.2%	4.3%	3.2%

Source: Oregon Employment Department, "Unemployment Rates (LAUS)". <http://www.qualityinfo.org>. Accessed February 2022.

Table C-26 displays the payroll and employee figures for Jefferson County. It is important to note the economic and employment impacts of the COVID-19 pandemic on the numbers. As of 2020, the County average wage is \$44,127. The State and Jefferson County, and counties such as Crook, Wasco, and Wheeler have lost employment since 2011. Employment has dropped by about 18% from 2011 to 2020 in Jefferson County; average pay for Jefferson County has increased by about 33% for that same period. Deschutes County has gained employment for the same period; and every county in the region has increased average pay.

<sup>11</sup> <http://www.qualityinfo.org/olmisj/labforce?key=region&areacode=4104000031&stat=unemprate>

**Table C-26 Employment and Average Pay, 2011-2021**

Jurisdiction	Employment			Average Pay		
	2011	2020	Percent Change	2011	2020	Percent Change
Oregon	1,617,243	1,836,333	13.5%	\$43,077	\$59,927	39.1%
Jefferson County	8,152	6,677	-18.1%	\$33,210	\$44,127	32.9%
Crook County	7,787	6,420	-17.6%	\$36,996	\$53,584	44.8%
Deschutes County	70,299	81,215	15.5%	\$36,134	\$52,962	46.6%
Wasco County	13,215	11,120	-15.9%	\$32,507	\$45,828	41.0%
Wheeler County	619	294	-52.5%	\$25,497	\$32,082	25.8%

Source: Oregon Employment Department, "Employment and Wages By Industry", 2020, [www.qualityinfo.org](http://www.qualityinfo.org). Accessed February 25, 2022.

The prevalence of small businesses in Jefferson County is an indication of sensitivity to natural hazards because small businesses are more susceptible to financial uncertainty. If a business is financially unstable before a natural disaster occurs, financial losses (resulting from both damages caused and the recovery process) may have a bigger impact than they would for larger and more financially stable businesses.

## Industry

### Major Regional 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. Key industries are those that both represent major employers and are significant revenue generators.

Below industry sectors are evaluated by (1) the percentage of the county workforce employed, (2) the revenue generated, (3) and whether the sector is a basic or non-basic 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. Whether or not an industry relies on outside sales therefore affects the local economy and employment. Trending towards basic industries can lead to higher community resilience.

### Employment by Industry

In 2011, nearly half of the county's workforce was employed by a federal, state, or local government agencies. Within that 36% were employed by local government agencies (including tribal governments), one of the largest employers in the county. Private industry sectors accounted for 54% of the workforce. Table C-27 identifies employment by industry. The private industry sectors in Jefferson County with the most employees, as of 2011, are

Manufacturing (819), Transportation and Utilities (793), Retail Trade (484), Leisure & Hospitality (449), and Natural Resources and Mining (369). The private sector of Jefferson County is primarily basic industry. In principle, basic industries, or industries that rely on outside sales, tend to lead to a more disaster resilient area. However, many of the county's basic industries, ranching for example, rely on stable climate conditions and natural resources that may be adversely affected by disaster events. The largest employer in the county is local government, a non-basic industry relying on local sales and services.

Table C-27 shows a decrease in employment over the last ten years. Included in this employment decrease were non-basic sectors such as Professional and Business Services, Education and Health Services, and State and Local Government have experienced decreases. The industries that suffered the greatest losses are Manufacturing, Construction, Wholesale, Retail, Finance Activities, Leisure and Hospitality and Federal.

**Table C-27 Total Employment by Industry**

Jurisdiction	2011				Percent Change in Employment 2001-2011
	Firms	Employees	Percent Workforce	Average Pay	
<b>Total</b>	417	5,853	100%	\$33,210	5.1%
<b>Total Private</b>	410	3,304	56.4%	\$27,996	-16.5%
Natural Resources and Mining	53	369	6.3%	\$27,336	-2.4%
Construction	29	70	1.2%	\$23,686	-22.2%
Manufacturing	23	819	14.0%	\$36,075	-46.5%
Trade, Transportation & Utilities	88	793	13.5%	\$30,331	-9.0%
<i>Wholesale</i>	22	196	3.3%	\$35,261	-17.3%
<i>Retail</i>	47	484	8.3%	\$22,377	-10.9%
Information	7	27	0.5%	\$27,471	0%
Finance Activities	31	112	1.9%	\$32,035	-14.5%
Professional & Business Services	39	136	2.3%	\$27,173	63.9%
Education & Health Services	33	344	5.9%	\$28,028	92.2%
Leisure & Hospitality	55	449	7.7%	\$13,783	-11.8%
Other Services	53	181	3.1%	\$17,854	18.3%
<b>Government</b>	61	2,549	43.6%	\$39,970	57.7%
Federal	14	132	2.3%	\$54,296	-18.5%
State	11	293	5.0%	\$43,959	229.2%
Local	36	2,124	36.3%	\$38,529	55.6%

Source: Oregon Employment Department, "2001 and 2011 Covered Employment and Wages Summary Reports". <http://www.qualityinfo.org/olmisj/labforce>.

## High Revenue Sectors

In 2020, the five sectors with the highest revenue were Retail Trade, Manufacturing, Health Care and Social Assistance, Wholesale Trade, and Accommodation & Food Services. Table C-28 shows the revenue generated by each economic sector. Because Jefferson County relies on both basic and non-basic sector industries 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.

**Table C-28 Revenue of Top Sectors in Jefferson County**

Sector Meaning (NAICS code)	Sector Revenue (\$1,000)	Percent of Total Revenue
Retail Trade	\$133,082	24.2%
Manufacturing	\$168,255	30.6%
Health Care & Social Assistance	\$51,162	9.3%
Wholesale Trade	\$156,443	28.5%
Accommodation & Food Services	\$21,335	3.9%
Professional, Scientific & Technical Services	\$3,830	0.7%
Real Estate & Rental & Leasing	\$5,972	1.1%
Administrative & Support & Waste Management & Remediation Services	\$5,117	0.9%
Other Services (except Public Administration)	\$4,510	0.8%
Arts, Entertainment & Recreation	NA	NA
Educational Services	NA	NA
Information	NA	NA
<b>Total</b>	<b>\$549,706</b>	

Source: Oregon Employment Department, "Employment Wages by Industry". <http://www.qualityinfo.org>. Accessed February 2022.

Manufacturing accounts for 30.6% of total revenue. Residents' discretionary spending diminishes after a natural disaster when they must pay to repair their homes and properties. In this situation, residents will likely concentrate their spending on essential items.

Wholesale Trade generated approximately 28.5% of the county revenue. Wholesale Trade is closely linked with retail trade but it has a broader client base, with local and non-local businesses as the typical clientele. Local business spending will be likely to diminish after a natural disaster, as businesses repair their properties and wait for their own retail trades to increase. Distanced clients may have difficulty reaching the local wholesalers due to transportation disruptions from a natural disaster.

Retail Trade generated approximately 24.2% of the county revenue. The retail trade sector typically relies on local residents and tourist and their discretionary spending ability. Residents' discretionary spending diminishes after a natural disaster when they must pay to repair their homes and properties. In this situation, residents will likely concentrate their spending on essential items that would benefit some types of retail (e.g., grocery) but hurt others (e.g., gift shops). The potential income from tourists also diminishes after a natural disaster as people are deterred from visiting the impacted area. Retail trade is also largely dependent on wholesale trade and the transportation network for the delivery of goods for sale. Disruption of the transportation system could have severe consequences for retail businesses. In summary, depending on the type and scale a disaster could affect specific segments of retail trade, or all segments.



Health Care & Social Assistance accounts for 9.3% of total revenue for the county. In the event of a natural disaster, these services could be disrupted or directly impacted by the event, depending on location and size. Rebuilding infrastructure and re-establishing services after an event can be an extensive, long process. Extended disruption of this sector in Jefferson County as a result of a natural disaster would have severe effects on the quality of life and ability of communities to recover from the disaster, exacerbating economic losses tied to this sector.

Accommodation & Food Services account for 3.9% of total revenue. Portions of the latter sector are more stable than others. The stable portion of this sector is likely dependent upon health care and residential facilities in the county; as these populations will continue to require these services. However, part of this revenue is generated through leisure and hospitality. This portion of the sector could be adversely affected by a disaster as it primarily serves regional residents with disposable income and tourists. The behavior of both demographics would be disrupted as tourists deter from visiting the impacted area, or local residents may concentrate spending on essential items rather than luxury expenditures (e.g. dining out).

Both accommodation and food services are highly dependent upon the transportation network in order to receive shipped goods (e.g. food supplies and products) and be accessible by traveling motorists. Disruption of the transportation system could have severe consequences for this sector. Depending on the type and scale of the disaster, it could affect specific segments of accommodation and food services.

In the event that any of these primary sectors are impacted by a disaster, Jefferson County may experience a significant disruption of economic productivity.

## Future Employment in Industry

Sectors that are anticipated to be major employers in the future also warrant special attention in the hazard mitigation planning process. Between 2020 and 2030, the largest employment growth is anticipated within leisure and hospitality (46%); other services (20%); private educational and health services and professional and business services (19%); information (15%), and construction (13%).<sup>12</sup> Manufacturing, the sector that earns the greatest amount of revenue in the county, is expected to grow by 11%.<sup>13</sup> For these revenue generating and/or high paying industries in Jefferson County (Tables C-26 and C-27) with projected employment increase, all of the above mentioned issues should be incorporated into future hazard mitigation planning.

## Synthesis

The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery. Considering the high regional unemployment, high housing cost burden, and an economy

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<sup>12</sup> Oregon Employment Department, "Oregon Industry Employment Projections: 2020-2030", <https://www.qualityinfo.org/projections#1>, accessed February 2022.

<sup>13</sup> Ibid.

heavily dependent on a few key industries and small businesses, Jefferson County may experience a more difficult time in recovering after a disaster than one with a more diverse economic base. It is important to consider what might happen to the County economy if the largest revenue generators and employers are impacted by a disaster. It is imperative that Jefferson County recognizes that economic diversification is a long-term issue; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.

## Built Capacity

Built capacity refers to the built environment and infrastructure that supports the community. The various forms, quantity, and quality of built capital mentioned above contribute significantly to community resilience. Physical infrastructures, including utility and transportation lifelines, are critical during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

## Housing Building Stock

In addition to location, the characteristics of the housing stock affect the level of risk posed by natural hazards. Table C-29 identifies the types of housing most common throughout the county. Of particular interest are mobile homes and other non-permanent housing structures, which account for about 22% of the housing in Jefferson County. Mobile structures 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. Mobile homes in Metolius comprise nearly 33% of housing units, which is higher than the county, while the rates in Culver (16%) and Madras (14%) are less than in the county.

**Table C-29 County Housing Profile**

Jurisdiction	Total Housing Units	Single-Family		Multiple-Family		Mobile Homes or Other		Percent of Total Housing Units Occupied
		Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	
Jefferson County	9,816	6,438	65.6%	1,209	12.3%	2,169	22.1%	79.9%
Culver	546	419	76.7%	42	7.7%	85	15.6%	90.8%
Madras	2,789	1,481	53.1%	920	33.0%	388	13.9%	85.6%
Metolius	284	165	58.1%	26	9.2%	93	32.7%	91.2%

Source: U.S. Census Bureau, 2020, S2504 "Physical Housing Characteristics for Occupied Housing Units", [www.census.gov](http://www.census.gov), accessed February 2022.

Table C-30 indicates that the majority of the housing stock is single-family homes. Each of the residential permits issued between 2000 and 2011 were for single-family units. There were two permits issued for Multi-Family Residential units between 2000 and 2011. This suggests that hazard mitigation and outreach should specifically address preparedness for detached housing structures.

Since 2006, before the national downturn, residential construction activity has decreased significantly; a trend that is visible in the table, which shows that between 2006 and 2008 the issuance residential building permits declined by 65% and by 52% between 2009 and 2011. Residential construction activity is a key indicator of community stability, and can demonstrate positive community growth. However, in recent years with the downfall of the residential market this is less of an accurate indicator as activity all across the nation was impacted.

**Table C-30 Private-Owner Residential Building Permits**

Building Type	2012-2014	2015-2017	2018-2020	2012-2020
	Building Units	Building Units	Building Units	Building Units
Single Family	74	183	286	543
Multi-Family	0	0	0	0
Total	74	183	286	543
<i>Percent Change From the Previous Period</i>	<i>N/A</i>	<i>147.3%</i>	<i>56.3%</i>	<i>N/A</i>

Source: Jefferson County Building Department Records, accessed February 2022.

Age of housing is another characteristic that influences a structure’s vulnerability to hazards. Generally, the older the home is, the greater the risk of damage. Structures built after the late 1960’s in the Northwest utilized earthquake resistant designs and construction. Communities began implementing flood elevation ordinances in the 1970’s, with the first FEMA flood insurance study completing in 1989,<sup>14</sup> and in 1990 Oregon again upgraded seismic standards to include earthquake loading in the building design.<sup>15</sup>

**Table C-31 Age of Housing Units**

Date Constructed	Jefferson County	Culver	Madras	Metolius
Total Housing Units	9,816	2,789	3,464	284
1990 - newer	46.4%	44.5%	57.2%	39.4%
1960 -1989	39.5%	42.8%	29.9%	40.5%
1959 -older	14.1%	12.7%	12.9%	20.1%

Source: U.S. Census Bureau, 2007-2011 American Community Survey, Table B25034 “Year Structure Built”, <http://factfinder2.census.gov/>, accessed January 2013

Knowing the age of the structure is helpful in targeting outreach regarding retrofitting and insurance for owners of older structures. Based on U.S. Census data, about 41.8% of Jefferson County housing was built prior to 1980 and the implementation of flood elevation requirements. There is a need to identify if these homes are located in a floodplain, and target outreach to the property owners to encourage appropriate flood mitigation.

Roughly 46.4% of the housing units in the county were built after 1990 when more stringent building codes were put in place. In the county, the remaining 53.6% of housing stock may have questionable seismic stability, although risk of seismic activity is low. In addition to single-family households, it is also important to consider the structural integrity of multi-unit residences, as these structures will have an amplified impact on the population.

<sup>14</sup> FEMA, Flood Insurance Study: Jefferson County, Oregon and incorporated Areas, May 2011.

<sup>15</sup> Wang Yumei and Bill Burns. “Case History on the Oregon GO Bond Task Force: Promoting Earthquake Safety in Public Schools and Emergency Facilities.” National Earthquake Conference. January 2006.

## Commercial Building Stock

### Critical Facilities

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

The following assets were identified by the NHMP Steering Committee in 2008 and reconfirmed in 2022:

**Table C-32 Critical Facilities and Infrastructure Asset Identification**

Infrastructure and Facilities
Highways 97, 26, and SW Culver Hwy
Police, fire, and other emergency services
Madras Municipal Airport
State highway bridges: 14 in total
Water storage and treatment plants
Government buildings
Schools
Fuel storage facilities
Fairgrounds
Waste disposal facilities
St. Charles - Madras Hospital
Communication infrastructure
Metolius City Hall
Wastewater Treatment Plant

Source: Jefferson County NHMP Steering Committee, 2022

Critical facilities in Jefferson County are identified in in the table below. There is one hospital with a total of 32 permanent beds for medical care in Jefferson County, though during a time of emergency the hospital can expand up to 45 beds. This could pose a problem in the event of a natural hazard. The hospital, St. Charles Madras, is located in Madras and the health district it serves has the same area as the county boundary.<sup>16</sup>

Several critical facilities are located within floodways or floodplains, including the old county courthouse, City of Madras road department, the county and city public works building, Madras Primary and High, Community Development, the Annex Building, the old City Hall, and the Jefferson County Library District. Critical facilities that are not located in a floodway or floodplain, but are occasionally subject to surface runoff flooding include the Crooked River Ranch Administrative Building, the Crooked River Ranch Fire Station,

While lifelines and other physical infrastructure, such as transmission lines, power generation facilities, levees, and dams are critical, they have been documented elsewhere

<sup>16</sup> Jefferson County Public Facilities & Services, [http://www.Jeffersoncounty.org/county\\_pfs.html](http://www.Jeffersoncounty.org/county_pfs.html), accessed February 2013.

for the purposes of this profile. This information provides the basis for informed decisions about the infrastructure and facilities already in place that can be used to reduce the vulnerability of Jefferson County to natural hazards.

**Table C-33 Jefferson County Critical Facilities**

Jurisdiction	# Hospitals	# Beds	Law Enforcement	Fire and Rescue Stations	School Districts and Colleges
Jefferson County	1	32 - 45	1 Sheriff, (1 County Dispatch located in Wasco County)	2	4 school districts
Culver	0	0	1 Chief of Police, 1 City Police Department	1	3 schools
Madras	1	32 - 45	1 Chief of Police, 1 City Police Department	1	4 schools
Metolius	0	0	NA	0	1 school

Source: Oregon Department of Human Services, “Oregon Hospitals: 2008-09-20”, <https://data.oregon.gov/dataset/USA-Cops>; The Nations Law Enforcement Site, <http://www.usacops.com/or/jefferson.html>; Oregon State Police Oregon Office of State Fire Marshal, “Fire Department List” <http://oregon.gov>; Oregon Department of Education, “Education Institutions”, <http://www.osba.org/>

### Dependent Facilities

In addition to the critical facilities mentioned above in Table C-33, there are other facilities that are vital to the continued delivery of health services and may significantly impact the public’s ability to recover from emergencies. Assisted living centers, nursing homes, residential mental health facilities, and psychiatric hospitals are important to identify within the community because of the dependent nature of the residents; and also these facilities can serve as secondary medical facilities as they are equipped with nurses, medical supplies and beds.

Jefferson County has one identifiable assisted living center or nursing home, located in Madras. There is one behavior health facility located also located in Madras. There are no reported psychiatric hospitals in Jefferson County, or surrounding counties.

### Correctional Facilities

Correctional facilities are incorporated into physical infrastructure as they play an important role in everyday society by maintaining a safe separation from the public. There are two correctional facilities located in Jefferson County. The Deer Ridge Correctional Facility has approximately 2,000 beds<sup>17</sup>. Consideration should be given to where these inmates should be placed in the event of a natural hazard that required evacuation.

<sup>17</sup> Oregon Department of Corrections, “Deer Ridge Correctional Institution,” <http://www.oregon.gov/DOC/OPS/PRISON/pages/drci.aspx>

## Physical Infrastructure

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

### Dams

Dam failures can occur rapidly and with little warning.<sup>18</sup> Most failures fortunately result in minor damage and pose little or no risk to life safety.<sup>19</sup> However, the potential for severe damage still exists. The Oregon Water and Resources Department has inventoried all dams located in Oregon. Of the high hazard dams, of special concern for Jefferson County are Haystack Equalizing Pond (last inspected 2008), Pelton Regulating Dam (last inspected 2003), Pelton Dam (last inspected 2003), and Round Butte Dam (last inspected 1990). In addition, the dams of significant hazard risk are Brewer Reservoir (last inspected 2011), Suttle Lake (Last inspected 1980), Gillworth Reservoir (last inspected 2009), and Fuston Ranch Dam (last inspected 2009)<sup>20</sup>.

**Table C-34 Jefferson County Dam Inventory**

Number of Dams	Threat Potential
4	High
4	Significant
10	Low

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

A failure of Round Butte Dam could cause the failure of Pelton Dam further downstream, and both would affect the Confederated Tribes of Warm Springs.

### Airports

Jefferson County has two public airports and four private airports.<sup>21</sup> The closest commercial airport is located in Redmond, Oregon, approximately 39 miles south of Madras. Access to these airports face the potential for closure from a number of 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.

### Power Sources

There are two electricity cooperatives that serve Jefferson County, Central Electric Cooperative, Inc. and Pacific Power. Pacific Power has an office located in Madras.

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<sup>18</sup> Federal Emergency Management Agency. Dam Failure. [www.fema.gov/hazard/damfailure/index.shtm](http://www.fema.gov/hazard/damfailure/index.shtm)

<sup>19</sup> Ibid.

<sup>20</sup> Oregon water Resources Department, "Dam Inventory Query", [http://apps.wrd.state.or.us/apps/misc/dam\\_inventory/](http://apps.wrd.state.or.us/apps/misc/dam_inventory/)

<sup>21</sup> FAA Airport Master Record. 2011. [http://www.faa.gov/airports/airport\\_safety/airportdata\\_5010/menu/index.cfm](http://www.faa.gov/airports/airport_safety/airportdata_5010/menu/index.cfm). Accessed January 2013.

## Roads and Bridges

Major highways that service this region include:

- OR Highway 26 that runs from northwest to southeast through Jefferson County and Madras, from Portland to Prineville.
- OR Highway 97 that runs from north to south through Jefferson County and Madras, from its junction with Interstate 82 in Washington, and Interstate 5 in Weed, California.

Transportation infrastructure capacity can be stressed by maintenance, congestion, and oversized loads. High average daily truck volume (more than 3,000 trucks per day) and frequent local trips on highways affect transportation infrastructure capacity in the southeast region of Oregon. Approximately 72% of workers commute by driving alone in the region. A natural disaster or winter storm could interrupt daily commuting patterns for thousands of residents.<sup>22</sup>

Natural disasters can also affect the structural integrity of transportation infrastructure, creating the need for mitigation or maintenance.

The existing condition of bridges in the region is also a factor that affects risk from natural hazards. Bridge failure can have immediate and long-term implications in the response and recovery of a community. Incapacitated bridges can disrupt traffic and exacerbate economic losses due to the inability to transport products and services in and out of the area.<sup>23</sup> Table C-35 represents the condition of the State National Bridge inventory (NBI), and highlights the number of distressed bridges in the region. The region encompasses all of Crook and Deschutes Counties, most of Jefferson County, northern Lake County and parts of Klamath County and Wheeler County as illustrated on Figure C-5.

The NBI identifies 19 bridges, 10.8% of all the State bridges in the region, that exhibit some form of structural or other deficiency. The classification of a distressed bridge does not imply the bridge is unsafe; however, in the event of seismic activity these bridges are of higher vulnerability to failure.

**Table C-35 State Bridge Condition – Region 4, District 10**

	Structurally Deficient / Distressed Bridges	Other Deficiency / Distressed Bridges	Not Distressed
Number	0	19	84
Percent	0.8%	10.8%	88.3%

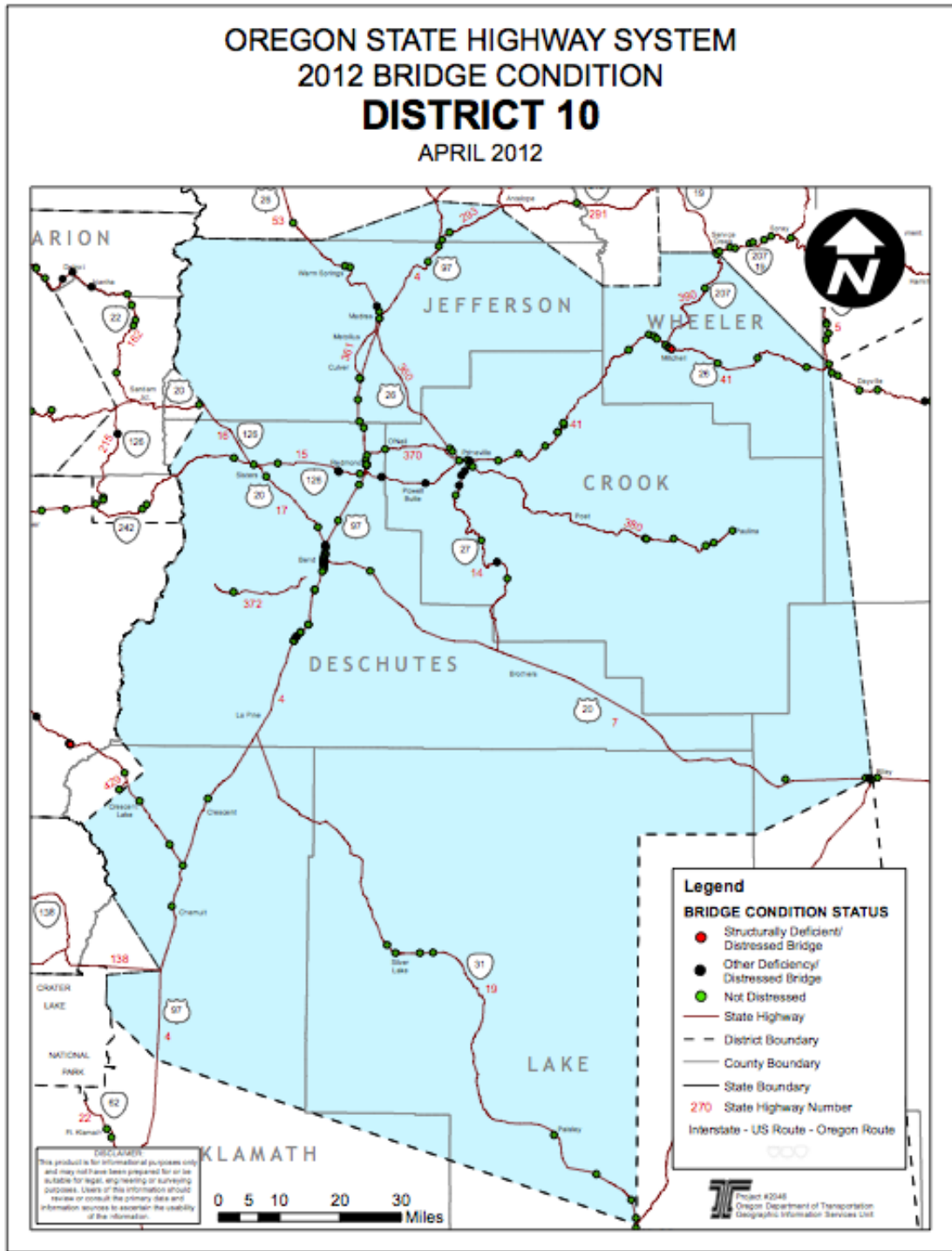
Source: Oregon Department of Transportation, “2021 Bridge Condition Report”, <http://cms.oregon.gov/odot/hwy/bridge/pages/index.aspx>, accessed February 2022

<sup>22</sup> Region 8 Southeast Oregon Regional Profile. Accessed February 2013.

<sup>23</sup> Ibid.



Figure C-5 2012 Bridge Condition: Region 4, District 10



Source: Oregon Department of Transportation, "2012 Bridge Condition Report", <http://cms.oregon.gov/odot/hwy/bridge/pages/index.aspx>.

## Utility Lifelines

Utility lifelines are the resources that the public relies on daily, (i.e., electricity, fuel and communication lines). If these lines fail or are disrupted, the essential functions of the community can become severely impaired. Utility lifelines are closely related to physical infrastructure, (i.e., dams and power plants) as they transmit the power generated from these facilities. Electricity lines in Jefferson County may be vulnerable to severe weather patterns, such as winter and windstorms.

Pacific Power supplies the network of electricity transmission lines running through the Central Oregon region. The Jefferson Electric Cooperative manages most electricity that supplies the county. Idaho Power and Oregon Trail Electric Cooperative manage the remaining electricity network in the northeastern corner of the county. The majority of energy produced and consumed in Oregon State comes from hydroelectric sources. There are approximately two industrial geothermal resources in Jefferson County.

## Synthesis

Given the rural and dependent nature of Jefferson County it is that more critical to maintain the quality of built capacity throughout the area. The planning considerations seemingly most significant for the county are contingency planning for medical resources and lifeline systems due to the imminent need for these resources. As mentioned above, functionality of hospital(s) and dependent care facilities are a significant priority in providing for Jefferson County residents. One factor that is critical to consider in planning is the availability of medical beds in the county hospital and dependent care facilities. In the event of a disaster, medical beds may be at a premium providing not just for the significant elderly population but the entire county. Some of these facilities may run at almost full capacity on a daily basis, hospitals should consider medical surge planning and develop memorandums with surrounding counties for medical transport and treatment. Planning efforts should take into consideration that the majority of Jefferson County residents live in detached housing and commute by driving alone. Additional memorandums to consider pertain to utility lifelines and transportation lifelines such as, airports, railways, roads and bridges with surrounding counties to acquire utility service and infrastructure repair.

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

## 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.

The following assets were identified by the NHMP Steering Committee in 2008 and reconfirmed in 2022:

**Table C-36 Cultural and Historic Asset Identification**

Cultural and Historic Resources
Camp Sherman Community Hall, Camp Sherman
Campbell Ferry. Exact location unknown; Deschutes River, about 1/4 mile upstream from Hwy 26.
Carl Kind Barn. Frame barn circa 1917. Location: Opal City area, King Ranch
Carl King House. One and 1/2 story building, shiplap exterior, circa 1912. Location: Opal City area, King Ranch.
Confederated Tribes of Warm Springs

Source: Jefferson County NHMP Steering Committee, 2022

## Social Systems

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

The social organizations identified in Jefferson County can be involved in hazard mitigation; a few 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 coordinating or partner organization to implement mitigation actions.

**Table C-37 Jefferson County Community Resources**

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation	
			Businesses	Children	Disabled	Elders	English Second Language	Families	Low Income		
<b>Alpha Omicron</b> Madras, OR 97741 Phone: 541-475-2863	Alpha Omicron Pi is an international women's fraternity promoting friendship for a lifetime, inspiring academic excellence and lifelong learning, and developing leadership skills through service to the fraternity and community.	Jefferson County		X	X	X			X	X	<ul style="list-style-type: none"> <li>Information dissemination</li> </ul>
<b>American Legion</b> 555 SW 3rd Street Madras, OR 97232 Phone: 541-475-2410	Condensed Mission Statement: to inculcate a sense of individual obligation to the community, state and nation; to combat the autocracy of both the classes and the masses; to make right the master of might; to promote peace and goodwill on earth; to safeguard and transmit to posterity the principles of justice, freedom and democracy; to consecrate and sanctify our comradeship by our devotion to mutual helpfulness.	Jefferson County		X	X	X			X	X	<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>
<b>Aspen Court</b> 470 NE Oak Street Madras OR, 97741 Phone: 541-475-6425 Fax: 541-475-6001	Adult Care Facility	Jefferson County			X	X					<ul style="list-style-type: none"> <li>Information dissemination</li> </ul>
<b>Big Brothers, Big Sisters of Central Oregon</b> 678 NE HWY 97 Suite B Madras, OR 97741 Phone: 541-475-2292 E 351 Fax: 541-475-6298	Big Brothers and Sisters volunteer a few hours each week as mentors, role models and friends who help youth face the challenges of growing up.	Jefferson County		X							<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>
<b>Boy Scouts of America</b> PO Box 668 Madras, OR 97741 Phone: 541-475-4590	To provide numerous volunteer services to community members in addition to preparing boys and young men for active participation in community life.	Jefferson County		X	X	X			X	X	<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>
<b>Boys &amp; Girls Club of Madras</b> 410 SW 4th Street Madras, OR 97741 Phone: 541-475-7028 Fax: 541-325-5514	To inspire and enable all young people, especially those from disadvantaged circumstances, to realize their full potential as productive, responsible, and caring citizens	Jefferson County		X						X	<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>
<b>Buff Boosters</b> 727 NE Fir Phone: 541-475-6422	The group meets at 7:30 p.m. the first Monday of the month during the school year at the Madras High School Library. The group does a variety of fund raising activities benefiting students within the district.	Jefferson County		X							<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>

Source: Jefferson County Steering Committee, 2022

**Table C-37 Jefferson County Community Resources (Continued)**

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation	
			Businesses	Children	Disabled	Elders	English Second Language	Families	Low Income		
<b>Central Oregon Intergovernmental Council</b> 2363 SW Glacier Place Redmond, OR 97756 Phone: 541-548-8163 Fax: 541-548-9548	To provide education, retraining and economic development services	Crook, Deschutes and Jefferson counties and the cities of Bend, Culver, Madras, Metolius, Prineville, Redmond and Sisters								X	<ul style="list-style-type: none"> <li>Information dissemination</li> </ul>
<b>Children's Learning Center</b> 650 NE A St. Madras, OR 97741 Phone: 541-475-3628 Fax: 541-475-2583	Oregon Head Start PreKindergarten	Jefferson County		X						X	<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>
<b>COCAAN</b> 645 SW Marshall Street Madras, OR 97741 Phone: 541-475-7017 Fax: 541-475-7017	Offers financial and other resources to help stabilized lives of people who are suffering from financial instability. It also supports Head Start and other child care resources	Jefferson County		X						X	<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>
<b>Crooked River Ranch Chamber of Commerce</b> 5200 SW Badger Rd Crooked River, OR 97760 Phone: 541-923-2679	Provide economic development assistance to local businesses.	Crooked River Ranch	X								<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> <li>Plan/project implementation</li> </ul>
<b>East Cascade Assisted Living Center</b> 385 NE Hillcrest Madras, OR 97741 Phone: 541-475-2273 Fax: 541-475-2663	Adult Care Facility	Jefferson County			X	X					<ul style="list-style-type: none"> <li>Information dissemination</li> </ul>
<b>Eastern Stars</b> 2071 SE Madras Road Phone: 541-475-7221	The group contributes to cancer and other medical research, care for approximately 90 elderly people in need at the care home in Forest Grove, and scholarships for religious education	Jefferson County		X		X					<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>
<b>Economic Development for Central Oregon (EDCO)</b> 109 NW Greenwood Ave Suite 102 Bend, OR 97701 Phone: 541-388-3236	EDCO is a private non-profit organization dedicated to building a vibrant and thriving regional economy by attracting new investment and jobs through marketing, recruitment and working with existing employers.	Jefferson County, Crook, Deschutes	X							X	Coordinating mitigation activities with economic development in Jefferson County.

Source: Jefferson County Steering Committee, 2022

**Table C-37 Jefferson County Community Resources (Continued)**

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation	
			Businesses	Children	Disabled	Elders	English Second Language	Families	Low Income		
<b>Girl Scouts</b> 6489 NE Quaale Road Phone: 541-475-2049	To provide numerous volunteer services to community members in addition to preparing girls and young women for active participation in community life.	Jefferson County	X	X	X	X			X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>High Lookee Lodge</b> 2321 Ollallie Lane Warm Springs, R 97761 Phone: 541-553-1182 Fax: 541-553-1186	Adult Care Facility	Jefferson County			X	X					<ul style="list-style-type: none"> <li>• Information dissemination</li> </ul>
<b>Jefferson County Extension Office</b> 34 SE D St. Madras, OR 97741 Phone: 541-475-3808 Fax: 541-475-4204	Provides research-based knowledge and education that focus on strengthening communities and economies, sustaining natural resources, and promoting healthy families and individuals.	Jefferson County	X								<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Jefferson County Food Bank</b> 346 Old Culver Hwy Madras, OR 97741 Phone: 541-475-3105	Food Bank	Jefferson County							X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Jefferson County Rotary</b> 727 NE Fir Phone: 541-475-7204	Rotary is a worldwide organization of business and professional leaders that provides humanitarian service, encourages high ethical standards in all vocations, and helps build goodwill and peace in the world.	Jefferson County	X	X	X	X			X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Jefferson County Search &amp; Rescue</b> 675 NW Cherry Lane Phone: 541-475-6520	Helping search for individuals who appear to be lost away from civilization for any number of reasons, and helping rescue such individuals if they are discovered to be in need of assistance	Jefferson County		X	X	X			X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Jefferson County Senior Center</b> 860 SW Madison Street Madras, OR 97741 Phone: 541-475-1148	Senior care facility and location for seniors to gather with peers for recreation and entertainment	Jefferson County		X	X	X					<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Source: Jefferson County Steering Committee, 2022

**Table C-37 Jefferson County Community Resources (Continued)**

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation	
			Businesses	Children	Disabled	Elders	English Second Language	Families	Low Income		
<b>Jericho Adult Foster Care</b> 3019 SW Jericho lane Culver, OR 97734 Phone: 541-546-2481 Fax: 541-546-2481	Adult Care Facility	Jefferson County			X	X				<ul style="list-style-type: none"> <li>Information dissemination</li> </ul>	
<b>Juniper Rebekah Lodge</b> 16 SE D Street Madras, OR 97741 Phone: 541-546-4373	The group is involved in a variety of activities benefiting the community, and is sponsor of the United Nations Pilgrimage, a program through which a Central Oregon high school sophomore or junior takes a month-long trip to New York City, including a visit to the United Nations, and to Washington, D.C.	Jefferson County		X	X	X			X	<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>	
<b>KIWANIS</b> 49 NE 12th Street Phone: 541-475-0505	Some of Kiwanis' focuses are: <ul style="list-style-type: none"> <li>Evaluating both children's issues and community needs on an ongoing basis</li> <li>Conducting service projects to respond to those identified needs</li> <li>Maintaining an active membership roster of professional business people who have both the desire and the ability to serve their community</li> </ul>	Jefferson County		X					X	<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>	
<b>Ladies of the Elks</b> PO Box 609 Phone: 541-475-6046	The group, made up of woman who have relatives who are members of the Elks Lodge, raises money for a variety of charities and special community projects.	Jefferson County		X	X	X			X	X	<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>
<b>Madras Area Community Action Team</b> 221 SE 7th Street Madras, OR 97741 Phone: 541-475-0301 Fax: 541-475-0318	The Madras Area Community Action Team (MaCAT) is a member of the Central Oregon Partnership. Its mission is to reduce the root causes of poverty in the Madras area. The values that guide MaCAT in this effort are inclusiveness, knowledge and collaboration.  MaCAT's primary focus to act as a catalyst to bring the communities together to work on poverty alleviation projects. Our organization works to find funding, provide technical assistance and to garner political support for our community's projects.	Jefferson County							X	<ul style="list-style-type: none"> <li>Education and outreach</li> <li>Information dissemination</li> </ul>	

Source: Jefferson County Steering Committee, 2022



**Table C-37 Jefferson County Community Resources (Continued)**

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	English Second Language	Families	Low Income	
<b>Madras Chamber of Commerce</b> 274 SW 4th St. Madras, OR 97741 Phone: 541-475-2350	Provide economic development assistance to local businesses.	Madras	X							<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Madras Elks Lodge #2017</b> 262 SW 2nd St Madras, OR 97741 Phone: 541-475-6046	Quoted from the mission statement: the Benevolent and Protective Order of Elks of the United States of America will serve the people and communities through benevolent programs, demonstrating that <i>Elks Care and Elks Share</i> .	Jefferson County		X	X	X		X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Madras Employment Department</b> 243 SW 3rd Street, Suite B Madras, OR 97741 Phone: 541-475-2382 E 21 Fax: 541-475-3821	Employment service	Jefferson County							X	<ul style="list-style-type: none"> <li>• Information dissemination</li> </ul>
<b>Mid Oregon Personnel Services, INC.</b> 29 SE "D" St Madras, OR 97741 Phone: 541-475-7640 Fax: 541-475-7656	Employment Service	Jefferson County							X	<ul style="list-style-type: none"> <li>• Information dissemination</li> </ul>
<b>Mid Columbia Children's Council, Inc.</b> 1100 E. Marina Way, Ste. 215 Hood River, OR 97031-2344 Phone: 541-386-2010	Early childhood program	Hood River, Jefferson and Wasco Counties		X						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>St. Charles - Madras Hospital District</b> 470 NE "A" Street Madras, OR 97741-1844 Phone: 541-475-3882 Fax: 541-475-0615 Email: mvhd@mvhd.org	St. Charles - Madras Hospital District provides a complete range of inpatient and outpatient services. As an affiliate of St. Charles Medical Center, we also offer greater access to resources and advanced technologies than the typical community hospital.	Jefferson County		X	X	X		X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Source: Jefferson County Steering Committee, 2022

**Table C-37 Jefferson County Community Resources (Continued)**

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation	
			Businesses	Children	Disabled	Elders	English Second Language	Families	Low Income		
<b>Mud Springs Grange</b> 5661 SW Elbe Dr. Culver, OR 97734 Phone: 541-546-3892	Grange/community center	Jefferson County		X	X	X			X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Opportunity Foundation of Central Oregon</b> 835 E. Hwy 126 Madras, OR 97741 Phone: 541-548-2611 Fax: 541-548-9573	The Opportunity Foundation of Central Oregon (OFCO) is a benchmark organization that is a leader in providing services to people in Central Oregon with disabilities.	Jefferson County			X						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Oregon Child Development Coalition of Jefferson County</b> P.O. Box 736 Madras, OR 97741 Phone: 541-475-4252	Oregon Head Start PreKindergarten (Migrant)	Jefferson County		X					X	X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Oregon Council for Hispanic Advancement</b> 2600 NW College Way Bend, OR 97701 Phone: 541-330-4363 Fax: 541-317-3070	OCHA is a champion for Hispanics in Oregon, ensuring equity in education and economic opportunity by empowering Latino youth. OCHA's educational and advocacy activities empower Hispanics to make positive changes in their lives to optimize their future success.	Jefferson County					X			X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Salvation Army</b> 66 SE D Street, Suite A Madras, OR 97741 Phone: 541-475-2449	The group provides emergency assistance to people in need.	Jefferson County								X	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Warm Springs Tribal Head Start</b> PO Box C Warm Springs, OR 97761 Phone: 541-553-3241	Early Head Start and Oregon Head Start PreKindergarten (Tribal)	Jefferson County	X								<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Source: Jefferson County Steering Committee, 2022

## 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 2012 General Election resulted in a voter participation rate of 82%.<sup>24</sup> These results are slightly higher than voter participation reported across the State (81% for the 2012 General Election).<sup>25</sup> 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

### 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. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important. Table C-38 identifies the type of historic features present in Jefferson County. According to the National Register Bulletin, “a contributing resource is a building, site, structure, or object adds to the historic associations, historic architectural qualities, or archeological values for which a property is significant because it was present during the period of significance, related to the documented significance of the property, and possesses historical integrity or is capable of yielding important information about the period; or it independently meets the National Register criteria.”<sup>26</sup> If a structure does not meet these criteria, it is considered to be non-contributing. Overall, there are a total of 72 historically registered places in Jefferson County.

**Table C-38 Jefferson County Historic Places**

Type	Listed on the National Register	Contributing Resources	Non-contributing
Houses, Hotels, Resorts and Cabins	26	16	6
Districts	1	0	0
Municipal Buildings, Libraries and Schools	2	1	0
Cemetaries	1	1	0
Parks, Campgrounds, Ranches, Barns, and Openspace	6	3	0
Military Posts, Ranger Stations and Guard Lookouts	1	0	0
Bridges	5	2	2
Churches	1	1	0
Misc. Buildings	21	15	2
<b>Total</b>	<b>64</b>	<b>39</b>	<b>10</b>

<sup>24</sup> The Oregon Community Foundation, February 2013. “Eastern Oregon Regional Profile.”

<sup>25</sup> Oregon Blue Book, Voter Participation. <http://bluebook.state.or.us/state/elections/elections04.htm>

<sup>26</sup> U.S. Department of the Interior, National Park Service, Cultural Resources, National Register Bulletin 16A: "How to Complete the National Register Registration Form".

## Libraries and Museums

Libraries and museums develop cultural capacity and community connectivity as they are places of knowledge and recognition, they are common spaces for the community to gather, and can serve critical functions in maintaining the sense of community during a disaster. They are recognized as safe places and reflect normalcy in times of distress. There are currently two libraries in Jefferson County located. The Jefferson County Library District is located in Madras and the Warm Springs Community Library is located in the Warm Spring Tribal Community.<sup>27</sup> The museums in Jefferson County cater to history.

## Cultural Events

Other such institutions that can strengthen community connectivity are the presence of festivals and organizations that engage diverse cultural interests. Jefferson County is home to the Annual Celtic Festival and Scottish Highland Games, the Central Oregon Film Festival, the Culver Crawdad Festival, the Jefferson County Historical Museum, and the Jefferson County Fair. Not only do these events bring some revenue into the community, they can improve cultural competence and enhance the sense of place. Northwest of Madras, the Wasco, Tenino, and Paiute Tribes continue to hunt and gather traditional foods and conduct traditional crafts like bead-work and drum-making.<sup>28</sup> 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 local culture.

## Community Stability

### Residential Geographic Stability

Community stability is a measure of rootedness in place. It is hypothesized that resilience to a disaster stems in part from familiarity with place, not only for navigating the community during a crisis, but also accessing services and other supports for economic or social challenges.<sup>29</sup> Table C-39 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. Jefferson County overall has geographic stability rating of 87.7%. The figures of community stability are relatively consistent across the region; Madras shows the least geographically stable population (79.1%) while Culver has a more geographically stable population (92.4%). Culver and Metolius have similar percentages of the population that resided in the same house a year ago; Madras has fewer people that resided in the same house a year ago, 60.6% compared to 84.4% in Culver and 81.9% in Metolius.

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<sup>27</sup> Oregon State Library, Library Directory. <http://libdir.osl.state.or.us/>

<sup>28</sup> Warm Springs, "History and Culture," <http://www.warmsprings.com>, accessed February 2013.

<sup>29</sup> Cutter, Susan, Christopher Burton, Christopher Emrich. "Disaster Resilience Indicators for Benchmarking Baseline Conditions". *Journal of Homeland Security and Emergency Management*.

**Table C-39 Regional Residential Stability**

Jurisdiction	Population	Geographic Stability	Same House	Same County
Jefferson County	21,527	87.7%	77.7%	10.0%
Culver	7,232	92.4%	84.4%	8.0%
Madres	6,020	79.1%	60.6%	18.6%
Metolius	764	91.9%	81.9%	9.9%

Source: U.S. Census Bureau, 2007-2011 American Community Survey, Table B07003 “Geographical Mobility in the Past Year 5-Year Estimate”, <http://factfinder2.census.gov/>, accessed January 2013.

## Homeownership

Often homeownership is associated with greater resilience as it is a measure of place attachment and commitment. Homeownership is an indicator that residents will return to a community post-disaster, as these people are economically and socially invested in the community. Similar to communities with higher median household income, homeownership can reflect an increased resource capacity to prepare, respond and cope with a crisis situation. Table C-40 identifies housing tenure across the county. The table shows the homeownership rate is 79.9% in Culver, 47.3% in Madras, and 68.0% in Metolius. The county has a home ownership rate of 68.5%. There are approximately, 2,451 renters (31.5%) within Jefferson County; renters are less likely to return after a disaster, since they are less economically invested in the community.

**Table C-40 Homeownership**

Jurisdiction	Occupied Households	Owner Occupied	Percent Owner Occupied	Renter Occupied	Percent Renter Occupied
Jefferson County	10,305	7,059	68.5%	3,246	31.5%
Culver	563	390	69.2%	173	30.8%
Madras	2,708	1,143	42.2%	1,565	57.8%
Metolius	379	285	75.2%	94	24.8%

Source: U.S. Census Bureau, Table DP-1 “Profile of General Population and Housing Characteristics: 2010”, <http://factfinder2.census.gov>, accessed February 2022.

## Synthesis

Jefferson County comprises various 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 communities including Madras, Culver, and Metolius makes available resources and services for the public. However, it is important to consider that these amenities may not be equally distributed to the rural portions of the county and may produce implications for recovery in the event of a disaster.

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

## Political Capacity

Political capacity is recognized as the government and planning structures established within the community. In terms of hazard resilience, it is essential for political capital to encompass diverse government and non-government entities in collaboration; as disaster losses stem from a predictable result of interactions between the physical environment, social and demographic characteristics and the built environment.<sup>30</sup> 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

Three commissioners govern Jefferson 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.<sup>31</sup>

All 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.

Some divisions and departments of Jefferson County government that have a role in hazard mitigation are:<sup>32</sup>

- **Planning:** conducts 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 Department 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.
- **GIS Program:** Administration and General Services manage The Jefferson County GIS department. They offer data and mapping services varying from zoning and subdivision maps, to snow removal routes. The County also maintains data about federally and state-owned lands in the area.
- **Health Department:** In addition to emergency preparedness, the County health department offers a range of services and programs for its community members such as immunizations, family planning, women-infant-children (WIC), Babies First/CaCoon, well child check-ups, vital records, communicable diseases, TB

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<sup>30</sup> Mileti, D. 1999. *Disaster by Design: A Reassessment of Natural Hazards in the United States*. Washington D.C.: Joseph Henry Press.

<sup>31</sup> Jefferson County. <http://www.co.Jefferson.or.us/electedofficials.html>. Accessed February 2013.

<sup>32</sup> Jefferson County Government: The Official Site. <http://www.co.jefferson.or.us>. Accessed January 2013.

program, dental health, environmental quality inspections, business licenses for restaurants and hotels, and tobacco prevention and education.

- **Senior and Community Services:** The Central Oregon Council on Aging is a non-profit that plans for and offers comprehensive services to aging populations, with a particular emphasis on low-income individuals and people with disabilities.<sup>33</sup>
- **Sheriff’s Office:** The Jefferson County Sheriff’s Office is committed to protecting its citizens and enhancing public safety. Their services and programs include 911 Dispatch, civic process, concealed handguns licenses, drug enforcement, homeland security, search and rescue, and emergency management.

The communities of Madras, Culver, and Metolius have the following government structures as illustrated in Table C-41.

**Table C-41 Participating City Government Structure**

	<b>Culver</b>	<b>Madras</b>	<b>Metolius</b>
Government Form	Mayor/Council	Mayor/ Council	Mayor/Council
City Manager/ Administrator	Yes	Yes	No
Mayor	Same Position as City Manager	Yes	Yes
City Council	6-Person	6-Person	Yes
Building	Yes	Yes	Yes
Conservation	No	No	No
Parks/ Recreation	No	Yes	No
Planning	No	Yes	No
Public Works	No	Yes	Yes
Police	Yes	Yes	No
Fire	Yes	Yes	No
Information Technology	No	No	No

Source: City of Madras, City of Culver, Jefferson County NHMP Steering Committee Members, 2022.

The Warm Springs Tribe is governed by the Tribal Council, which consists of 11 members from three districts. Eight elected members serve for three years, while three traditional chiefs serve for life. The Tribal Council oversees the government, including nine departments and various committees, that offers services to the tribal community and upholds tribal interests when working with state and federal agencies.<sup>34</sup>

## Existing Plan & Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy

<sup>33</sup> Jefferson County Senior and Community Services Plan, 2013-2016 Area Plan.

<sup>34</sup> Warm Springs Tribe, “Current Governing Body,” [http://www.warmsprings.com/Warmsprings/Tribal\\_Community/Tribal\\_Government/Current\\_Governing\\_Body/](http://www.warmsprings.com/Warmsprings/Tribal_Community/Tribal_Government/Current_Governing_Body/) accessed February 2013.

makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.<sup>35</sup>

The Jefferson County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the county’s vulnerability to natural hazards. Some of these recommendations are related to the goals and objectives of the county’s existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the Plan. Implementing the natural hazards mitigation plan’s action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the county’s resources.

Table C-42 shows current planning documents for Jefferson County while Table C-43 shows how these plans relate and could potentially relate to natural hazard planning.

**Table C-42 Jefferson County Planning Documents**

Document
<b>State and Regional</b>
Active Tree Removal Plan
Adjoining County NHMP's
Central Oregon Fire/Rescue Mobilization Plan
Oregon State Mobilization Plan
Tri-County Regional Health Plan
<b>Tribal</b>
Warm Springs Comprehensive Plan
Warm Springs Hazard Mitigation Plan
Warm Springs EOP
<b>County</b>
Jefferson County CWPP
Jefferson County Natural Hazards Mitigation Plan
Jefferson County Public Health Preparation Plan
Jefferson County Coordinated Human Services Transportation Plan
Jefferson County Transportation System Plan
Stormwater ordinances (where applicable)
<b>City</b>
City of Madras TSP Reinement Plans and Amendments
City fo Madras Urban Revitalization Action Plan
City of Madras, Metolius, and Culver's Comprehensive Plans
City of Madras, Stormwater Management Plan
City of Madras Design and Construction Standards for Public Improve
City of Madras Flood Mitigation Plan

Source: <http://www.co.jefferson.or.us>, <http://ci.madras.or.us>

<sup>35</sup> Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.



**Table C-43 Policy Crosswalk**

Plan	#1 Wildfire	#2 Drought	#2 Winter Storm	#4 Flood	#5 Windstorm	#6 Earthquake	#7 Volcano	#8 Landslide/ Debris Flow	Multi- Hazards	Total References
NHMP - Jefferson Co.	2	1	3	12	1	1	1	2	12	35
Comp Plan - Jefferson Co.	3	2	-	7	-	-	-	2	2	16
TSP - Jefferson Co.	1	-	-	-	-	-	-	-	-	1
CWPP - Jefferson Co.	11	-	-	-	-	-	-	-	1	12
CWPP - Greater Sisters/Deschutes	6	-	-	-	-	-	-	-	-	6
SWM - Madras	-	-	-	9	-	-	-	-	-	9
Flood Mitigation Plan - Madras	-	-	-	11	-	-	-	-	-	11
Comp Plan - Madras	-	-	-	1	-	-	-	-	-	1
NHMP - Oregon	11	4	8	22	5	22	9	8	54	143

Source: Various state, county, and local plans.

## Synthesis

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

# Appendix D: Economic Analysis of Natural Hazard Mitigation Projects

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

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

## Why Evaluate Mitigation Strategies?

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

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

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

# Mitigation Strategy Economic Analyses Approaches

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

## Benefit/Cost Analysis

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

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

## Cost-Effectiveness Analysis

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

## Investing in Public Sector Mitigation Activities

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

## Investing in Private Sector Mitigation Activities

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

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

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

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

## **STAPLE/E Approach**

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

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

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

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

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

- Will the proposed action work?

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

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

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

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

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

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

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

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

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

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

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

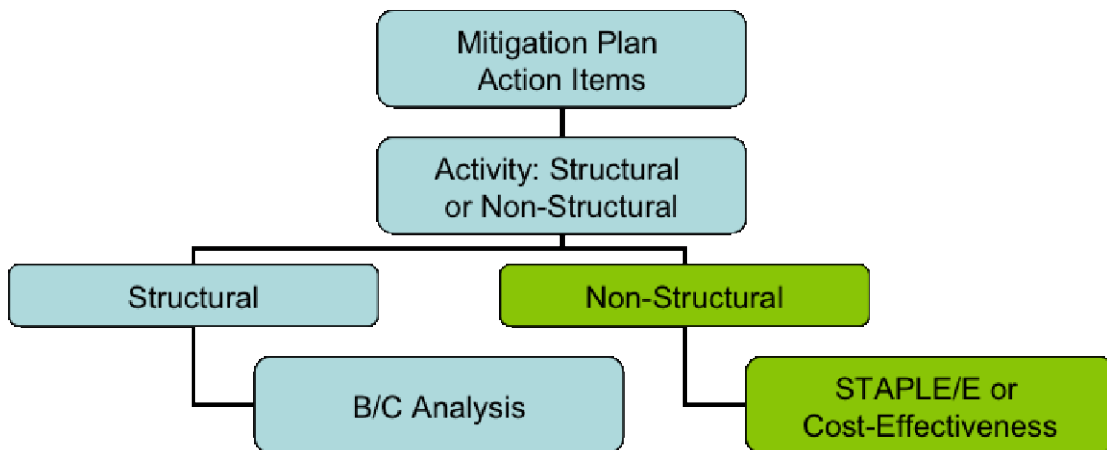
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

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

## When to use the Various Approaches

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

**Figure D-I Economic Analysis Flowchart**



Source: Oregon Partnership for Disaster Resilience. 2005.

## Implementing the Approaches

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

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

## 1. Identify the Activities

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

## 2. Calculate the Costs and Benefits

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

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

## 3. Analyze and Rank the Activities

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

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

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

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

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

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

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

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

## **Additional Costs from Natural Hazards**

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

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



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

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

## **Additional Considerations**

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

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

## Resources

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

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

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

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

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

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

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

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

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

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

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

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# APPENDIX E: GRANT PROGRAMS AND RESOURCES

## Introduction

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

## Post-Disaster Federal Programs

### Hazard Mitigation Grant Program

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

### Physical Disaster Loan Program

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

## Pre-Disaster Federal Programs

### Building Resilient Infrastructure and Communities Grant Program

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

## **Flood Mitigation Assistance Program**

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

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

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

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

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

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

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

## **State Programs**

### **Special Public Works Fund**

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

## **Seismic Rehabilitation Grant Program**

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

## **Community Development Block Grant Program**

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

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

## **Oregon Watershed Enhancement Board**

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

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

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

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

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

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

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

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

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

## **Hazard ID and Mapping**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## **Project Support**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



### **Public Assistance Grant Program, FEMA**

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

### **National Flood Insurance Program, FEMA**

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

### **HOME Investments Partnerships Program, HUD**

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

### **Disaster Recovery Initiative, HUD**

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

### **Emergency Management Performance Grants, FEMA**

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

### **Partners for Fish and Wildlife, DOI – FWS**

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

### **North American Wetland Conservation Fund, DOI-FWS**

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

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

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

## Wetlands Reserve program, USDA-NCRS

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

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

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

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

# APPENDIX F: JEFFERSON COUNTY NATURAL HAZARDS COMMUNITY SURVEY

## Survey Purpose and Use

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

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

## Background

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

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

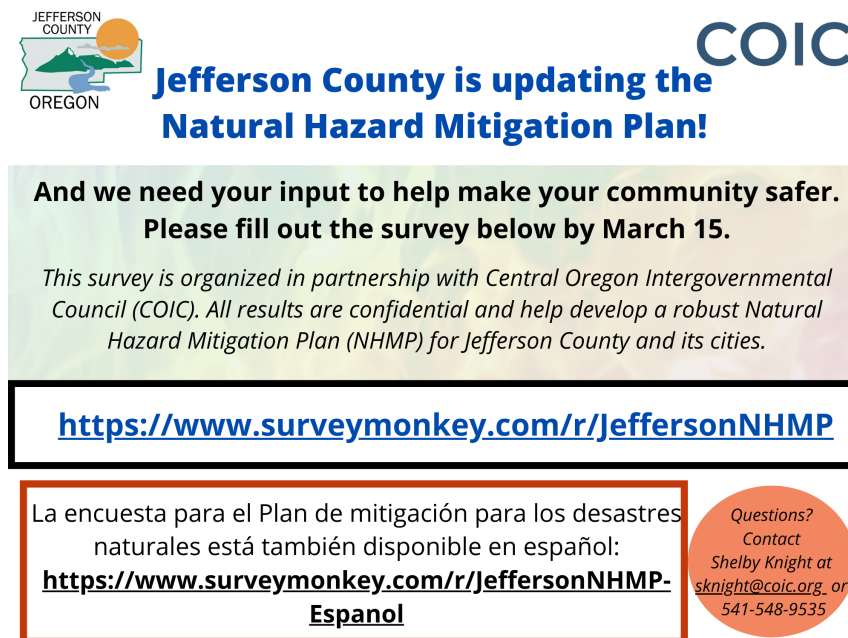
1. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval
2. An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses,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

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

## Methodology

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

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



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

**COIC**

**And we need your input to help make your community safer.  
Please fill out the survey below by March 15.**

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

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

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

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

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

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



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

**Y necesitamos sus sugerencias para ayudar a que su comunidad sea más segura. Por favor, complete la encuesta a continuación antes del 15 de marzo.**

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

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

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

*¿Preguntas?  
Contacte Ana Young a  
[ayoung@jco.law](mailto:ayoung@jco.law)  
o 541-475-6520*

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

A total of 38 surveys in English, and zero in Spanish were submitted. The survey consisted of 44 questions divided into four sections: natural hazard information, community natural hazard mitigation strategies and priorities, mitigation and preparedness activities in your household, and general household information. The questions were designed to determine public perceptions and opinions regarding natural hazards. Questions also focused on the methods and techniques survey respondents prefer to use in reducing the risks and losses associated with natural hazards. The intent of this survey was not to be statistically valid but instead to gain the perspective and opinions of resident’s regarding natural hazards in the region. Our assessment is that the results reflect a range attitudes and opinions of residents throughout the county.

## Survey Results

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

## Key Consideration and Outcomes

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

- The top concerns for survey respondents in regards to hazards were Wildfire, Drought, Windstorm and Winter Storm.
- 63% of respondents have received information about natural hazards. The main sources where respondents got this information were news media and utilities.

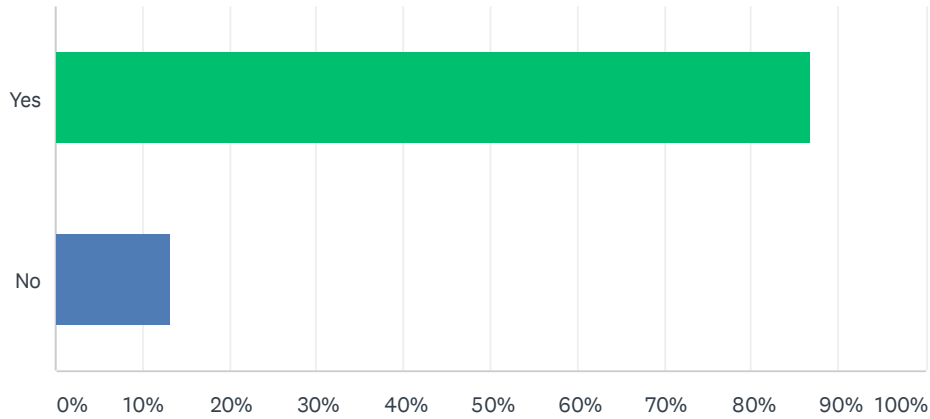
- Survey respondents identified the following as the most effective routes for emergency services professionals and agencies for sharing information: emergency services, social media, fact sheets/brochures, and public workshops and meetings.
- Respondent top priorities were as follows: protecting critical facilities, protecting and reducing damage to utilities, preventing development in hazard areas.
- Respondents were split between feeling like Jefferson County is somewhat prepared (55%) and not prepared (27%) to respond to natural hazard events.
- 50% of respondents felt they have an awareness of mitigation activities in Jefferson County.
- A majority of respondents have participated in some form of personal preparedness activities, but were least likely to have a utility shut off plan.
- Feedback for next time included having more options for cultural and traditional resources in the area, and reducing the overall length of the survey.

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

# **ATTACHMENT A: SURVEY RESULTS**

**Q1 During the past five years, within Jefferson County, have you or someone in your household directly experienced a natural hazard such as a wildfire, severe windstorm, flood, severe winter storm or other type of natural hazard?**

Answered: 38 Skipped: 0

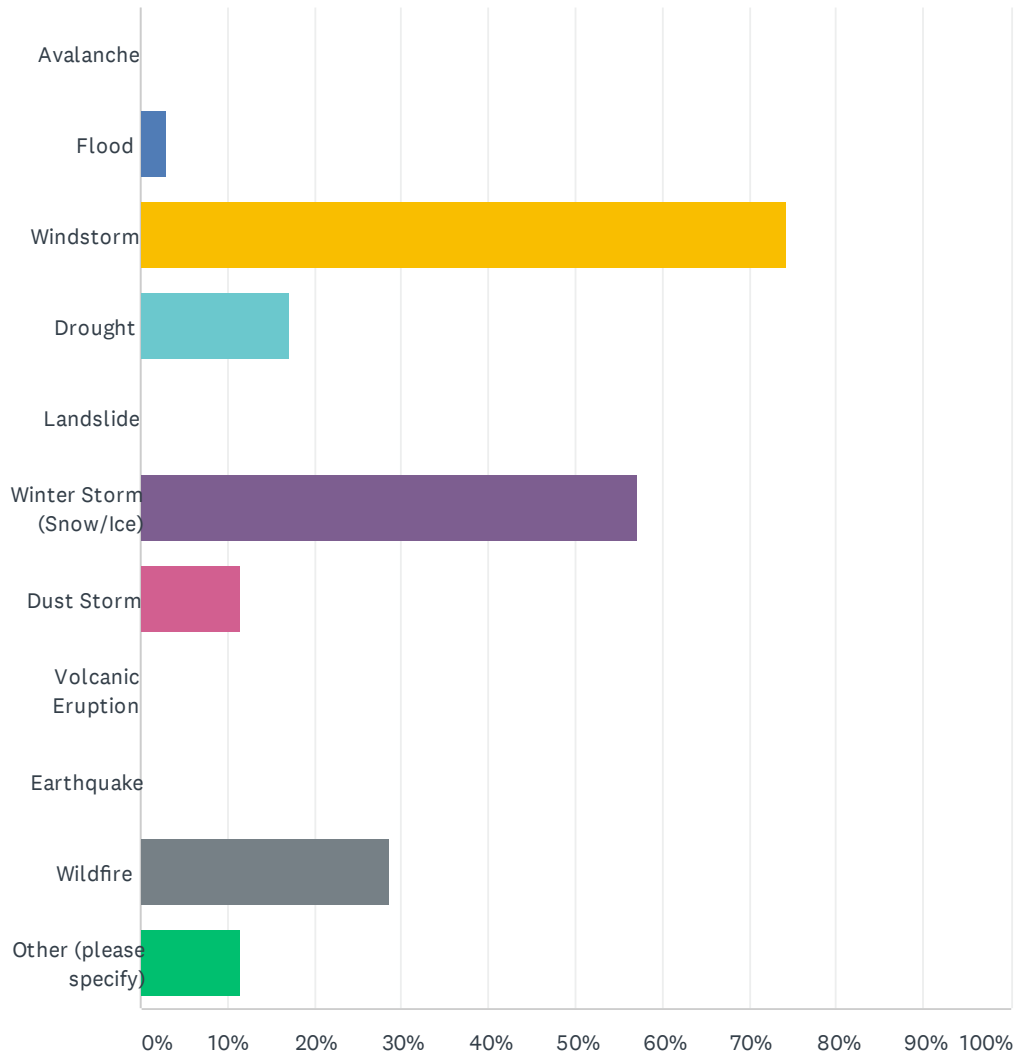


ANSWER CHOICES	RESPONSES	
Yes	86.84%	33
No	13.16%	5
TOTAL		38



## Q2 Which of the following natural hazards have you or someone in your household experienced during the past five years? (Please check all that apply)

Answered: 35 Skipped: 3



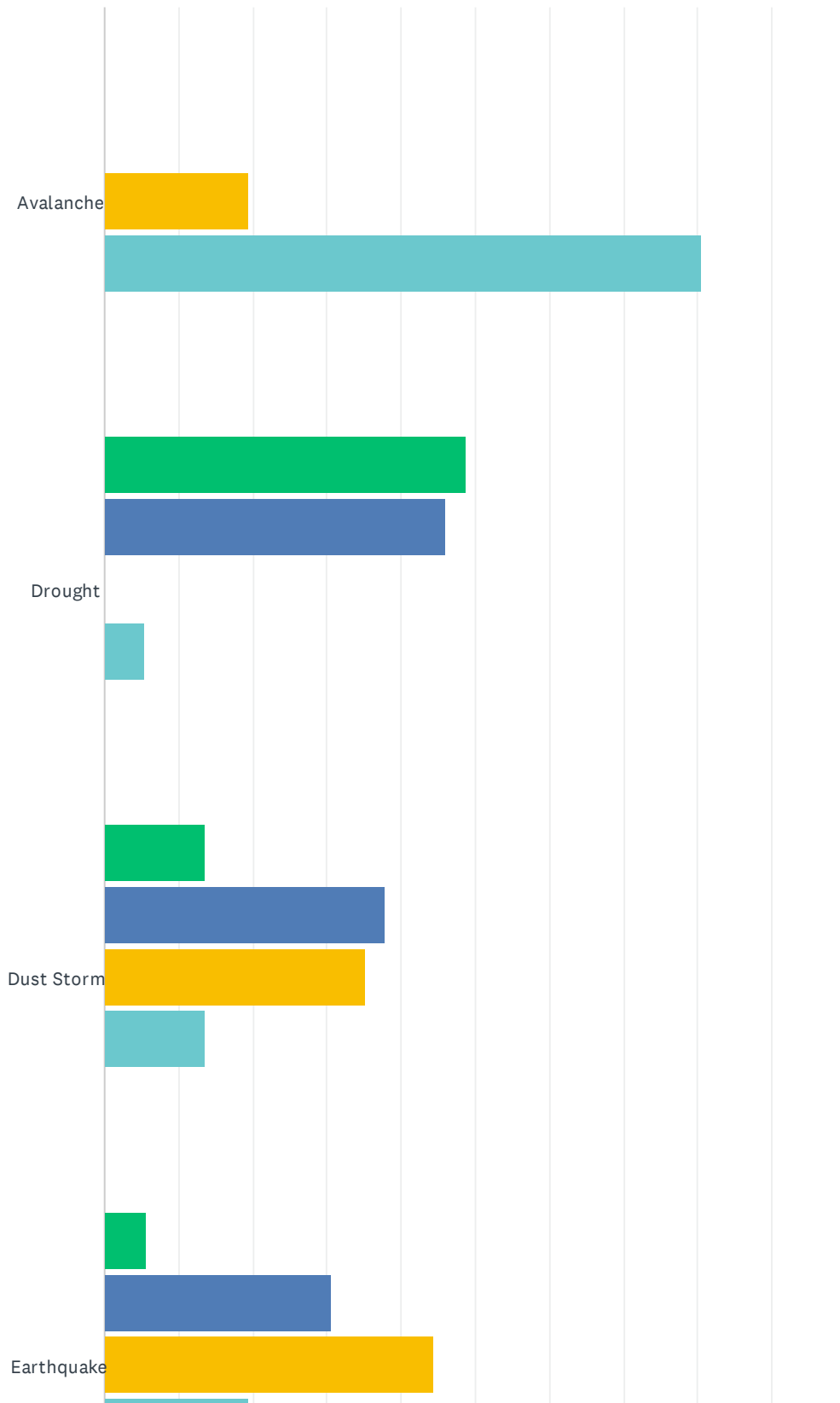
Public Opinion Survey - Jefferson

ANSWER CHOICES	RESPONSES	
Avalanche	0.00%	0
Flood	2.86%	1
Windstorm	74.29%	26
Drought	17.14%	6
Landslide	0.00%	0
Winter Storm (Snow/Ice)	57.14%	20
Dust Storm	11.43%	4
Volcanic Eruption	0.00%	0
Earthquake	0.00%	0
Wildfire	28.57%	10
Other (please specify)	11.43%	4
Total Respondents: 35		

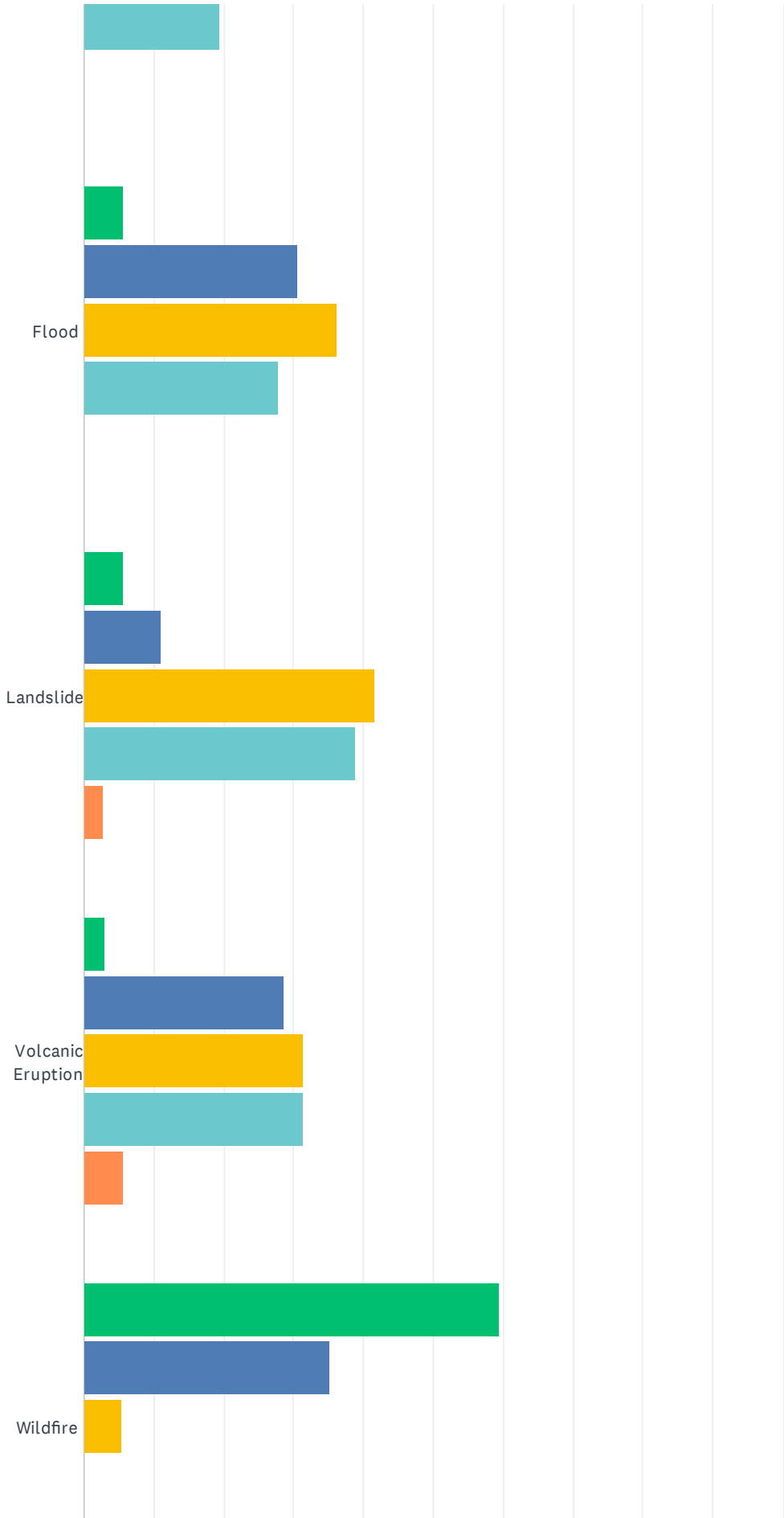
#	OTHER (PLEASE SPECIFY)	DATE
1	Tornado	3/2/2021 8:48 AM
2	Hail (had to replace roof)	2/26/2021 1:17 AM
3	Minor flooding during a Spring storm.	2/25/2021 9:21 PM
4	Hail	2/25/2021 4:57 PM

### Q3 Please indicate your level of concern about the following natural hazards affecting Jefferson County?

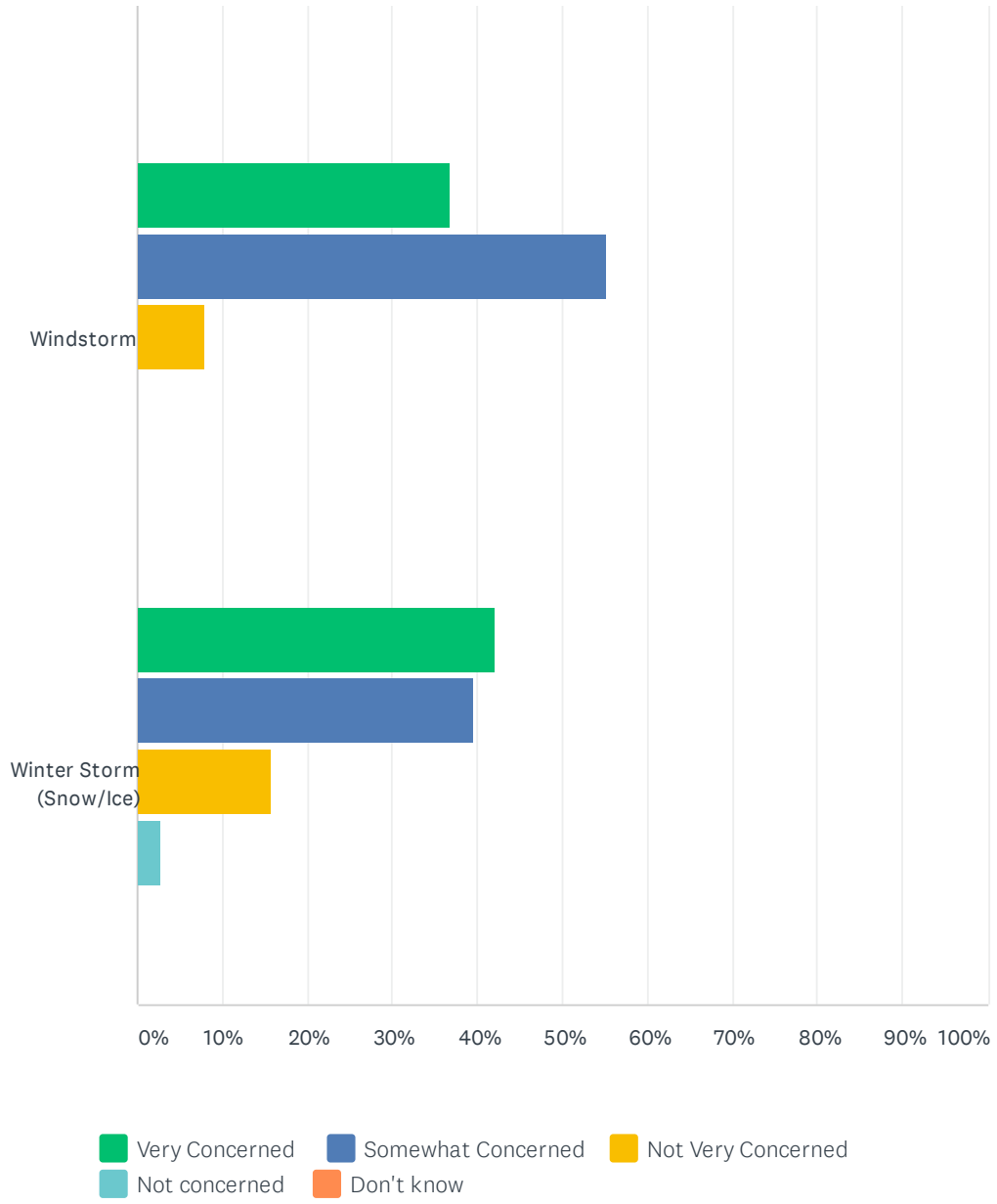
Answered: 38 Skipped: 0



# Public Opinion Survey - Jefferson



# Public Opinion Survey - Jefferson



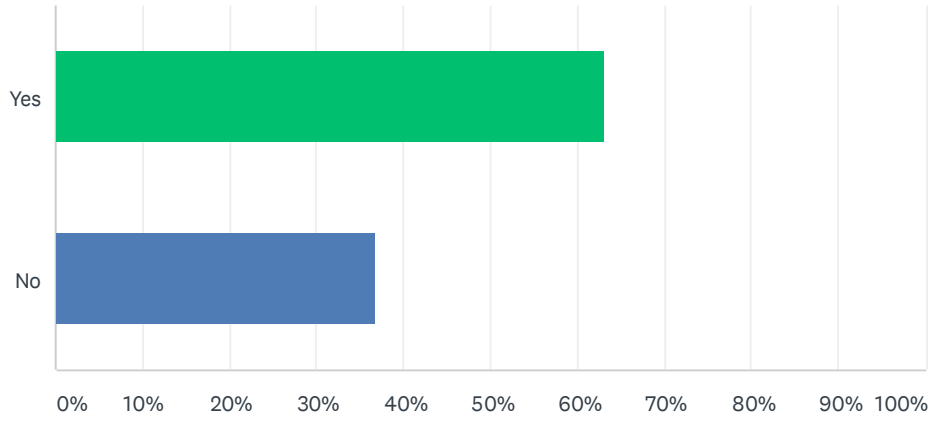
Public Opinion Survey - Jefferson

	VERY CONCERNED	SOMEWHAT CONCERNED	NOT VERY CONCERNED	NOT CONCERNED	DON'T KNOW	TOTAL
Avalanche	0.00% 0	0.00% 0	19.44% 7	80.56% 29	0.00% 0	36
Drought	48.65% 18	45.95% 17	0.00% 0	5.41% 2	0.00% 0	37
Dust Storm	13.51% 5	37.84% 14	35.14% 13	13.51% 5	0.00% 0	37
Earthquake	5.56% 2	30.56% 11	44.44% 16	19.44% 7	0.00% 0	36
Flood	5.56% 2	30.56% 11	36.11% 13	27.78% 10	0.00% 0	36
Landslide	5.56% 2	11.11% 4	41.67% 15	38.89% 14	2.78% 1	36
Volcanic Eruption	2.86% 1	28.57% 10	31.43% 11	31.43% 11	5.71% 2	35
Wildfire	59.46% 22	35.14% 13	5.41% 2	0.00% 0	0.00% 0	37
Windstorm	36.84% 14	55.26% 21	7.89% 3	0.00% 0	0.00% 0	38
Winter Storm (Snow/Ice)	42.11% 16	39.47% 15	15.79% 6	2.63% 1	0.00% 0	38

#	OTHER (PLEASE SPECIFY)	DATE
1	Blue algae in the Deschutes River from farm run off water	3/9/2021 10:25 AM

### Q4 Have you ever received information about how to make members of your household and your home safer from natural hazards?

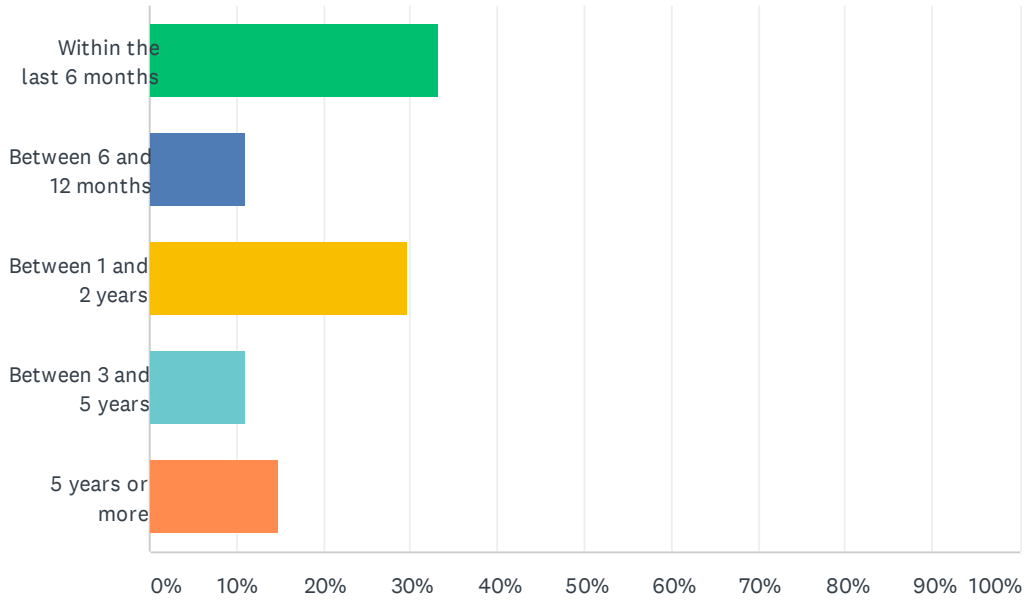
Answered: 38 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	63.16%	24
No	36.84%	14
TOTAL		38

### Q5 If "YES", how recently?

Answered: 27 Skipped: 11

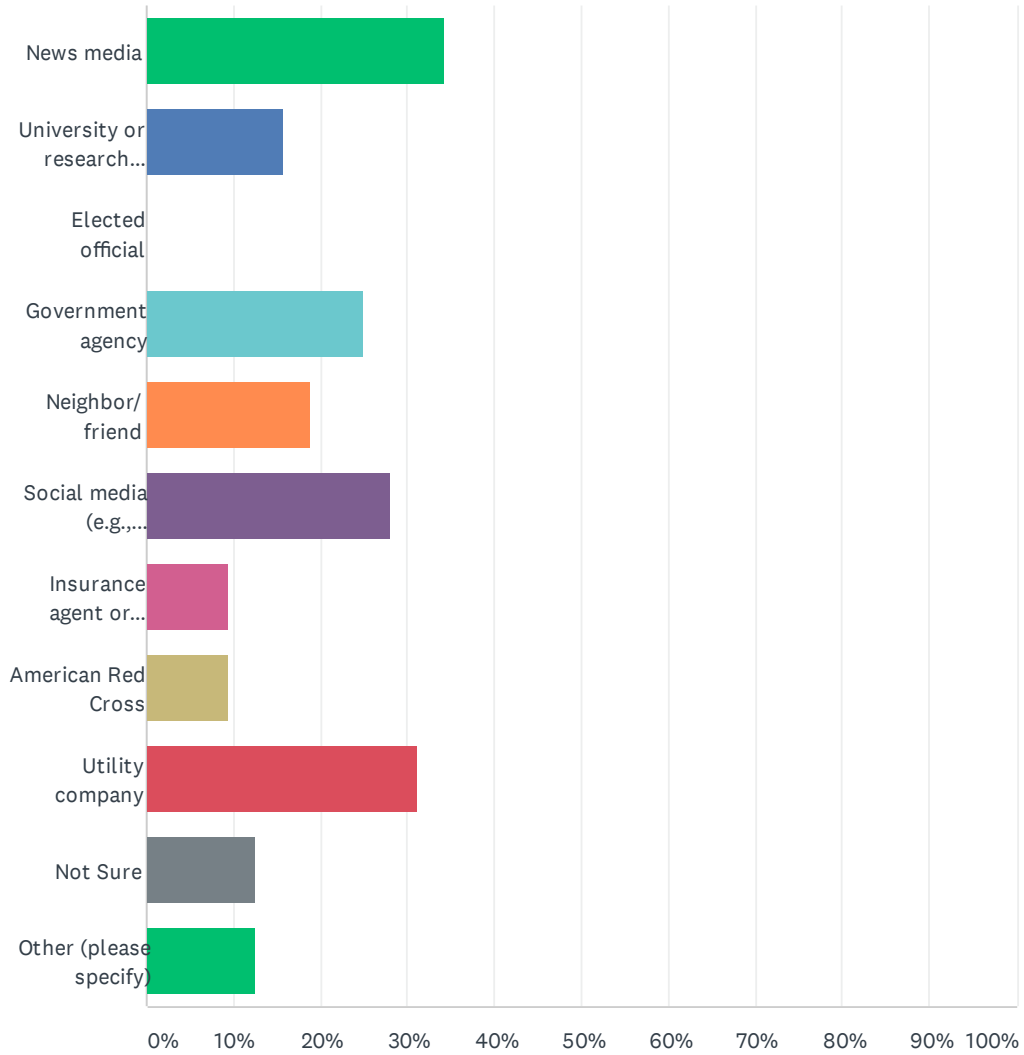


ANSWER CHOICES	RESPONSES	
Within the last 6 months	33.33%	9
Between 6 and 12 months	11.11%	3
Between 1 and 2 years	29.63%	8
Between 3 and 5 years	11.11%	3
5 years or more	14.81%	4
<b>TOTAL</b>		<b>27</b>



# Q6 From whom have you received information about how to make members of your household and your home safer from natural disasters? (Please check all that apply)

Answered: 32 Skipped: 6



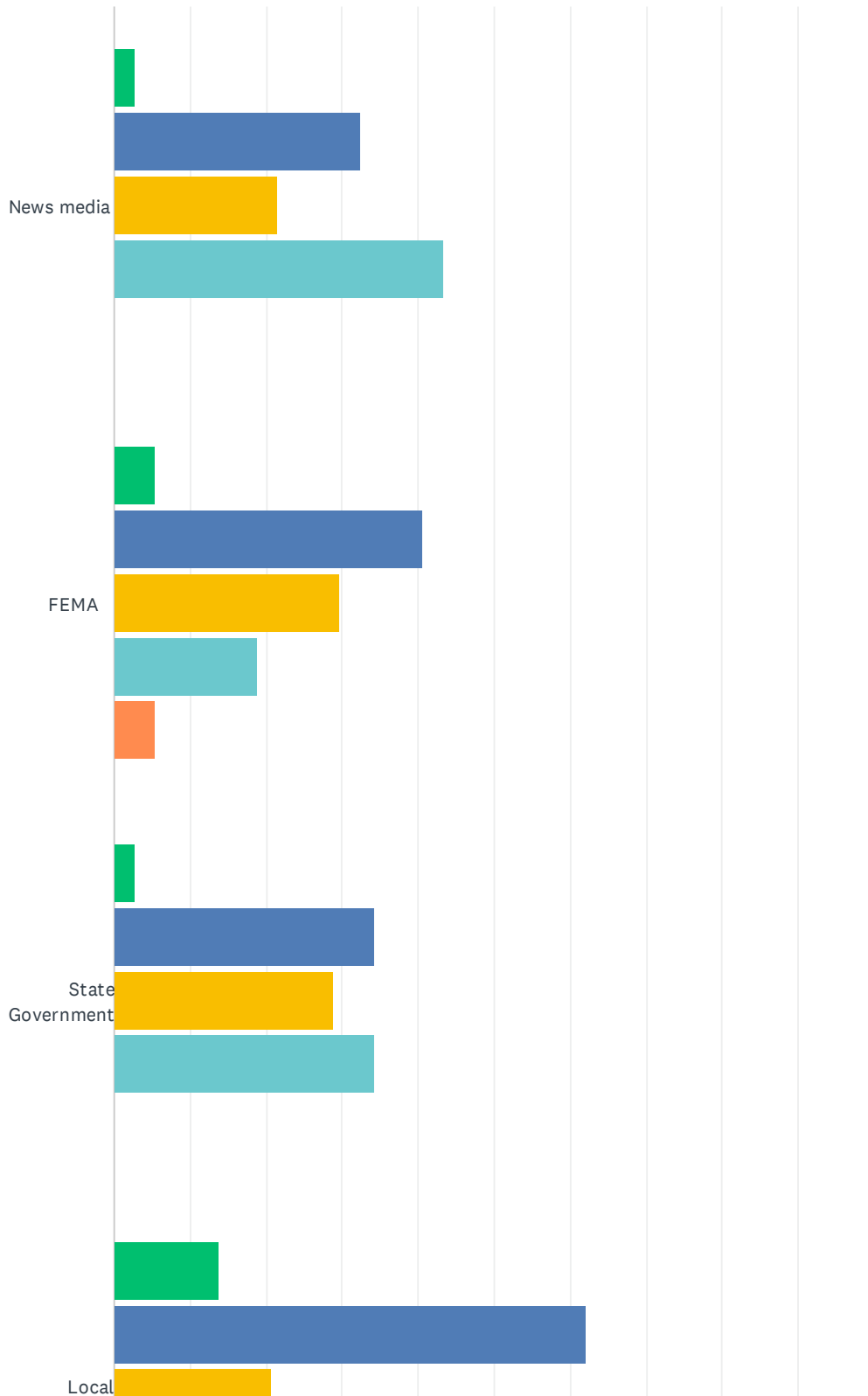
Public Opinion Survey - Jefferson

ANSWER CHOICES	RESPONSES	
News media	34.38%	11
University or research institution	15.63%	5
Elected official	0.00%	0
Government agency	25.00%	8
Neighbor/ friend	18.75%	6
Social media (e.g., Facebook, Twitter, etc.)	28.13%	9
Insurance agent or company	9.38%	3
American Red Cross	9.38%	3
Utility company	31.25%	10
Not Sure	12.50%	4
Other (please specify)	12.50%	4
Total Respondents: 32		

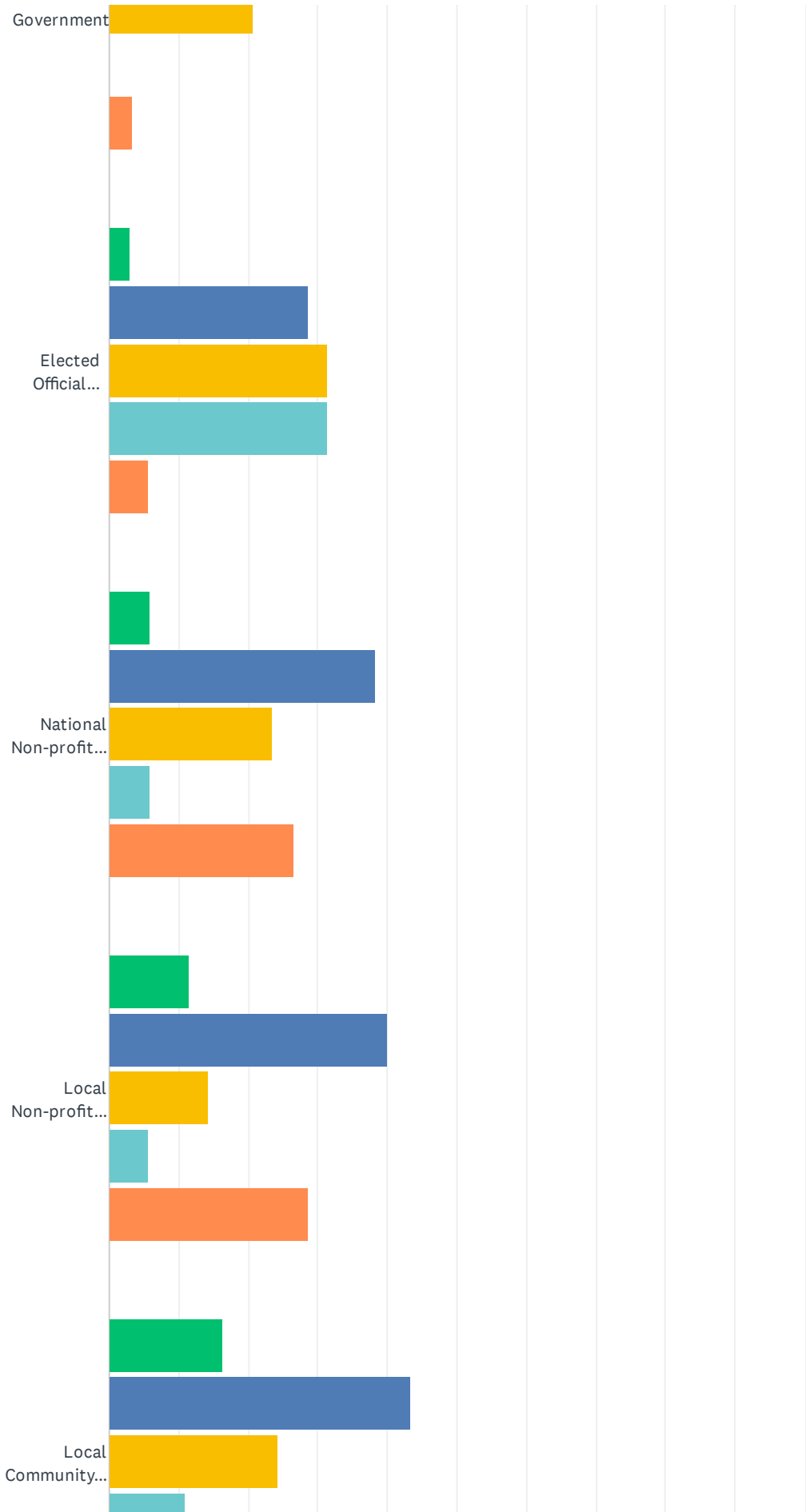
#	OTHER (PLEASE SPECIFY)	DATE
1	I have not	3/12/2021 7:45 PM
2	Warm Springs Emergency Preparedness	3/9/2021 10:25 AM
3	Fire department	3/4/2021 2:03 PM
4	Internet	2/25/2021 12:28 PM

# Q7 How much confidence do you have in the following entities regarding their ability to provide you with information about how to make your household and home safer from natural disasters?

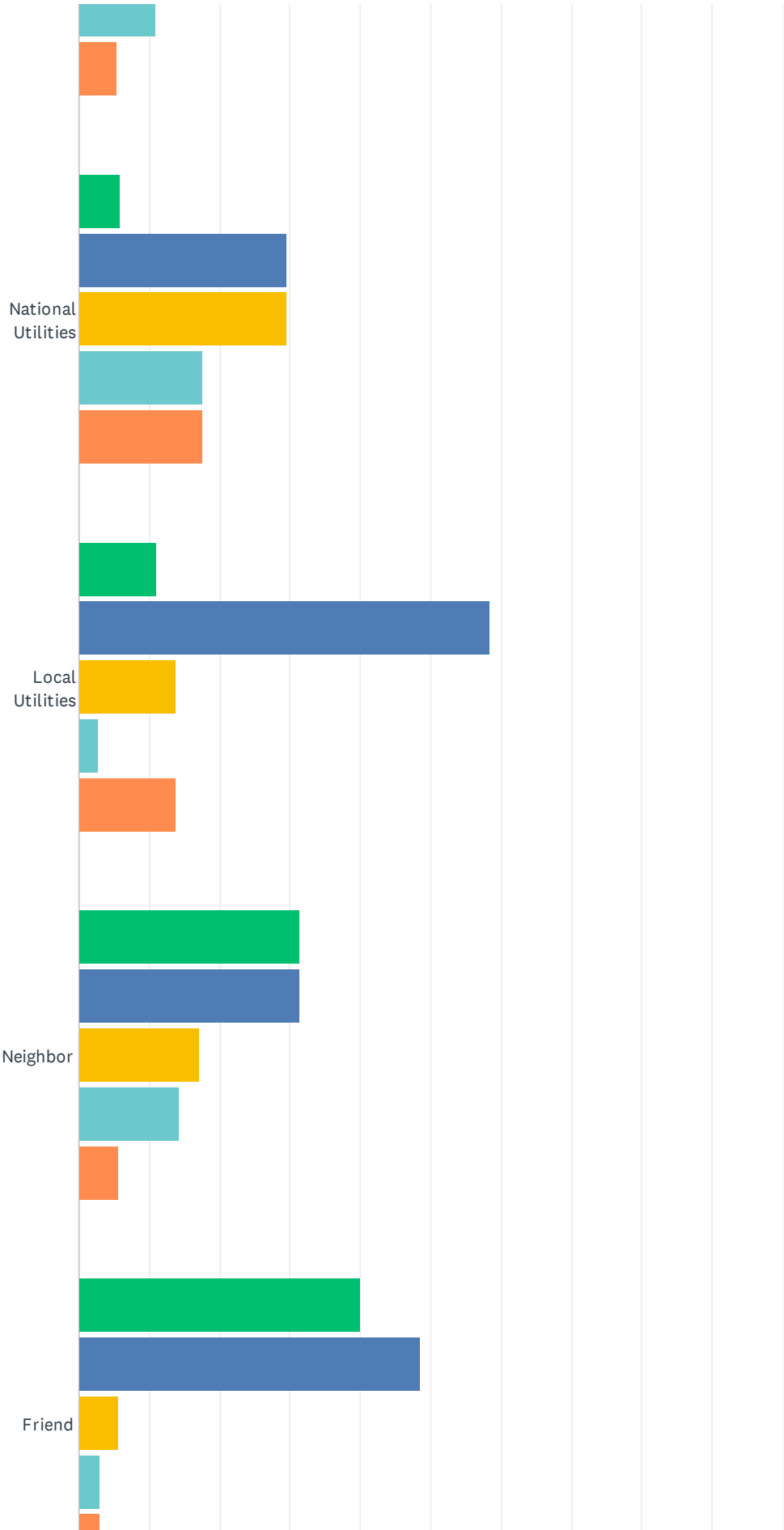
Answered: 38 Skipped: 0



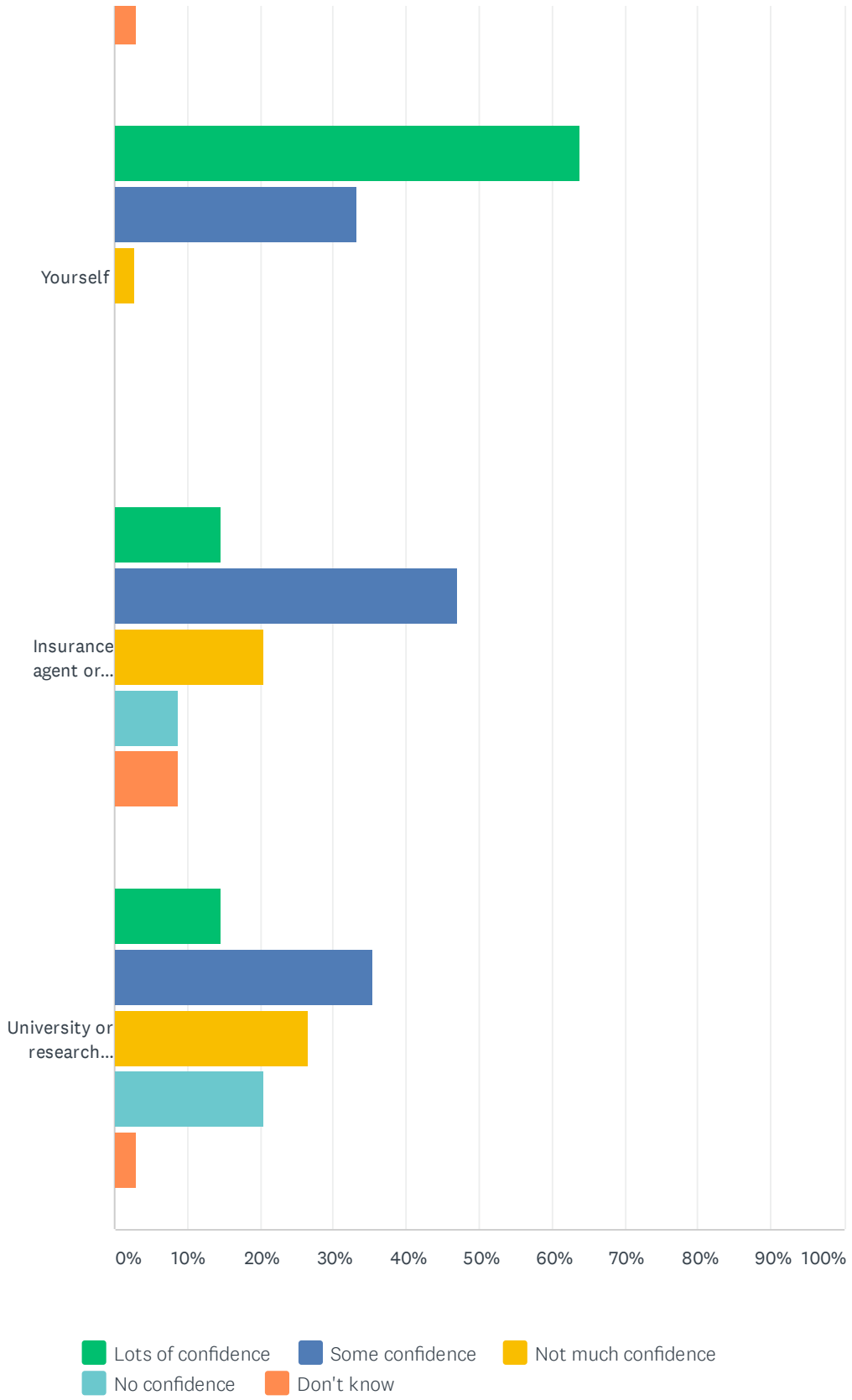
# Public Opinion Survey - Jefferson



# Public Opinion Survey - Jefferson



# Public Opinion Survey - Jefferson



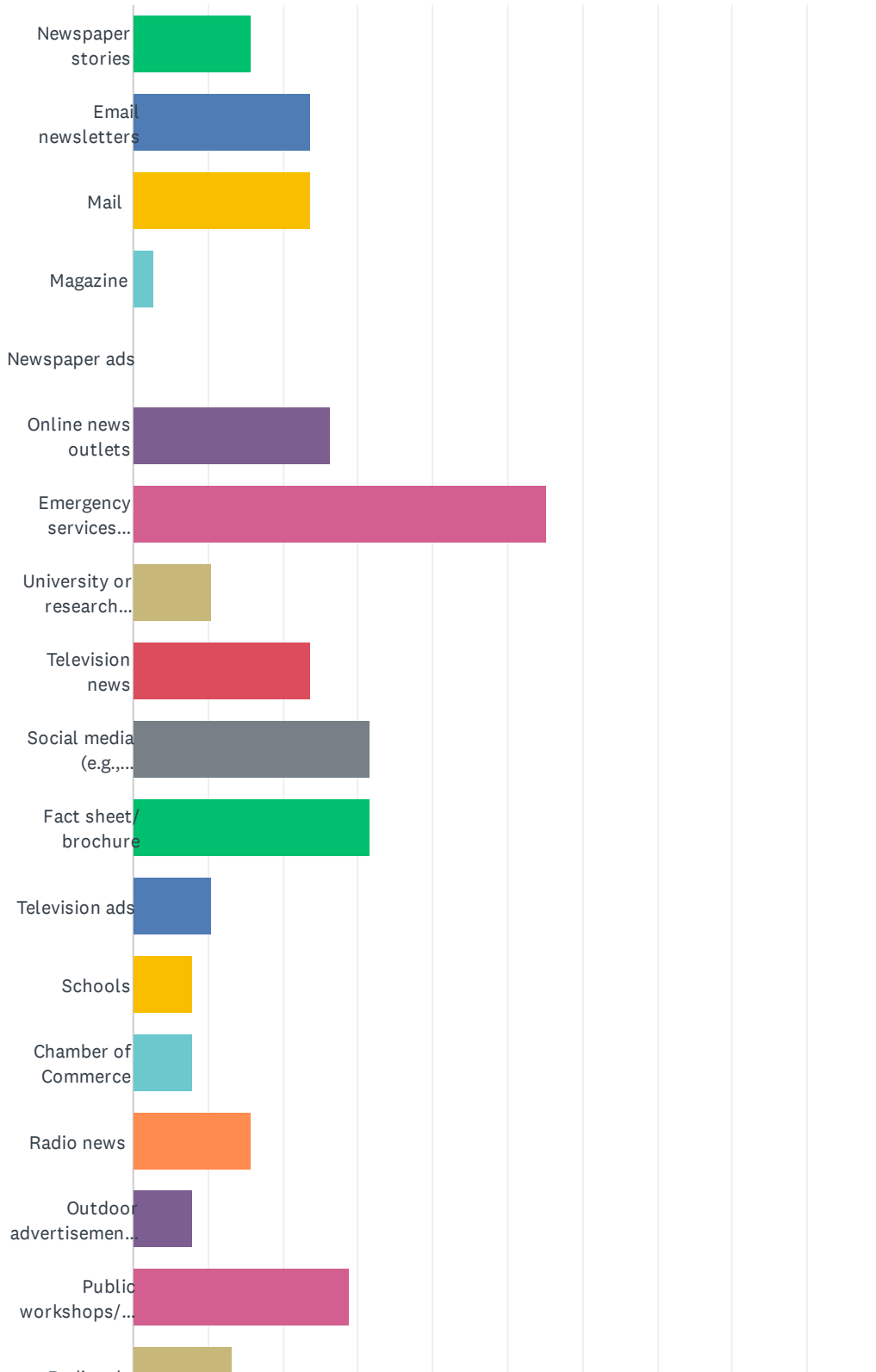
Public Opinion Survey - Jefferson

	LOTS OF CONFIDENCE	SOME CONFIDENCE	NOT MUCH CONFIDENCE	NO CONFIDENCE	DON'T KNOW	TOTAL
News media	2.70% 1	32.43% 12	21.62% 8	43.24% 16	0.00% 0	37
FEMA	5.41% 2	40.54% 15	29.73% 11	18.92% 7	5.41% 2	37
State Government	2.63% 1	34.21% 13	28.95% 11	34.21% 13	0.00% 0	38
Local Government	13.79% 4	62.07% 18	20.69% 6	0.00% 0	3.45% 1	29
Elected Official (please specify below)	2.86% 1	28.57% 10	31.43% 11	31.43% 11	5.71% 2	35
National Non-profit (please specify below)	5.88% 2	38.24% 13	23.53% 8	5.88% 2	26.47% 9	34
Local Non-profit (please specify below)	11.43% 4	40.00% 14	14.29% 5	5.71% 2	28.57% 10	35
Local Community Leaders (please specify below)	16.22% 6	43.24% 16	24.32% 9	10.81% 4	5.41% 2	37
National Utilities	5.88% 2	29.41% 10	29.41% 10	17.65% 6	17.65% 6	34
Local Utilities	11.11% 4	58.33% 21	13.89% 5	2.78% 1	13.89% 5	36
Neighbor	31.43% 11	31.43% 11	17.14% 6	14.29% 5	5.71% 2	35
Friend	40.00% 14	48.57% 17	5.71% 2	2.86% 1	2.86% 1	35
Yourself	63.89% 23	33.33% 12	2.78% 1	0.00% 0	0.00% 0	36
Insurance agent or company	14.71% 5	47.06% 16	20.59% 7	8.82% 3	8.82% 3	34
University or research institution	14.71% 5	35.29% 12	26.47% 9	20.59% 7	2.94% 1	34

#	OTHER (PLEASE SPECIFY)	DATE
1	Dan Martinez	3/9/2021 10:25 AM
2	Local Emergency Management- HAM Radio	3/8/2021 7:05 PM
3	commisioners	2/26/2021 10:13 AM
4	Local fire dept	2/25/2021 5:53 PM
5	Cliff Bentz, has no experience and supports overthrowing the government	2/25/2021 2:49 PM

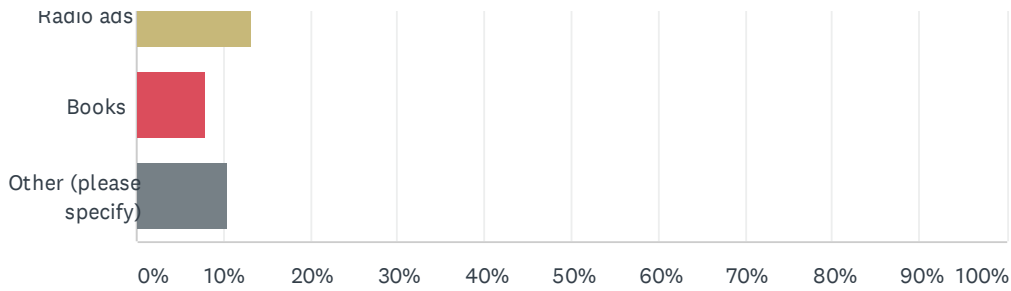
# Q8 What are the most effective ways for you to receive information about how to make your household and home safer from natural disasters? (Please check all that apply)

Answered: 38 Skipped: 0





## Public Opinion Survey - Jefferson



ANSWER CHOICES	RESPONSES	
Newspaper stories	15.79%	6
Email newsletters	23.68%	9
Mail	23.68%	9
Magazine	2.63%	1
Newspaper ads	0.00%	0
Online news outlets	26.32%	10
Emergency services (police/fire)	55.26%	21
University or research institution	10.53%	4
Television news	23.68%	9
Social media (e.g., Facebook, Twitter) (if other please specify below)	31.58%	12
Fact sheet/ brochure	31.58%	12
Television ads	10.53%	4
Schools	7.89%	3
Chamber of Commerce	7.89%	3
Radio news	15.79%	6
Outdoor advertisements (billboards, etc.)	7.89%	3
Public workshops/ meetings	28.95%	11
Radio ads	13.16%	5
Books	7.89%	3
Other (please specify)	10.53%	4
Total Respondents: 38		

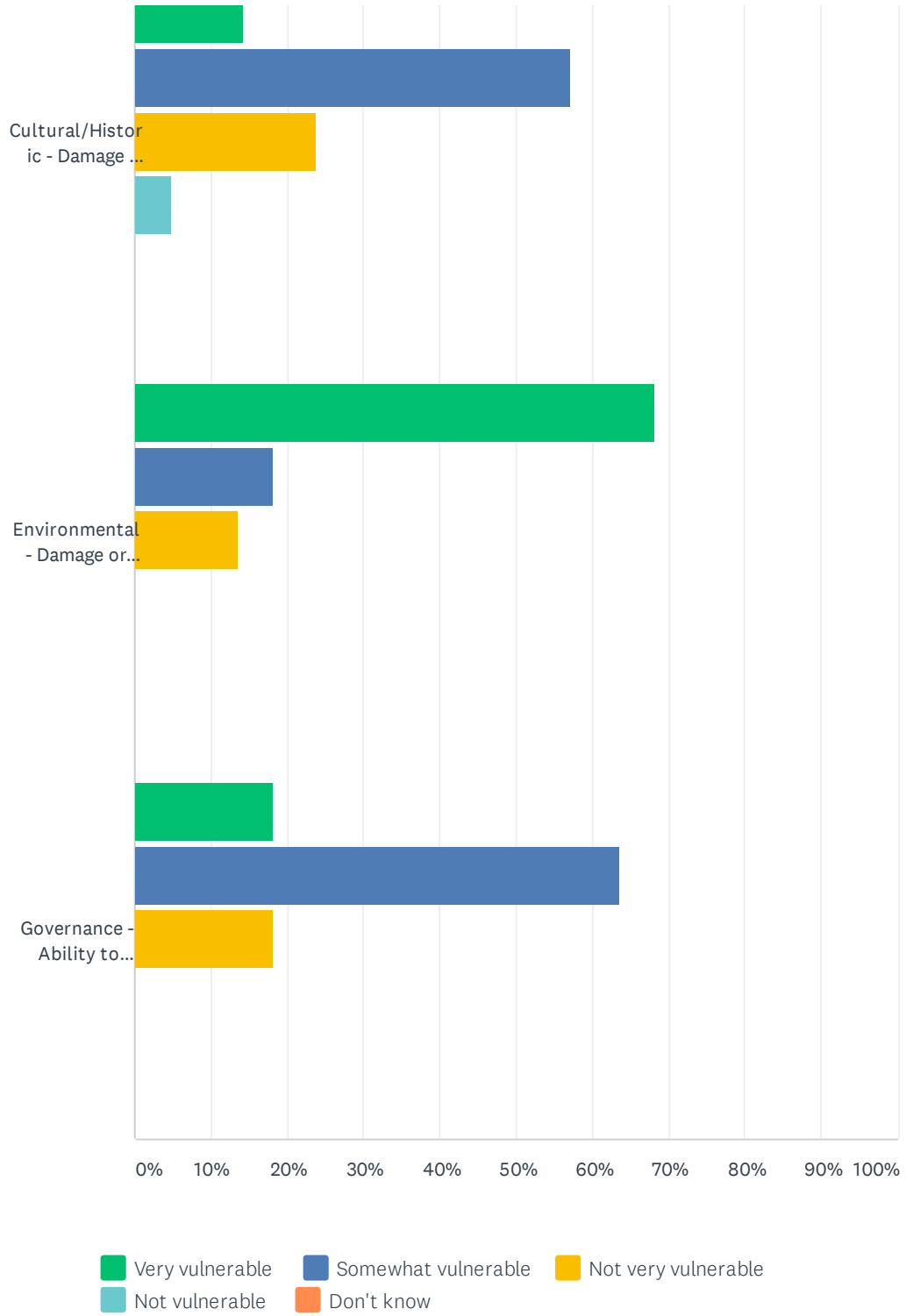
#	OTHER (PLEASE SPECIFY)	DATE
1	WS Emergency Preparedness	3/9/2021 10:25 AM
2	Text	2/27/2021 9:27 AM
3	My internet research	2/25/2021 4:57 PM
4	Scientific internet sources	2/25/2021 12:28 PM

Q9 Community assets are features, characteristics, or resources that either make a community unique, or allow the community to function. Listed below are categories of community assets followed by potential natural hazard impacts. Please tell us how vulnerable you feel each of the following categories of community assets are to the listed natural hazard impacts in Jefferson County.

Answered: 22 Skipped: 16



# Public Opinion Survey - Jefferson



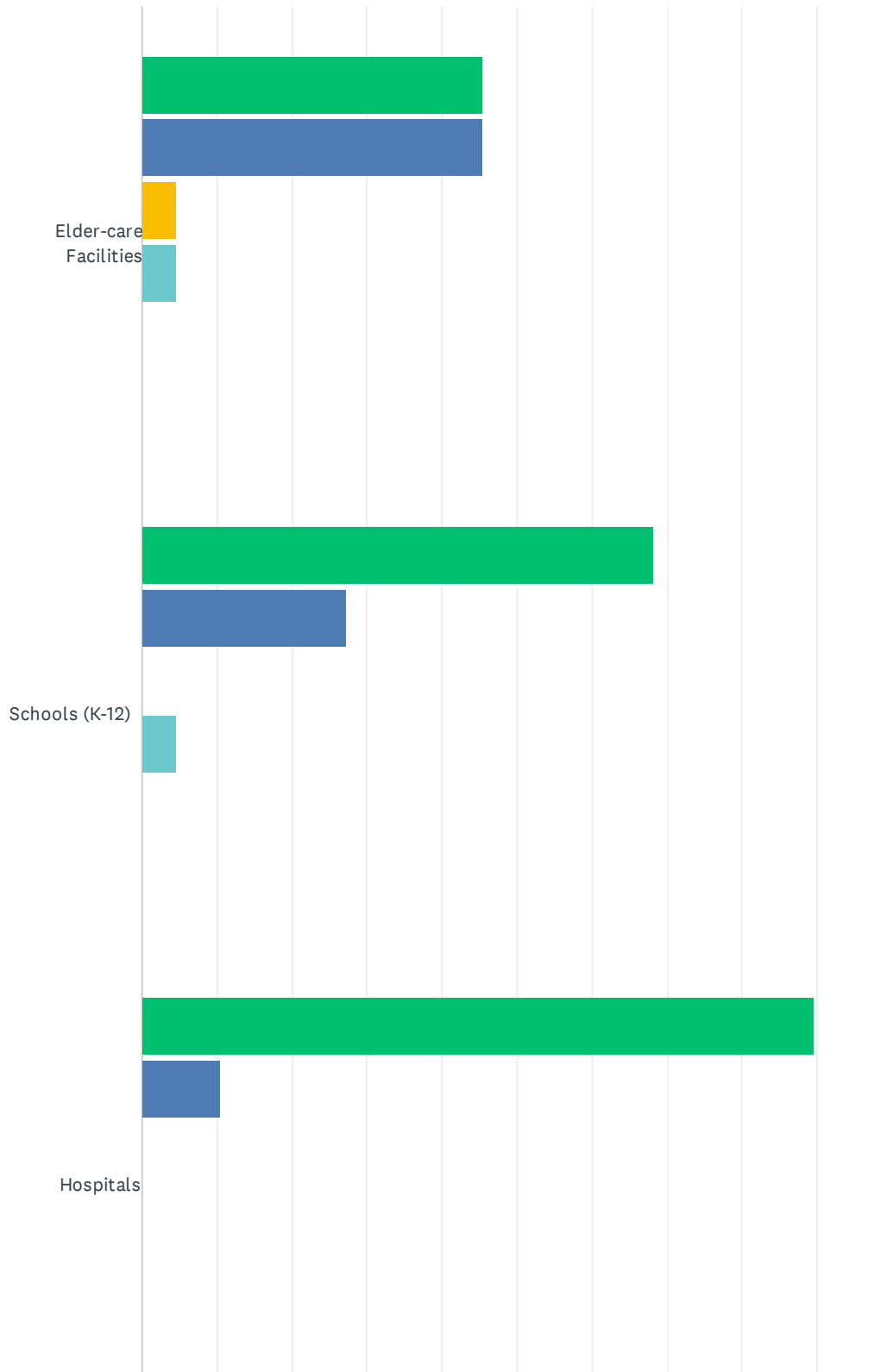
Public Opinion Survey - Jefferson

	VERY VULNERABLE	SOMEWHAT VULNERABLE	NOT VERY VULNERABLE	NOT VULNERABLE	DON'T KNOW	TOTAL
Human - Loss of life and/or injuries	31.82% 7	45.45% 10	22.73% 5	0.00% 0	0.00% 0	22
Economic - Business closures and/or job losses	54.55% 12	36.36% 8	9.09% 2	0.00% 0	0.00% 0	22
Infrastructure - Damage or loss of bridges, utilities, schools, etc.	36.36% 8	59.09% 13	4.55% 1	0.00% 0	0.00% 0	22
Cultural/Historic - Damage or loss of libraries, museums, fairgrounds, etc.	14.29% 3	57.14% 12	23.81% 5	4.76% 1	0.00% 0	21
Environmental - Damage or loss of forests, rangeland, waterways, etc.	68.18% 15	18.18% 4	13.64% 3	0.00% 0	0.00% 0	22
Governance - Ability to maintain order and/or provide public amenities and services	18.18% 4	63.64% 14	18.18% 4	0.00% 0	0.00% 0	22

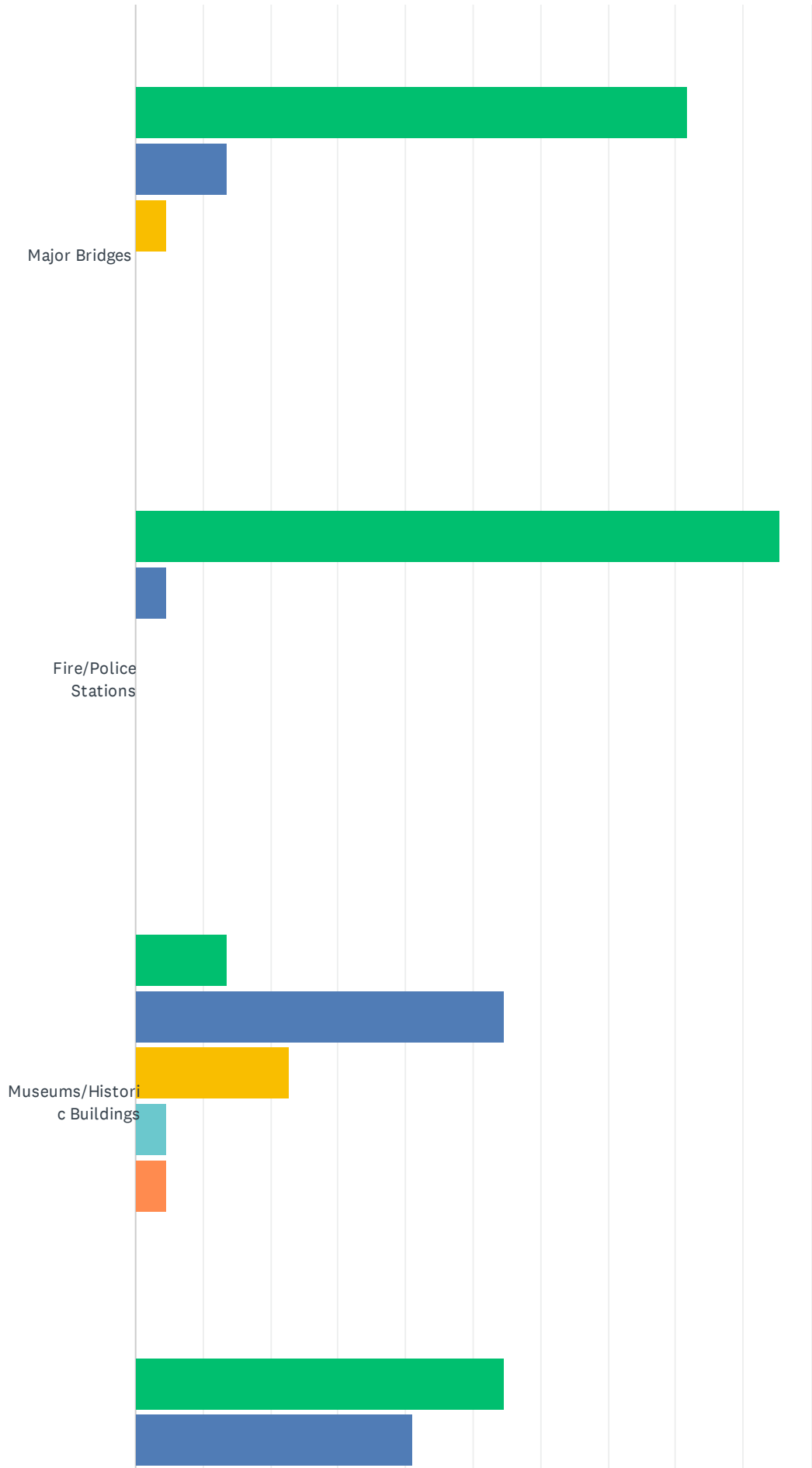
#	OTHER (PLEASE SPECIFY)	DATE
1	Traditional and Cultural Assets are not listed, food, fish, game, water and land	3/9/2021 10:33 AM

Q10 Next we would like to know how important or not important specific types of community assets are to you. (Check the corresponding box for each asset)

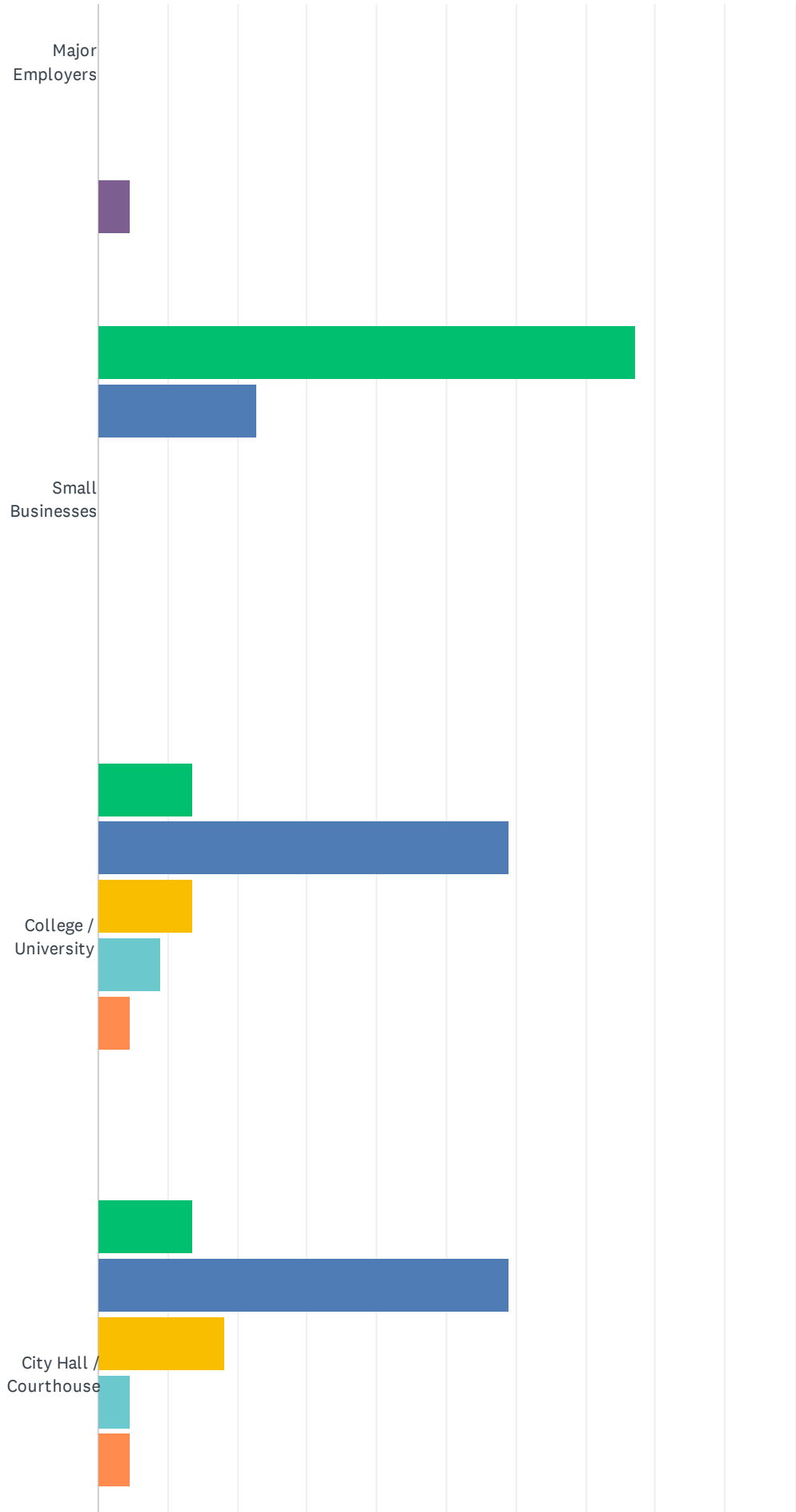
Answered: 22 Skipped: 16



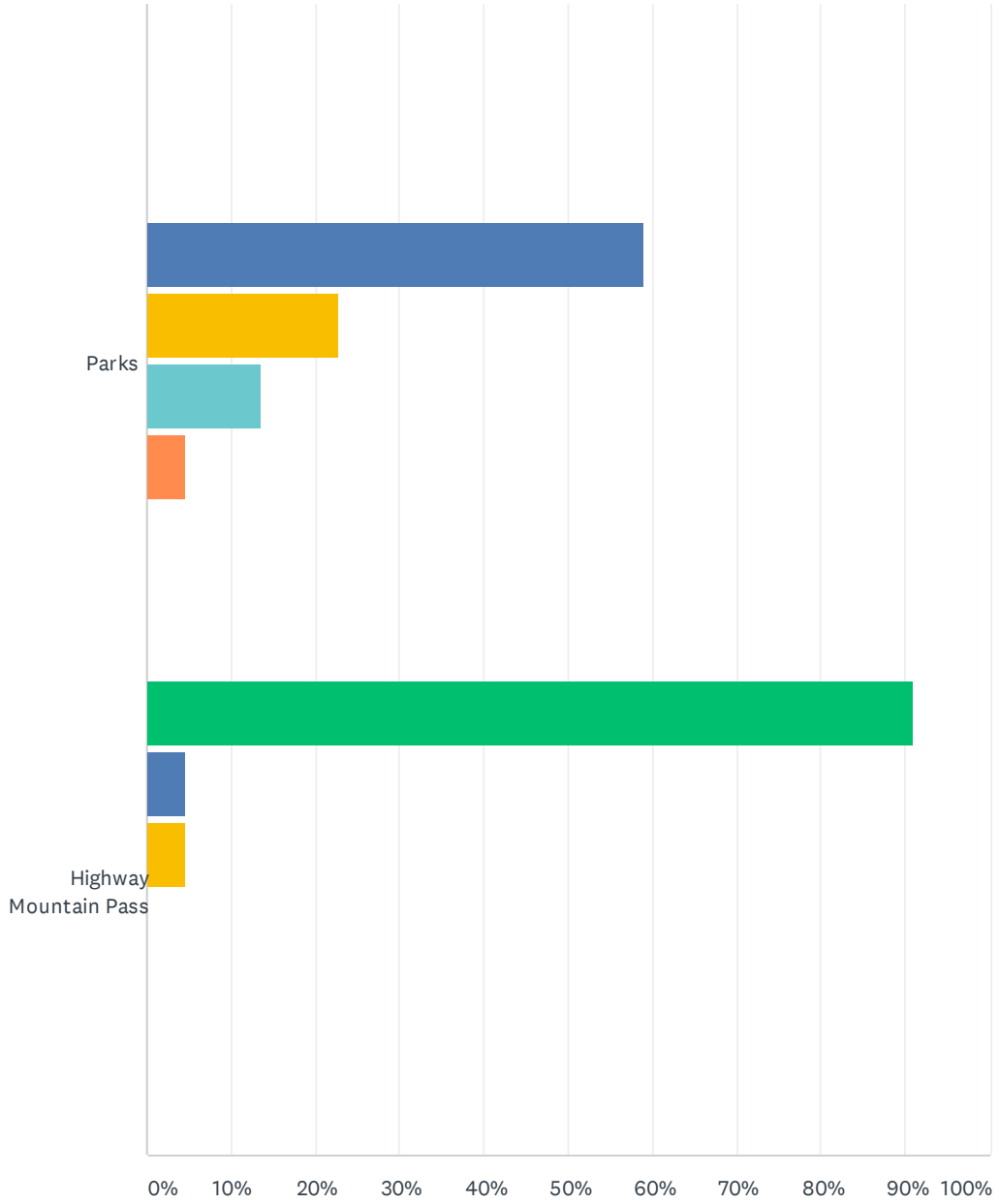
# Public Opinion Survey - Jefferson



# Public Opinion Survey - Jefferson



# Public Opinion Survey - Jefferson



Very important    Somewhat important    Neither important nor unimportant  
Unimportant    Very unimportant    Don't know



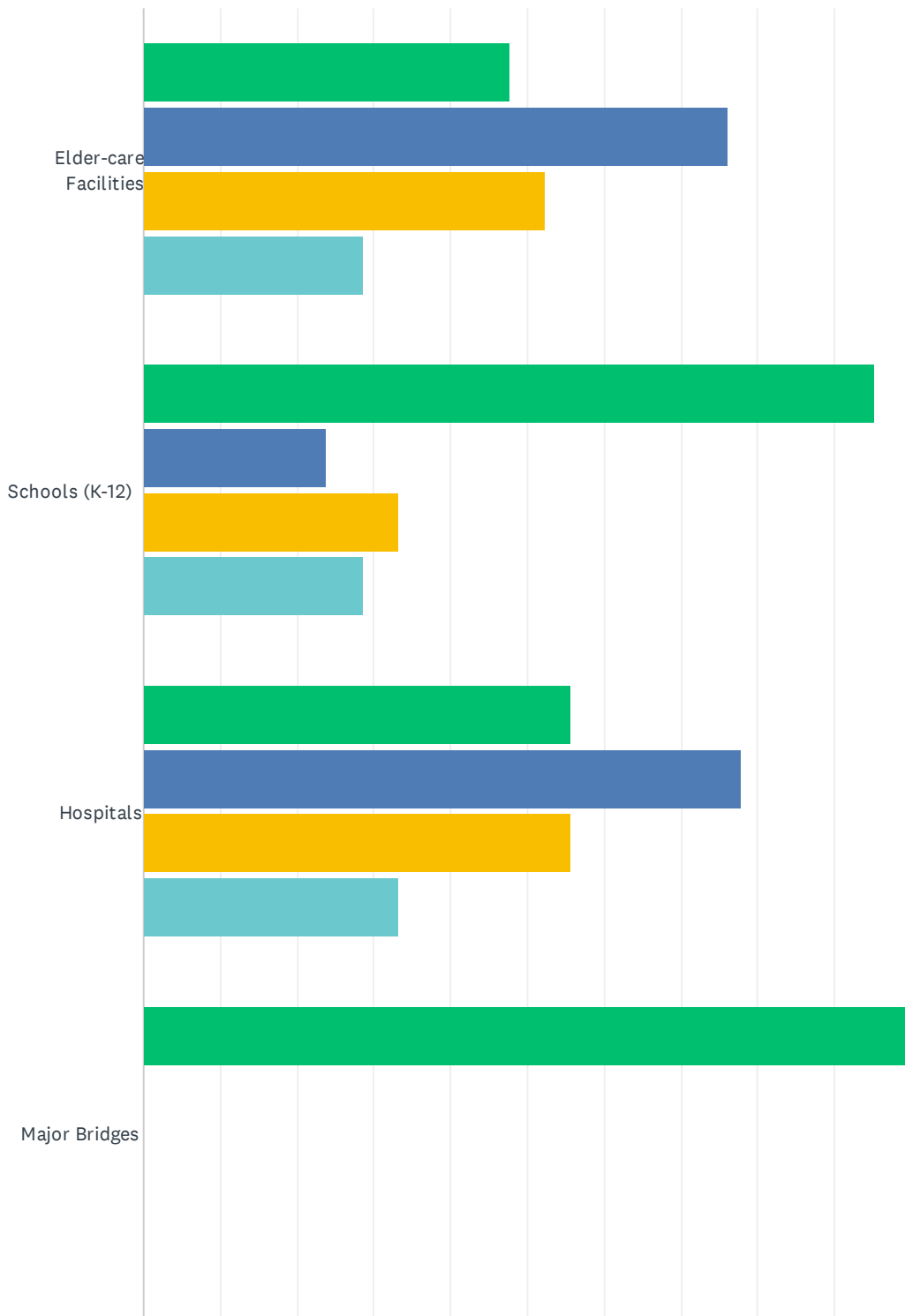
Public Opinion Survey - Jefferson

	VERY IMPORTANT	SOMEWHAT IMPORTANT	NEITHER IMPORTANT NOR UNIMPORTANT	UNIMPORTANT	VERY UNIMPORTANT	DON'T KNOW	TOTAL
Elder-care Facilities	45.45% 10	45.45% 10	4.55% 1	4.55% 1	0.00% 0	0.00% 0	22
Schools (K-12)	68.18% 15	27.27% 6	0.00% 0	4.55% 1	0.00% 0	0.00% 0	22
Hospitals	89.47% 17	10.53% 2	0.00% 0	0.00% 0	0.00% 0	0.00% 0	19
Major Bridges	81.82% 18	13.64% 3	4.55% 1	0.00% 0	0.00% 0	0.00% 0	22
Fire/Police Stations	95.45% 21	4.55% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	22
Museums/Historic Buildings	13.64% 3	54.55% 12	22.73% 5	4.55% 1	4.55% 1	0.00% 0	22
Major Employers	54.55% 12	40.91% 9	0.00% 0	0.00% 0	0.00% 0	4.55% 1	22
Small Businesses	77.27% 17	22.73% 5	0.00% 0	0.00% 0	0.00% 0	0.00% 0	22
College / University	13.64% 3	59.09% 13	13.64% 3	9.09% 2	4.55% 1	0.00% 0	22
City Hall / Courthouse	13.64% 3	59.09% 13	18.18% 4	4.55% 1	4.55% 1	0.00% 0	22
Parks	0.00% 0	59.09% 13	22.73% 5	13.64% 3	4.55% 1	0.00% 0	22
Highway Mountain Pass	90.91% 20	4.55% 1	4.55% 1	0.00% 0	0.00% 0	0.00% 0	22

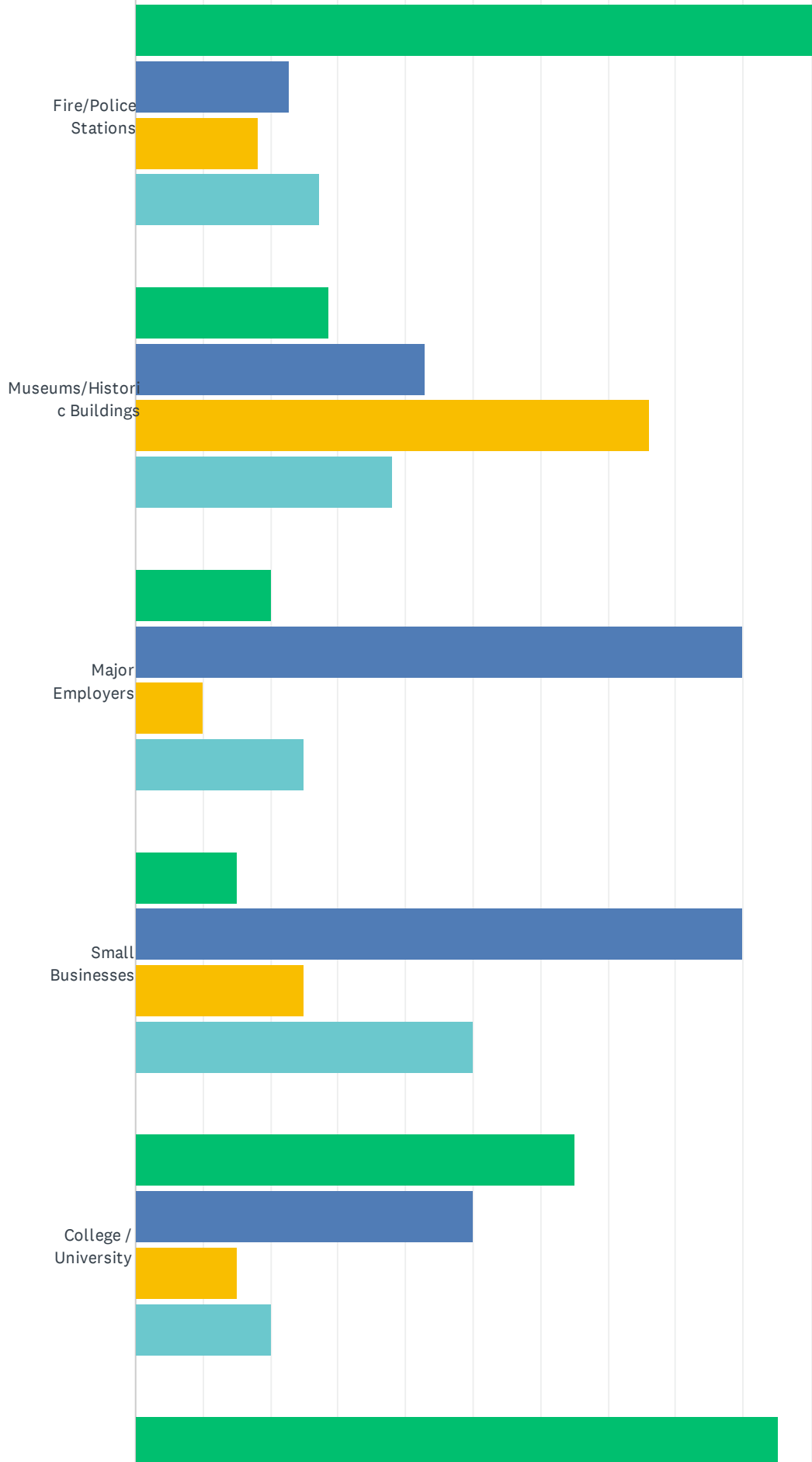
#	OTHER (PLEASE SPECIFY)	DATE
1	Traditional and Cultural Assets are not listed, food, fish, game, water and land	3/9/2021 10:33 AM

Q11 Now we would like to know whom you think should be responsible for mitigating the impacts from natural hazards on specific types of community assets. (Check the corresponding box for each asset; check multiple boxes if you consider it to be a shared responsibility by more than one group.)

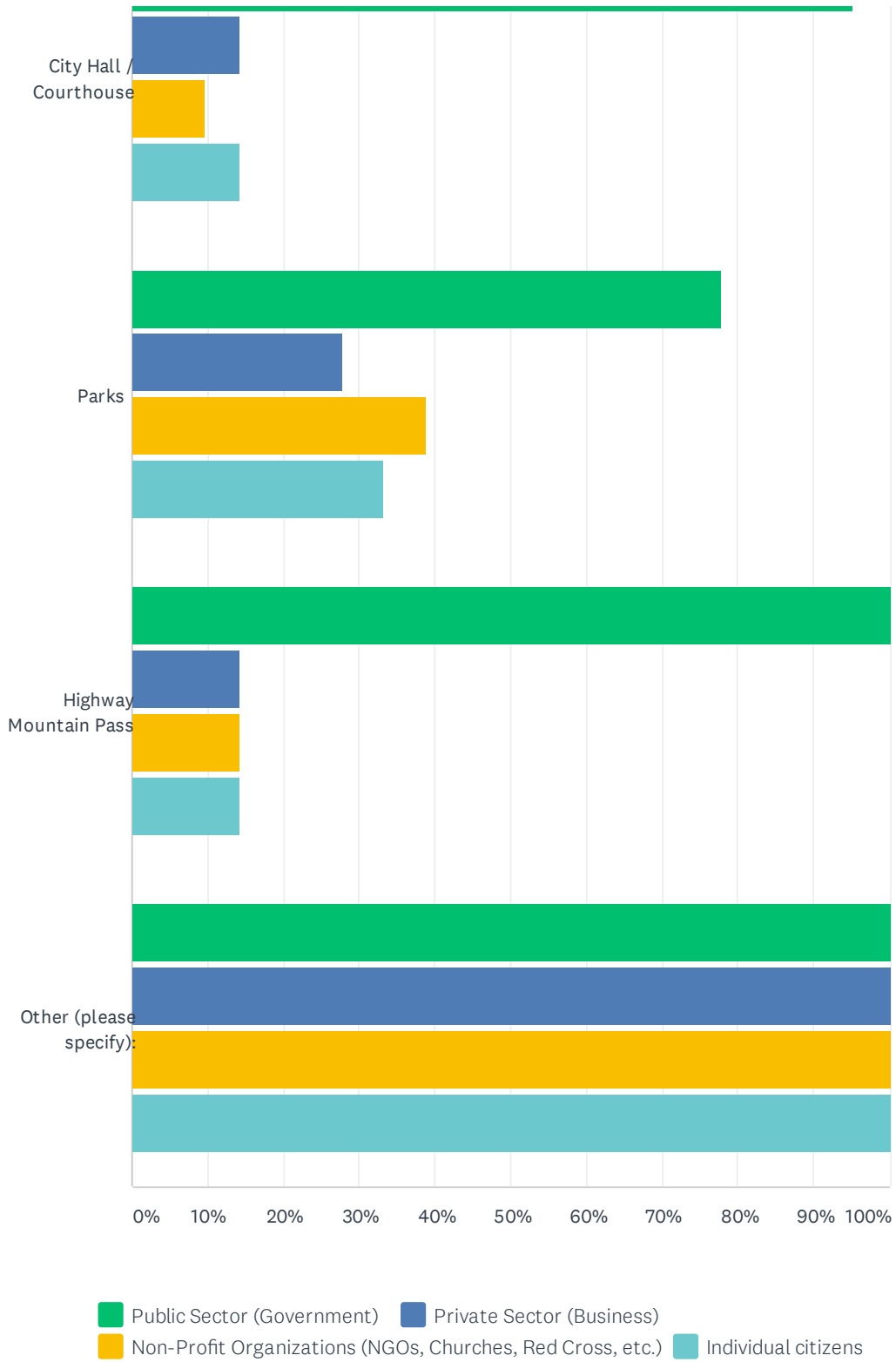
Answered: 22 Skipped: 16



# Public Opinion Survey - Jefferson



# Public Opinion Survey - Jefferson



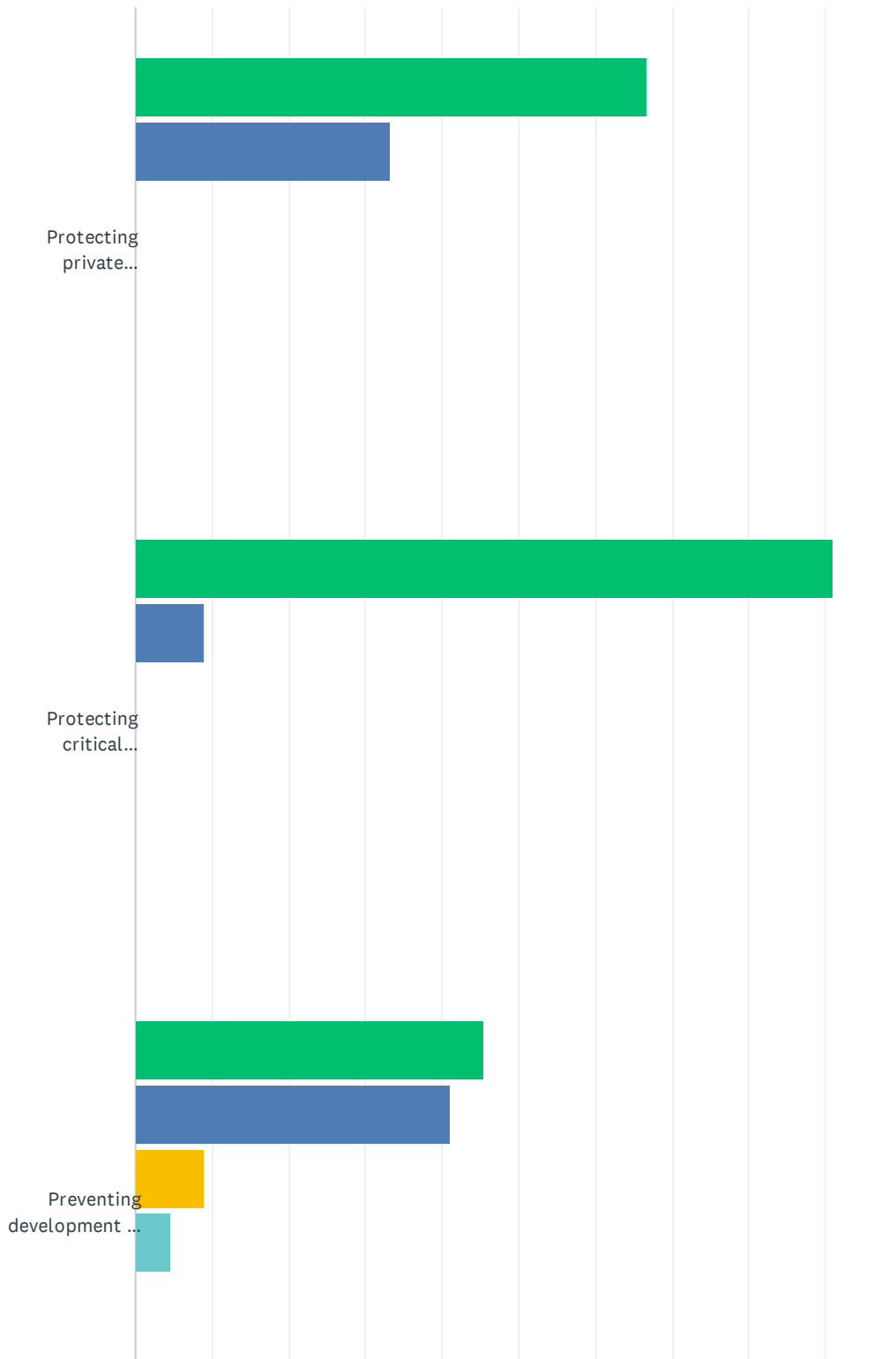
Public Opinion Survey - Jefferson

	<b>PUBLIC SECTOR (GOVERNMENT)</b>	<b>PRIVATE SECTOR (BUSINESS)</b>	<b>NON-PROFIT ORGANIZATIONS (NGOS, CHURCHES, RED CROSS, ETC.)</b>	<b>INDIVIDUAL CITIZENS</b>	<b>TOTAL RESPONDENTS</b>
Elder-care Facilities	47.62% 10	76.19% 16	52.38% 11	28.57% 6	21
Schools (K-12)	95.24% 20	23.81% 5	33.33% 7	28.57% 6	21
Hospitals	55.56% 10	77.78% 14	55.56% 10	33.33% 6	18
Major Bridges	100.00% 21	0.00% 0	0.00% 0	0.00% 0	21
Fire/Police Stations	100.00% 22	22.73% 5	18.18% 4	27.27% 6	22
Museums/Historic Buildings	28.57% 6	42.86% 9	76.19% 16	38.10% 8	21
Major Employers	20.00% 4	90.00% 18	10.00% 2	25.00% 5	20
Small Businesses	15.00% 3	90.00% 18	25.00% 5	50.00% 10	20
College / University	65.00% 13	50.00% 10	15.00% 3	20.00% 4	20
City Hall / Courthouse	95.24% 20	14.29% 3	9.52% 2	14.29% 3	21
Parks	77.78% 14	27.78% 5	38.89% 7	33.33% 6	18
Highway Mountain Pass	100.00% 21	14.29% 3	14.29% 3	14.29% 3	21
Other (please specify):	100.00% 2	100.00% 2	100.00% 2	100.00% 2	2

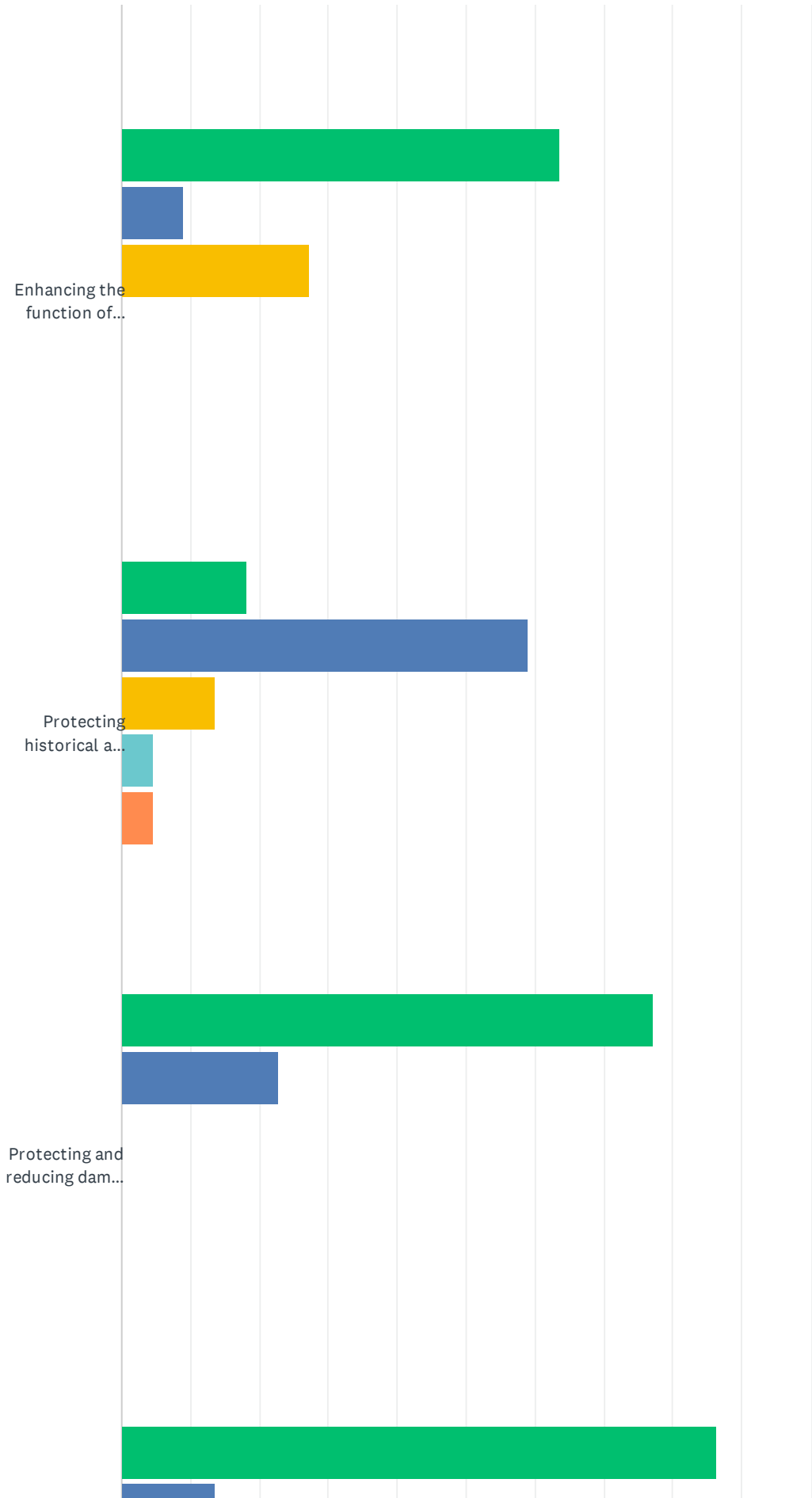
<b>#</b>	<b>OTHER (PLEASE SPECIFY)</b>	<b>DATE</b>
1	Tribal Assets	3/9/2021 10:33 AM

Q12 Natural hazards can have a significant impact on a community, but planning for these events can help lessen the impacts. The following statements will help determine citizen priorities for planning for natural hazards. Please tell us how important each one is to you.

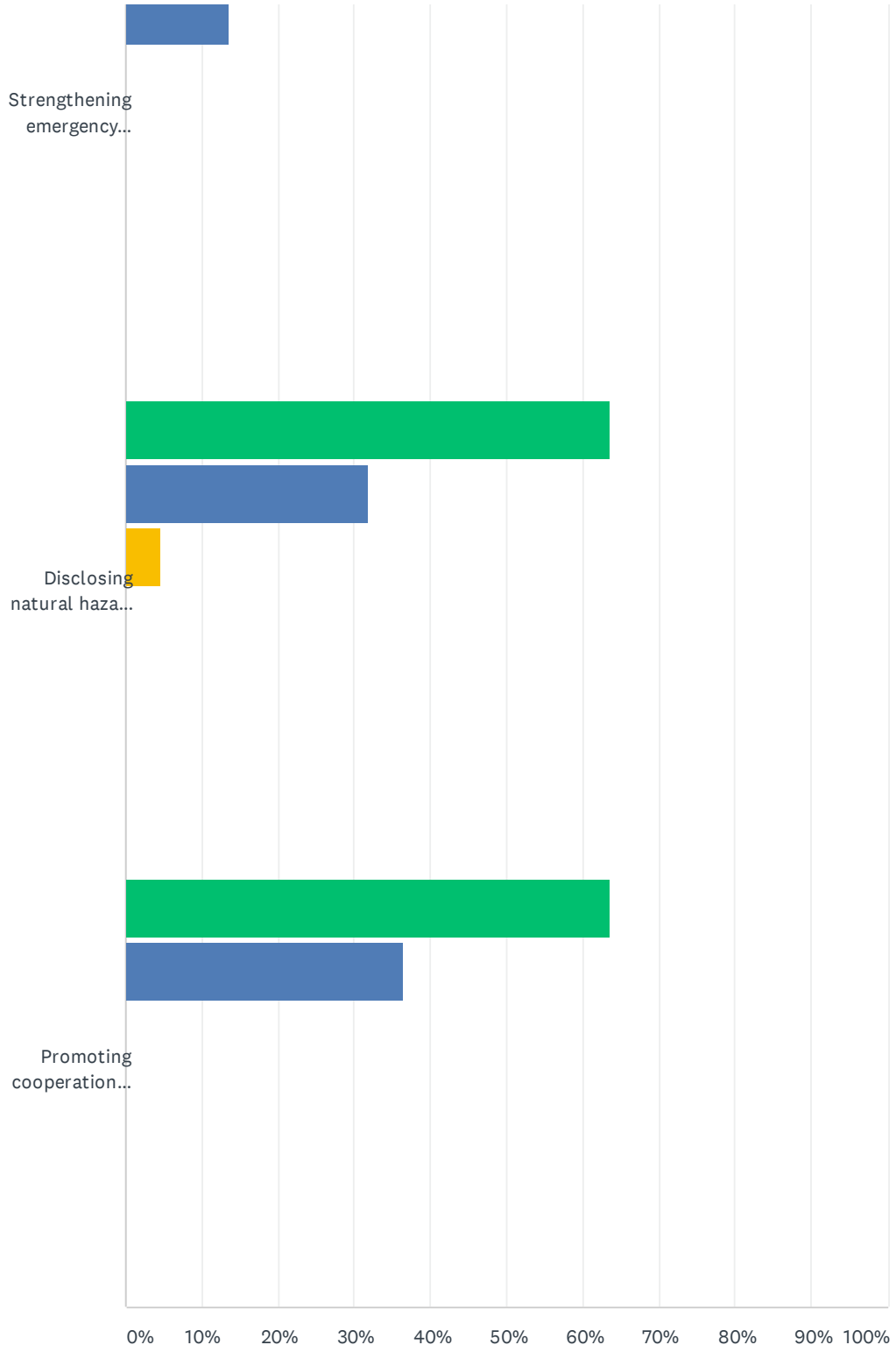
Answered: 22 Skipped: 16



# Public Opinion Survey - Jefferson



# Public Opinion Survey - Jefferson



Very important    Somewhat important    Neither important nor unimportant  
Unimportant    Very unimportant    Don't know

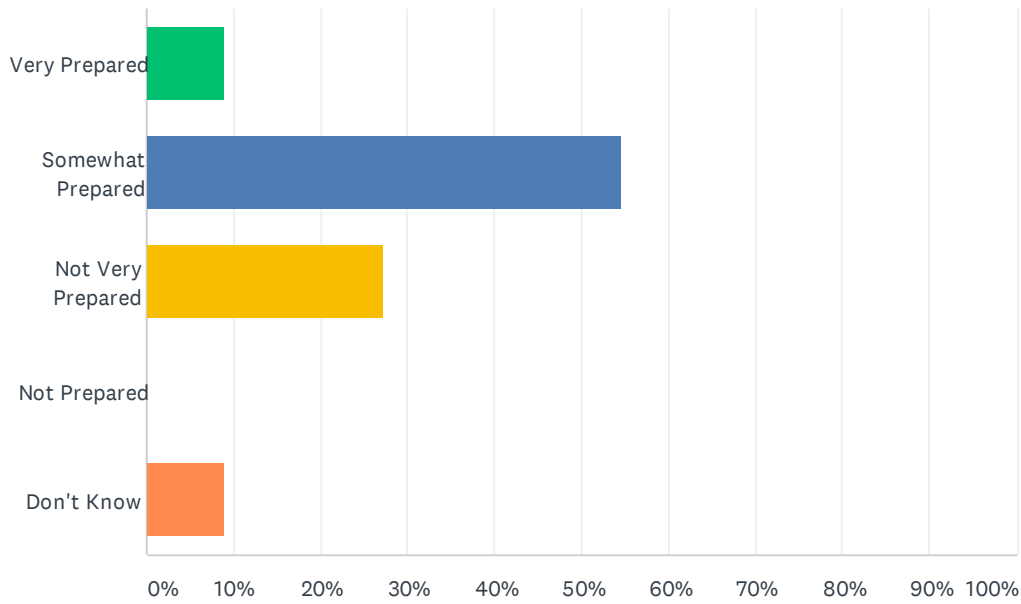


Public Opinion Survey - Jefferson

	VERY IMPORTANT	SOMEWHAT IMPORTANT	NEITHER IMPORTANT NOR UNIMPORTANT	UNIMPORTANT	VERY UNIMPORTANT	DON'T KNOW	TOTAL
Protecting private property	66.67% 14	33.33% 7	0.00% 0	0.00% 0	0.00% 0	0.00% 0	21
Protecting critical facilities (e.g. transportation networks, hospitals, fire stations)	90.91% 20	9.09% 2	0.00% 0	0.00% 0	0.00% 0	0.00% 0	22
Preventing development in hazard areas	45.45% 10	40.91% 9	9.09% 2	4.55% 1	0.00% 0	0.00% 0	22
Enhancing the function of natural features (e.g. streams, wetlands)	63.64% 14	9.09% 2	27.27% 6	0.00% 0	0.00% 0	0.00% 0	22
Protecting historical and cultural landmarks	18.18% 4	59.09% 13	13.64% 3	4.55% 1	4.55% 1	0.00% 0	22
Protecting and reducing damage to utilities	77.27% 17	22.73% 5	0.00% 0	0.00% 0	0.00% 0	0.00% 0	22
Strengthening emergency services (e.g. police, fire, ambulance)	86.36% 19	13.64% 3	0.00% 0	0.00% 0	0.00% 0	0.00% 0	22
Disclosing natural hazard risks during real estate transactions	63.64% 14	31.82% 7	4.55% 1	0.00% 0	0.00% 0	0.00% 0	22
Promoting cooperation among public agencies, citizens, non-profit organizations, and businesses	63.64% 14	36.36% 8	0.00% 0	0.00% 0	0.00% 0	0.00% 0	22

### Q13 In your opinion how prepared is Jefferson County to respond to natural hazard events?

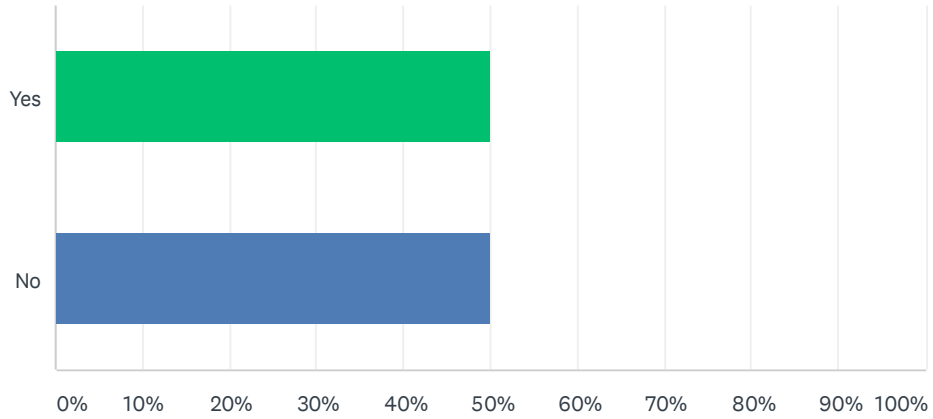
Answered: 22 Skipped: 16



ANSWER CHOICES	RESPONSES
Very Prepared	9.09% 2
Somewhat Prepared	54.55% 12
Not Very Prepared	27.27% 6
Not Prepared	0.00% 0
Don't Know	9.09% 2
<b>TOTAL</b>	<b>22</b>

### Q14 Are you aware of mitigation activities that Jefferson County is taking to reduce individual risk (life or property) from natural hazard events?

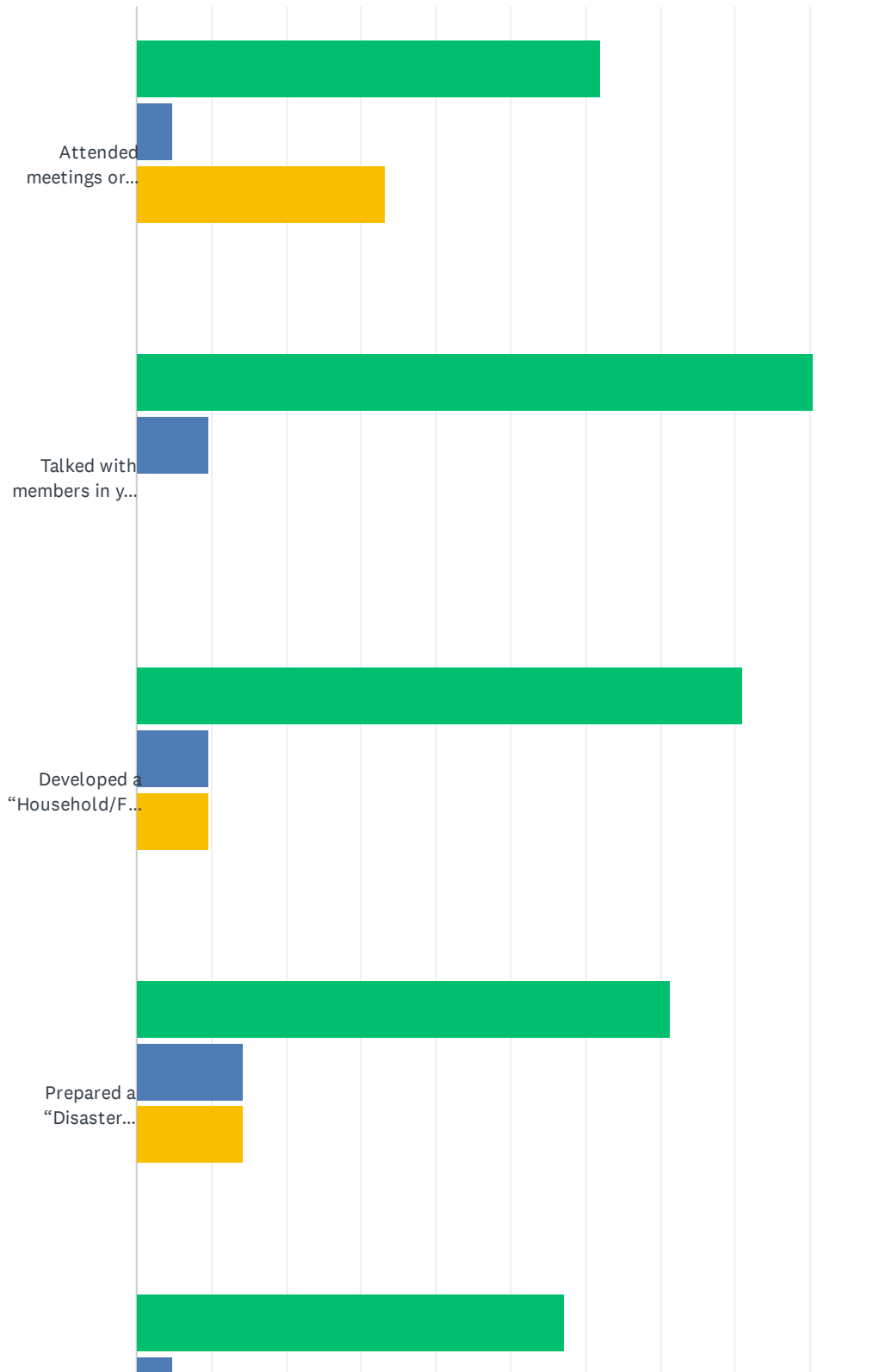
Answered: 22 Skipped: 16



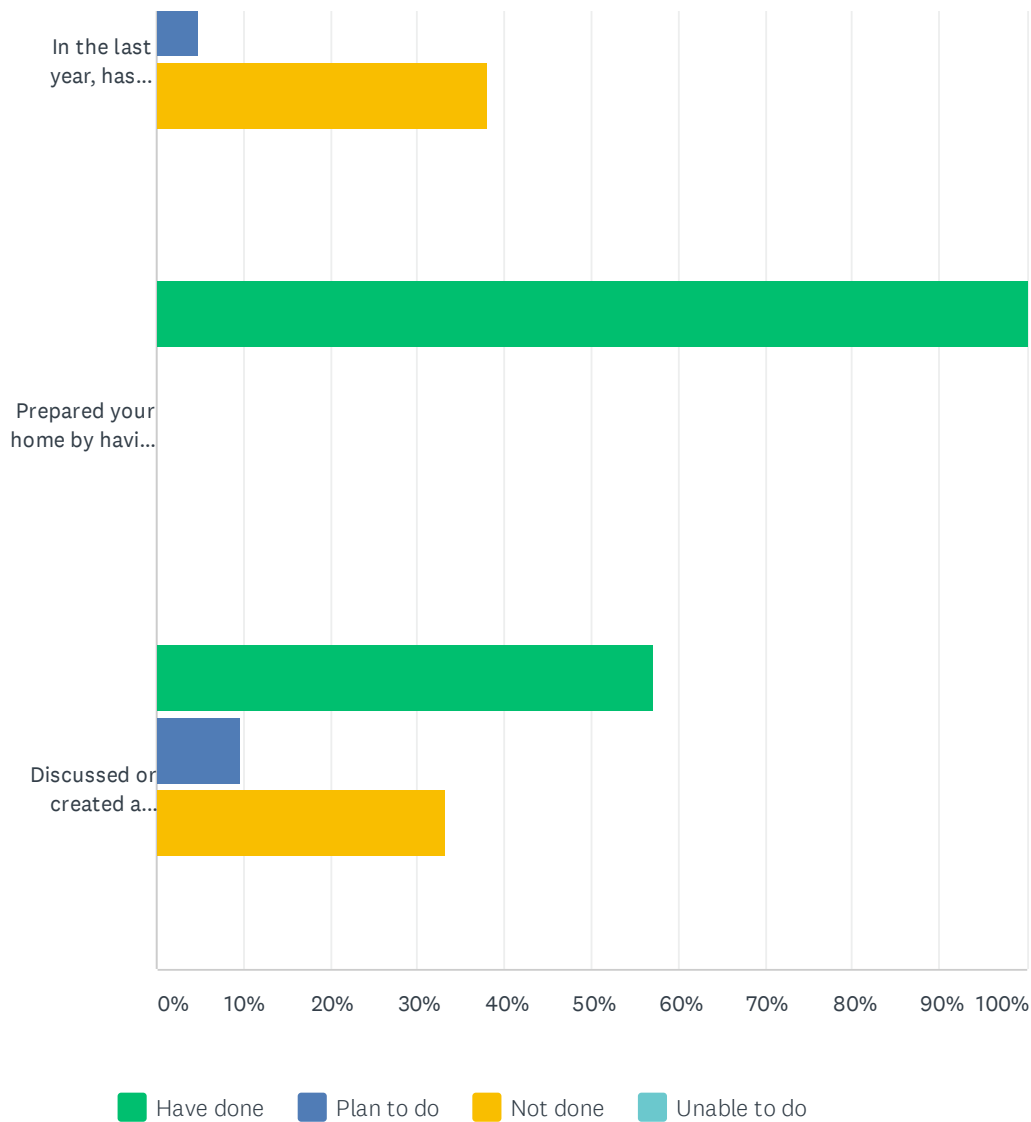
ANSWER CHOICES	RESPONSES	
Yes	50.00%	11
No	50.00%	11
TOTAL		22

Q15 In the following list, please check those activities that you have done in your household, plan to do in the near future, have not done, or are unable to do. (Please check one answer for each preparedness activity)

Answered: 21 Skipped: 17



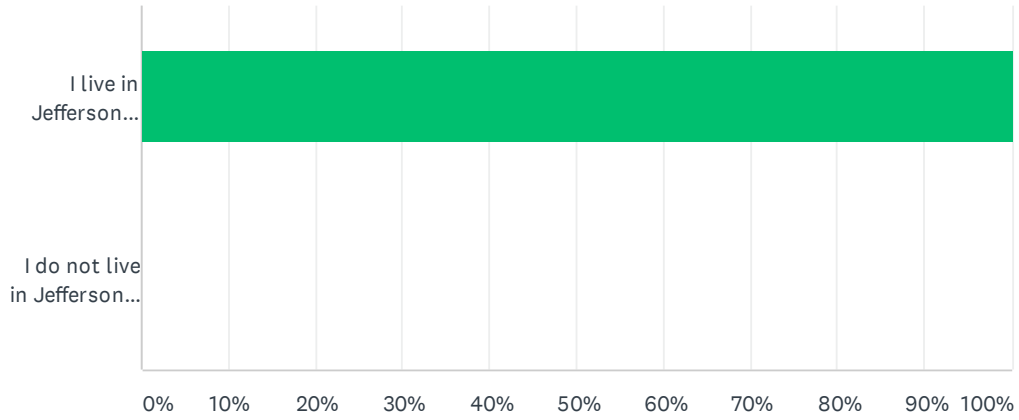
## Public Opinion Survey - Jefferson



	HAVE DONE	PLAN TO DO	NOT DONE	UNABLE TO DO	TOTAL
Attended meetings or received written information on natural disasters or emergency preparedness?	61.90% 13	4.76% 1	33.33% 7	0.00% 0	21
Talked with members in your household about what to do in case of a natural disaster or emergency?	90.48% 19	9.52% 2	0.00% 0	0.00% 0	21
Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster?	80.95% 17	9.52% 2	9.52% 2	0.00% 0	21
Prepared a "Disaster Supply Kit" (Stored extra food, water, batteries, or other emergency supplies)?	71.43% 15	14.29% 3	14.29% 3	0.00% 0	21
In the last year, has anyone in your household been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR)?	57.14% 12	4.76% 1	38.10% 8	0.00% 0	21
Prepared your home by having smoke detectors on each level of the house	100.00% 21	0.00% 0	0.00% 0	0.00% 0	21
Discussed or created a utility shutoff procedure in the event of a natural disaster?	57.14% 12	9.52% 2	33.33% 7	0.00% 0	21

## Q16 Do you live in Jefferson County?

Answered: 17 Skipped: 21



ANSWER CHOICES	RESPONSES	
I live in Jefferson County	100.00%	17
I do not live in Jefferson County	0.00%	0
TOTAL		17

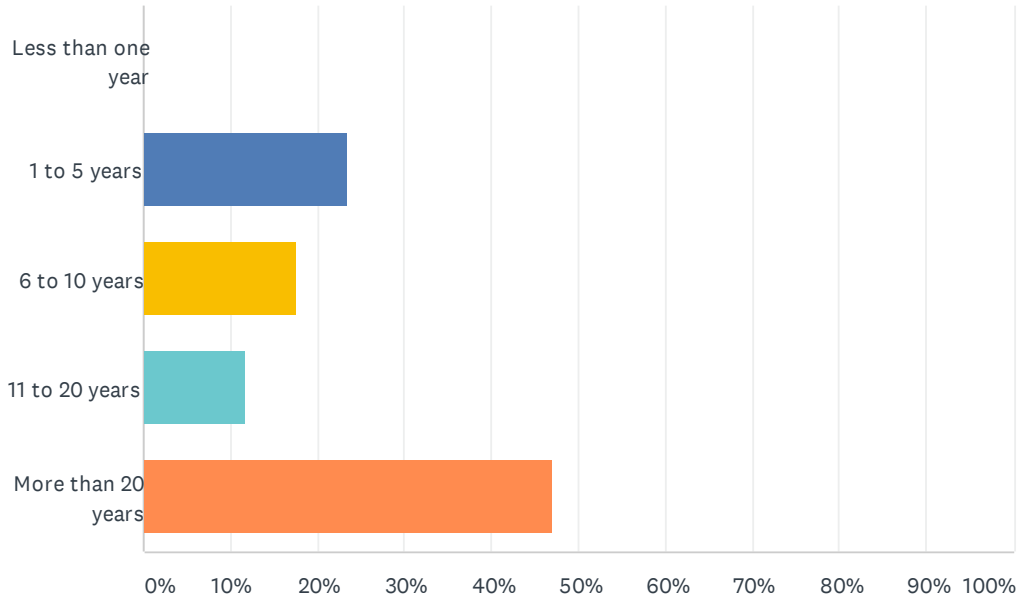
## Q17 Please indicate the zip code of your primary home below:

Answered: 17 Skipped: 21

#	RESPONSES	DATE
1	97741	3/9/2021 2:11 PM
2	97761	3/9/2021 10:38 AM
3	97734	3/8/2021 11:44 AM
4	97741	3/5/2021 9:16 PM
5	97741	3/3/2021 9:14 PM
6	97741	3/2/2021 7:38 PM
7	97734	3/2/2021 9:23 AM
8	97741	2/27/2021 12:49 AM
9	97741	2/26/2021 1:30 AM
10	97741	2/25/2021 9:31 PM
11	97760	2/25/2021 6:01 PM
12	97734	2/25/2021 5:33 PM
13	97741	2/25/2021 3:20 PM
14	97760	2/25/2021 2:59 PM
15	97711	2/25/2021 1:07 PM
16	97741	2/25/2021 12:39 PM
17	97741-9289	2/25/2021 12:38 PM

## Q18 How long have you lived in Jefferson County?

Answered: 17 Skipped: 21

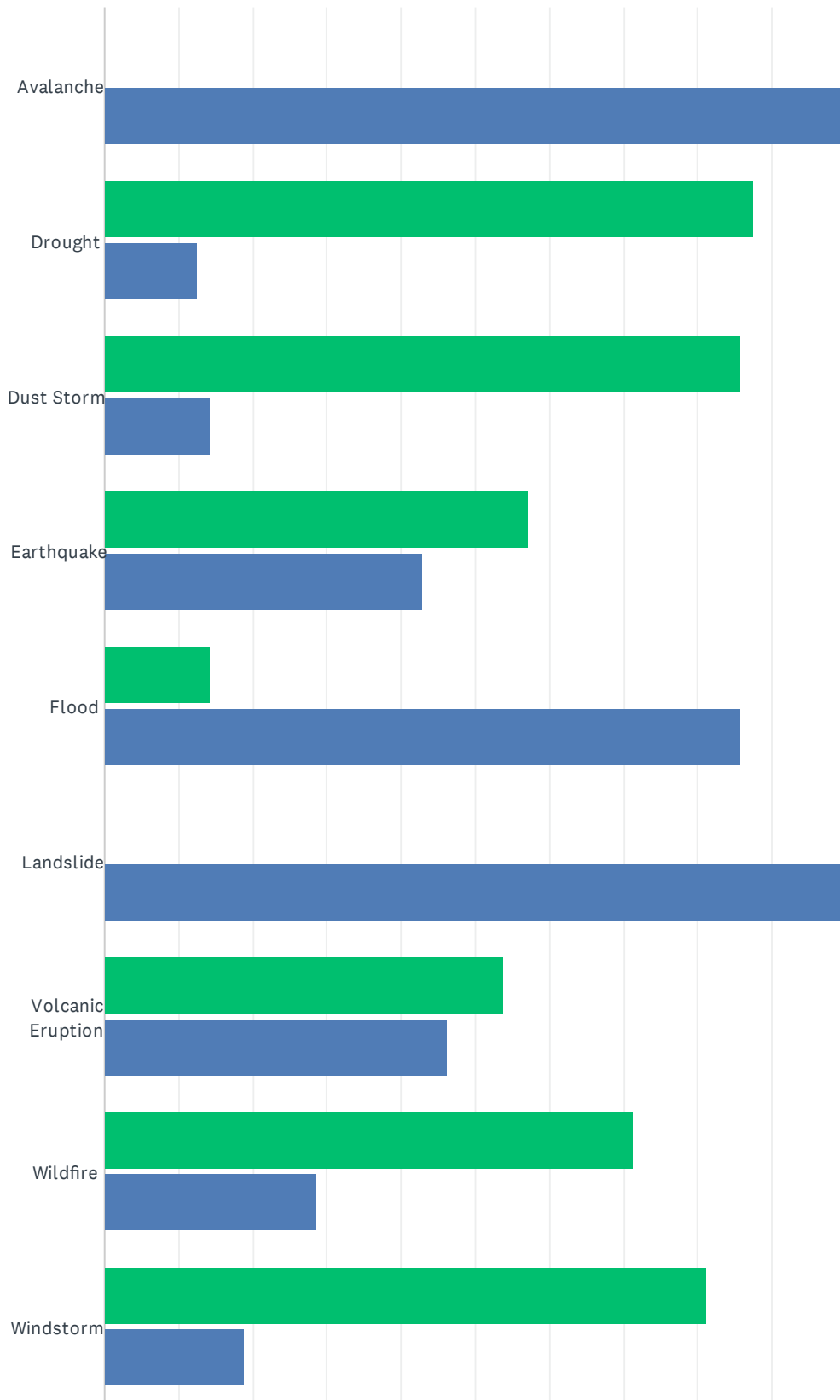


ANSWER CHOICES	RESPONSES
Less than one year	0.00% 0
1 to 5 years	23.53% 4
6 to 10 years	17.65% 3
11 to 20 years	11.76% 2
More than 20 years	47.06% 8
<b>TOTAL</b>	<b>17</b>

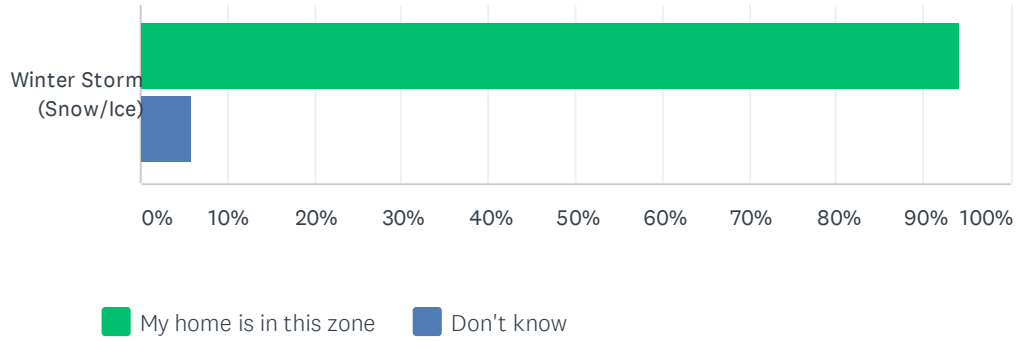


### Q19 Is your primary home located in any of the following hazard zones within Jefferson County? (Please check all that apply.)

Answered: 17 Skipped: 21



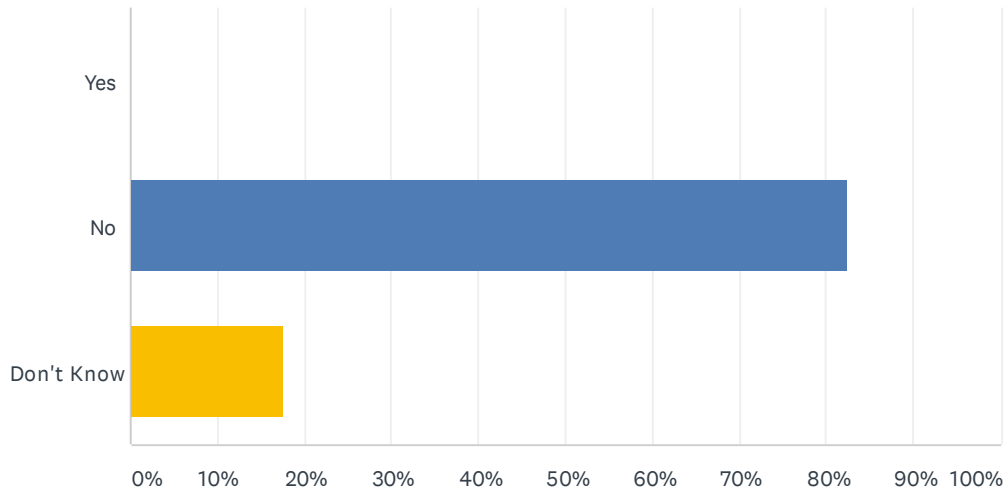
## Public Opinion Survey - Jefferson



	MY HOME IS IN THIS ZONE	DON'T KNOW	TOTAL
Avalanche	0.00% 0	100.00% 6	6
Drought	87.50% 14	12.50% 2	16
Dust Storm	85.71% 12	14.29% 2	14
Earthquake	57.14% 8	42.86% 6	14
Flood	14.29% 1	85.71% 6	7
Landslide	0.00% 0	100.00% 6	6
Volcanic Eruption	53.85% 7	46.15% 6	13
Wildfire	71.43% 10	28.57% 4	14
Windstorm	81.25% 13	18.75% 3	16
Winter Storm (Snow/Ice)	94.12% 16	5.88% 1	17

## Q20 Is your primary home within the Special Flood Hazard Area (SFHA)?

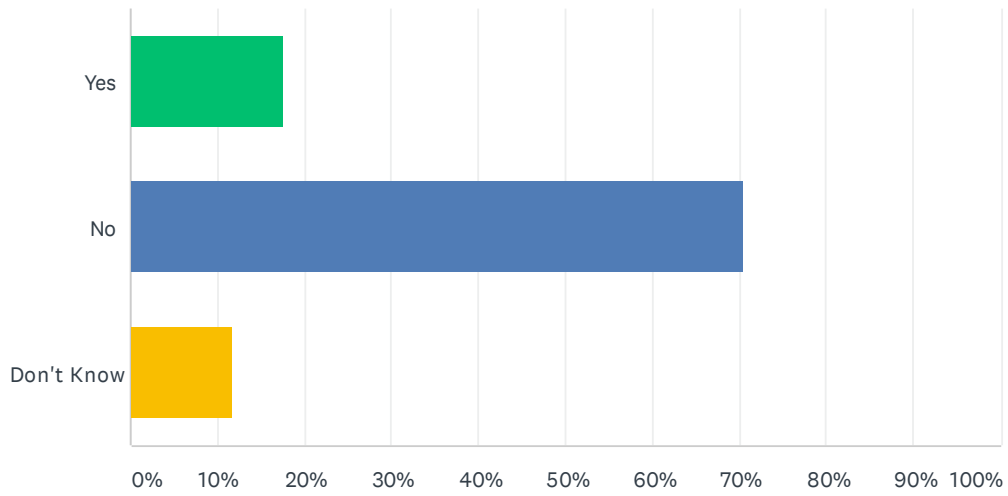
Answered: 17 Skipped: 21



ANSWER CHOICES	RESPONSES	
Yes	0.00%	0
No	82.35%	14
Don't Know	17.65%	3
TOTAL		17

## Q21 Is your primary home currently covered against the flood hazard by a flood insurance policy?

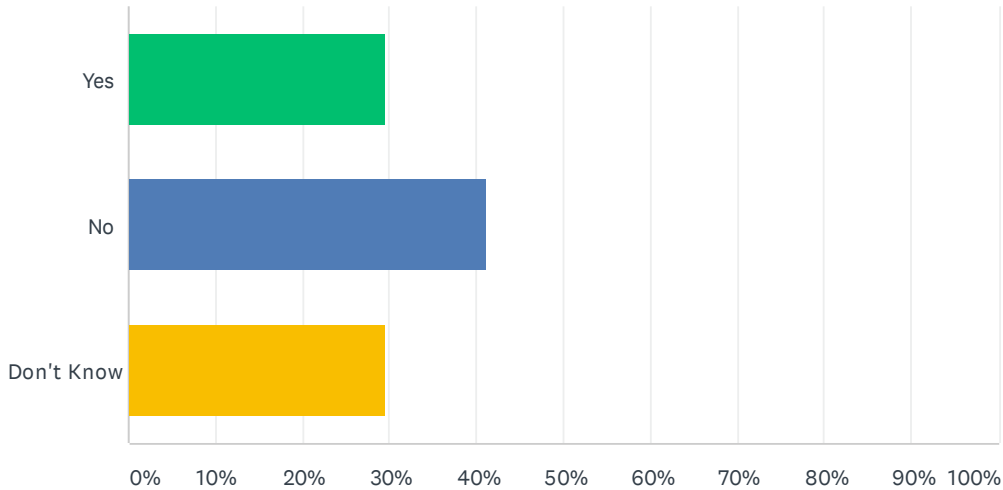
Answered: 17 Skipped: 21



ANSWER CHOICES	RESPONSES	
Yes	17.65%	3
No	70.59%	12
Don't Know	11.76%	2
TOTAL		17

**Q22 The Healthy Forests Restoration Act defines the Wildland Urban Interface (WUI) as an area within the zone of transition between unoccupied land and human development that is at-risk of wildfire. Jefferson County identifies WUI areas within Community Wildfire Protection Plans (CWPPs). Is your primary home within an identified WUI area?**

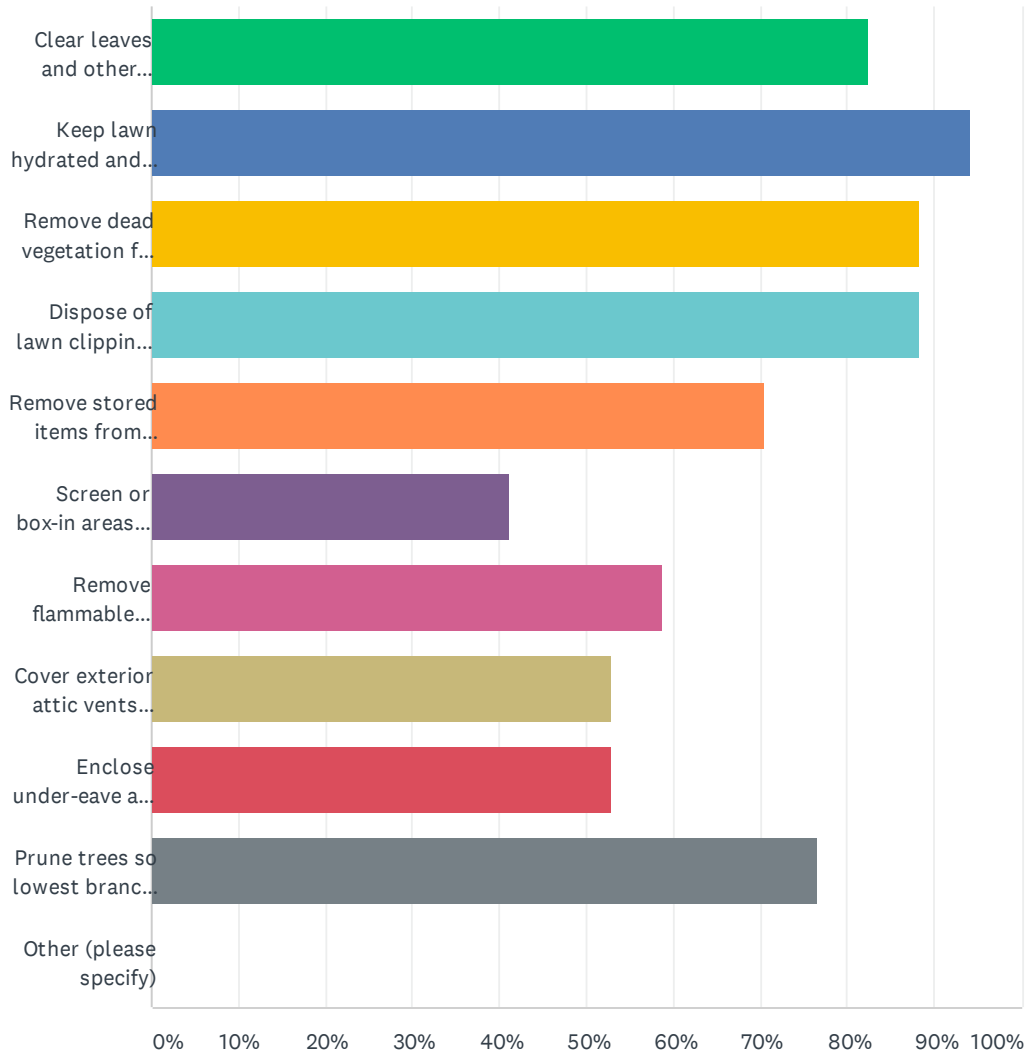
Answered: 17 Skipped: 21



ANSWER CHOICES	RESPONSES	
Yes	29.41%	5
No	41.18%	7
Don't Know	29.41%	5
<b>TOTAL</b>		<b>17</b>

Q23 Cleaning your property of debris and maintaining your landscaping are important first steps to minimize damage and loss due to wildfire. Have you completed any of the following defensible space techniques at your primary home. (Please check all that apply.)

Answered: 17 Skipped: 21



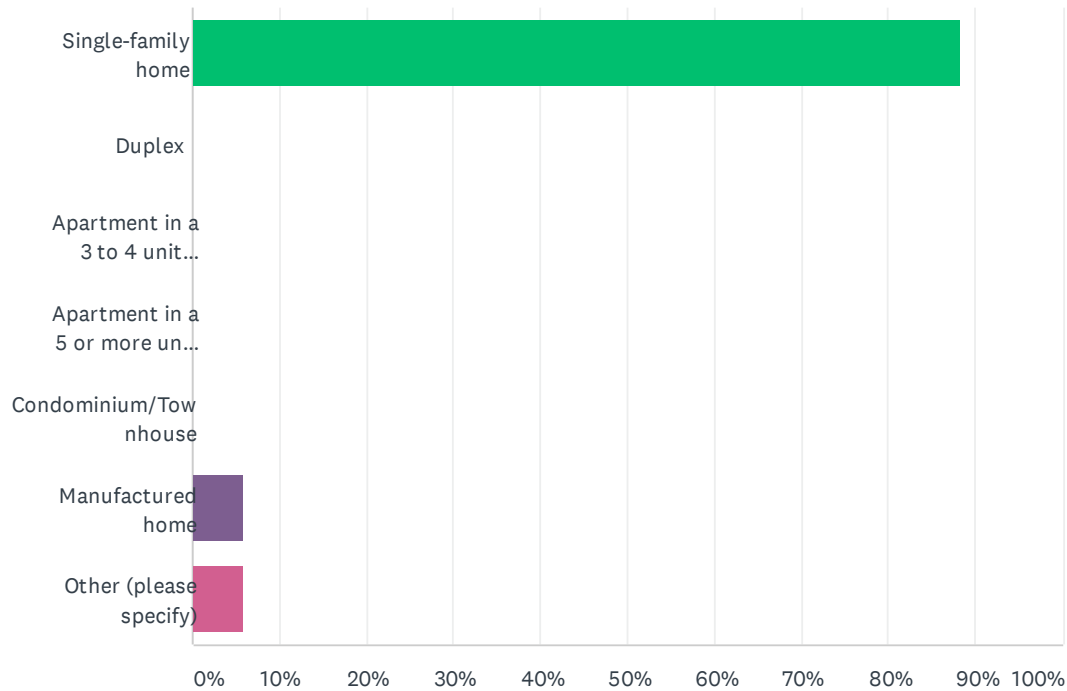
Public Opinion Survey - Jefferson

ANSWER CHOICES	RESPONSES	
Clear leaves and other debris from gutters, eaves, porches, and decks.	82.35%	14
Keep lawn hydrated and maintained (mowed).	94.12%	16
Remove dead vegetation from under deck and/ or from within 10 feet of house.	88.24%	15
Dispose of lawn clippings and other vegetated debris from lawns and planting areas.	88.24%	15
Remove stored items from under decks or porches. Inspect shingles and roof tiles and replace/ repair those that are loose or missing.	70.59%	12
Screen or box-in areas below patios and decks metal with wire mesh to prevent debris and combustible materials from accumulating.	41.18%	7
Remove flammable materials (firewood stacks, propane tanks, dry vegetation) from within 30 feet of your home and outbuildings (garages, sheds).	58.82%	10
Cover exterior attic vents with metal wire mesh to prevent sparks from entering home.	52.94%	9
Enclose under-eave and soffit vents or screen with metal wire mesh to prevent ember entry.	52.94%	9
Prune trees so lowest branches are 6 to 10 feet from the ground.	76.47%	13
Other (please specify)	0.00%	0
Total Respondents: 17		

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

## Q24 Please tell us your primary home type? My Primary Home is a:

Answered: 17 Skipped: 21



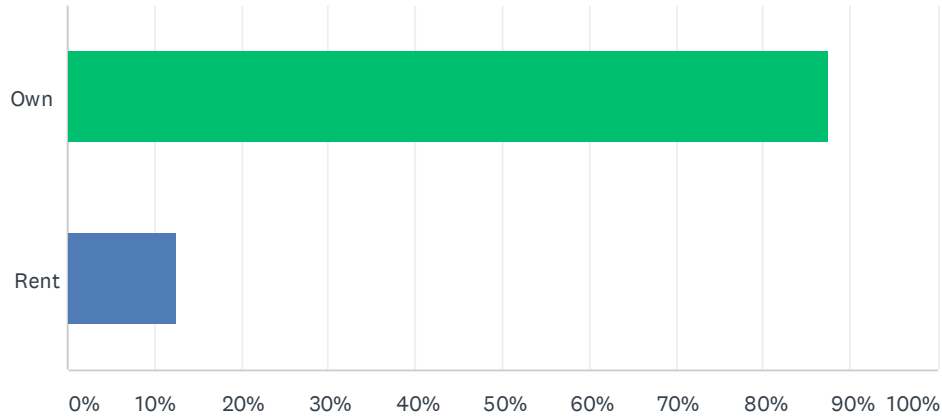
ANSWER CHOICES	RESPONSES	
Single-family home	88.24%	15
Duplex	0.00%	0
Apartment in a 3 to 4 unit structure	0.00%	0
Apartment in a 5 or more unit structure	0.00%	0
Condominium/Townhouse	0.00%	0
Manufactured home	5.88%	1
Other (please specify)	5.88%	1
<b>TOTAL</b>		<b>17</b>

#	OTHER (PLEASE SPECIFY)	DATE
1	Resident managers at storage facility	2/25/2021 2:59 PM



## Q25 Do you own or rent your primary home?

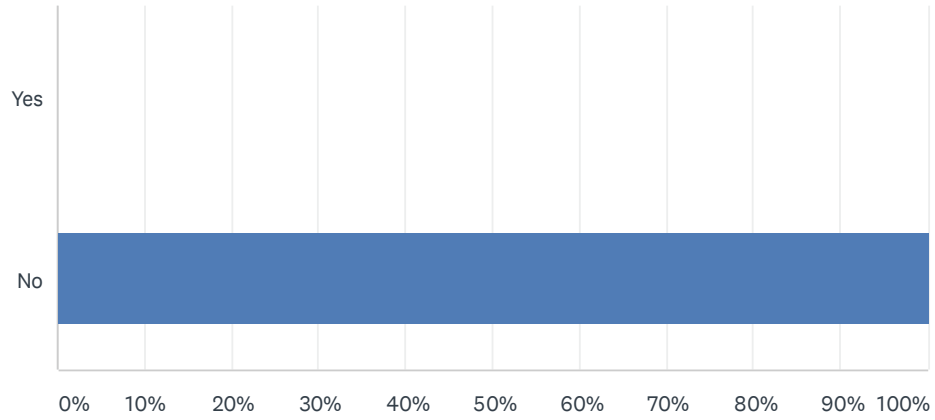
Answered: 16 Skipped: 22



ANSWER CHOICES	RESPONSES	
Own	87.50%	14
Rent	12.50%	2
TOTAL		16

## Q26 Do you own a secondary/vacation home in Jefferson County?

Answered: 17 Skipped: 21



ANSWER CHOICES	RESPONSES	
Yes	0.00%	0
No	100.00%	17
TOTAL		17

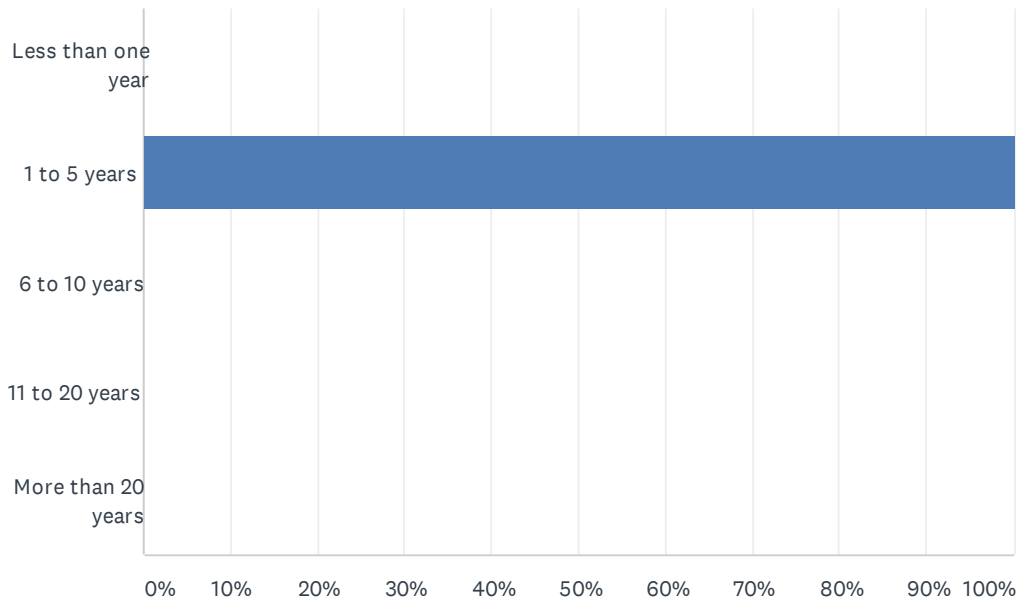
## Q27 Please indicate the zip code of your secondary/vacation home below:

Answered: 3 Skipped: 35

#	RESPONSES	DATE
1	97741	3/9/2021 2:11 PM
2	NA	3/5/2021 9:16 PM
3	97056	3/3/2021 9:14 PM

## Q28 How long have you owned a secondary/vacation home in Jefferson County?

Answered: 1 Skipped: 37



ANSWER CHOICES	RESPONSES
Less than one year	0.00% 0
1 to 5 years	100.00% 1
6 to 10 years	0.00% 0
11 to 20 years	0.00% 0
More than 20 years	0.00% 0
<b>TOTAL</b>	<b>1</b>

## Q29 Is your secondary/vacation home located in any of the following hazard zones within Jefferson County? (Please check all that apply.)

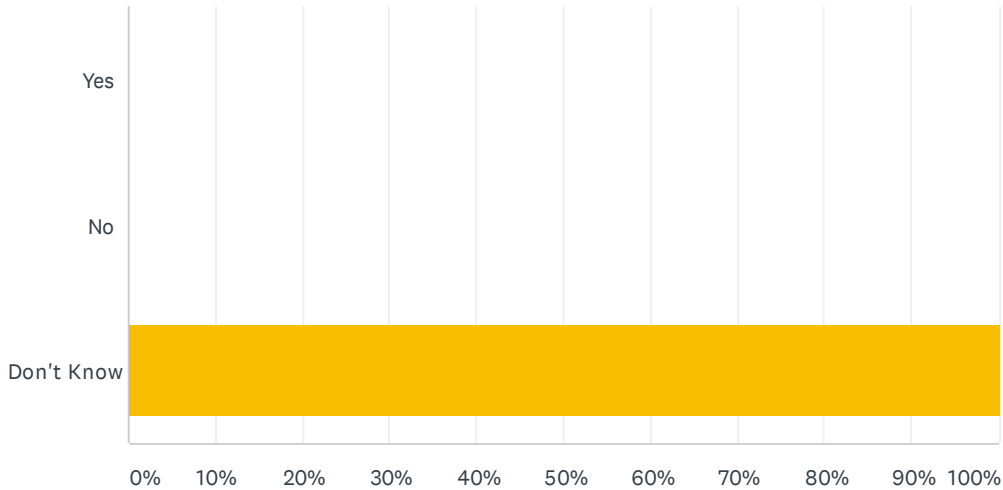
Answered: 0 Skipped: 38

 No matching responses.

	MY SECONDARY HOME IS IN THIS ZONE	DON'T KNOW	TOTAL
Avalanche	0.00% 0	0.00% 0	0
Drought	0.00% 0	0.00% 0	0
Dust Storm	0.00% 0	0.00% 0	0
Earthquake	0.00% 0	0.00% 0	0
Flood	0.00% 0	0.00% 0	0
Landslide	0.00% 0	0.00% 0	0
Volcanic Eruption	0.00% 0	0.00% 0	0
Wildfire	0.00% 0	0.00% 0	0
Windstorm	0.00% 0	0.00% 0	0
Winter Storm (Snow/Ice)	0.00% 0	0.00% 0	0

Q30 The land area covered by the floodwaters of the base flood is the Special Flood Hazard Area (SFHA). The SFHA is the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies. Is your secondary/vacation home within the Special Flood Hazard Area (SFHA) on NFIP maps?

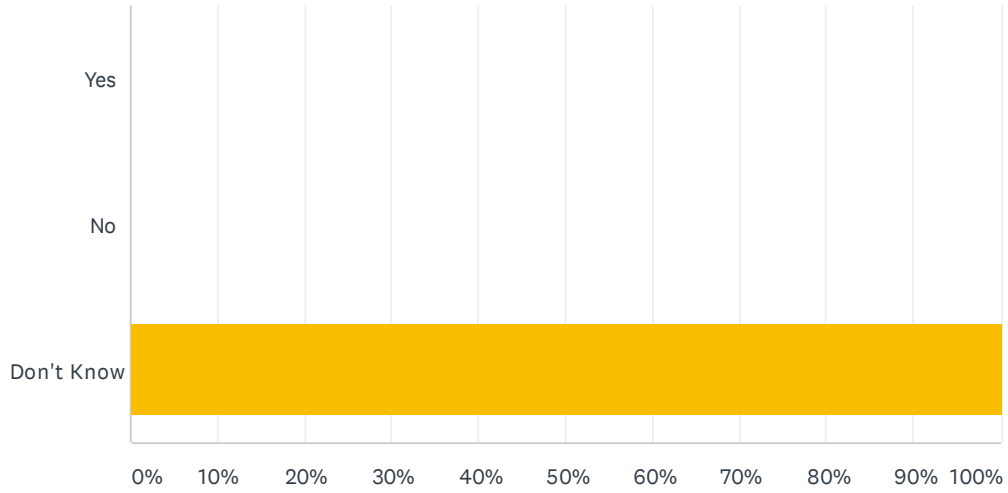
Answered: 2 Skipped: 36



ANSWER CHOICES	RESPONSES	
Yes	0.00%	0
No	0.00%	0
Don't Know	100.00%	2
<b>TOTAL</b>		<b>2</b>

### Q31 Is your secondary/vacation home currently covered against the flood hazard by a flood insurance policy?

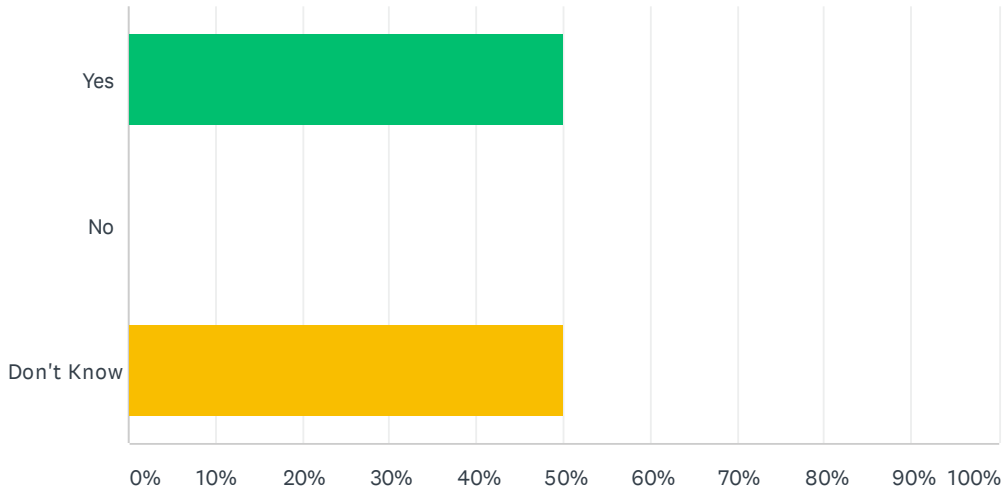
Answered: 1 Skipped: 37



ANSWER CHOICES	RESPONSES
Yes	0.00% 0
No	0.00% 0
Don't Know	100.00% 1
<b>TOTAL</b>	<b>1</b>

Q32 The Healthy Forests Restoration Act defines the Wildland Urban Interface (WUI) as an area within the zone of transition between unoccupied land and human development that is at-risk of wildfire. Jefferson County identifies WUI areas within Community Wildfire Protection Plans (CWPPs). Is your secondary/vacation home within an identified WUI area?

Answered: 2 Skipped: 36

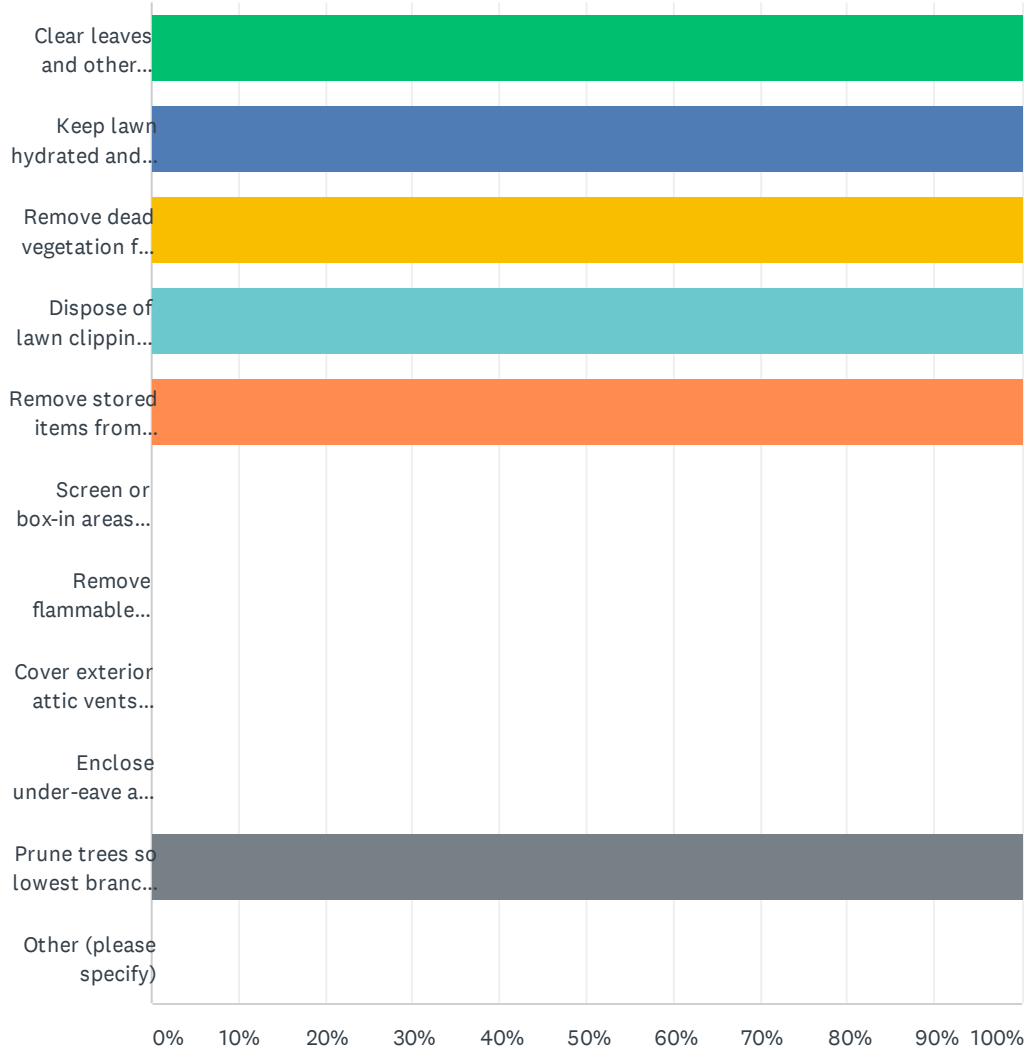


ANSWER CHOICES	RESPONSES	
Yes	50.00%	1
No	0.00%	0
Don't Know	50.00%	1
TOTAL		2



Q33 Cleaning your property of debris and maintaining your landscaping are important first steps to minimize damage and loss due to wildfire. Have you completed any of the following defensible space techniques at your secondary/vacation home? (Please check all that apply.)

Answered: 1 Skipped: 37



Public Opinion Survey - Jefferson

ANSWER CHOICES	RESPONSES	
Clear leaves and other debris from gutters, eaves, porches, and decks.	100.00%	1
Keep lawn hydrated and maintained (mowed).	100.00%	1
Remove dead vegetation from under deck and/ or from within 10 feet of house.	100.00%	1
Dispose of lawn clippings and other vegetated debris from lawns and planting areas.	100.00%	1
Remove stored items from under decks or porches. Inspect shingles and roof tiles and replace/ repair those that are loose or missing.	100.00%	1
Screen or box-in areas below patios and decks metal with wire mesh to prevent debris and combustible materials from accumulating.	0.00%	0
Remove flammable materials (firewood stacks, propane tanks, dry vegetation) from within 30 feet of your home and outbuildings (garages, sheds).	0.00%	0
Cover exterior attic vents with metal wire mesh to prevent sparks from entering home.	0.00%	0
Enclose under-eave and soffit vents or screen with metal wire mesh to prevent ember entry.	0.00%	0
Prune trees so lowest branches are 6 to 10 feet from the ground.	100.00%	1
Other (please specify)	0.00%	0
Total Respondents: 1		

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

## Q34 Please tell us your secondary/vacation home type? My secondary/vacation home is a:

Answered: 0 Skipped: 38

 No matching responses.

ANSWER CHOICES	RESPONSES
Single-family home	0.00% 0
Duplex	0.00% 0
Apartment (3 to 4 units in structure)	0.00% 0
Apartment (5 or more units in structure)	0.00% 0
Condominium/ Townhouse	0.00% 0
Manufactured home	0.00% 0
Other:	0.00% 0
<b>TOTAL</b>	<b>0</b>

## Q35 Do you rent out your secondary/ vacation home?

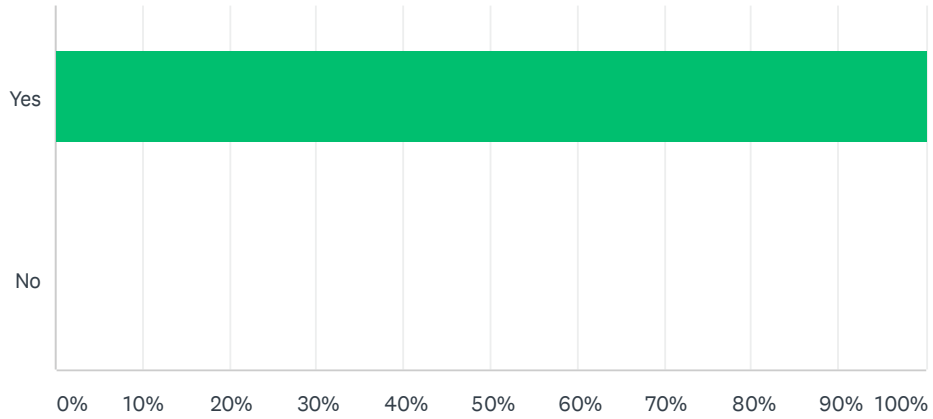
Answered: 0 Skipped: 38

 No matching responses.

ANSWER CHOICES	RESPONSES
Yes	0.00% 0
No	0.00% 0
TOTAL	0

### Q36 Does a property management company manage the rental arrangements for your secondary/vacation home?

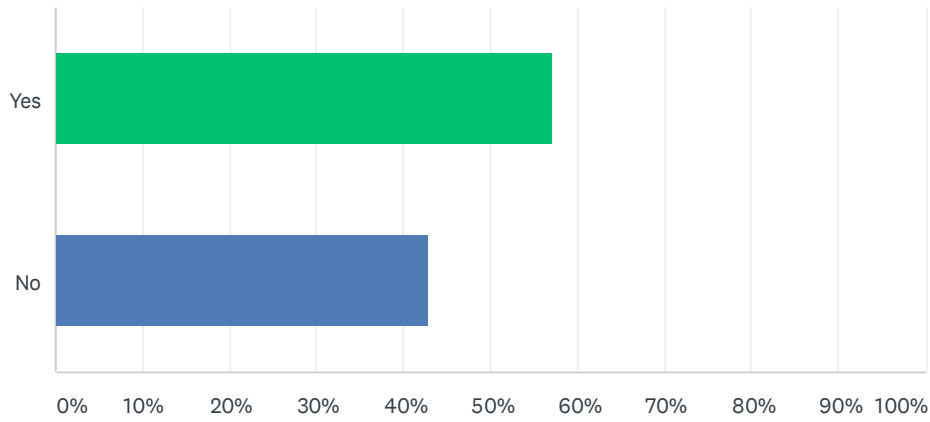
Answered: 1 Skipped: 37



ANSWER CHOICES	RESPONSES	
Yes	100.00%	1
No	0.00%	0
TOTAL		1

### Q37 Do you work in Jefferson County?

Answered: 14 Skipped: 24



ANSWER CHOICES	RESPONSES	
Yes	57.14%	8
No	42.86%	6
TOTAL		14

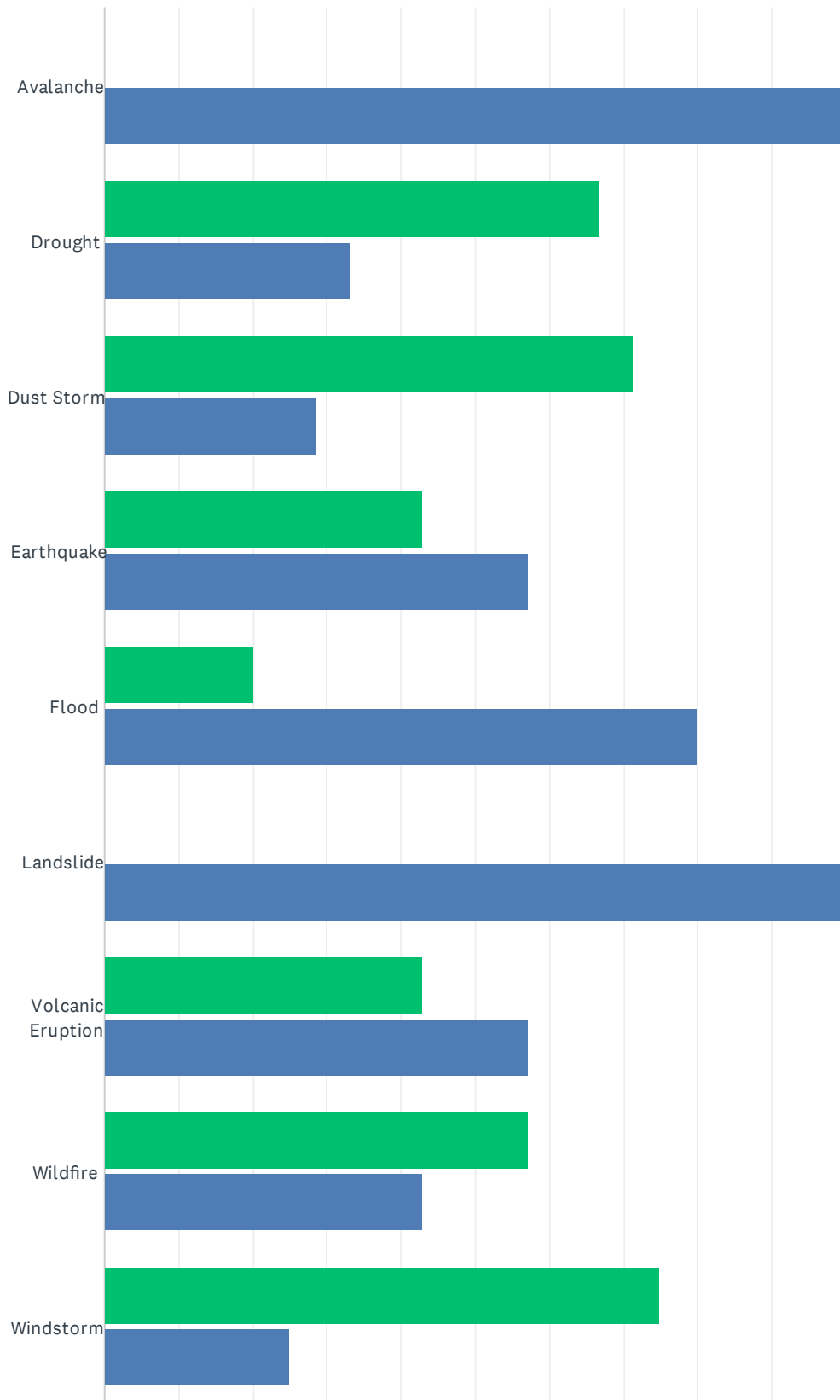
## Q38 Please indicate the zip code of your primary workplace location below:

Answered: 10 Skipped: 28

#	RESPONSES	DATE
1	97741	3/9/2021 2:11 PM
2	97761	3/9/2021 10:38 AM
3	97741	3/5/2021 9:16 PM
4	97051	3/3/2021 9:14 PM
5	97741	3/2/2021 7:38 PM
6	97756	3/2/2021 9:23 AM
7	97741	2/27/2021 12:49 AM
8	97741	2/25/2021 9:31 PM
9	97760	2/25/2021 2:59 PM
10	97741	2/25/2021 12:39 PM

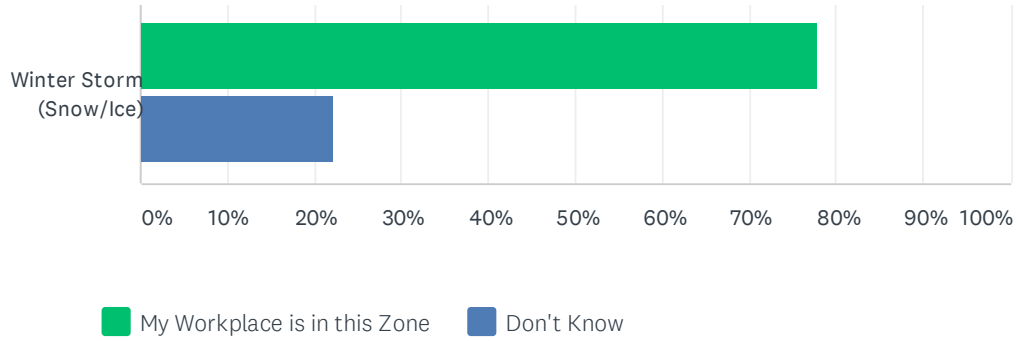
### Q39 Is your primary workplace located in any of the following hazard zones within Jefferson County? (Please check all that apply.)

Answered: 11 Skipped: 27





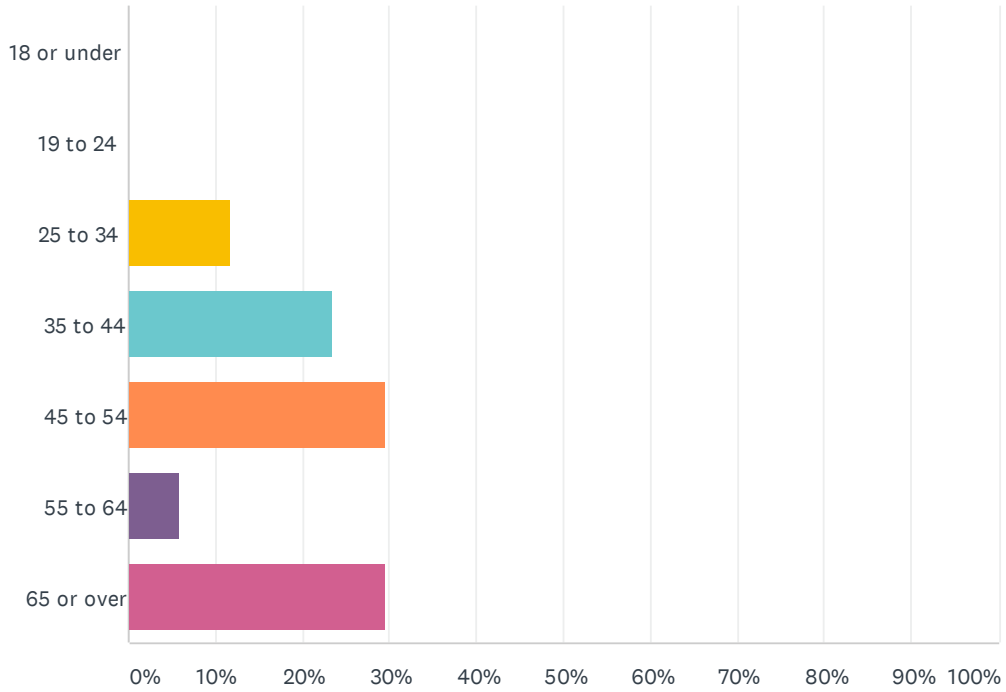
## Public Opinion Survey - Jefferson



	MY WORKPLACE IS IN THIS ZONE	DON'T KNOW	TOTAL
Avalanche	0.00% 0	100.00% 4	4
Drought	66.67% 4	33.33% 2	6
Dust Storm	71.43% 5	28.57% 2	7
Earthquake	42.86% 3	57.14% 4	7
Flood	20.00% 1	80.00% 4	5
Landslide	0.00% 0	100.00% 4	4
Volcanic Eruption	42.86% 3	57.14% 4	7
Wildfire	57.14% 4	42.86% 3	7
Windstorm	75.00% 6	25.00% 2	8
Winter Storm (Snow/Ice)	77.78% 7	22.22% 2	9

## Q40 Please indicate your age:

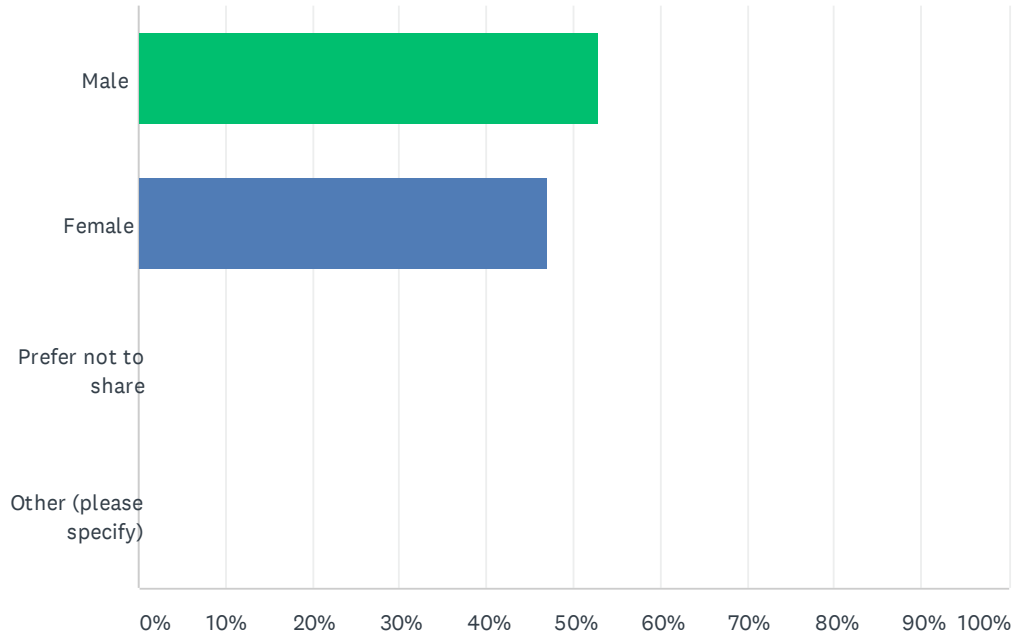
Answered: 17 Skipped: 21



ANSWER CHOICES	RESPONSES
18 or under	0.00% 0
19 to 24	0.00% 0
25 to 34	11.76% 2
35 to 44	23.53% 4
45 to 54	29.41% 5
55 to 64	5.88% 1
65 or over	29.41% 5
<b>TOTAL</b>	<b>17</b>

## Q41 Gender:

Answered: 17 Skipped: 21

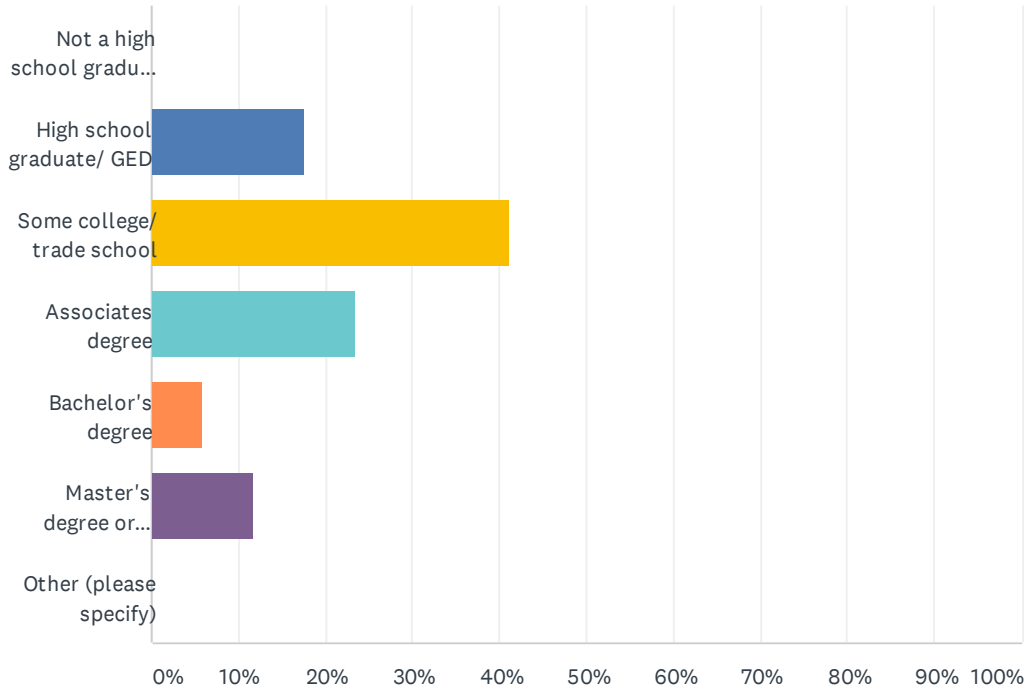


ANSWER CHOICES	RESPONSES	
Male	52.94%	9
Female	47.06%	8
Prefer not to share	0.00%	0
Other (please specify)	0.00%	0
<b>TOTAL</b>		<b>17</b>

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

## Q42 Please indicate your highest level of education:

Answered: 17 Skipped: 21

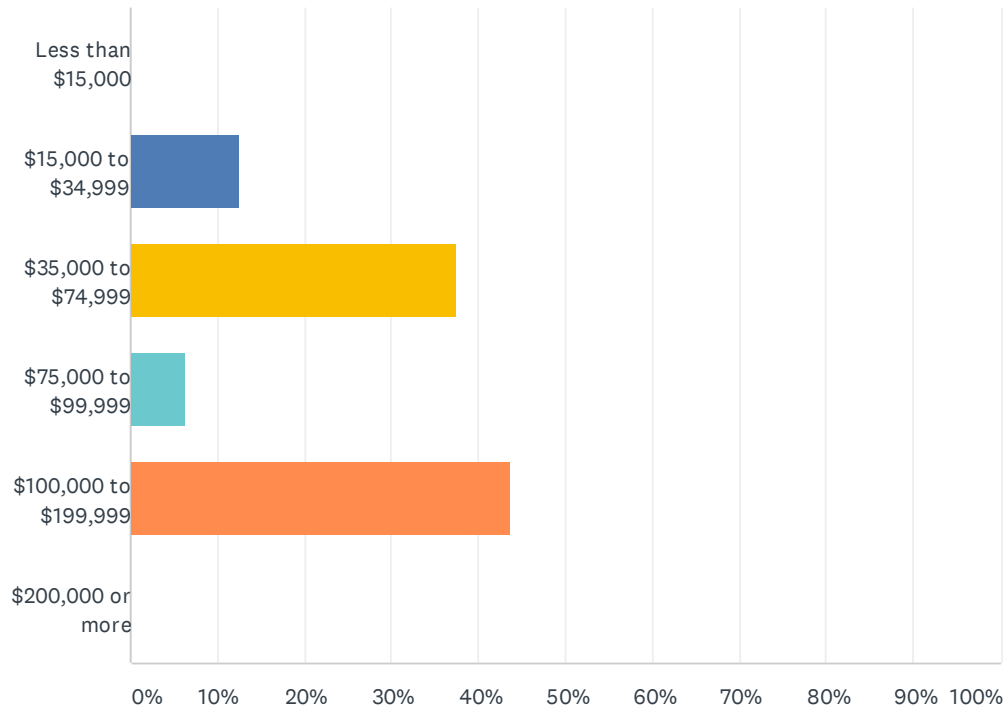


ANSWER CHOICES	RESPONSES
Not a high school graduate	0.00% 0
High school graduate/ GED	17.65% 3
Some college/ trade school	41.18% 7
Associates degree	23.53% 4
Bachelor's degree	5.88% 1
Master's degree or higher	11.76% 2
Other (please specify)	0.00% 0
<b>TOTAL</b>	<b>17</b>

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

## Q43 What is your total household income?

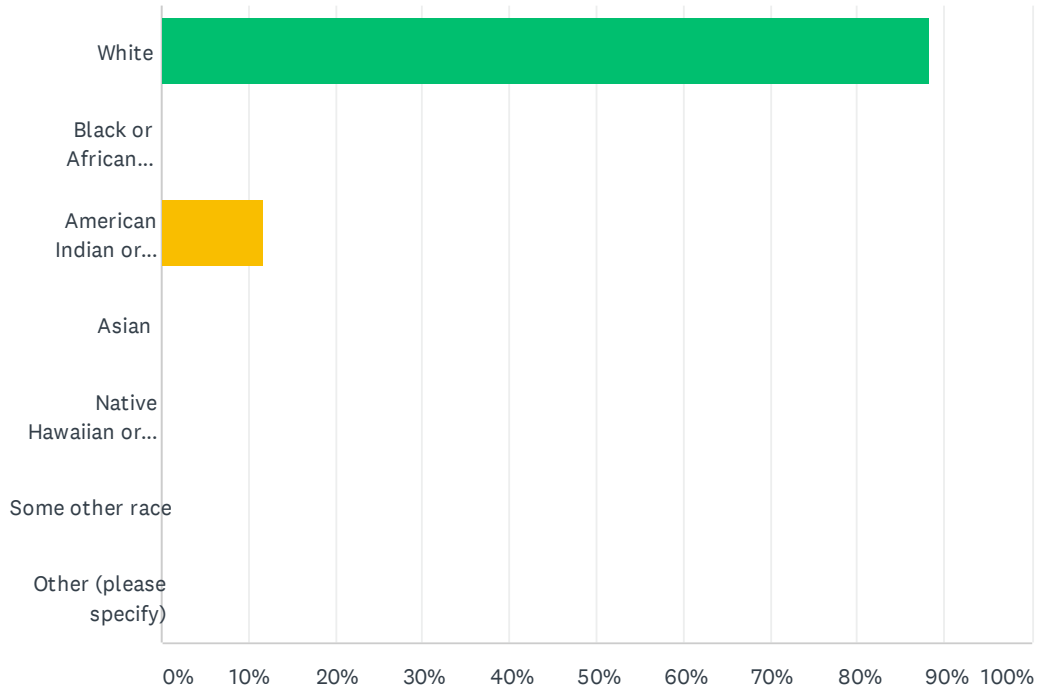
Answered: 16 Skipped: 22



ANSWER CHOICES	RESPONSES	
Less than \$15,000	0.00%	0
\$15,000 to \$34,999	12.50%	2
\$35,000 to \$74,999	37.50%	6
\$75,000 to \$99,999	6.25%	1
\$100,000 to \$199,999	43.75%	7
\$200,000 or more	0.00%	0
<b>TOTAL</b>		<b>16</b>

### Q44 Please specify your race:

Answered: 17 Skipped: 21

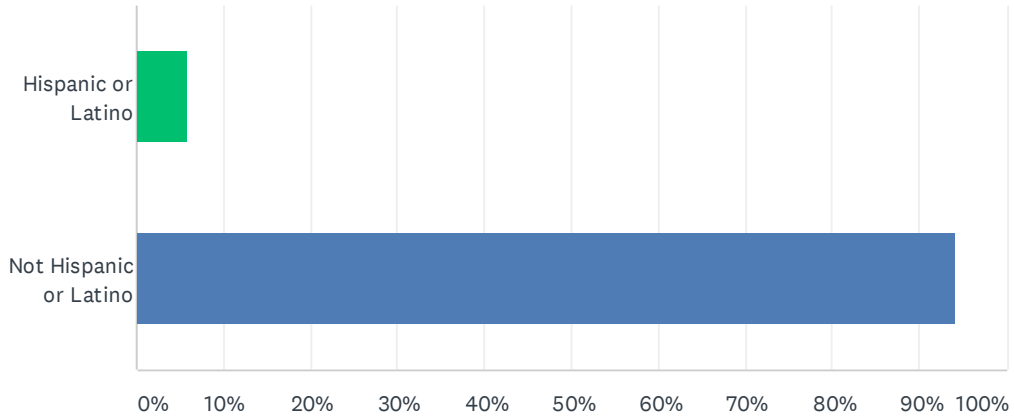


ANSWER CHOICES	RESPONSES	
White	88.24%	15
Black or African American	0.00%	0
American Indian or Alaskan Native	11.76%	2
Asian	0.00%	0
Native Hawaiian or Other Pacific Islander	0.00%	0
Some other race	0.00%	0
Other (please specify)	0.00%	0
<b>TOTAL</b>		<b>17</b>

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

### Q45 Please specify your ethnicity:

Answered: 17 Skipped: 21



ANSWER CHOICES	RESPONSES
Hispanic or Latino	5.88% 1
Not Hispanic or Latino	94.12% 16
TOTAL	17

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



## Public Opinion Survey - Jefferson

**Jefferson County is partnering with the Federal Emergency Management Agency (FEMA) and Central Oregon Intergovernmental Council (COIC) to better understand your, and Jefferson County's, risk to natural hazards and to help reduce that risk.**

**We would like to know your perceptions and opinions regarding the risk of and vulnerability to natural hazards in Jefferson County and its cities. We would also like to know how you reduce the risks and losses from disaster events. The information you provide about vulnerability to natural hazards could help improve coordination of hazard mitigation and risk reduction efforts within the county. If you would like to review the 2013 Jefferson County NHMP, click [here](#).**

**The development and administration of this survey is made possible from funds provided through a Pre-Disaster Mitigation grant provided by FEMA. Your completed survey indicates your willingness to take part in the study. Your participation in this study is voluntary. All individual survey responses are strictly confidential and are for research purposes only.**

## Public Opinion Survey - Jefferson

### NATURAL HAZARD INFORMATION

1. During the past five years, within Jefferson County, have you or someone in your household directly experienced a natural hazard such as a wildfire, severe windstorm, flood, severe winter storm or other type of natural hazard?

Yes

No

2. Which of the following natural hazards have you or someone in your household experienced during the past five years? **(Please check all that apply)**

Avalanche

Flood

Windstorm

Drought

Landslide

Winter Storm (Snow/Ice)

Dust Storm

Volcanic Eruption

Earthquake

Wildfire

Other (please specify)

3. Please indicate your level of concern about the following natural hazards affecting Jefferson County?

	Very Concerned	Somewhat Concerned	Not Very Concerned	Not concerned	Don't know
Avalanche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drought	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dust Storm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Earthquake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Landslide	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Volcanic Eruption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wildfire	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Windstorm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Winter Storm (Snow/Ice)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

4. Have you ever received information about how to make members of your household and your home safer from natural hazards?

- Yes
- No

5. If "YES", how recently?

- Within the last 6 months
- Between 6 and 12 months
- Between 1 and 2 years
- Between 3 and 5 years
- 5 years or more

6. From whom have you received information about how to make members of your household and your home safer from natural disasters? **(Please check all that apply)**

- News media
- University or research institution
- Elected official
- Government agency
- Neighbor/ friend
- Social media (e.g., Facebook, Twitter, etc.)
- Insurance agent or company
- American Red Cross
- Utility company
- Not Sure
- Other (please specify)

7. How much confidence do you have in the following entities regarding their ability to provide you with information about how to make your household and home safer from natural disasters?

	Lots of confidence	Some confidence	Not much confidence	No confidence	Don't know
News media	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FEMA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
State Government	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local Government	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elected Official (please specify below)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National Non-profit (please specify below)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local Non-profit (please specify below)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local Community Leaders (please specify below)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National Utilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local Utilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neighbor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Friend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Yourself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insurance agent or company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
University or research institution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

8. What are the most effective ways for you to receive information about how to make your household and home safer from natural disasters? **(Please check all that apply)**

- Newspaper stories
- Email newsletters
- Mail
- Magazine
- Newspaper ads
- Online news outlets
- Emergency services (police/fire)
- University or research institution
- Television news
- Social media (e.g., Facebook, Twitter) (if other please specify below)
- Fact sheet/ brochure
- Television ads
- Schools
- Chamber of Commerce
- Radio news
- Outdoor advertisements (billboards, etc.)
- Public workshops/ meetings
- Radio ads
- Books
- Other (please specify)

## Public Opinion Survey - Jefferson

### COMMUNITY NATURAL HAZARD MITIGATION STRATEGIES AND PRIORITIES

**In order to assess community risk, we need to understand which community assets may be vulnerable to natural hazards. Vulnerable assets are those community features, characteristics, or resources that may be impacted by natural hazards (e.g. special populations, economic components, environmental resources). The next set of questions will focus on determining what assets in your community are most vulnerable to natural hazards.**

9. Community assets are features, characteristics, or resources that either make a community unique, or allow the community to function. Listed below are categories of community assets followed by potential natural hazard impacts. Please tell us how vulnerable you feel each of the following categories of community assets are to the listed natural hazard impacts in Jefferson County.

	Very vulnerable	Somewhat vulnerable	Not very vulnerable	Not vulnerable	Don't know
Human - Loss of life and/or injuries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Economic - Business closures and/or job losses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infrastructure - Damage or loss of bridges, utilities, schools, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cultural/Historic - Damage or loss of libraries, museums, fairgrounds, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environmental - Damage or loss of forests, rangeland, waterways, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Governance - Ability to maintain order and/or provide public amenities and services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

10. Next we would like to know how important or not important specific types of community assets are to you.  
**(Check the corresponding box for each asset)**

	Very important	Somewhat important	Neither important nor unimportant	Unimportant	Very unimportant	Don't know
Elder-care Facilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Schools (K-12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hospitals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Major Bridges	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fire/Police Stations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Museums/Historic Buildings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Major Employers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Small Businesses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
College / University	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
City Hall / Courthouse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Parks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Highway Mountain Pass	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)



11. Now we would like to know whom you think should be responsible for mitigating the impacts from natural hazards on specific types of community assets. **(Check the corresponding box for each asset; check multiple boxes if you consider it to be a shared responsibility by more than one group.)**

	Public Sector (Government)	Private Sector (Business)	Non-Profit Organizations (NGOs, Churches, Red Cross, etc.)	Individual citizens
Elder-care Facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Schools (K-12)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hospitals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Major Bridges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire/Police Stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Museums/Historic Buildings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Major Employers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Small Businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
College / University	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
City Hall / Courthouse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Highway Mountain Pass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify)

12. Natural hazards can have a significant impact on a community, but planning for these events can help lessen the impacts. The following statements will help determine citizen priorities for planning for natural hazards. Please tell us how important each one is to you.

	Very important	Somewhat important	Neither important nor unimportant	Unimportant	Very unimportant	Don't know
Protecting private property	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Protecting critical facilities (e.g. transportation networks, hospitals, fire stations)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preventing development in hazard areas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhancing the function of natural features (e.g. streams, wetlands)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Protecting historical and cultural landmarks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Protecting and reducing damage to utilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strengthening emergency services (e.g. police, fire, ambulance)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disclosing natural hazard risks during real estate transactions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Promoting cooperation among public agencies, citizens, non-profit organizations, and businesses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. In your opinion how prepared is Jefferson County to respond to natural hazard events?

- Very Prepared
- Somewhat Prepared
- Not Very Prepared
- Not Prepared
- Don't Know

14. Are you aware of mitigation activities that Jefferson County is taking to reduce individual risk (life or property) from natural hazard events?

Yes

No

**MITIGATION & PREPAREDNESS ACTIVITIES IN YOUR HOUSEHOLD**

**Households can mitigate and prepare for natural disaster emergencies in order to prevent damage to property, injuries, and losses of life. The precautions you take and training you receive can make a big difference in your ability to recover from a natural disaster or emergency. Access to basic services, such as electricity, gas, water, telephones and emergency care may be cut off temporarily, or you may have to evacuate at a moment's notice.**

**The following question focuses on your household's preparedness for disaster events.**

15. In the following list, please check those activities that you have done in your household, plan to do in the near future, have not done, or are unable to do. **(Please check one answer for each preparedness activity)**

	Have done	Plan to do	Not done	Unable to do
Attended meetings or received written information on natural disasters or emergency preparedness?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Talked with members in your household about what to do in case of a natural disaster or emergency?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prepared a "Disaster Supply Kit" (Stored extra food, water, batteries, or other emergency supplies)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the last year, has anyone in your household been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prepared your home by having smoke detectors on each level of the house	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discussed or created a utility shutoff procedure in the event of a natural disaster?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Public Opinion Survey - Jefferson

### GENERAL HOUSEHOLD INFORMATION

**Finally, we would appreciate any information you are willing to share with us about you and your household. This information will remain confidential and is for survey comparison purposes only.**

16. Do you live in Jefferson County?

- I live in Jefferson County
- I do not live in Jefferson County

17. Please indicate the zip code of your primary home below:

18. How long have you lived in Jefferson County?

- Less than one year
- 1 to 5 years
- 6 to 10 years
- 11 to 20 years
- More than 20 years

19. Is your primary home located in any of the following hazard zones within Jefferson County? **(Please check all that apply.)**

	My home is in this zone	Don't know
Avalanche	<input type="radio"/>	<input type="radio"/>
Drought	<input type="radio"/>	<input type="radio"/>
Dust Storm	<input type="radio"/>	<input type="radio"/>
Earthquake	<input type="radio"/>	<input type="radio"/>
Flood	<input type="radio"/>	<input type="radio"/>
Landslide	<input type="radio"/>	<input type="radio"/>
Volcanic Eruption	<input type="radio"/>	<input type="radio"/>
Wildfire	<input type="radio"/>	<input type="radio"/>
Windstorm	<input type="radio"/>	<input type="radio"/>
Winter Storm (Snow/Ice)	<input type="radio"/>	<input type="radio"/>

Other (please specify)

The land area covered by the floodwaters of the base flood is the Special Flood Hazard Area (SFHA). The SFHA is the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies.

20. Is your primary home within the Special Flood Hazard Area (SFHA)?

- Yes
- No
- Don't Know

21. Is your primary home currently covered against the flood hazard by a flood insurance policy?

- Yes
- No
- Don't Know

Just a few inches of water from a flood can cause tens of thousands of dollars in damage. From 2008 to 2012, the average residential flood claim amounted to more than \$38,000. Flood insurance is the best way to protect yourself from devastating financial loss.

Flood insurance is available to homeowners, renters, condo owners/renters, and commercial owners/renters. Costs vary depending on how much insurance is purchased, what it covers and the property's flood risk.

All policy forms provide coverage for buildings and contents. However, you might want to discuss insuring personal property with your agent, since contents coverage is optional. Typically, there's a 30-day waiting period from date of purchase before your policy goes into effect. That means now is the best time to buy flood insurance.

To learn more visit the NFIP Homeowners webpage by clicking the Flood Smart Link provided [here](#) and at the end of this survey.

22. The Healthy Forests Restoration Act defines the Wildland Urban Interface (WUI) as an area within the zone of transition between unoccupied land and human development that is at-risk of wildfire. Jefferson County identifies WUI areas within Community Wildfire Protection Plans (CWPPs).

**Is your primary home within an identified WUI area?**

- Yes
- No
- Don't Know

23. Cleaning your property of debris and maintaining your landscaping are important first steps to minimize damage and loss due to wildfire.

**Have you completed any of the following defensible space techniques at your primary home. (Please check all that apply.)**

- Clear leaves and other debris from gutters, eaves, porches, and decks.
- Keep lawn hydrated and maintained (mowed).
- Remove dead vegetation from under deck and/ or from within 10 feet of house.
- Dispose of lawn clippings and other vegetated debris from lawns and planting areas.
- Remove stored items from under decks or porches. Inspect shingles and roof tiles and replace/ repair those that are loose or missing.
- Screen or box-in areas below patios and decks metal with wire mesh to prevent debris and combustible materials from accumulating.
- Remove flammable materials (firewood stacks, propane tanks, dry vegetation) from within 30 feet of your home and outbuildings (garages, sheds).
- Cover exterior attic vents with metal wire mesh to prevent sparks from entering home.
- Enclose under-eave and soffit vents or screen with metal wire mesh to prevent ember entry.
- Prune trees so lowest branches are 6 to 10 feet from the ground.
- Other (please specify)



**About the Firewise Communities Program**

Brush, grass and forest fires don't have to be disasters. The National Fire Protection Association's (NFPA) Firewise Communities Program encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. Firewise is a key component of Fire Adapted Communities – a collaborative approach that connects all those who play a role in wildfire education, planning and action with comprehensive resources to help reduce risk.

The program is co-sponsored by the USDA Forest Service, the US Department of the Interior, and the National Association of State Foresters.

To learn more visit the Firewise Communities webpage by clicking the link provided [here](#) and at the end of this survey.

24. Please tell us your primary home type?

My Primary Home is a:

- Single-family home
- Duplex
- Apartment in a 3 to 4 unit structure
- Apartment in a 5 or more unit structure
- Condominium/Townhouse
- Manufactured home
- Other (please specify)

25. Do you own or rent your primary home?

- Own
- Rent

26. Do you own a secondary/vacation home in Jefferson County?

- Yes
- No

27. Please indicate the zip code of your secondary/vacation home below:

28. How long have you owned a secondary/vacation home in Jefferson County?

- Less than one year
- 1 to 5 years
- 6 to 10 years
- 11 to 20 years
- More than 20 years

29. Is your secondary/vacation home located in any of the following hazard zones within Jefferson County?  
**(Please check all that apply.)**

	My Secondary Home is in this Zone	Don't know
Avalanche	<input type="radio"/>	<input type="radio"/>
Drought	<input type="radio"/>	<input type="radio"/>
Dust Storm	<input type="radio"/>	<input type="radio"/>
Earthquake	<input type="radio"/>	<input type="radio"/>
Flood	<input type="radio"/>	<input type="radio"/>
Landslide	<input type="radio"/>	<input type="radio"/>
Volcanic Eruption	<input type="radio"/>	<input type="radio"/>
Wildfire	<input type="radio"/>	<input type="radio"/>
Windstorm	<input type="radio"/>	<input type="radio"/>
Winter Storm (Snow/Ice)	<input type="radio"/>	<input type="radio"/>

Other (please specify)

30. The land area covered by the floodwaters of the base flood is the Special Flood Hazard Area (SFHA). The SFHA is the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies.

**Is your secondary/vacation home within the Special Flood Hazard Area (SFHA) on NFIP maps?**

- Yes
- No
- Don't Know

31. Is your secondary/vacation home currently covered against the flood hazard by a flood insurance policy?

- Yes
- No
- Don't Know

Just a few inches of water from a flood can cause tens of thousands of dollars in damage. From 2008 to 2012, the average residential flood claim amounted to more than \$38,000. Flood insurance is the best way to protect yourself from devastating financial loss. Flood insurance is available to homeowners, renters, condo owners/renters, and commercial owners/renters. Costs vary depending on how much insurance is purchased, what it covers and the property's flood risk.

All policy forms provide coverage for buildings and contents. However, you might want to discuss insuring personal property with your agent, since contents coverage is optional. Typically, there's a 30-day waiting period from date of purchase before your policy goes into effect. That means now is the best time to buy flood insurance.

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32. The Healthy Forests Restoration Act defines the Wildland Urban Interface (WUI) as an area within the zone of transition between unoccupied land and human development that is at-risk of wildfire. Jefferson County identifies WUI areas within Community Wildfire Protection Plans (CWPPs).

**Is your secondary/vacation home within an identified WUI area?**

- Yes
- No
- Don't Know

33. Cleaning your property of debris and maintaining your landscaping are important first steps to minimize damage and loss due to wildfire.

**Have you completed any of the following defensible space techniques at your secondary/vacation home? (Please check all that apply.)**

- Clear leaves and other debris from gutters, eaves, porches, and decks.
- Keep lawn hydrated and maintained (mowed).
- Remove dead vegetation from under deck and/ or from within 10 feet of house.
- Dispose of lawn clippings and other vegetated debris from lawns and planting areas.
- Remove stored items from under decks or porches. Inspect shingles and roof tiles and replace/ repair those that are loose or missing.
- Screen or box-in areas below patios and decks metal with wire mesh to prevent debris and combustible materials from accumulating.
- Remove flammable materials (firewood stacks, propane tanks, dry vegetation) from within 30 feet of your home and outbuildings (garages, sheds).
- Cover exterior attic vents with metal wire mesh to prevent sparks from entering home.
- Enclose under-eave and soffit vents or screen with metal wire mesh to prevent ember entry.
- Prune trees so lowest branches are 6 to 10 feet from the ground.
- Other (please specify)

**About the Firewise Communities Program**

Firewise Communities Program encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. Firewise is a key component of Fire Adapted Communities – a collaborative approach that connects all those who play a role in wildfire education, planning and action with comprehensive resources to help reduce risk.

The program is co-sponsored by the USDA Forest Service, the US Department of the Interior, and the National Association of State Foresters.

To learn more visit the Firewise Communities webpage by clicking the link provided [here](#) and at the end of this survey.

34. Please tell us your secondary/vacation home type? My secondary/vacation home is a:

- Single-family home
- Duplex
- Apartment (3 to 4 units in structure)
- Apartment (5 or more units in structure)
- Condominium/ Townhouse
- Manufactured home
- Other:

35. Do you rent out your secondary/ vacation home?

- Yes
- No

36. Does a property management company manage the rental arrangements for your secondary/vacation home?

- Yes
- No

37. Do you work in Jefferson County?

- Yes
- No

38. Please indicate the zip code of your primary workplace location below:

39. Is your primary workplace located in any of the following hazard zones within Jefferson County? (Please check all that apply.)

	My Workplace is in this Zone	Don't Know
Avalanche	<input type="radio"/>	<input type="radio"/>
Drought	<input type="radio"/>	<input type="radio"/>
Dust Storm	<input type="radio"/>	<input type="radio"/>
Earthquake	<input type="radio"/>	<input type="radio"/>
Flood	<input type="radio"/>	<input type="radio"/>
Landslide	<input type="radio"/>	<input type="radio"/>
Volcanic Eruption	<input type="radio"/>	<input type="radio"/>
Wildfire	<input type="radio"/>	<input type="radio"/>
Windstorm	<input type="radio"/>	<input type="radio"/>
Winter Storm (Snow/Ice)	<input type="radio"/>	<input type="radio"/>

Other (please specify)

40. Please indicate your age:

- |                                   |                                  |
|-----------------------------------|----------------------------------|
| <input type="radio"/> 18 or under | <input type="radio"/> 45 to 54   |
| <input type="radio"/> 19 to 24    | <input type="radio"/> 55 to 64   |
| <input type="radio"/> 25 to 34    | <input type="radio"/> 65 or over |
| <input type="radio"/> 35 to 44    |                                  |

41. Gender:

- Male
- Female
- Prefer not to share
- Other (please specify)

42. Please indicate your highest level of education:

- Not a high school graduate
- High school graduate/ GED
- Some college/ trade school
- Associates degree
- Bachelor's degree
- Master's degree or higher
- Other (please specify)

43. What is your total household income?

- Less than \$15,000
- \$15,000 to \$34,999
- \$35,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$199,999
- \$200,000 or more

44. Please specify your race:

- White
- Black or African American
- American Indian or Alaskan Native
- Asian
- Native Hawaiian or Other Pacific Islander
- Some other race
- Other (please specify)

45. Please specify your ethnicity:

- Hispanic or Latino
- Not Hispanic or Latino

For more information on Flood Insurance please visit official National Flood Insurance Program website: <https://www.floodsmart.gov>

For more information on the Firewise Program please visit the program website: <http://firewise.org>

46. If you would like to receive emails from Jefferson County to stay updated on the progress of the update of their Natural Hazards Mitigation Plan, Community Wildfire Protection Plans, local preparedness activities/ information, and/ or other natural hazards related information please provide your contact information below:

First Name:	<input type="text"/>
Last Name:	<input type="text"/>
Email:	<input type="text"/>
Phone:	<input type="text"/>
Address:	<input type="text"/>
City:	<input type="text"/>
State:	<input type="text"/>
Zipcode:	<input type="text"/>

47. Please feel free to provide any additional comments in the space provided:

**THANK YOU VERY MUCH FOR PROVIDING THIS INFORMATION!**

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



**El condado de Jefferson se asoció con el Federal Emergency Management Agency, FEMA, (La agencia federal administradora de emergencia, FEMA por sus siglas en inglés) y el Central Oregon Intergovernmental Council, COIC (Concilio intergubernamental del centro de Oregón, COIC por sus siglas en inglés) para entenderlo mejor a usted y el riesgo del condado Jefferson a desastres naturales y así ayudar a reducir ese riesgo.**

**Queremos saber su percepción y opinión en cuanto al riesgo y vulnerabilidad a los desastres en el condado Jefferson y sus ciudades. Deseamos también saber cómo reducir el riesgo y las pérdidas en los eventos catastróficos. La información que usted provea acerca de la vulnerabilidad a los desastres naturales pudiera ayudar a mejorar la coordinación para mitigación de catástrofes y los esfuerzos para reducir el riesgo del condado. Si desea ver el Plan de mitigación para los desastres naturales de 2013, haga clic [aquí](#).**

**El desarrollo y administración de esta encuesta es posible por los fondos provistos a través del subsidio para la mitigación antes de un desastre brindado por FEMA. El completar esta encuesta indica su voluntad en tomar parte en este estudio. Su participación en este estudio es voluntaria. Todas las respuestas a las encuestas individuales son estrictamente confidenciales y son solo con el propósito de investigación.**

## INFORMACIÓN DE DESASTRES NATURALES

1. ¿Durante los pasados cinco años, en el condado Jefferson alguien en su hogar o usted han experimentados directamente un desastre natural como incendios forestales, una tormenta severa, inundación, vientos severos u otros tipos de desastre natural?

- Sí
- No

2. ¿Cuál de los siguientes desastres naturales usted o alguien en su hogar han experimentado durante los pasados cinco años en el condado Jefferson? **Por favor, marque todos los que apliquen.**

- Avalancha
- Sequia
- Tormenta de arena
- Terremoto
- Inundación
- Deslave
- Erupción volcánica
- Incendios forestales
- Tormenta de viento
- Tormenta invernal (nieve/hielo)
- Otros (por favor especifique)

3. Por favor indique ¿Cuál es su nivel de preocupación sobre los siguientes desastres naturales que afecten al condado Jefferson?

	Muy preocupado	Algo preocupado	No muy preocupado	No preocupado	No se
Avalancha	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sequia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tormenta de arena	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Terremoto	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inundación	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Deslave	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Erupción volcánica	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fuegos forestales	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tormenta de viento	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tormenta invernal (nieve/hielo)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Otros (por favor especifique)

4. ¿Ha usted recibido alguna vez información sobre cómo hacer que los miembros de su hogar y su vivienda estén más seguros de los desastres naturales?

- Sí
- No

5. Si respondió Si, ¿Qué tan reciente?

- En los últimos 6 meses
- Entre 6 y 12 meses
- Entre 1 y 2 años
- Entre 3 y 5 años
- 5 años o más

6. ¿De quién ha recibido información sobre cómo hacer que los miembros de su hogar y su casa estén más seguros ante los desastres naturales?

- Noticieros
- Universidades o Instituciones de investigación
- Oficiales electos
- Agencias del gobierno
- Vecinos/amigos
- Social media (Ejm.: Facebook, Twitter, etc.)
- Agentes o compañías de seguros
- La Cruz Roja
- las Compañías de servicios públicos
- No estoy seguro
- Otro (Por favor especifique)

7. ¿Qué tanta confianza tiene usted en las siguientes entidades en cuanto a su habilidad en proveerle información acerca de cómo hacer a su hogar y vivienda más seguros ante los desastres naturales?

	Mucha confianza	Algo de confianza	No mucha confianza	Nada de confianza	No sé
Social media	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FEMA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gobierno estatal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gobierno local	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Oficiales electos (Por favor especifique abajo)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organizaciones nacionales sin ánimo de lucro (por favor especifique abajo)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Líderes locales de la comunidad (por favor especifique)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Servicios públicos locales	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vecinos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amigos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usted mismo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Agentes y compañías de seguros	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Universidades o instituciones de investigación	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Servicios nacionales	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Otros (por favor especifique).

8. ¿Para usted cuáles son las formas más efectivas para recibir información acerca de cómo hacer su hogar y vivienda más segura ante los desastres naturales? **Por favor, marque todos los que apliquen.**

- Historias de periódicos
- Cartas por email
- Correo
- Magazine
- Avisos en periódicos
- Canales de noticias por internet
- Servicios de emergencia (policía/bomberos)
- Universidades o instituciones de investigación
- Noticias por televisión
- Social media (Ejm: Facebook, Twitter) (por favor especifique bajo)
- Notas con hechos reales/cuadernillos
- Avisos de televisión
- Escuela
- Cámaras de comercio
- Noticieros radiales
- Avisos en lugares al aire libre (vallas publicitarias, etc.)
- Reuniones/talleres públicos
- Avisos por radio
- Libros
- Otros (por favor especifique)

## ESTRATEGIAS Y PRIORIDADES COMUNITARIAS DE MITIGACION A DESASTRES NATURALES

Para medir el riesgo de la comunidad, necesitamos entender cuales de los activos de la comunidad pudieran ser vulnerables a los desastres naturales.

Los activos vulnerables son las características o los recursos que pudieran ser impactados por los desastres naturales (por ejemplo: las poblaciones especiales, los componentes económicos, los recursos naturales). El paso siguiente grupo de preguntas se enfocara en determinar cuáles activos en su comunidad son mas vulnerables a los desastres naturales.

9. Los activos de la comunidad son funciones, características o recursos que igual hacen de la comunidad única o permiten que funcione la comunidad. A continuación, están enlistadas las categorías de los activos de la comunidad seguidos de los potenciales impactos de los desastres naturales. Por favor, díganos que tan vulnerable siente cada una de las siguientes categorías de los activos que son listados de acuerdo al impacto del desastre natural en el condado Jefferson.

	Muy vulnerable	Algo vulnerable	Not muy vulnerable	Nada vulnerable	No sé
Humanos: Perdida de vida y/o lesiones.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Economía: Cierre de negocios y/o pérdida de trabajos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infraestructura: Daño o pérdida de puentes, servicios públicos, escuelas, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cultura/historia: Daño o perdida de bibliotecas, museos, centros de exposiciones o ferias, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medio ambiente: Daño o perdida de bosques, pastizales, vías fluviales, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gobierno: Habilidad para mantener el orden y/o las comodidades y servicios públicos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Otros (por favor especifique)	<input type="text"/>				

10. Ahora, nosotros queremos saber que tan importante o no, son algunos de los tipos específicos de activos de la comunidad. **(Chequee el cuadrado correspondiente para cada activo)**

	Muy importante	Algo importante	Ni importante ni no importante	No importante	Sin ninguna importancia	No sé
Centros de cuidados para adultos mayores	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
escuelas (de kínder a grado 12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hospitales	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Puentes principales	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Estaciones de bomberos/policías	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Edificios de museos/históricos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mayores empleadores	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pequeños negocios	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Colegios/universidades	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alcaldías/cortes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Parques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Autopistas en pasos de montañas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Otros (por favor especifique)



11. Ahora queremos saber ¿Quién piensa usted que debería ser responsable por la mitigación de los impactos por desastres naturales en los tipos específicos de activos de la comunidad? **(Chequee el cuadrado para cada activo, chequee varios cuadrados si usted considera que sea responsable por más de un grupo)**

	Sector público (gobierno)	sector privado (negocios)	organizaciones sin ánimo de lucro (ONGs, iglesias, la Cruz roja, etc.)	ciudadanos individuales
Ancianatos o centros para adultos mayores	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
escuelas (desde kínder hasta el grado 12)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hospitales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
puentes principales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
estaciones de bomberos/policía	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
edificios de museos/históricos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mayores empleadores	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pequeños negocios	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
colegios/universidades	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
alcaldías/cortes de justicia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
parques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
autopistas en pasos de montañas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

otros (por favor especifique)



13. En su opinión ¿Qué tan preparado está el condado Jefferson para responder a un evento de desastre natural?

- Muy preparado
- Algo preparado
- No muy preparado
- No preparado
- No sé

14. ¿Está usted consiente de las actividades de mitigación que el condado Jefferson está tomando para reducir el riesgo individual, de vida o propiedad, a eventos de desastre natural?

- Sí
- No

## ACTIVIDADES DE MITIGACIÓN Y PREPARACIÓN EN SU HOGAR

Los hogares pueden mitigar y prepararse para emergencias por desastres naturales en para prevenir daños a la propiedad, lesiones y pérdidas de vida. Las precauciones que usted tome y el entrenamiento que usted reciba puede ser la gran diferencia en su habilidad para recuperarse de un desastre natural o una emergencia. El acceso a servicios básicos como la electricidad, el gas, el agua, el teléfono y el cuidado de emergencia, puede interrumpirse temporalmente o pudiera usted tener que evacuar al aviso momentáneo. Las siguientes preguntas se enfocan en la preparación de su hogar ante eventos de desastre.

15. En la siguiente lista, por favor marque aquellas actividades que usted ha realizado en su hogar, planea hacer en un futuro cercano, no ha hecho, o estoy inhabilitado hacer **(por favor cheque una respuesta para cada actividad de preparación)**

	Lo he hecho	Lo planeo hacer	No lo he hecho	No lo puedo hacer
¿Ha asistido a reuniones o ha recibido información escrita sobre desastres naturales o preparación para desastres?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
¿Ha hablado con miembros de su hogar sobre que hacer en caso de desastre natural o emergencia?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
¿Ha desarrollado un "Plan de emergencia del hogar/familiar" para decidir que es lo que cada uno debería hacer en el evento de un desastre?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
¿Ha preparado un "Kit de suministros para desastre" (Almacenado comida extra, agua, pilas o suministros de emergencia)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
¿En el último año alguien en su hogar se ha entrenado en primeros auxilios o resucitación cardíaca pulmonar?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
¿Ha preparado a su hogar teniendo detectores de humo en cada nivel de su casa?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
¿Ha discutido o creado un procedimiento ante la interrupción de los servicios públicos en el evento de un desastre natural?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## INFORMACIÓN GENERAL DEL HOGAR

Finalmente, queremos apreciar cualquier información que usted este dispuesto a compartir con nosotros acerca de usted y su hogar. Esta información permanecerá confidencial y tiene el único propósito de ser una encuesta de sondeo.

16. ¿Vive usted en el condado Jefferson?

- Vivo en el condado Jefferson.
- No, yo no vivo en el condado Jefferson.

17. Por favor indique a continuación el código postal de su hogar principal:

18. ¿Por cuánto tiempo ha vivido en el condado Jefferson?

- Menos de un año
- de 1 a 5 años
- de 6 a 10 años
- de 11 a 20 años
- más de 20 años

19. ¿Está su casa principal localizada en una de las siguientes zonas de peligro dentro del condado Jefferson? **(Por favor marque todos los que aplican).**

	Mi casa está en esta zona	No sé
Avalancha	<input type="radio"/>	<input type="radio"/>
Sequia	<input type="radio"/>	<input type="radio"/>
Tormenta de arena	<input type="radio"/>	<input type="radio"/>
Terremoto	<input type="radio"/>	<input type="radio"/>
Inundación	<input type="radio"/>	<input type="radio"/>
Deslave	<input type="radio"/>	<input type="radio"/>
Erupción volcánica	<input type="radio"/>	<input type="radio"/>
Incendios forestales	<input type="radio"/>	<input type="radio"/>
Tormentas de viento	<input type="radio"/>	<input type="radio"/>
Tormentas invernales (nieve/hielo)	<input type="radio"/>	<input type="radio"/>

Otro (por favor especifique)

20. El área de la tierra cubierta es la base de inundación por aguas desbordadas en el Special Flood Hazard Area, SFHA (Área especial en peligro de inundación). El SFHA es el área donde el Programa nacional de seguros por inundación (National Flood Insurance Program's, NFIP's), de la administración de llanuras aluviales debe hacer cumplir las regulaciones y es el área donde aplica la compra obligatoria del seguro para inundación. ¿Esta su casa principal en un Área de peligro por inundación especial, SFHA?

- Sí
- No
- No sé

21. ¿Está su casa principal actualmente cubierta ante el peligro de inundación por una póliza de seguro para inundación?

- Sí
- No
- No sé

Unas cuantas pulgadas de agua por inundación pueden causar decenas de miles de dolos en daños. Desde el 2008 al 2012, el promedio de la cantidad de reclamos residenciales por inundación es más de \$38,000. El seguro por inundación es la mejor forma de protegerse a si mismo de las pérdidas financieras devastadoras.

El seguro por inundación esta disponible a propietarios de casas, arrendatarios, propietarios de condominios/arrendatarios. El costo varía dependiendo cuanto seguro se compra, cuanto cubre y el riesgo por inundación de la propiedad.

Todas las formas de pólizas proveen cobertura a edificios y contenidos. Sin embargo, usted debería discutir con su agente de seguros sobre la propiedad personal, ya que la cobertura al contenido es opcional. Típicamente, hay 30 días de periodo de espera antes de que la póliza se ponga en efecto. Esto quiere decir que ahora es el mejor tiempo para comprar un seguro por inundación. Para conocer más, visite la página en internet de propietarios NFIP, haciendo clic en el enlace a [Flood Smart](#) (Inundación inteligente).

22. 16. El Healthy Forests Restoration Act (El Acta de restauración de los bosques saludables) define el Wildland Urban Interface, WUI (el Punto de interacción del bosque y lo urbano) como un área entre la zona de transición de las tierras no ocupadas y el desarrollo humano, que está en riesgo de incendio forestal. El condado Jefferson a identificado las áreas WUI en los Community Wildfire Protection Plans, CWPPs (Planes de protección de incendios forestales de la comunidad). **¿Está su vivienda principal dentro de un área identificada como WUI?**

- Sí
- No
- No sé

23. Limpiando su propiedad de restos vegetales y manteniendo su jardín limpio son los primeros pasos importantes para minimizar los daños y las pérdidas debido a un incendio forestal. ¿Ha completado una de las siguientes técnicas de defensa del espacio en su vivienda principal? **(Por favor, marque todos los que aplican).**

- Limpie las hojas y otros restos vegetales de las canaletas, aleros, porches y patios cubiertos.
- Mantenga el césped hidratado y mantenido (cortado)
- Remueva la vegetación muerta de debajo de los patios cubiertos y/o entre 10 pies alrededor de la vivienda
- Deseche el pasto cortado y otros restos de vegetación de los pastales y las áreas plantadas.
- Remueva los artículos guardados de debajo de los patios cubiertos o porches. Inspeccione la cobertura de los techos y las tejas y reemplace/repáre aquellas sueltas o faltantes.
- Cubra con malla o encierre las áreas de debajo de los patios cubiertos y las plataformas metálicas con rejilla de alambre para prevenir que se acumulen basuras y materiales combustibles.
- Remueva materiales inflamables (leña amontonada, tanques de gas propano, vegetación seca) dentro de 30 pies alrededor de su vivienda y edificaciones anexas (garajes, cobertizos)
- Cubra los agujeros de ventilación de los altillos con una malla metálica para prevenir que chispas entren a la vivienda.
- Encierre la parte de debajo de los aleros y los agujeros de ventilación del plafón o encierre en malla de alambre metálico para prevenir la entrada de brasas.
- Poda los árboles y las ramas bajas de entre los 6 y 10 pies del suelo
- Otros (especifique)

#### **Acerca el programa comunitario de incendios inteligentes**

Maleza, pasto e incendios forestales no tienen que ser un desastre. El National Fire Protection Association's, NFPA (La asociación nacional para la protección de incendios) el Firewise Communities Program (El Programa comunitario de incendios inteligentes) promueve por seguridad soluciones locales involucrando a los propietarios de viviendas a que tomen responsabilidades individuales para preparar a sus viviendas ante el riesgo de fuegos forestales. El incendio inteligente es el componente clave del Fire Adapted Communities (Comunidades adaptadas al incendio), un enfoque participativo que conecta a todos aquellos que juegan un rol en la educación, la planeación y la acción en los incendios forestales, con recursos comprensivos para ayudar a reducir el riesgo.

El programa es patrocinado en asociación con el USDA Forest Service (Servicio forestal de los Estados Unidos), el Departamento del interior de los Estados Unidos y la National Association of State Foresters (Asociación nacional de guardabosques estatales). Para conocer más, visite la página en internet de [Firewise Communities](#) (Incendios inteligentes en las comunidades) haciendo clic en el enlace.



24. Por favor díganos ¿Cuál es el tipo de su vivienda principal? Mi vivienda principal es:

- Una casa uni-familiar
- Dúplex
- Apartamento en una estructura de 3 a 4 unidades
- Apartamento en una estructura con 5 o más unidades
- Condominio/townhouse
- Casa prefabricada
- Otro (Por favor especifique)

25. ¿Renta o es propietaria de su vivienda principal?

- Propietario
- Arriendo

26. ¿Es usted propietario de una segunda casa/casa vacacional en el condado Jefferson?

- Sí
- No

27. Por favor díganos a continuación el código postal de su segunda casa vacacional:

28. ¿Hace cuanto tiene usted esta segunda casa/casa vacacional en el condado Jefferson?

- Menos de un año
- De 1 a 5 años
- De 6 a 10 años
- De 11 a 20 años
- Más de 20 años

29. ¿Está su segunda casa/casa vacacional situada en una de las siguientes zonas de peligro dentro del condado Jefferson? **(Por favor, marque todas las que apliquen)**

	Mi segunda casa está en esta zona	No sé
Avalancha	<input type="radio"/>	<input type="radio"/>
Sequia	<input type="radio"/>	<input type="radio"/>
Tormenta de arena	<input type="radio"/>	<input type="radio"/>
Terremoto	<input type="radio"/>	<input type="radio"/>
Inundación	<input type="radio"/>	<input type="radio"/>
Deslave	<input type="radio"/>	<input type="radio"/>
Erupción volcánica	<input type="radio"/>	<input type="radio"/>
Incendio forestal	<input type="radio"/>	<input type="radio"/>
Tormenta de viento	<input type="radio"/>	<input type="radio"/>
Tormenta invernal (nieve/hielo)	<input type="radio"/>	<input type="radio"/>

Otro (Por favor especifique)

30. El área de la tierra es Special Flood Hazard Area, SFHA (Área especial en peligro de inundación) y está al nivel de inundación que es cubierta por aguas desbordadas. El SFHA es el área donde el National Flood Insurance Program's, NFIP's (El Programa nacional de seguros por inundación) hace cumplir las regulaciones de la administración de las planicies inundables y donde aplica el mandato de comprar seguros por inundación. ¿Está su segunda casa/casa vacacional en un Special Flood Hazard Area, SFHA (Área especial en peligro de inundación) o en un mapa NFIP?

- Sí
- No
- No sé

31. ¿Está su segunda casa/casa vacacional actualmente cubierta por una póliza de seguro por riesgo de inundación?

- Sí
- No
- No sé

Tan solo unas cuantas pulgadas de agua de inundación pueden causar decenas de miles de dólares en daños. Del 2008 al 2012, el promedio de reclamos de residencias por inundaciones fue de más de \$38,000. El seguro por inundación es la mejor forma de protegerse usted mismo de la devastación financiera por pérdidas. El seguro por inundación está disponible para propietarios, arrendatarios, propietarios/arrendatarios de condominios y propietarios/arrendatarios comerciales. Los costos varían dependiendo de cuanto seguro es comprado, cual es la cobertura y el riesgo de inundación de la propiedad.

Todo tipo de póliza provee cobertura para edificación y su contenido. Sin embargo, usted debería discutir el aseguramiento de la propiedad personal con su agente de seguros, ya que el contenido de la cobertura es opcional. Típicamente, hay 30 días de periodo de espera desde que se compra hasta antes que su póliza haga efecto. Esto quiere decir que ahora es el mejor tiempo de comprar el seguro por inundación. Para conocer más visite la página en internet de NFIP Homeowners (Propietarios de vivienda) haciendo clic en enlace de [Flood Smart](#) (Inundación inteligente).

32. El Healthy Forests Restoration Act (Acta de restauración de los bosques saludables) define el Wildland Urban Interface, WUI (Punto de encuentro entre el bosque y lo urbano) como el área dentro de la zona de transición entre la tierra no ocupada y el desarrollo humano que está en riesgo de incendio forestal. El condado Jefferson identifica las áreas WUI dentro de los Community Wildfire Protection Plans, CWPPs (los Planes comunitarios de protección para incendios forestales). **¿Esta su segunda casa/casa vacacional dentro de un área WUI identificada?**

- Sí
- No
- No sé

33. Limpiar su propiedad de restos vegetales y mantener su jardín limpio, son los primeros pasos importantes para minimizar el daño y la pérdida debido a un incendio forestal.

**¿Ha completado usted una de las siguientes técnicas de defensa del espacio en su segunda casa/casa vacacional? (Por favor marque todas las que aplican)**

- Limpie las hojas y los restos vegetales de las canaletas, aleros, porches y patios.
- Mantenga el césped hidratado y mantenido (cortado)
- Remueva la vegetación muerta de debajo del patio y/o dentro de los 10 pies alrededor de la vivienda
- Bote los pastos cortados y otros restos de vegetación de los pastales y las áreas plantadas.
- Remueva los artículos depositados debajo de los patio o porches. Inspeccione las coberturas de los techos y tejas y reemplace/repáre aquellas sueltas o faltantes.
- Cubra con malla o encierre el área debajo de los patios y cobertura de suelos exteriores metálicos con mallas de alambre para prevenir la acumulación de basuras y materiales combustibles.
- Remueva materiales inflamables (leña amontonada, tanques de gas propano, vegetación seca) dentro de los 30 pies alrededor de su vivienda y edificaciones anexas (garajes, cobertizos).
- Cubra los agujeros de ventilación con malla de alambre de metal para prevenir que se entren chispas a la vivienda.
- Encierre la parte de abajo del alero y los agujeros de ventilación del plafón o coloque una malla de alambre de metal para prevenir que se entren brasas.
- Poda los árboles y las ramas bajas que están dentro de los 6 y 10 pies del suelo.
- Otros (Por favor especifique)

**ACERCA DEL PROGRAMA COMUNITARIO DE INCENDIOS INTELIGENTES**

El Firewise Communities Program (Programa comunitario de incendios inteligentes) promueve por seguridad soluciones locales tomando responsabilidades individuales en la preparación de sus casas ante el riesgo de incendios forestales. Los incendios inteligentes son el componente clave de Fire Adapted Communities (Comunidades adaptadas al incendio), un enfoque participativo que conecta a todos los participantes que juegan un papel en la educación, planeación y acción ante los incendios forestales con recursos comprensibles para ayudar a reducir el riesgo.

El programa es patrocinado en asocio con el USDA Forest Service (el Servicio Forestal de los Estados Unidos), el Departamento del interior de los Estados Unidos y la Asociación nacional de guardabosques estatales. Para conocer más, visite la página en internet del [the Firewise Communities](#) haciendo clic en el enlace.

34. Por favor díganos ¿Qué tipo de vivienda es su segunda casa/casa vacacional?:

- Una casa para una sola familia
- un Dúplex
- un apartamento en una estructura de 3 a 4 unidades
- Un apartamento en una estructura de 5 o más unidades
- Un condominio/ townhouse
- Una casa prefabricada
- Otro (Por favor especifique)

35. ¿Usted pone en renta su segunda casa/casa vacacional?

- Sí
- No

36. ¿Una compañía administradora de propiedades maneja los detalles de poner en arriendo su segunda casa/casa vacacional por usted?

- Sí
- No

37. ¿Trabaja usted en el condado Jefferson?

- Sí
- No

38. Por favor díganos a continuación el código postal de la locación de su trabajo principal:

39. ¿Esta su trabajo principal localizado en alguna de las siguientes zonas de peligro dentro del condado Jefferson? **(Por favor marque todas las que aplican)**

	Mi lugar de trabajo está en una de estas zonas	No sé.
Avalancha	<input type="radio"/>	<input type="radio"/>
Sequia	<input type="radio"/>	<input type="radio"/>
Tormenta de arena	<input type="radio"/>	<input type="radio"/>
Terremoto	<input type="radio"/>	<input type="radio"/>
Inundación	<input type="radio"/>	<input type="radio"/>
Deslave	<input type="radio"/>	<input type="radio"/>
Erupción volcánica	<input type="radio"/>	<input type="radio"/>
Incendio Forestal	<input type="radio"/>	<input type="radio"/>
Tormenta de viento	<input type="radio"/>	<input type="radio"/>
Tormenta invernal (nieve/hielo)	<input type="radio"/>	<input type="radio"/>

Otro (Por favor especifique)

40. Por favor marque su edad:

- |                                  |                                     |
|----------------------------------|-------------------------------------|
| <input type="radio"/> 18 o menor | <input type="radio"/> De 45 a 54    |
| <input type="radio"/> De 19 a 24 | <input type="radio"/> De 55 a 64    |
| <input type="radio"/> De 25 a 34 | <input type="radio"/> De 65 o mayor |
| <input type="radio"/> De 35 a 44 |                                     |

41. Género:

- Masculino
- Femenino
- Prefiero no decir
- Otro (Por favor especifique)

42. Por favor indique su nivel de educación completada:

- No graduado de la preparatoria
- Graduado de la preparatoria/GED
- Igo de colegio/escuela técnica
- Graduado de Asociado
- Graduado de Licenciatura
- Graduado de maestría o más avanzado
- Otro (Por favor especifique)

43. ¿Cuál es el ingreso total de su hogar?

- Menos de \$15,000
- De \$15,000 a \$34,999
- De \$35,000 a \$74,999
- De \$75,000 a \$99,999
- De \$100,000 a \$199,999
- De \$200,000 or más

44. Por favor indique su raza:

- Blanco
- Negro o Afroamericano
- Indio Americano o Nativo de Alaska
- Asiático
- Nativo de Hawái u otro isleño del Pacífico
- Alguna otra raza
- Otro (Por favor especifique)

45. Por favor indique su etnicidad:

- Hispano o Latino/Latinx
- No Hispano o Latino/Latinx

Para más información de seguros por inundación por favor visite la página en internet del National Flood Insurance Program (El programa nacional de seguros para inundación) <https://www.floodsmart.gov>.

Para más información del Firewise Program (Programa de incendio inteligente) visite la página en internet del <http://firewise.org>

46. Si usted desea recibir correos electrónicos del condado Jefferson para estar al día con el progreso del Natural Hazards Mitigation Plan (el Plan de mitigación de desastres naturales), Community Wildfire Protection Plans (Planes comunitarios de protección de incendios forestales), Actividades/información sobre la preparación local y /o otra información relacionada a desastres naturales, por favor denos su información de contacto a continuación:

Nombre:

Apellido:

Correo electrónico:

Teléfono:

Dirección:

Ciudad:

Estado:

Área postal:

47. Por favor, siéntase libre de darnos cualquier comentario adicional en el espacio que se provee:

**¡MUCHAS GRACIAS POR BRINDARNOS ESTA INFORMACIÓN!**