Siskiyou County

Hazard Mitigation Plan
Volume 1: Planning-Area-Wide Elements

DRAFT

August 2018

Siskiyou County

HAZARD MITIGATION PLAN
VOLUME 1: PLANNING-AREA-WIDE ELEMENTS

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Siskiyou County
Hazard Mitigation Plan; Volume 1—Planning-Area-Wide Elements

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Disaster Mitigation Act (DMA) is federal legislation enacted to promote proactive pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. It established a Pre-Disaster Mitigation Program and new requirements for the national post-disaster Hazard Mitigation Grant Program.

The DMA encourages state and local authorities to work together on pre-disaster planning, and it promotes sustainability as a strategy for disaster resistance. Sustainable hazard mitigation includes the sound management of natural resources, local economic and social resiliency, and the recognition that hazards and mitigation must be understood in the largest possible social and economic context. The enhanced planning network called for by the DMA helps local governments articulate accurate needs for mitigation, resulting in faster allocation of funding and more cost-effective risk-reduction projects.

Siskiyou County and nine local government planning partners worked together to create this Siskiyou County Hazard Mitigation Plan, fulfilling the DMA requirements for all participating partners. This effort was funded by a Hazard Mitigation Planning grant from the Federal Emergency Management Agency (FEMA), administered by the California Office of Emergency Services (Cal OES).

PLAN PURPOSE

Several factors initiated this planning effort for Siskiyou County and its planning partners:

- The Siskiyou County area has significant exposure to numerous natural hazards that have caused millions of dollars in past damage.
- Local resources for risk reduction are limited. Being able to leverage federal financial assistance is paramount to successful hazard mitigation in the area.
- The partners wanted to be proactive in preparing for the impacts of natural hazards

With these factors in mind, Siskiyou County committed to meeting with local partners and move forward with planning for the future and continuing to evaluate our risk in county. We set down as a committee to reevaluate our risk and perform a risk assessment sense the plan was developed in 2012. After closely looking at past events and disasters that have plagued the county in the past 5 years we determined that the risk have not changed. We still are dealing with the same hardships as we were in the past.

THE PLANNING PARTNERSHIP

A planning partnership was assembled consisting of Siskiyou County, nine incorporated cities and four special purpose districts, all defined as “local governments” under the DMA. This partnership represents approximately 30 percent of the eligible local governments in the planning area. Jurisdictional annexes are included in Volume 2 of this plan for the 10 planning partners who completed all required phases of the plan’s development. Jurisdictions not covered by this process can link to this plan at a future date by following prescribed linkage procedures identified in Appendix B of Volume 2.

PLAN DEVELOPMENT METHODOLOGY

Under Chapter 44 of the Code of Federal regulations (44 CFR), a local hazard mitigation plan must include the following:

- A description of the planning process

- Risk assessment (applicable to each planning partner)
- Mitigation strategy
  - Goals
  - Review of alternatives
  - Prioritized "action plan"
- A plan maintenance section
- Documentation of adoption.

The Siskiyou County Hazard Mitigation Plan was developed as follows to meet federal requirements:

- **Phase 1, Organize Resources**— A Planning Partnership was formed, and a 10-member Steering Committee was assembled to oversee development of the plan, consisting of planning partners and other planning area stakeholders. A multimedia public involvement strategy, centered on the plan being put on the county website for public review, was implemented. Coordination occurred with local, state and federal agencies involved in hazard mitigation. A review was conducted of existing programs in the planning area that may support hazard mitigation actions.
- **Phase 2, Hazard Identification & Profiling; Phase 3, Asset Inventory and Vulnerability Analysis**—Risk assessment is the process of assessing the vulnerability of people, buildings and infrastructure to natural hazards by estimating potential hazard-related loss of life, personal injury, economic loss, and property damage. It focuses on the following:
  - Hazard identification and profiling
  - The impact of hazards on physical, social and economic assets
  - Vulnerability identification
  - Estimates of the cost of damage or costs that can be avoided through mitigation.
- **Phase 4, Develop Mitigation Initiatives**—This phase included development of a guiding principle, goals and measurable objectives; comprehensive review of mitigation alternatives; development of a benefit/cost review methodology for prioritizing actions; ranking of risk to support prioritization of actions; review of jurisdiction-specific capabilities; identification of recommended mitigation initiatives (actions); and prioritization of the actions.
- **Phase 5, Prepare Draft Plan**—The Steering Committee assembled key information from Phases 1 and 2 into a document to meet the DMA requirements. The document was produced in two volumes: Volume 1 including all information that applies to the entire planning area; and Volume 2, including jurisdiction-specific information.
- **Phase 6, Plan Review and Revision**—The draft plan was circulated to planning partners, stakeholders, and agencies to solicit comment on the recommended actions. The plan was presented to the public for review and comment via the public involvement strategy developed under Phase 1. The means of engaging the public were web-based tools. A pre-adoption review draft of the plan was prepared along with a DMA compliance "crosswalk," which was submitted to Cal OES for review and approval. Cal OES will forward the plan to FEMA Region IX for approval upon determining that the plan is compliant with federal requirements.

- **Phase 7, Plan Adoption and Submittal**— Final plan adoption occurs once pre-adoption approval has been granted by Cal OES and FEMA. Each planning partner is required to adopt the plan according to its own formal adoption protocol.

MITIGATION GUIDING PRINCIPLE, GOALS AND OBJECTIVES

The following guided the Steering Committee and the Planning Partners in selecting the initiatives contained in this plan:

- Guiding Principle—Through partnerships among local jurisdictions, identify and reduce the vulnerability to natural hazards in order to protect the health, safety, quality of life, environment and economy of the diverse communities within Siskiyou County.
- Goals:
  - 1. Protect life, health, property and the environment.
  - 2. Increase public awareness of vulnerability and enable the public to mitigate, prepare for, respond to and recover from the impacts of hazards and disasters.
  - 3. Reduce the adverse impacts of disasters on the economy.
  - 4. Improve cooperative emergency management capabilities among all entities.
  - 5. Facilitate the development and implementation of long-term, cost-effective and environmentally sound mitigation projects and programs
- Objectives:
  - 1. Eliminate or minimize disruption of local government operations caused by natural hazards.
  - 2. Increase resilience of (or protect and maintain) infrastructure and critical facilities.
  - 3. Consider the impacts of natural hazards on future land uses within the planning area.
  - 4. Sustain reliable local emergency operations and facilities during and after a disaster.
  - 5. Educate the public on the risk from natural hazards and increase awareness, preparation, mitigation, response, and recovery activities.
  - 6. Retrofit, relocate or elevate structures in high hazard areas including those known to be repetitively damaged.
  - 7. Improve understanding of the location, causes and potential impacts of natural hazards.
  - 8. Encourage coordination among all jurisdictions, adjoining communities and stakeholders.
  - 9. Develop or improve early warning emergency response systems, communications and evacuation procedures.

MITIGATION INITIATIVES

In this document, mitigation initiatives are defined as activities designed to reduce or eliminate losses resulting from natural hazards. The mitigation initiatives are the key element of the hazard mitigation plan. Implementing the initiatives will help the Planning Partners become disaster-resistant.

Although grant funding eligibility was a driving influence for preparing this plan, the plan’s purpose goes beyond access to federal funding. It was important to the Planning Partnership and the Steering

Committee to look at initiatives that will work through all phases of emergency management. Some of the initiatives outlined in this plan are not grant eligible—grant eligibility was not the focus of the selection. Rather, the focus was the initiatives' effectiveness in achieving the goals of the plan and whether they are within each jurisdiction's capabilities.

This planning process resulted in the identification 156 mitigation actions to be targeted for implementation by the Planning Partners. Jurisdiction-specific initiatives are listed in Volume 2 of this plan. In addition, a series of countywide initiatives were identified by the Steering Committee and the Planning Partnership. These are initiatives that benefit the whole partnership, to be implemented by pooling resources based on capability. These initiatives are summarized in Table ES-1.

CONCLUSION

Full implementation of the recommendations of this plan will take time and resources. The measure of the plan's success will be the coordination and pooling of resources within the Planning Partnership. Keeping this coordination and communication intact will be the key to the successful implementation of this plan. Teaming together to seek financial assistance at the state and federal level will be a priority to initiate projects that are dependent on alternative funding sources. This plan was built upon the effective leadership of a multi-disciplined Steering Committee and a process that relied heavily on public input and support. The plan will succeed for the same reasons.

TABLE ES-1.
ACTION PLAN—COUNTYWIDE MITIGATION INITIATIVES

Hazards Addressed	Lead Agency	Possible Funding Sources or Resources	Time Line[a]	Objectives
CW-1—Continue to maintain a countywide hazard mitigation plan website to house the plan and plan updates, in order to provide the public an opportunity to monitor plan implementation and progress. Each planning partner may support the initiative by including an initiative in its action plan and creating a web link to the website.				
All Hazards	County OES	General Fund	Short term/ongoing	1, 5, 7, 8
CW-2—Leverage public outreach partnering capabilities to inform and educate the public about hazard mitigation and preparedness.				
All Hazards	County OES	General Fund	Short term/ongoing	1, 5, 7, 8, 9
CW-3—Coordinate all mitigation planning and project efforts, including grant application support, to maximize all resources available to the planning partnership.				
All Hazards	County OES	General Fund, FEMA mitigation grants	Short term/ongoing	1, 2, 3, 4, 5, 7, 8, 9
CW-4—Support the collection of improved data (hydrologic, geologic, topographic, volcanic, historical, etc.) to better assess risks and vulnerabilities.				
All Hazards	County OES	General Fund, FEMA mitigation grants	Short term/ongoing	1, 3, 5, 7, 8
CW-5—Provide coordination and technical assistance in grant application preparation that includes assistance in cost vs. benefit analysis for grant-eligible projects.				
All Hazards	County OES	General Fund, FEMA mitigation grants	Short term/ongoing	1, 8
CW-6—Where appropriate, support retrofitting, purchase, or relocation of structures or infrastructure located in hazard-prone areas to protect structures/infrastructure from future damage, with repetitive loss and severe repetitive loss properties as priority when applicable.				
All Hazards	County OES	FEMA mitigation grants	Long term	1, 2, 4, 5, 6
CW-7— Continue to maintain the Steering Committee as a viable committee to monitor the progress of the hazard mitigation plan, provide technical assistance to Planning Partners and oversee the update of the plan as necessary.				
All Hazards	County OES	General Fund	Short term/ongoing	1, 8
CW-8— In areas of the County with urban/wildland fire interface exposure, continue to promote access for ingress and egress as part of a defensible space initiative.				
Wildfire	Siskiyou Area Fire Safe Council	FEMA mitigation Grants, Fire Safe Council funding sources	Short term/ongoing	1,5,7,8,9
CW-9— Promote landscape approach to fuel reduction as part of a defensible space initiative in areas with high wildfire exposure.				
Wildfire	Siskiyou Area Fire Safe Council	FEMA mitigation Grants, Fire Safe Council funding sources	Short term/ongoing	1,5,7,8,9

PART 1 —
THE PLANNING PROCESS

CHAPTER 1.
INTRODUCTION TO THE PLANNING PROCESS

1.1. WHY PREPARE THIS PLAN?

1.1.1 The Big Picture

Hazard mitigation is defined as a way to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster through long- and short-term strategies. It involves strategies such as planning, policy changes, programs, projects, and other activities that can mitigate the impacts of hazards. The responsibility for hazard mitigation lies with many, including private property owners; business and industry; and local, state, and federal government.

The federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) required state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. Prior to 2000, federal disaster funding focused on disaster relief and recovery, with limited funding for hazard mitigation planning. The DMA increased the emphasis on planning for disasters before they occur.

The DMA encourages state and local authorities to work together on pre-disaster planning, and it promotes sustainability for disaster resistance. “Sustainable hazard mitigation” includes the sound management of natural resources and the recognition that hazards and mitigation must be understood in the largest possible social and economic context. The enhanced planning network called for by the DMA helps local governments articulate accurate needs for mitigation, resulting in faster allocation of funding and more cost-effective risk reduction projects.

1.1.2 Local Concerns

Several factors initiated this planning effort for Siskiyou County and its planning partners:

- The Siskiyou County area has significant exposure to natural hazards, and disasters have caused costly damage in the past.
- Limited local resources make it difficult to be pre-emptive in risk reduction initiatives. Being able to leverage federal financial assistance is paramount to successful hazard mitigation in the area.
- The partners wanted to be proactive in its preparedness for the probable impacts of natural hazards.

With these factors in mind, Siskiyou County committed to the preparation of the plan to continue the effort and then securing technical assistance to facilitate a planning process that would comply with all program requirements. Due to past experiences, Siskiyou County recognized that disasters are not always contained by political boundaries and therefore invited multiple local jurisdictions (municipalities and special purpose districts) within the County to participate in the hazard mitigation planning process.

1.1.3 Purposes for Planning

This hazard mitigation plan identifies resources, information, and strategies for reducing risk from natural hazards. Elements and strategies in the plan were selected because they meet a program requirement and because they best meet the needs of the planning partners and their citizens. One of the benefits of multi-jurisdictional planning is the ability to pool resources and eliminate redundant activities within a planning area that has uniform risk exposure and vulnerabilities. The Federal Emergency Management Agency (FEMA) encourages multi-jurisdictional planning under its guidance for the DMA. The plan will help guide and coordinate mitigation activities throughout Siskiyou County. The plan was developed to meet the following objectives:

- Meet or exceed requirements of the DMA.
- Enable all planning partners to continue the pursuit of federal grant funding to reduce risk through mitigation.
- Meet the needs of each planning partner as well as state and federal requirements.
- Create a risk assessment that focuses on Siskiyou County hazards of concern.
- Create a single planning document that integrates all planning partners into a framework that supports partnerships within the County, and puts all partners on the same planning cycle for future updates.
- Coordinate existing plans and programs so that high-priority initiatives and projects to mitigate possible disaster impacts are funded and implemented.

1.2. WHO WILL BENEFIT FROM THIS PLAN?

All citizens and businesses of Siskiyou County are the ultimate beneficiaries of this hazard mitigation Plan. The plan reduces risk for those who live in, work in, and visit the County. It provides a viable planning framework for all foreseeable natural hazards that may impact the County. Participation in development of the plan by key stakeholders in the County helped ensure that outcomes will be mutually beneficial. The resources and background information in the plan are applicable countywide, and the plan’s goals and recommendations can lay groundwork for the development and implementation of local mitigation activities and partnerships.

1.3. HOW TO USE THIS PLAN

This plan has been set up in two volumes so that elements that are jurisdiction-specific can easily be distinguished from those that apply to the whole planning area:

- **Volume 1**—Volume 1 includes all federally required elements of a disaster mitigation plan that apply to the entire planning area. This includes the description of the planning process, public involvement strategy, goals and objectives, countywide hazard risk assessment, countywide mitigation initiatives, and a plan maintenance strategy.
- **Volume 2**—Volume 2 includes all federally required jurisdiction-specific elements, in annexes for each participating jurisdiction. It includes a description of the participation requirements established by the Steering Committee, as well as instructions and templates that the partners used to complete their annexes. Volume 2 also includes “linkage” procedures for eligible jurisdictions that did not participate in development of this plan but wish to adopt it in the future.

All planning partners will adopt Volume 1 in its entirety and at least the following parts of Volume 2: Part 1; each partner’s jurisdiction-specific annex; and the appendices.

The following appendices provided at the end of Volume 1 include information or explanations to support the main content of the plan:

- Appendix A—A glossary of acronyms and definitions
- Appendix B—Public outreach information, including the hazard mitigation questionnaire and summary and documentation of public meetings.
- Appendix C—A template for progress reports to be completed as this plan is implemented
- Appendix D—Plan Adoption Resolutions from Planning Partners

CHAPTER 2.
PLAN METHODOLOGY

To develop the Siskiyou County Hazard Mitigation Plan, the County followed a process that had the following primary objectives:

- Form a planning team
- Establish a planning partnership
- Define the planning area
- Establish a steering committee
- Coordinate with other agencies
- Review existing programs
- Engage the public.

Chapter 3 describes the public involvement. The other objectives are discussed in the following sections.

2.1. FORMATION OF THE PLANNING TEAM

A planning team was formed to lead the planning effort, made up of the following members:

- Jasen Vela, Siskiyou County Office of Emergency Services (OES) Deputy Director (Project Manager)
- Tom Morton (OES Staff Service Analyst)
- Katie Eastman (Public Health Preparedness)
- Holly Baun (GIS/ lead)
- Jacqueline Nushi (OES Volunteer/Public)
- Christy Cummings Dawson (Deputy Director of Planning)

2.2. ESTABLISHMENT OF THE PLANNING PARTNERSHIP

Siskiyou County opened this planning effort to all eligible local governments in the County. The planning team introduced the planning process and solicited planning partners at a meeting on May 17, 2017. Meeting objectives were as follows:

- Provide an overview of the Disaster Mitigation Act.
- Describe the reasons for a plan.
- Outline the County work plan.
- Outline planning partner expectations.
- Seek commitment to the planning partnership.
- Seek volunteers for the Steering Committee.

Each jurisdiction wishing to join the planning partnership was asked to provide a “letter of intent to participate” that designated a point of contact and confirmed the jurisdiction’s commitment to the process and understanding of expectations. Procedures have been established for any jurisdiction wishing to link to this plan in the future (see Volume 2). Letters of intent were received from 14 planning partners, establishing a 15-member planning partnership including the County (see Table 2-1).

TABLE 2-1.
PLANNING PARTNERS

Jurisdiction	Point of Contact	Title
Siskiyou County	Jasen Vela	OES Deputy Director
City of Dorris	Wayne Frost	Fire Chief
City of Dunsmuir	Mark Brannigan	City Manager
City of Etna	Sara Griggs	City Clerk
City of Montague	Dave Dunn	Public Works Supervisor
City of Mt. Shasta	Juliana Lucchesi	City Planner
City of Tulelake	Jenny Coelho	City Clerk
City of Weed	Ron Stock	City Administrator
City of Yreka	Steve Baker	City Manager
Lake Shastina Community Services District	Mike Wilson	General Manager
McCloud Community Services District	Kimberly Paul	General Manager

2.3. DEFINING THE PLANNING AREA

The defined planning area for this planning effort consists of all of Siskiyou County as shown in Figure 2-1. All partners to this plan have jurisdictional authority over specific locations within this planning area.

2.4. THE STEERING COMMITTEE

Hazard mitigation planning enhances collaboration and support among diverse parties whose interests can be affected by hazard losses. A steering committee was formed to oversee development of this plan. Committee members included key planning partner staff and other planning area stakeholders. The planning team assembled a list of interests within the planning area that could have recommendations for the plan or be impacted by its recommendations. The partnership confirmed a committee of 14 members at the kickoff meeting. Table 2-2 lists the committee members.

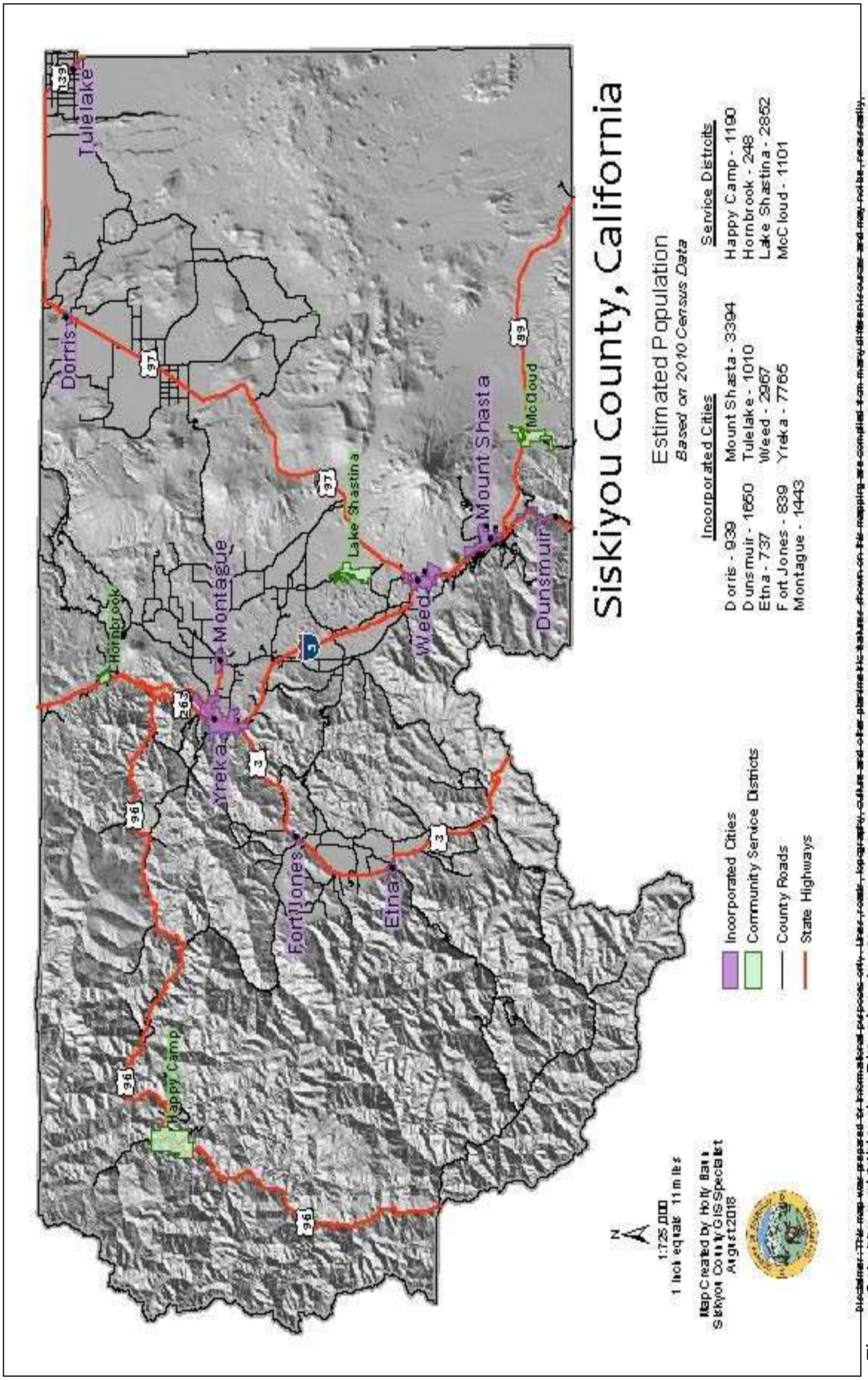


Figure 2-1: Hazard Mitigation Planning Area

**TABLE 2-2.
STEERING COMMITTEE MEMBERS**

Name	Title	Jurisdiction/Agency	Representing
Jasen Vela	OES Deputy Director	Siskiyou County	Planning Partner
Darrin Quigley	Fire Chief	City of Weed	Planning Partner
Brett Neystrom	Public Works Director	City of Tulelake	Planning Partner
Wayne Frost	Council Member	City of Dorris	Planning Partner
Tom Morton	Public Health	Siskiyou County	Planning Partner
Jacqueline Nushi	Teacher Assistant	Evergreen Elementary	Stakeholder
Phil Anzo	Fire Warden	California Department of Forestry and Fire Protection (CAL FIRE)	Stakeholder
Katie Eastman	Public Health	Siskiyou County	Planning Partner
Kimberly Paul	General Manager	McCloud Community Services District	Planning Partner
Steve Baker	City Manager	City of Yreka	Planning Partner
Sara Griggs	City Clerk	City of Etna	Planning Partner

Leadership roles and ground rules were established during the Steering Committee's initial meeting on May 17, 2017. The Steering Committee agreed to meet monthly or as needed throughout the course of the plan's development. The planning team facilitated each Steering Committee meeting, which addressed a set of objectives based on the work plan established for the plan. The Steering Committee met 5 times from May 2017 through June 2018. Meeting agendas, notes and attendance logs are available for review upon request. All Steering Committee meetings were open to the public (see Chapter 3).

2.5. COORDINATION WITH OTHER AGENCIES

Federal emergency management regulations require that hazard mitigation planning efforts provide involvement opportunities for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, businesses, academia and other private and nonprofit interests (44CFR Section 201.6.b(2)). This task was accomplished by the planning team as follows:

- **Steering Committee Involvement**—Agency representatives were invited to participate on the Steering Committee.
- **Agency Notification**—The following agencies were invited to participate in the plan development process from the beginning and were kept apprised of plan development milestones:
  - FEMA Region IX
  - California Office of Emergency Services
  - California Department of Transportation
  - CAL FIRE
  - College of the Siskiyous

  - Klamath National Forest
  - U.S. Forest Service
  - Karuk Tribe
  - Cities/towns of Dorris, Dunsmuir, Etna, Fort Jones, Montague, Mt. Shasta, Tulelake, Weed, and Yreka

  These agencies received meeting announcements, meeting agendas by e-mail throughout the plan development process. They supported the effort by attending meetings or providing feedback on issues.

- **Pre-Adoption Review**—All the agencies listed above were provided an opportunity to review and comment on this plan (see Chapter 3). Each agency was sent an e-mail message informing them that draft portions of the plan were available for review.

2.6. REVIEW OF EXISTING PROGRAMS

Hazard mitigation planning must include review and incorporation, if appropriate, of existing plans, studies, reports and technical information (44 CFR, Section 201.6(b)(3)). 0 of this plan provides a review of laws and ordinances in effect within the planning area that can affect hazard mitigation initiatives. In addition, the following programs can affect mitigation within the planning area:

- Siskiyou County Code
- Siskiyou County Land Development Manual (2011)
- State of California Code, Chapter 2 Hazardous Fire Areas
- Siskiyou County General Plan (2010)
- State of California Multi-Hazard Mitigation Plan (2018)
- Siskiyou County Fire Plan (2018)
- General/Comprehensive Plans for each of the incorporated city planning partners

An assessment of all planning partners’ regulatory, technical and financial capabilities to implement hazard mitigation initiatives is presented in Chapter 20 and in the individual jurisdiction-specific annexes in Volume 2. Many of these relevant plans, studies and regulations are cited in the capability assessment.

2.7. PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

Table 2-3 summarizes important milestones in the development of the plan.

**TABLE 2-3.
PLAN DEVELOPMENT MILESTONES**

Date	Event	Description	Attendance
2009			
6/15	County submits grant application	Seek funding for plan development process	N/A
12/15	County receives notice of grant award	Funding secured.	N/A
2010			
4/19	County selects Tetra Tech to facilitate plan development	Facilitation contractor secured	N/A
6/22	Planning team identified	Formation of the planning team	N/A
7/28	Stakeholder meeting	Presentation on plan process given to potential planning partners.	13
8/20	Public Outreach	Information announcing hazard mitigation plan published in Siskiyou Daily News Ridin' Point column by Steering Committee member Marcia Armstrong.	N/A
10/20	Planning partnership finalized	Deadline for submittal of letters of intent to participate in the planning effort.	N/A
10/20	Steering Committee formed	Planning partners nominated potential committee members. The planning team received commitments from 14 members, finalizing the formation of the Steering Committee.	N/A
10/20	Steering Committee Meeting #1	• Review purposes for mitigation plan • Organize Steering Committee • State plan review • Public involvement strategy	14
12/1	Steering Committee Meeting #2	• Review/approve Steering Committee ground rules • Risk assessment update • State plan review observations • Critical facilities definitions • Public outreach—design survey/questionnaire	11
2011			
1/5	Steering Committee Meeting #3	• Planning partner status & deadlines • Risk assessment update • Critical facilities decisions • Guiding principle • Public outreach campaign	15
1/24	Public Outreach	Hazard mitigation plan website established on the OES web page at http://www.co.siskiyou.ca.us/phs/emerg/hazard_mitigation.aspx	N/A
2/2	Steering Committee Meeting #4	• Risk assessments • Establishing critical facilities data deadline • Determining the guiding principle • Defining goals • Public outreach campaigns	15
2/4	Public Outreach	Weekly column, "Ridin' Point" requesting hazard mitigation plan input from citizens published in Siskiyou Daily News by Steering Committee member Marcia Armstrong.	N/A

**TABLE 2-3.
PLAN DEVELOPMENT MILESTONES**

Date	Event	Description	Attendance
2/23	Public Outreach	A hazard mitigation survey/questionnaire was deployed on-line. Web links and hard copies were distributed to planning partners and steering committee members for dissemination to the public.	N/A
3/2	Steering Committee Meeting #5	• Risk assessment updates • Hazard maps & critical facilities data discussion • Finalizing goals of the plan • Identifying plan objectives • Public outreach campaign	12
4/6	Steering Committee Meeting #6	• Risk assessment updates • Hazard maps & critical facilities data discussion • Finalizing plan objectives • Public outreach campaign	9
4/13	Public Outreach	County distributed a press release to local media outlets advertising the upcoming open houses. Flyers distributed to stakeholders and planning partners and posted throughout Siskiyou County.	N/A
5/4	Public Outreach	Mount Shasta Area Newspapers publishes article about Hazard Mitigation Planning process, survey and invites citizens to open houses.	N/A
5/11	Public Outreach	A public open houses was held in Yreka at the Jackson Street Middle School. The presentation, maps and information were on display in the evening.	13
5/12	Public Outreach	A public open house was held at the Mount Shasta City Park. The evening presentation and maps were viewed by six citizens.	6
6/1	Steering Committee Meeting #7	• Public meeting follow-up • Risk assessment updates • Review strengths, weaknesses, obstacles and opportunities • Scheduling annex workshops	10
6/1	Public Outreach	County OES held a public meeting in Happy Camp as an opportunity for citizens in the Happy Camp area to provide comment on the planning process.	4
7/6	Jurisdictional Annex Workshop	Mandatory session for planning partners. Workshop held in Yreka focused on how to complete the jurisdictional annex template.	21
11/1	Draft Plan	Internal review draft provided to Steering Committee by planning team	N/A
12/7	Steering Committee Meeting #8	• Provide comments on Draft Plan • Confirm plan maintenance strategy • Confirm County-wide initiatives • Determine public comment process	12
12/12	Public Comment Period	Initial public comment period of draft plan opens. Draft plan posted on plan website with press release notifying public of plan availability	N/A
12/29	Press coverage	Article in the Siskiyou Daily advertising the public comment period for the draft plan.	N/A
12/30	Adoption	Adoption window of final plan opens	N/A

TABLE 2-3.
PLAN DEVELOPMENT MILESTONES

Date	Event	Description	Attendance
2012			
1/31	Plan submittal	Final draft plan submitted for review and approval	N/A
2017			
3/10	Planning team identified	Formation of the planning team	N/A
4/27	Steering Committee Meeting	Review/approve Steering Committee • Perform Risk assessment • State plan review observations • Critical facilities definitions	6
5/17	Steering Committee Meeting	Continue Plan Review	5
7/19	Planning Partnership	Deadline for submittal of letters of intent to participate in the planning effort.	N/A
10/16	Steering Committee Meeting	• Risk assessments • Establishing critical facilities data deadline • Determining the guiding principle	5
11/2	Meeting Yreka City	Risk Assessments and plan overview	4
2018			
1/11	Meeting City of Etna	Risk Assessments and plan overview	3
1/24	Steering Committee Meeting	Reached out to other jurisdictions about plan updates	4
2/8	Meeting Tulelake	Risk Assessments and plan overview	4
2/13	Jurisdictional Annex Workshop	Mandatory session for planning partners. Workshop held in Yreka focused on how to complete the jurisdictional annex template.	21
4/8	Steering Committee Meeting	Reached out to other jurisdictions about plan updates	N/A
7/23	Cal OES Call	Updates on for City Annex’s given to Cal OES	N/A
8/2	Steering Committee Meeting	GIS Data	2
8/13	Steering Committee Meeting	Plan overview	2
8/29	Public Comment Period	Initial public comment period of draft plan opens. Draft plan posted on plan website with press release notifying public of plan availability as shown in Appendix B. It was out for public comment from August 29th to September 13th	N/A
X/X	Plan Approval	Final plan approved by FEMA	N/A

CHAPTER 3.
PUBLIC INVOLVEMENT

Broad public participation in the planning process helps ensure that diverse points of view about the planning area's needs are considered and addressed. The public must have opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval (44CFR, Section 201.6(b)(1)). The Community Rating System expands on these requirements by making CRS credits available for optional public involvement activities.

3.1. STRATEGY

The strategy for involving the public in this plan emphasized the following elements:

- Establish a website that will house the plan and provide public access to the planning process.
- Use a questionnaire to determine if the public's perception of risk and support of hazard mitigation has changed since the initial planning process.
- Attempt to reach as many planning area citizens as possible using multiple media.
- Identify and involve planning area stakeholders.

3.1.1 Stakeholders and the Steering Committee

Stakeholders are the individuals, agencies and jurisdictions that have a vested interest in the recommendations of the hazard mitigation plan, including planning partners. The effort to include stakeholders in this process included stakeholder participation on the Steering Committee.

All members of the Steering Committee live or work in Siskiyou County. Committee members represented government agencies, emergency managers, health services, tribes, fire and community service districts. The Steering Committee met eight times during the course of the plan's development and all meetings were posted and open to the public. Protocols for managing public comments were established in the ground rules developed by the Steering Committee.

3.1.2 Questionnaire

A hazard mitigation plan questionnaire (see Figure 3-1) was developed by the planning team with guidance from the Steering Committee. The questionnaire was used to gauge household preparedness for natural hazards and the level of knowledge of tools and techniques that assist in reducing risk and loss from natural hazards. This questionnaire was designed to help identify areas vulnerable to one or more natural hazards. The answers to its 32 questions helped guide the Steering Committee in selecting goals, objectives and mitigation strategies. Over 200 hard copies of the questionnaires were disseminated throughout the planning area by multiple means. Additionally, a web-based version of the questionnaire was made available on the hazard mitigation plan website. Over 440 questionnaires were completed during the course of this planning process. The complete questionnaire and a summary of its findings can be found in Appendix B of this volume.

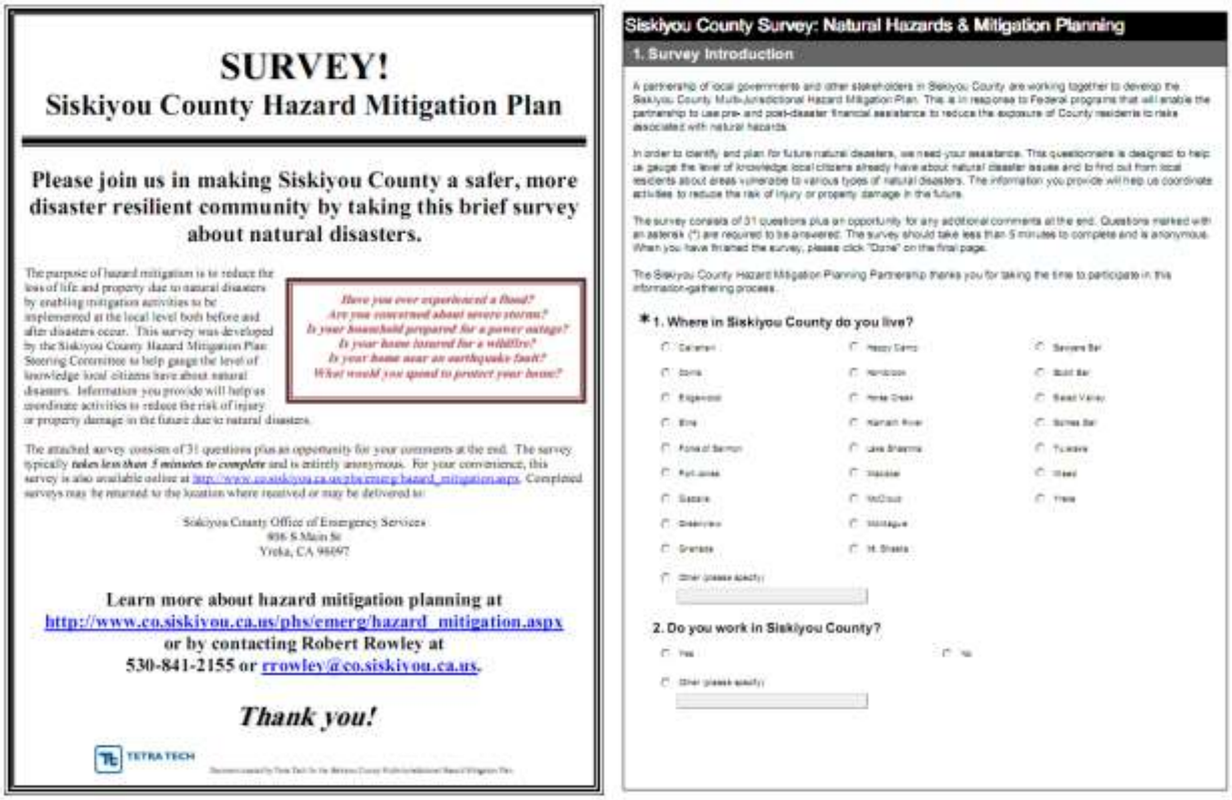


Figure 3-1. Sample Pages from Questionnaire Distributed to the Public

3.1.3 Opportunity for Public Comment

Public Meetings

Open-house public meetings were held on May 11, 2011 in Yreka and on May 12, 2011 in Mt. Shasta, (see Figure 3-2 through Figure 3-5). The Yreka meeting ran from 6:30 p.m. to 8:30 p.m. and the meeting in Mt. Shasta was took place from 6:00 p.m. to 8:00 p.m. The events were advertised with flyers posted throughout the county (see Figure 3-6).

The meeting format allowed attendees to examine maps and handouts and have direct conversations with project staff. Reasons for planning and information generated for the risk assessment were shared with attendees via a PowerPoint presentation. Tables were set up for each of the primary hazards to which the County is most vulnerable. A HAZUS-MH workstation allowed citizens to see information on their property, including exposure and damage estimates for earthquake and flood hazard events. Participating property owners were provided printouts of this information for their properties. This tool was effective in illustrating risk to the public. Planning partners and the planning team were present to answer questions. Each citizen attending the open houses was asked to complete a questionnaire, and each was given an opportunity to provide written comments to the Steering Committee. Local media outlets were informed of the open houses by a press release from the County.

Figure 3-2. Yreka Public Meeting Photo 1

Figure 3-3. Yreka Public Meeting Photo 2

Figure 3-4. Mt. Shasta Public Meeting Photo 3

Figure 3-5. Mt. Shasta Public Meeting Photo 4

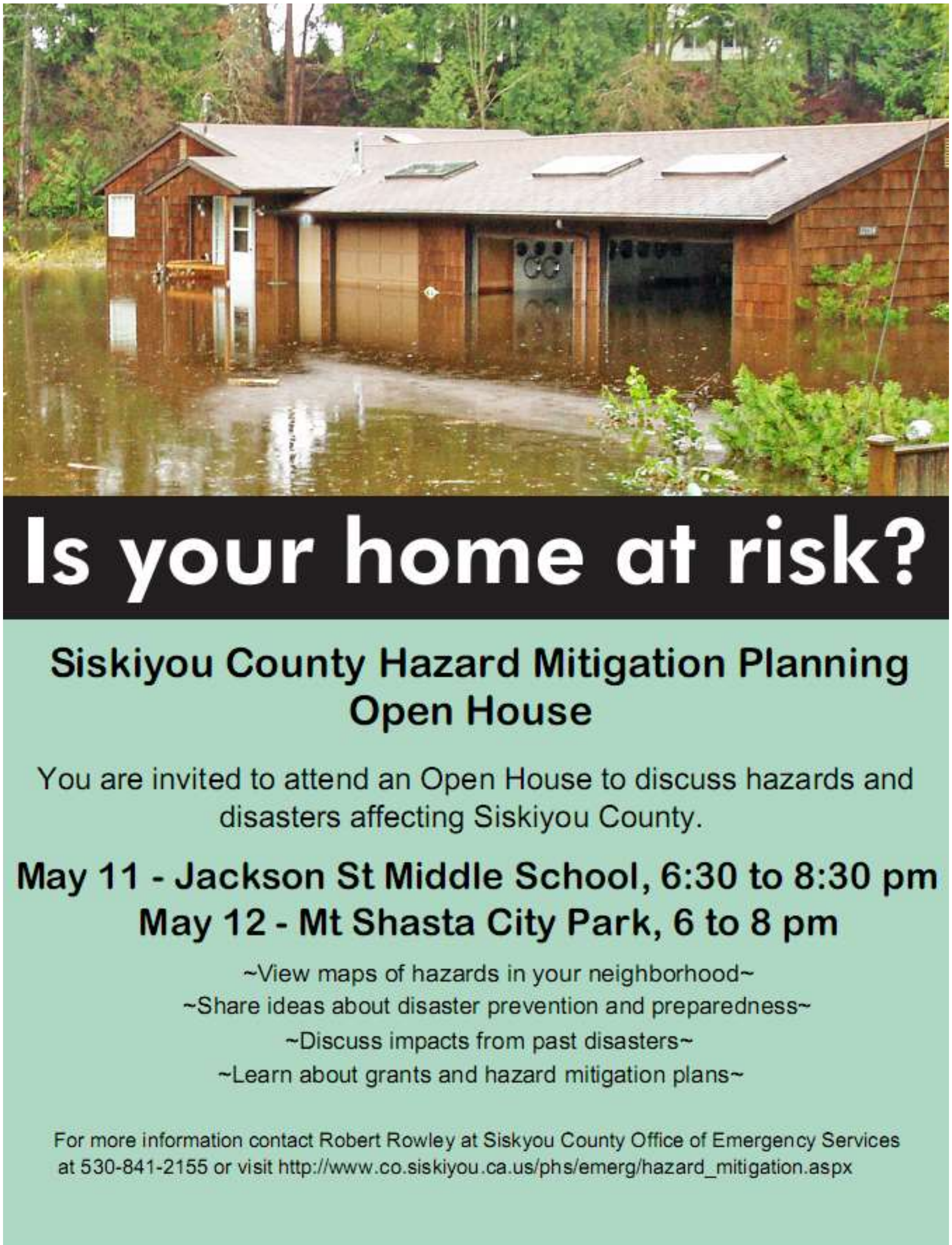


Figure 3-6. Open House Flyers Posted Throughout County

Press Releases

Press releases were distributed over the course of the plan's development as key milestones were achieved and prior to each public meeting. The planning effort received coverage in the May 4, 2011 Mount Shasta Area Newspapers (see Figure 3-7).

Hazard mitigation public meetings scheduled

Siskiyou County has begun the planning process for the Siskiyou County Multi-Jurisdictional Hazard Mitigation Plan. The HMP will identify natural hazards within Siskiyou County and will outline the history, vulnerability and damage potential for each hazard.

The Hazard Mitigation Plan Steering Committee invites the public to attend one of three upcoming meetings to learn more about this process.

Detailed maps, as well as computer modeling will be available for public viewing to see how various hazards could impact different areas in Siskiyou County. The meetings will be held at the following times and locations:

• Wednesday, May 11 – 6:30 to 8:30 p.m., Jackson Street Middle School, multipurpose room, 405 Jackson Street, Yreka.

• Thursday, May 12 – 6 to 8 p.m., Mount Shasta City Park, recreation center, Mount Shasta.

The plan will address local hazards including floods, earthquakes, wildfire, landslides, drought, severe weather/storms, dam failure and volcano/lahar/ashfall.

The plan's goal is to identify mitigation projects that will reduce the vulnerability and damage potential of each hazard; and will include goals, objectives and strategies to guide implementation of the mitigation projects.

Some examples of mitigation projects are elevating existing structures above flood levels; soil stabilization projects to reduce the risk of landslides; and structural retrofits to existing buildings to reduce the risk of damage during earthquakes.

With a Federal Emergency Management Agency approved HMP, local governments will be eligible for both pre and post-disaster grant funding for mitigation projects identified within the plan.

If members of the public can not attend either of the meetings listed above, they can still participate in the process by completing an online survey at http://www.surveymonkey.com/s/Q5CT6R9.

The information will help the Steering Committee coordinate activities to reduce the risk of injury or property damage in the future due to natural disasters. The survey is anonymous and should take less than five minutes to complete.

Since many natural hazard issues are better resolved by evaluating them comprehensively at the countywide level, the plan will be a collaborative planning effort between Siskiyou County and other jurisdictions within the county.

The following jurisdictions have chosen to join Siskiyou County and participate in the planning process: city of Mount Shasta, city of Weed, city of Dunsmuir, Lake Shastina Community Services District, city of Tulelake, city of Dorris, McCloud Community Services District, town of Fort Jones, city of Montague, Happy Camp Community Services District, city of Yreka, and city of Etna.

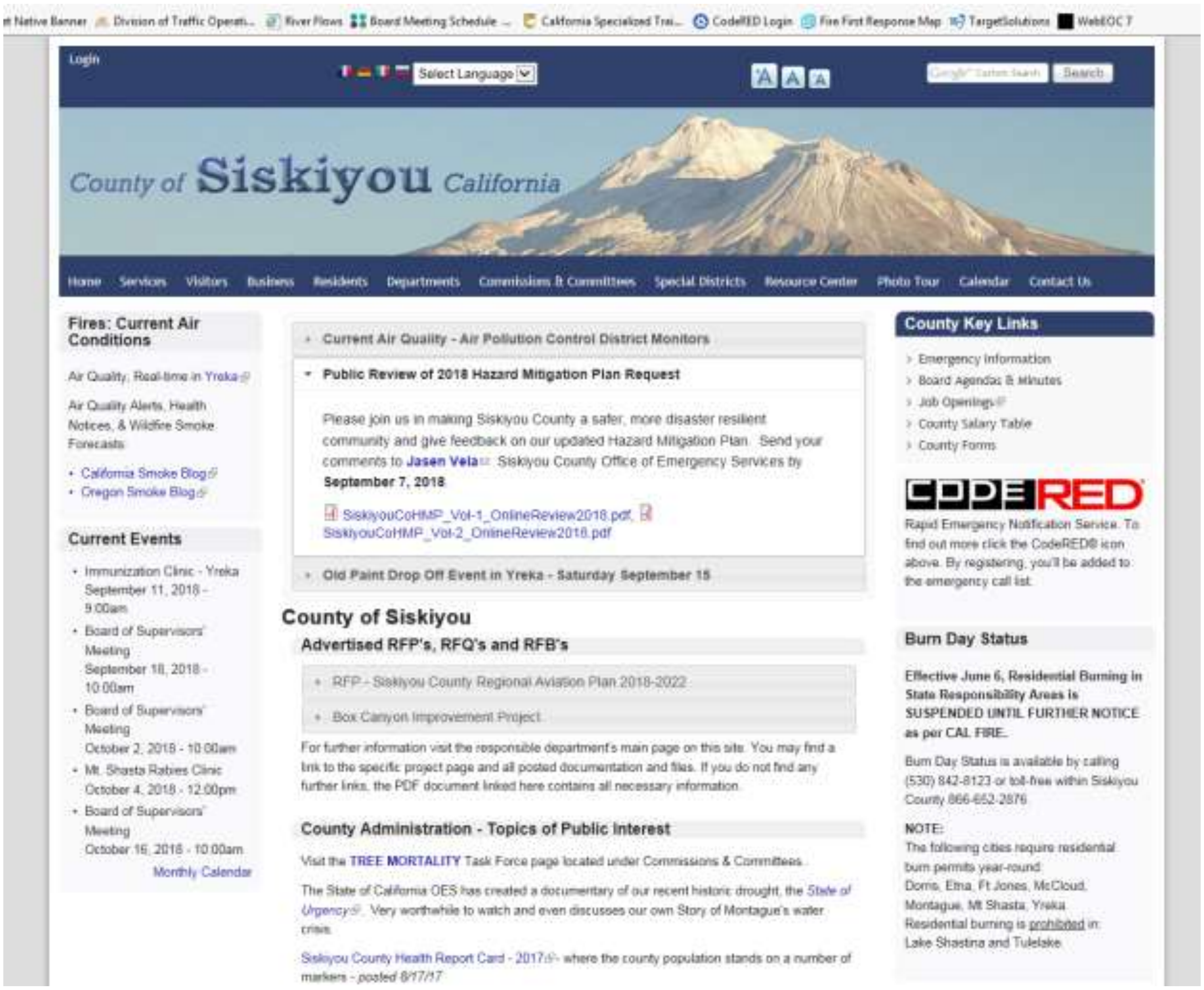
Additional information on the hazard mitigation planning process can be found at http://www.co.siskiyou.ca.us/PHS/emerg/hazard_mitigation.aspx

Figure 3-7. News Article from the May 4, 2011 Mount Shasta Area Newspapers

A press release was sent to all media outlets on December 12, 2011, advertising the public comment period for the draft plan. In response to this press release, the process received coverage in the Siskiyou Daily on December 29, 2011. An article was published about the process, advertising the final public comment period for the draft plan. See Appendix B for a copy of this article.

Internet

The plan development process was added to the county website to keep the public posted on plan development milestones and to solicit relevant input (see **Error! Reference source not found.**):



Public Involvement Results

By engaging the public through the public involvement strategy, the concept of mitigation was introduced to the public, and the Steering Committee received feedback that was used in developing the components of the plan. The committee received one comment but did not relate to the plan. Details of attendance and comments received are summarized in Table 3-1.

TABLE 3-1.
SUMMARY OF PUBLIC MEETINGS

Date	Location	Number of Citizens in Attendance	Number of Comments Received	Number of Questionnaires Received
5/11	Yreka	13	0	3
5/12	Mt. Shasta	6	0	6
5/12	Happy Camp	4	0	0
12/12	Public Comment period	N/A	0	0
8/18	Public Comment period	N/A	0	0
9/7	Public Comment period	N/A	1	0
Total		**23**	**0**	**9**

CHAPTER 4.
GUIDING PRINCIPLE, GOALS AND OBJECTIVES

Hazard mitigation plans must identify goals for reducing long-term vulnerabilities to identified hazards (44CFR Section 201.6(c)(3)(i)). The Steering Committee established a guiding principle, a set of goals and measurable objectives for this plan, based on data from the preliminary risk assessment and the results of the public involvement strategy. The guiding principle, goals, objectives and actions in this plan are linear and support each other. Goals were selected to support the guiding principle. Objectives were selected that met multiple goals. Actions were prioritized based on the number of objectives met.

4.1. GUIDING PRINCIPLE

A guiding principle focuses the range of objectives and actions to be considered. This is not a goal because it does not describe a hazard mitigation outcome, and it is broader than a hazard-specific objective. The guiding principle for the Siskiyou County Hazard Mitigation Plan is as follows:

Through partnerships among local jurisdictions, identify and reduce the vulnerability to natural hazards in order to protect the health, safety, quality of life, environment and economy of the diverse communities within Siskiyou County.

4.2. GOALS

The following are the mitigation goals for this plan:

1. Protect life, health, property and the environment.
2. Increase public awareness of vulnerability and enable the public to mitigate, prepare for, respond to and recover from the impacts of hazards and disasters.
3. Reduce the adverse impacts of disasters on the economy.
4. Improve cooperative emergency management capabilities among all entities.
5. Facilitate the development and implementation of long-term, cost-effective and environmentally sound mitigation projects and programs.

The effectiveness of a mitigation strategy is assessed by determining how well these goals are achieved.

4.3. OBJECTIVES

Nine objectives were identified that meet multiple goals, acting as a bridge between the mitigation goals and actions, rather than as a subset of a goal. The objectives also are used to help establish priorities. The objectives are as follows:

1. Eliminate or minimize disruption of local government operations caused by natural hazards.
2. Increase resilience of (or protect and maintain) infrastructure and critical facilities.
3. Consider the impacts of natural hazards on future land uses within the planning area.
4. Sustain reliable local emergency operations and facilities during and after a disaster.
5. Educate the public on the risk from natural hazards and increase awareness, preparation, mitigation, response, and recovery activities.

6. Retrofit, relocate or elevate structures in high hazard areas including those known to be repetitively damaged.
7. Improve understanding of the location, causes and potential impacts of natural hazards.
8. Encourage coordination among all jurisdictions, adjoining communities and stakeholders.
9. Develop or improve early warning emergency response systems, communications and evacuation procedures through Code Red.

CHAPTER 5.
PLAN ADOPTION

A hazard mitigation plan must document that it has been formally adopted by the governing body of the jurisdiction requesting federal approval of the plan (44CFR Section 201.6(c)(5)). For multi-jurisdictional plans, each jurisdiction requesting approval must document that is has been formally adopted. This plan will be submitted for a pre-adoption review to California Office of Emergency Services and FEMA prior to adoption. Once pre-adoption approval has been provided, all planning partners will formally adopt the plan. All partners understand that DMA compliance and its benefits cannot be achieved until the plan is adopted. Copies of the resolutions adopting this plan for all planning partners can be found in Appendix D of this volume.

CHAPTER 6.
PLAN MAINTENANCE STRATEGY

A hazard mitigation plan must present a plan maintenance process that includes the following (44CFR Section 201.6(c)(4)):

- A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan over a 5-year cycle
- A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate
- A discussion on how the community will continue public participation in the plan maintenance process.

This chapter details the formal process that will ensure that the Siskiyou County Hazard Mitigation Plan remains an active and relevant document and that the planning partners maintain their eligibility for applicable funding sources. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing an updated plan every five years. This chapter also describes how public participation will be integrated throughout the plan maintenance and implementation process. It also explains how the mitigation strategies outlined in this Plan will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, and building code enforcement and implementation. The Plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

6.1. PLAN IMPLEMENTATION

The effectiveness of the hazard mitigation plan depends on its implementation and incorporation of its action items into partner jurisdictions' existing plans, policies and programs. Together, the action items in the Plan provide a framework for activities that the Partnership can implement over the next 5 years. The planning team and the Steering Committee have established goals and objectives and have prioritized mitigation actions that will be implemented through existing plans, policies, and programs.

Siskiyou County OES will have lead responsibility for overseeing the Plan implementation and maintenance strategy. Plan implementation and evaluation will be a shared responsibility among all planning partnership members and agencies identified as lead agencies in the mitigation action plans (see planning partner annexes in Volume 2 of this plan).

6.2. STEERING COMMITTEE

The Steering Committee is a total volunteer body that oversaw the development of the Plan and made recommendations on key elements of the plan, including the maintenance strategy. It was the Steering Committee's position that an oversight committee with representation similar to the initial Steering Committee should have an active role in the Plan maintenance strategy. Therefore, it is recommended that a steering committee remain a viable body involved in key elements of the Plan maintenance strategy. The new steering committee should strive to include representation from the planning partners, as well as other stakeholders in the planning area.

The principal role of the new steering committee in this plan maintenance strategy will be to review the annual progress report and provide input to OES on possible enhancements to be considered at the next update. Future Plans will be overseen by a steering committee similar to the one that participated in this plan development process, so keeping an interim steering committee intact will provide a head start on future updates. Completion of the progress report is the responsibility of each planning partner, not the responsibility of the steering committee. It will simply be the steering committee's role to review the progress report in an effort to identify issues needing to be addressed by future Plans.

6.3. ANNUAL PROGRESS REPORT

The minimum task of each planning partner will be the evaluation of the progress of its individual action plan during a 12-month performance period. This review will include the following:

- Additions or deletions to the planning partnership
- Summary of any hazard events that occurred during the performance period and the impact these events had on the planning area
- Review of mitigation success stories
- Review of continuing public involvement
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or initiatives that involve hazard mitigation.

OES will assume the responsibility of initiating the annual progress reporting process. A template to guide the planning partners in preparing a progress report has been created as part of this planning process (see Appendix C). At OES's discretion, a committee as described in Section 6.2 may be convened to provide feedback to the planning partners on items included in the template. Siskiyou County OES will then prepare a formal annual report on the progress of the plan. This report should be used as follows:

- Posted on the Hazard Mitigation Plan on the County website
- Provided to the local media through a press release
- Presented to planning partner governing bodies to inform them of the progress of actions implemented during the reporting period

Uses of the progress report will be at the discretion of each planning partner. Annual progress reporting is not a requirement specified under 44CFR. However, it may enhance the planning partnership's opportunities for funding. While failure to implement this component of the plan maintenance strategy will not jeopardize a planning partner's compliance under the DMA, it may jeopardize its opportunity to partner and leverage funding opportunities with the other partners. Each planning partner was informed of these protocols at the beginning of this planning process (in the "Planning Partner Expectations" package provided at the start of the process), and each partner acknowledged these expectations when with submittal of a letter of intent to participate in this process.

6.4. PLAN

Local hazard mitigation plans must be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits under the DMA (44CFR, Section 201.6(d)(3)). The Siskiyou County partnership intends to update the hazard mitigation plan on a 5-year cycle from the date of initial plan adoption. This cycle may be accelerated to less than 5 years based on the following triggers:

- A Presidential Disaster Declaration that impacts the planning area
- A hazard event that causes loss of life
- A comprehensive update of the County or participating city's comprehensive plan

It will not be the intent of future updates to develop a complete new hazard mitigation plan for the planning area. The update will, at a minimum, include the following elements:

- The update process will be convened through a steering committee.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plans will be reviewed and revised to account for any initiatives completed, dropped, or changed and to account for changes in the risk assessment or new partnership policies identified under other planning mechanisms (such as the comprehensive plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The partnership governing bodies will adopt their respective portions of the updated plan.

6.5. CONTINUING PUBLIC INVOLVEMENT

The public will continue to be apprised of the plan's progress through the Hazard Mitigation Plan website and by providing copies of annual progress reports to the media. Each planning partner has agreed to provide links to the County hazard mitigation plan website on their individual jurisdictional websites to increase avenues of public access to the plan. Siskiyou County OES has agreed to maintain the hazard mitigation plan website. This site will not only house the final plan, it will become the one-stop shop for information regarding the plan, the partnership and plan implementation. Copies of the plan will be distributed to the Siskiyou County Library system. Upon initiation of future update processes, a new public involvement strategy will be initiated based on guidance from a new steering committee. This strategy will be based on the needs and capabilities of the planning partnership at the time of the update. At a minimum, this strategy will include the use of local media outlets within the planning area. The jurisdiction will provide contact information on their website if the public wishes to have more input. They can contact the program manager for any questions or comments.

6.6. INCORPORATION INTO OTHER PLANNING MECHANISMS

The information on hazard, risk, vulnerability, and mitigation contained in this plan is based on the best science and technology available at the time this plan was prepared. The Siskiyou County General Plan and the general plans of the partner cities are considered to be integral parts of this plan. The County and partner cities, through adoption of general plans and zoning ordinances, have planned for the impact of natural hazards. The plan development process provided the County and the cities with the opportunity to review and expand on policies contained within these planning mechanisms. The planning partners used their comprehensive plans and the hazard mitigation plan as complementary documents that work together to achieve the goal of reducing risk exposure to the citizens of the Siskiyou County. An update to a general plan may trigger an update to the hazard mitigation plan.

All municipal planning partners are committed to maintaining compliance with the provisions of California Assembly Bill 2140 (AB 2140) by creating a linkage between the hazard mitigation plan and their individual general plans by identifying a mitigation initiative and giving that initiative a high priority. Other planning processes and programs to be coordinated with the recommendations of the hazard mitigation plan include the following:

- Partners' emergency response plans
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments
- Master fire protection plans.

Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. As information becomes available from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process. We will be adopting this plan into the safety elements of the general plan when adopted. Due to insufficient staff and funding to the Siskiyou OES position we were not able to integrate information from the 2012 plan into these planning mechanisms as noted above. It is the intent of the jurisdictions to perform these integrations after the 2019 plan is approved.

PART 2 —
RISK ASSESSMENT

CHAPTER 7. IDENTIFIED HAZARDS AND RISK ASSESSMENT METHODOLOGY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Hazard identification—Use all available information to determine what types of disasters may affect a jurisdiction, how often they can occur, and their potential severity.
- Vulnerability identification—Determine the impact of natural hazard events on the people, property, environment, economy and lands of the region.
- Cost evaluation—Estimate the cost of potential damage or cost that can be avoided by mitigation.

The risk assessment for this hazard mitigation Plan evaluates the risk of natural hazards prevalent in Siskiyou County and meets requirements of the DMA (44CFR, Section 201.6(c)(2)).

7.1 IDENTIFIED HAZARDS

7.1.1 7Hazards of Concern

For this plan, the Steering Committee considered the full range of hazards that could impact the planning area and then listed hazards that present the greatest concern. The process incorporated review of state and local hazard planning documents, as well as information on the frequency, magnitude and costs associated with hazards that have impacted or could impact the planning area. Anecdotal information regarding natural hazards and the perceived vulnerability of the planning area's assets to them was also used. Based on the review, the following were identified as hazards of concern:

- Dam failure
- Drought
- Earthquake
- Flood
- Landslide
- Severe weather
- Volcano
- Wildfire.

A complete risk assessment is provided for each of these hazards.

7.1.2 Hazards of Interest

The Steering Committee also identified natural and human-caused hazards that, while not posing enough threat to warrant a complete risk assessment, do have some limited potential to impact the planning area. These "hazards of interest" were not evaluated with a complete risk assessment for this plan, but a profile of all of them is presented in a single chapter at the end of the risk assessment section of the plan. The hazards of interest are as follows:

- Avalanche
- Air quality/smoke pollution
- Energy shortages
- Hazardous materials
- Fish disease
- Noxious weeds.

7.1.3 Climate Change

Climate includes patterns of temperature, precipitation, humidity, wind and seasons. Climate plays a fundamental role in shaping natural ecosystems, and the human economies and cultures that depend on them. "Climate change" refers to changes over a long period of time. It is generally perceived that climate change will have a measurable impact on the occurrence and severity of natural hazards around the world. Impacts include the following:

- Snow cover losses will continue, and declining snowpack will affect snow-dependent water supplies and stream flow levels around the world.
- The risk of drought and the frequency, intensity, and duration of heat waves are expected to increase.
- More extreme precipitation is likely, increasing the risk of flooding.
- The world's average temperature is expected to increase.

Climate change will affect communities in a variety of ways. Impacts could include an increased risk for extreme events such as drought, storms, flooding, and forest fires; more heat-related stress; and the spread of existing or new vector-born disease into a community. In many cases, communities are already facing these problems to some degree. Climate change changes the frequency, intensity, extent, and/or magnitude of the problems.

This hazard mitigation Plan addresses climate change as a secondary impact for each identified hazard of concern. Each chapter addressing one of the hazards of concern includes a section with a qualitative discussion on the probable impacts of climate change for that hazard. While many models are currently being developed to assess the potential impacts of climate change, there are currently none available to support hazard mitigation planning. As these models are developed in the future, this risk assessment may be enhanced to better measure these impacts.

7.2 METHODOLOGY

The risk assessments in 0 through Chapter 16 describe the risks associated with each identified hazard of concern. Each chapter describes the hazard, the planning area's vulnerabilities, and probable event scenarios. The following steps were used to define the risk of each hazard:

- Identify and profile each hazard—The following information is given for each hazard:
  - Geographic areas most affected by the hazard
  - Event frequency estimates

- Severity estimates
- Warning time likely to be available for response.

Determine exposure to each hazard—Exposure was determined by overlaying hazard maps with an inventory of structures, facilities, and systems to determine which of them would be exposed to each hazard.

Assess the vulnerability of exposed facilities—Vulnerability of exposed structures and infrastructure was determined by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. Tools such as GIS and FEMA's hazard-modeling program called HAZUS-MH were used to perform this assessment for the flood, dam failure and earthquake hazards. Outputs similar to those from HAZUS were generated for other hazards, using maps generated by the HAZUS program.

7.3 RISK ASSESSMENT TOOLS

7.3.1 Dam Failure, Earthquake and Flood—HAZUS-MH

Overview

In 1997, FEMA developed the standardized Hazards U.S., or HAZUS, model to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. HAZUS was later expanded into a multi-hazard methodology, HAZUS-MH, with new models for estimating potential losses from hurricanes and floods.

HAZUS-MH is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, critical facility, transportation and utility lifeline, and multiple models to estimate potential losses from natural disasters. The program maps and displays hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

Provides a consistent methodology for assessing risk across geographic and political entities.

Provides a way to save data so that it can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.

Facilitates the review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.

Supports grant applications by calculating benefits using FEMA definitions and terminology.

Produces hazard data and loss estimates that can be used in communication with local stakeholders.

Is administered by the local government and can be used to manage and update a hazard mitigation plan throughout its implementation.

The version used for this plan was HAZUS-MH MR5, released by FEMA in September 2010.

Levels of Detail for Evaluation

HAZUS-MH provides default data for inventory, vulnerability and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the planning area:

Level 1—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the planning area.

Level 2—More accurate estimates of losses require more detailed information about the planning area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.

Level 3—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the planning area.

Application for This Plan

The following methods were used to assess specific hazards for this plan:

- **Flood**—A Level 2, general building stock analysis was performed. An updated inventory was used in place of the HAZUS-MH defaults for essential facilities, transportation and utilities. Current Siskiyou County DFIRMs were used to delineate flood hazard areas and estimate potential losses from the 100-year flood event. Using the DFIRM floodplain boundaries and a countywide 10-meter digital elevation model, a 100-year flood depth grid was generated and integrated into the model. Flood exposure numbers were generated using Siskiyou County assessor data. The assessor data does not include tax exempt structures, such as federal and local government buildings. Assessor data was the best available data to estimate hazard exposure. Flood hazard vulnerability numbers were generated in HAZUS, using the default census block General Building Stock.

- **Dam Failure**—Dam failure inundation mapping for Siskiyou County was collected where available. This data was imported into HAZUS-MH and a modified Level 2 analysis was run using the flood methodology described above. Using the dam inundation mapping and a countywide 10-meter digital elevation model, a dam failure flood depth grid was generated and integrated into the model. Dam failure exposure numbers were generated using Siskiyou County assessor data. Dam failure vulnerability numbers were generated in HAZUS, using the default census block General Building Stock.

Earthquake—A Level 2 analysis was performed to assess earthquake risk and exposure. Earthquake probabilistic data prepared by the U.S. Geological Survey (USGS) was used for the analysis of this hazard. An updated inventory of essential facilities, transportation and utility features was used in place of the HAZUS-MH defaults. A modified version of the California Department of Conservation National Earthquake Hazard Reduction Program (NEHRP) soils inventory was used. The standard HAZUS analysis for the 100- and 500-year probabilistic events was used to assess earthquake risk in Siskiyou County.

7.3.2 Landslide, Severe Weather, Volcano and Wildfire

For most of the hazards evaluated in this risk assessment, historical data was not adequate to model future losses. However, HAZUS-MH and GIS are able to map hazard areas and calculate exposures if geographic information is available on the locations of the hazards and inventory data. Areas and inventory susceptible to some of the hazards of concern were mapped and exposure was evaluated. For other hazards, a qualitative analysis was conducted using the best available data and professional judgment. County-relevant information was gathered from a variety of sources. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists and others. The primary data source was the Siskiyou County GIS database, augmented with state and federal data sets. Additional data sources for specific hazards were as follows:

- **Landslide—**Historical landslide and probable landslide data were provided by Siskiyou County and incorporated into the plan. Also included in the landslide assessment was geomorphology characteristics provided by the Klamath National Forest. Landslide exposure numbers were generated using Siskiyou County assessor data.
- **Severe Weather**—Severe weather data was downloaded from the Natural Resources Conservation Service and the National Climatic Data Center.
- **Volcano**—Volcanic hazard data was obtained from the USGS Cascade Volcano Observatory.
- **Wildfire**—Information on wildfire hazards areas was provided by California Department of Forestry and Fire Protection. Wildfire exposure numbers were generated using Siskiyou County assessor data.

7.3.3 Drought

The risk assessment methodologies used for this plan focus on damage to structures. Because drought does not impact structures, the risk assessment for drought was more limited and qualitative than the assessment for the other hazards of concern.

7.3.4 Limitations

Loss estimates, exposure assessments and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

Approximations and simplifications necessary to conduct a study

Incomplete or outdated inventory, demographic or economic parameter data

The unique nature, geographic extent and severity of each hazard

Mitigation measures already employed

The amount of advance notice residents have to prepare for a specific hazard event.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. The results do not predict precise results and should be used only to understand relative risk. Over the long term, Siskiyou County and its planning partners will collect additional data to assist in estimating potential losses associated with other hazards.

CHAPTER 8.
SISKIYOU COUNTY PROFILE

Siskiyou County is located in northern California (see *Figure 7-1*). It is the 45th most populous of California's 58 counties. Its incorporated cities are Dorris, Dunsmuir, Etna, Fort Jones, Montague, Mount Shasta, Tulelake, Weed and Yreka. Yreka, in the center of the county, is the county seat. Siskiyou County is the fifth largest county in California, covering 6,347 square miles in the Siskiyou Mountain region. The county is bounded to the north by the state of Oregon, to the east by Modoc County, to the south by Shasta and Trinity Counties and to the west by Del Norte and Humboldt Counties.

Figure 7-1. Main Features of Siskiyou County

About 60 percent of the land is managed by state and federal government agencies, including the U.S. Forest Service, the U.S. Bureau of Land Management, the U.S. Fish and Wildlife Service and the California Department of Fish and Game. Much of the land use in the county is resource-based, in the form of forested hills, cropland, range and pasture land.

Much of the county's rural and sparse population is located along major transportation corridors, which also are interspersed with commercial and light industrial operations. Interstate-5, the primary transportation corridor along the West Coast, divides the county east and west. Services, retail trade, wholesale trade, manufacturing and agriculture, forestry and fishing are important base industries in the county. The summer months see a large influx of tourists who take advantage of the County's wide-open spaces for outdoor recreation including hunting, fishing, white-water rafting, and mountain climbing and camping.

8.1 COMMUNITIES

Some of the county's cities and towns are located along major transportation corridors, including Interstate 5, while others are located along small rural highways that connect the scenic valleys:

Yreka, located on Interstate 5 and near State Routes 96 and 3, has the largest population in the county. Yreka was a gold rush boomtown and its downtown district, museum and monuments attract many tourists each year.

Mount Shasta is the County's second largest city.

The City of Dunsmuir is a hub for tourism and once was an important railroad yard.

The city of Montague is home to a historic preservation district, an annual hot air balloon fair and several old-fashioned farms and ranches.

Tulelake, in the eastern corner of the county, is known for its volcanic cinder cones, lava bed landscapes and a wildlife refuge visited by millions of migrating birds.

Weed is named after a lumber mill pioneer, although the timber industry has scaled back. The town's economy is now supported by tourism, the College of the Siskiyous and the Crystal Geyser bottled water company.

The community of Dorris is located in the Butte Valley at the California-Oregon boundary.

Surrounded by ranch lands in the Scott Valley, the City of Etna attracts anglers in search of stillwater rainbow trout.

The Scott River runs through the Town of Fort Jones, which is an historical military post.

Significant unincorporated communities in Siskiyou County include Callahan, Edgewood, Forks of Salmon, Gazelle, Greenview, Grenada, Happy Camp, Hornbrook, Horse Creek, Klamath River, Lake Shastina, Macdoel, McCloud, Sawyers Bar, Scott Bar, Seiad Valley, and Somes Bar.

8.2 HISTORICAL OVERVIEW

The presence of Native Americans in Siskiyou County has been traced back over 7,000 years, and oral histories of local tribes extend even further back. The historical distribution of tribes in the area was as follows:

The area north of Mount Shasta and west into Scott Valley was the territory of the Shasta Indians. The tribe had a vast land base encompassing a substantial proportion of Northern California and Southern Oregon.

The Karuk Tribe lived along the Klamath River and across the Marble and Salmon Mountains in the Scott Valley area. People of the Karuk Tribe lived sustainably within their ancestral lands using land management techniques such as burning. The rivers and surrounding forests sustained the population with fish, game and acorns.

The traditional homelands of the Modocs were east of Mount Shasta and up into Butte Valley and the Klamath Basin. In the late 1800s, the federal government relocated the Modoc people to Oklahoma reservations where the majority of tribe remains.

The Wintu people lived south of Mount Shasta, including most of Shasta and Trinity Counties.

The Achomawi and Klamath native peoples had some historical territory within what is now Siskiyou County.

The first record of non-Indian travel in Siskiyou County was in the winter of 1826-27 when Hudson's Bay Company fur trappers under Peter Ogden, traveled through the area. Ogden noted in his journal that Mount Shasta was equal in height to Mount Hood and that the mountain was named Mount Sastise. Early maps portrayed Mount Shasta with a variety of other names including Mount Pitt, Mount Jackson, and Mount Simpson and also indicated that the mountain stood over 20,000 feet above sea level. For the most part, explorers and fur trappers traveled in the area but did not stay for any extensive length of time.

Gold was discovered in Siskiyou County in 1850 by prospectors on the South Fork of the Salmon River. The Gold Rush brought considerable numbers of gold-seekers to parts of Siskiyou County. Men and women from across America and some from Europe, Australia and Asia came to mine gold, though most were unsuccessful. Many failed gold-seekers stayed in the region, displacing Native American people while establishing small settlements and boomtowns, along with roads, churches, hotels and schools. The town of Yreka was one such settlement, settled in the 1850s while ranching, logging and railroads became an economic force in the county.

Siskiyou County was created on March 22, 1852, from parts of Shasta and Klamath Counties. Yreka was declared the county seat. The county was named after the Siskiyou Mountains; although the origin of the word *siskiyou* is not entirely understood, one suggestion is that it is the Chinook Indian word for "bob-tailed horse." Another version is that the name has French origins from the phrase *six cailloux*, or "six stones," which was given to a ford crossing on the Umpqua River by a party of Hudson's Bay Company trappers, because six large stones or rocks lay in the river where they crossed. Others attribute the name to a local Native American tribe.

8.3 PHYSICAL SETTING

Siskiyou County encompasses 1.2 million acres of ecologically diverse wildland ranging from high desert in the east, to the coniferous forests of the Klamath River drainage with farmland carpeting the interior valleys, and Mt. Shasta as the geographical centerpiece.

8.3.1 Geology

The Siskiyou County region has a complex geologic history of folding, faulting, uplifting, sedimentation, volcanism and erosion. The primary bedrock in Siskiyou County includes igneous, or volcanic, rocks, with an array of surficial alluvial and colluvial deposits. Considerable marble, sandstone and limestone deposits exist throughout the County, many of which have been mined for minerals or road materials. The county features three major geomorphic provinces:

Klamath Mountains—The Klamath Mountains have rugged topography with jagged peaks and ridges that extend 6,000 to 8,000 feet above sea level. In the western Klamath Range, an irregular drainage pattern is incised into the Klamath peneplain, an uplifted plateau. The uplift has left successive benches exposing gold bearing gravels on the canyon walls. This geomorphic province is considered to be a northern extension of the Sierra Nevada.

Cascade Range—The Cascade Range is chain of volcanoes and mountains from Washington, through Oregon and into California. In Siskiyou County, this province is dominated by Mt. Shasta, a glacier covered volcanic peak that rises 14,162 feet above sea level and is the second highest active volcano in the Cascade Range. The broad and relatively flat Medicine Lake Volcano is one of the largest shield volcanoes in the Cascade Range.

Modoc Plateau—The Modoc Plateau is a broad volcanic table that ranges from 4,000 to 6,000 feet above sea level. The plateau consists of a thick accumulation of basaltic lava flows and tuff layers and numerous small volcanic cones. The Modoc Plateau is dissected by several north-south fault lines.

8.3.2 Soils

With a diverse landscape altered by geologic processes, the soils in Siskiyou County range from simple to the most complex. Alluvium and terrace deposits, primarily composed of sand, silt, clay and gravel, are prevalent in the lowlands and flat riverine valleys. The intermountain valleys and foothills contain alluvial soils and terrace deposits. The mountainous areas consist of hearty soils from a variety of lithic parent materials, including sedimentary, metamorphic and igneous rocks. Mapping units in the Natural Resources Conservation Service's (NRCS) soil survey for Siskiyou County, Central Part describe the prevailing soils and include information about parent rock material, soil depth, erosion and slope. The acreage and proportionate extent of the major soil groups is described below:

Duzel-Jilson-Facey Complex—This soil complex is the majority soil, covering 11.4 percent (103,165 acres) of the map. The component is located in steep, mountainous areas with 15 to 50 percent slopes. The parent material is weathered metamorphic rock and is considered well-drained.

Marpa-Kinkel-Boomer, Cool Complex—This soil complex covers over 80,000 acres and is 8.8 percent of the map area. It is located in steep, mountainous areas with 15 to 50 percent slopes. The parent material is weathered metamorphic rock and is considered well-drained.

Kindig-Neuns Gravelly Loams—These gravelly loams cover 46,590 acres, making up about 5 percent of the map area. They are located in very steep mountains with 50 to 80 percent slopes. The parent material is weathered metamorphic rock and is considered well-drained.

Lassen-Kuck Complex, Stony—Covering over 46,000 acres, this complex makes up 5.1 percent of the map area. These formations occur on hills with 2 to 50 percent slopes. The rocky materials are well-drained and come from weathered igneous parent materials.

Lassen-Rock Outcrop-Kuck Complex—This soil complex covers 35,845 acres, or 3.9 percent of the map area. This outcrop and soil complex is located on hills with a range of 2 to 50 percent slopes. The parent material is weathered igneous rock and is considered well-drained.

Soils have varying levels of susceptibility to erosion, but each soil type benefits from conservation management techniques to prevent accelerated erosion. Topsoil erosion often results in reduced crop productivity and may cause sedimentation in nearby streams. Sedimentation fills in stream beds, diminishing water quality and limiting water transportation, and it may damage sensitive riparian habitats.

Soil erosion in Siskiyou County occurs as a result of intensive land use, wind and water erosion. Erosion may be most severe where urbanization, development, recreational activities, logging and intensive agricultural practices take place. Extreme rainfall events, lack of vegetative cover, fragile soils and steep slopes combine to accelerate erosion. Wind erosion can also be a factor for soil losses in some areas. Agricultural crops are subject to the erosive forces of water, and hillside grazing pastures have been strained by reduced root structure due to years of drought conditions. With proper drainage construction and landscaping techniques, these altered soils may return to pre-construction stability and condition.

8.3.3 Surface Water

The County is drained by the Sacramento River in the south, the Klamath River in the north and the Salmon River in the west. The Klamath River winds an irregular course from the Cascade Range through the Klamath Mountains. Numerous watercourses drain the snow-capped peaks of the Cascade Range. Lakes, marshes and slow moving streams meander across the relatively flat Modoc Plateau.

8.3.4 Climate

In general, Siskiyou County's climate is characterized by warm, dry summers and cool, wet winters typical of Mediterranean climates. However, since Siskiyou County is at the northern extreme of the Mediterranean climate zone (above 41° N) and is in a mountainous region, winters tend to be colder than the average Mediterranean region. The geographic diversity of Siskiyou County contributes to a broad range of regional micro-climates. Elevation differences, along with distance from the Pacific Ocean, which is the main source of precipitation, account for most of the variability in Siskiyou County's climate. The alpine areas around Mount Shasta and other mountainous areas receive considerable snow in the winter, which blankets the ski area on the slopes of Mount Shasta. In contrast, the valleys receive a only a light dusting of snow in winter.

Due to the influence of coastal air masses, the western portion of Siskiyou County receives the most moisture and it becomes progressively drier toward the east. High elevation and proximity to the Pacific Ocean results in the Klamath Mountains receiving an average of 40 to 60 inches per year in the valley regions and from 80 to 100 inches per year in the higher elevations. The Shasta Valley lies in the rain shadow of the Klamath Range, so on average the valley receives less than 20 inches each year. As winter storms move eastward with the prevailing westerlies, they reach the Cascade Range, where uplift results in relatively high precipitation (approximately 30 to 60 inches per year). As coastal storms pass over the Coast Range (west of Siskiyou County) and the ranges in the County, much of the moisture precipitates out, so the Modoc Plateau in the eastern county receives little precipitation—about 10 to 20 inches year. Due to the distance from the moderating influence of the Pacific Ocean, the Modoc Plateau has more extreme temperature ranges and much colder winter temperatures. This eastern, interior part of Siskiyou County is better classified as having a steppe climate rather than a Mediterranean climate.

8.4 MAJOR PAST HAZARD EVENTS

Presidential disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. Some of the programs are matched by state programs. Siskiyou County has experienced eight events since 1964 for which presidential disaster declarations were issued. These events are listed in **TABLE 7-1**.

TABLE 7-1.
PRESIDENTIAL DISASTER DECLARATIONS FOR HAZARD EVENTS IN SISKIYOU COUNTY

Year	Date	Incident Description	Disaster Number
2017	01/02	Severe Winter Storms, Flooding, and Debris and Mud Flows	4301
2017	01/23	Severe Winter Storms, Flooding, and Debris and Mud Flows	4308
2010	03/08	Severe Winter Storms, Flooding, and Debris and Mud Flows	1884
2006	02/03	Severe Storms, Flooding, Mudslides, and Landslides	1628
1997	01/04	Severe Storms/Flooding	1155
1995	03/12	Severe Winter Storms, Flooding, Landslides, Mud Flows	1046
1993	02/03	Severe Storm, Winter Storm, Mud & Landslides, Flooding	979
1974	01/25	Severe storms, flooding	412
1970	02/16	Severe storms, flooding	283

1964	12/24	Heavy Rains & Flooding	183

Many natural hazard events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for hazards of concern.

8.5 CRITICAL FACILITIES AND INFRASTRUCTURE

Critical facilities and infrastructure are those that are essential to the health and welfare of the population. These become especially important after a hazard event. Critical facilities typically include police and fire stations, schools and emergency operations centers. Critical infrastructure can include the roads and bridges that provide ingress and egress and allow emergency vehicles access to those in need, and the utilities that provide water, electricity and communication services to the community. Also included are "Tier II" facilities and railroads, which hold or carry significant amounts of hazardous materials with a potential to impact public health and welfare in a hazard event. As defined for this hazard mitigation Plan, critical facilities include but are not limited to the following:

- Police stations, fire stations, city/county government facilities (including those that house critical information technology and communication infrastructure), vehicle and equipment storage facilities, and emergency operations centers needed for disaster response before, during, and after hazard events
- Public and private utilities and infrastructure vital to maintaining or restoring normal services to areas damaged by hazard events. These facilities include but are not limited to:
  - Public and private water supply infrastructure, water and wastewater treatment facilities and infrastructure, potable water pumping, flow regulation, distribution and storage facilities and infrastructure
  - Public and private power generation (electrical and non-electrical), regulation and distribution facilities and infrastructure
  - Data and server communication facilities
  - Structures that manage or limit the impacts of natural hazards such as regional flood conveyance systems, potable water trunk main interconnect systems and redundant pipes crossing fault lines and reservoirs
  - Major road and rail systems including bridges, airports and marine terminal facilities
- Educational facilities, including K-12 and community college.
- Community gathering places, such as libraries, community centers, senior centers, veterans halls, and the County fairground
- Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a hazard event
- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials.

Map 8-1 shows the location of critical facilities in unincorporated areas of the county. Critical facilities within the cities participating in this plan are shown in maps for each city provided in Volume 2 of the plan. Due to the sensitivity of this information, a detailed list of facilities is not provided. The list is on file with each planning partner. **TABLE 7-2** and **TABLE 7-3** provide summaries of the general types of critical facilities and infrastructure, respectively, in each municipality and unincorporated county areas. All critical facilities/infrastructure were analyzed in HAZUS to help rank risk and identify mitigation actions. The risk assessment for each hazard qualitatively discusses critical facilities with regard to that hazard. There has been little development in infrastructure that puts the county in higher risk sense the 2012 plan. All buildings were built to code and gone through the proper planning departments and approved.

TABLE 7-2.
CRITICAL FACILITIES BY JURISDICTION AND CATEGORY

City	Medical	Government	Protective	Schools	Hazmat	Other	**Total**
Dorris	1	0	1	2	0	0	**4**
Dunsmuir	0	0	2	6	0	1	**9**
Etna	3	12	2	5	0	0	**22**
Fort Jones	1	11	2	5	0	0	**19**
Montague	1	0	1	3	0	0	**5**
Mt Shasta	15	0	3	13	0	0	**31**
Tulelake	1	0	1	4	0	1	**7**
Weed	4	2	2	9	0	0	**17**
Yreka	25	12	5	28	0	2	**72**
Unincorporated	13	33	26	42	0	12	**126**
Total	**64**	**70**	**45**	**117**	**0**	**16**	**312**

TABLE 7-3.
CRITICAL INFRASTRUCTURE BY JURISDICTION AND CATEGORY

City	Bridges	Water	Wastewater	Power	Communications	Other	**Total**
Dorris	0	0	0	0	0	0	**0**
Dunsmuir	9	0	0	0	0	0	**9**
Etna	0	0	0	0	0	0	**0**
Fort Jones	2	7	0	1	0	0	**10**
Montague	0	0	0	0	0	0	**0**
Mt Shasta	5	0	0	0	0	0	**5**
Tulelake	0	0	0	0	0	0	**0**
Weed	9	0	0	1	0	0	**10**
Yreka	21	0	0	0	0	0	**21**
Unincorporated	320	7	1	1	0	0	**329**
Total	**366**	**14**	**1**	**3**	**0**	**0**	**384**

8.6 DEMOGRAPHICS

Some populations are at greater risk from hazard events because of decreased resources or physical abilities. Elderly people, for example, may be more likely to require additional assistance. Research has shown that people living near or below the poverty line, the elderly (especially older single men), the disabled, women, children, ethnic minorities and renters all experience, to some degree, more severe effects from disasters than the general population. These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability—such as disability, age, poverty, and minority race and ethnicity—often overlap spatially and often in the geographically most vulnerable locations. Detailed spatial analysis to locate areas where there are higher concentrations of vulnerable community members would assist the County in extending focused public outreach and education to these most vulnerable citizens.

8.6.1 Siskiyou County Population Characteristics

An understanding the composition of the population and how it has changed in the past and how it may change in the future is needed for making informed decisions about the future. Information about population is a critical part of planning because it directly relates to land needs such as housing, industry, stores, public facilities and services, and transportation. Siskiyou County is the 41st most populous of California's 58 counties. The California Department of Finance estimated Siskiyou County's population at 44,900 as of 2010.

Population changes are useful socio-economic indicators. A growing population generally indicates a growing economy, while a decreasing population signifies economic decline. *Figure 7-2* shows the growth rate of Siskiyou County from 2000 to 2010 compared to that of the State of California. Between 2000 and 2010, California's population grew by 10 percent (about 1.0 percent per year) while Siskiyou County's population increased by 1.8 percent (0.18 percent per year).

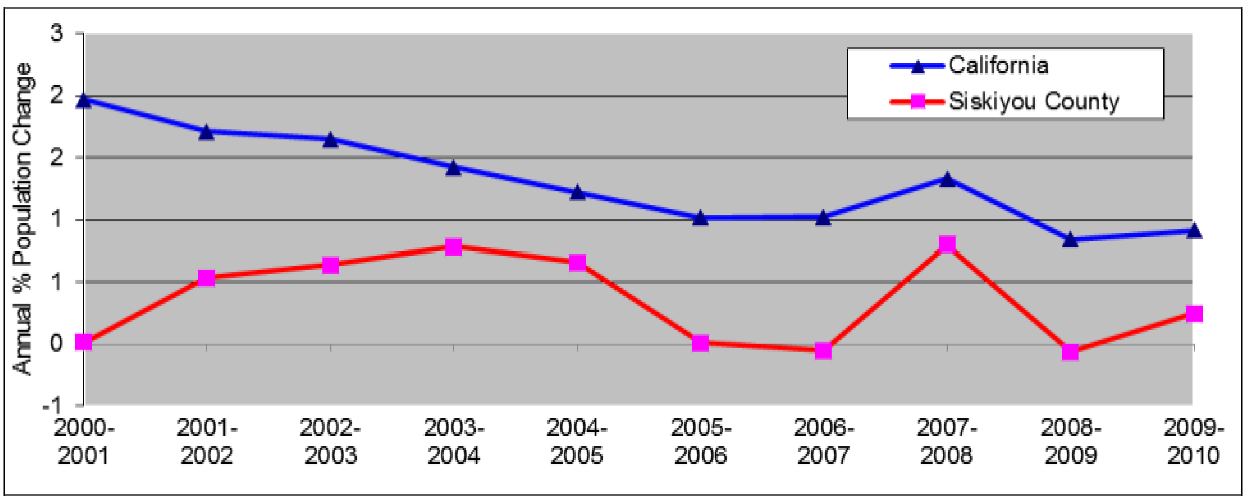


Figure 7-2. California and Siskiyou County Population Growth

TABLE 7-4 shows the population of incorporated municipalities and the unincorporated area in Siskiyou County from 2000 to 2010. In 2000, about 53 percent of Siskiyou County's residents lived outside incorporated areas. Overall growth in incorporated areas was 129 persons from 2000 to 2010, while the unincorporated areas of the county grew by 470 persons during the same timeframe.

8.6.2 Income

In the United States, individual households are expected to use private resources to prepare for, respond to and recover from disasters to some extent. This means that households living in poverty are automatically disadvantaged when confronting hazards. Additionally, the poor typically occupy more poorly built and inadequately maintained housing. Mobile or modular homes, for example, are more susceptible to damage in earthquakes and floods than other types of housing. In urban areas, the poor often live in older houses and apartment complexes, which are more likely to be made of un-reinforced masonry, a building type that is particularly susceptible to damage during earthquakes.

TABLE 7-4.
CITY AND COUNTY POPULATION DATA

	Population										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Dorris	915	919	922	920	922	932	939	933	918	907	903
Dunsmuir	1,830	1,803	1,771	1,729	1,702	1,684	1,650	1623	1600	1581	1574
Etna	769	766	760	748	742	743	737	732	724	716	711
Fort Jones	655	657	647	645	647	648	710	703	694	687	686
Montague	1,457	1,471	1,477	1,472	1,455	1,453	1,443	1434	1417	1402	1397
Mt. Shasta	3,598	3,577	3,537	3,480	3,438	3,435	3,394	3362	3323	3283	3285
Tulelake	1,023	1,020	1,016	1,005	1,000	1,005	1,010	1007	998	993	989
Weed	2,965	2,946	2,896	2,981	2,989	2,988	2,967	2987	2945	2897	2865
Yreka	7,484	7,482	7,448	7,542	7,687	7,750	7,765	7763	7674	7594	7564
Unincorporated	23,919	24,131	24,322	24,220	24,223	24,193	24,156	24,292	24,268	24,346	24,419
Total	**44,691**	**44,865**	**44,918**	**44,877**	**44,952**	**44,996**	**44,900**	**44,836**	**44,561**	**44,406**	**44,393**

Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters. This means that residents below the poverty level have a great deal to lose during an event and are the least prepared to deal with potential losses. The events following Hurricane Katrina in 2005 illustrated that personal household economics significantly impact people's decisions on evacuation. Individuals who cannot afford gas for their cars will likely decide not to evacuate.

Based on U.S. Census Bureau estimates, per capita income in Siskiyou County in 2009 was $22,528, and the median household income was $37,938. It is estimated that about 7 percent of households have an income between $100,000 and $149,999 per year and over 3 percent of the county's household incomes are above $150,000 annually. About 33.8 percent of the households in Siskiyou County make less than $25,000 per year and are therefore below the poverty level. As defined by the Census Bureau's Office of Management and Budget and updated for inflation using the Consumer Price Index, the weighted average poverty threshold for a family of four in 2010 was $24,314; for a family of three, $17,374; for a family of two, $14,218; and for unrelated individuals, $11,139.

8.6.3 Age Distribution

As a group, the elderly are more apt to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. They are more likely to be vision, hearing, and/or mobility impaired, and more likely to experience mental impairment or dementia. Additionally, the elderly are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as "critical facilities" by emergency managers because they require extra notice to implement evacuation. Elderly residents living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters due to isolation caused by the event. Specific planning attention for the elderly is an important consideration given the current aging of the American population.

Children under 14 are particularly vulnerable to disaster events because of their young age and dependence on others for basic necessities. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards.

The overall age distribution for Siskiyou County is illustrated in *Figure 7-3*. Based on U.S. Census data estimates for 2010-2017, 24.7 percent of Siskiyou County's population is 65 or older, compared to the state average of 12.6 percent. According to the 2010 U.S. Census data, 39.7 percent of the County's over-65 population has disabilities of some kind and 7.3 percent have incomes below the poverty line. Children under 18 account for nearly 20.2 percent of individuals who are below the poverty line. It is also estimated that 16.6 percent of the County's population is 14 or younger, compared to the state average of 21.5 percent.

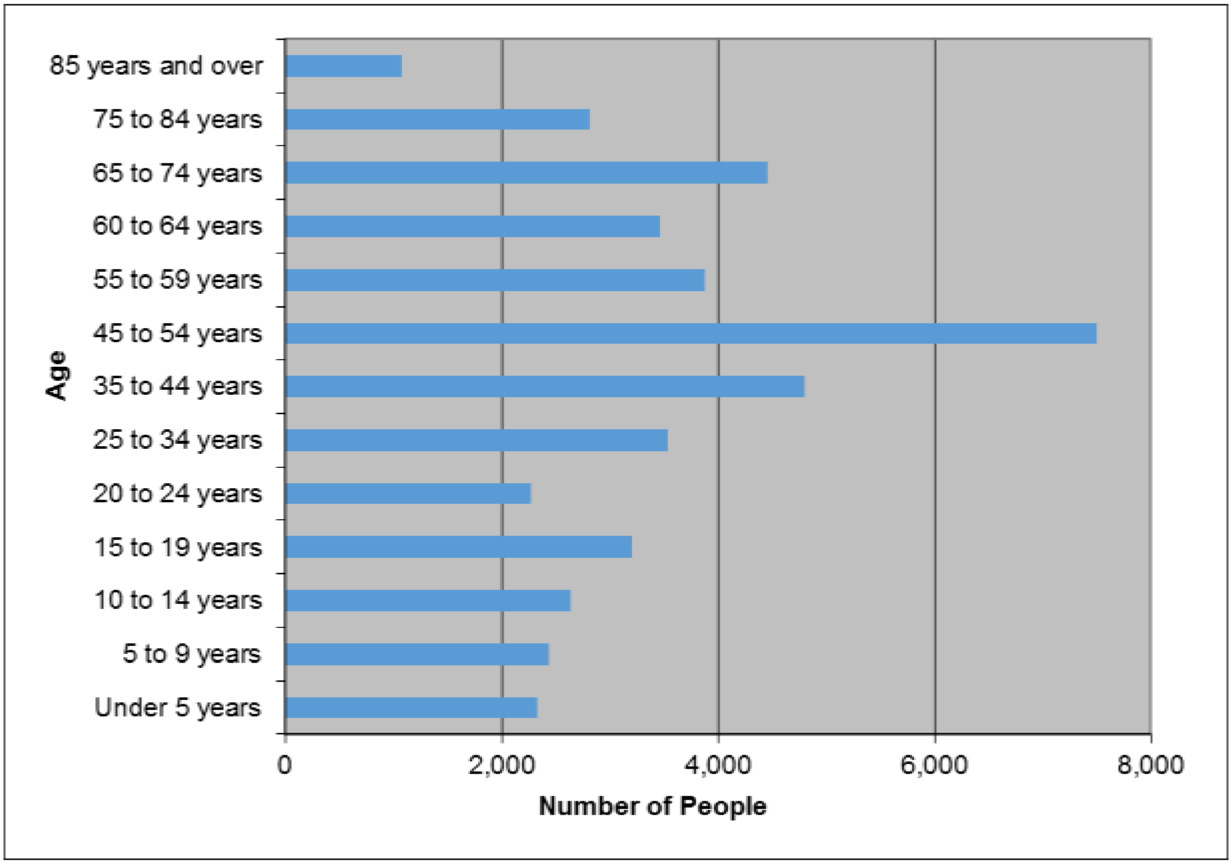


Figure 7-3. Siskiyou County Age Distribution

8.6.4 Race, Ethnicity and Language

Research shows that minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Post-disaster recovery can be ineffective and is often characterized by cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poverty can compound vulnerability. According to the U.S. Census, the racial composition of Siskiyou County is predominantly White, at about 86.5percent. The largest minority populations are Hispanic or Latino at 12.6 percent and "some other race" at 5.3 percent. *Figure 7-4* shows the racial distribution in Siskiyou County.

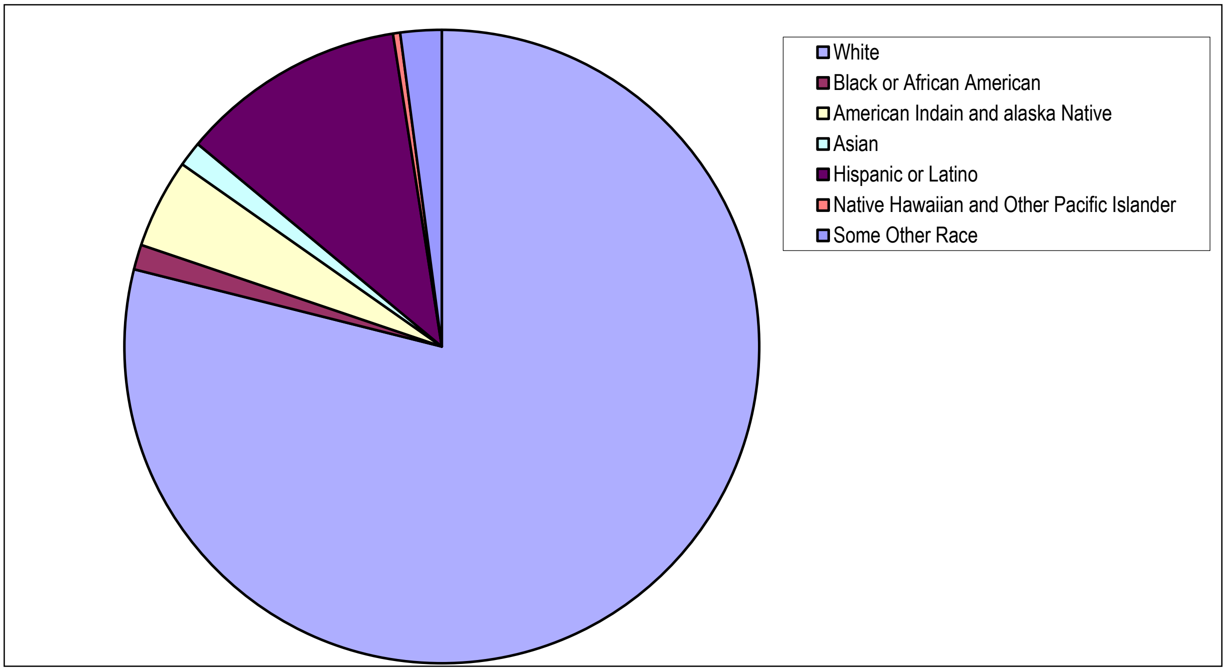


Figure 7-4. Siskiyou County Race Distribution

Siskiyou County has a 5.6-percent foreign-born population. Other than English, the most commonly spoken language in Siskiyou County is Spanish. The census estimates 3.9 percent of the county's residents speak English "less than very well."

8.6.5 Disabled Populations

People living with disabilities are significantly more likely to have difficulty responding to a hazard event than the general population. According to U.S. Census figures, roughly one-fifth of the U.S. population lives with a disability. Disabled populations are increasingly integrated into society. This means that a relatively large segment of the population will require assistance during the 72 hours after a hazard event, the period generally reserved for self-help. Disabilities can vary greatly in severity and permanence, making populations difficult to define and track. There is no "typical" disabled person, which can complicate disaster-planning processes that attempt to incorporate them. Disability is likely to be compounded with other vulnerabilities, such as age, economic disadvantage and ethnicity, all of which mean that housing is more likely to be substandard.

Table 7-5 summarizes the estimates of disabled people in Siskiyou County. According to 2010 U.S. Census data, 20.6 percent of the County's population over the age of 5 has a disability.

**TABLE 7-5.
DISABILITY STATUS OF NON-INSTITUTIONALIZED POPULATION**

Age	Persons with a Disability	Percent of Age Group
Age 5 to 20 years	728	5.2
Age 21 to 64 years	5,260	20.2
Age 65 years and over	3,166	50.2

8.7 ECONOMY

8.7.1 Industry, Businesses and Institutions

Siskiyou County's economy is strongly based in the "educational services, health care and social assistance" industry (23.7 percent), followed by the retail trade industry. The information and wholesale trade industries make up the smallest source of the county's economy. *Figure 7-5* shows the breakdown of industry types in Siskiyou County.

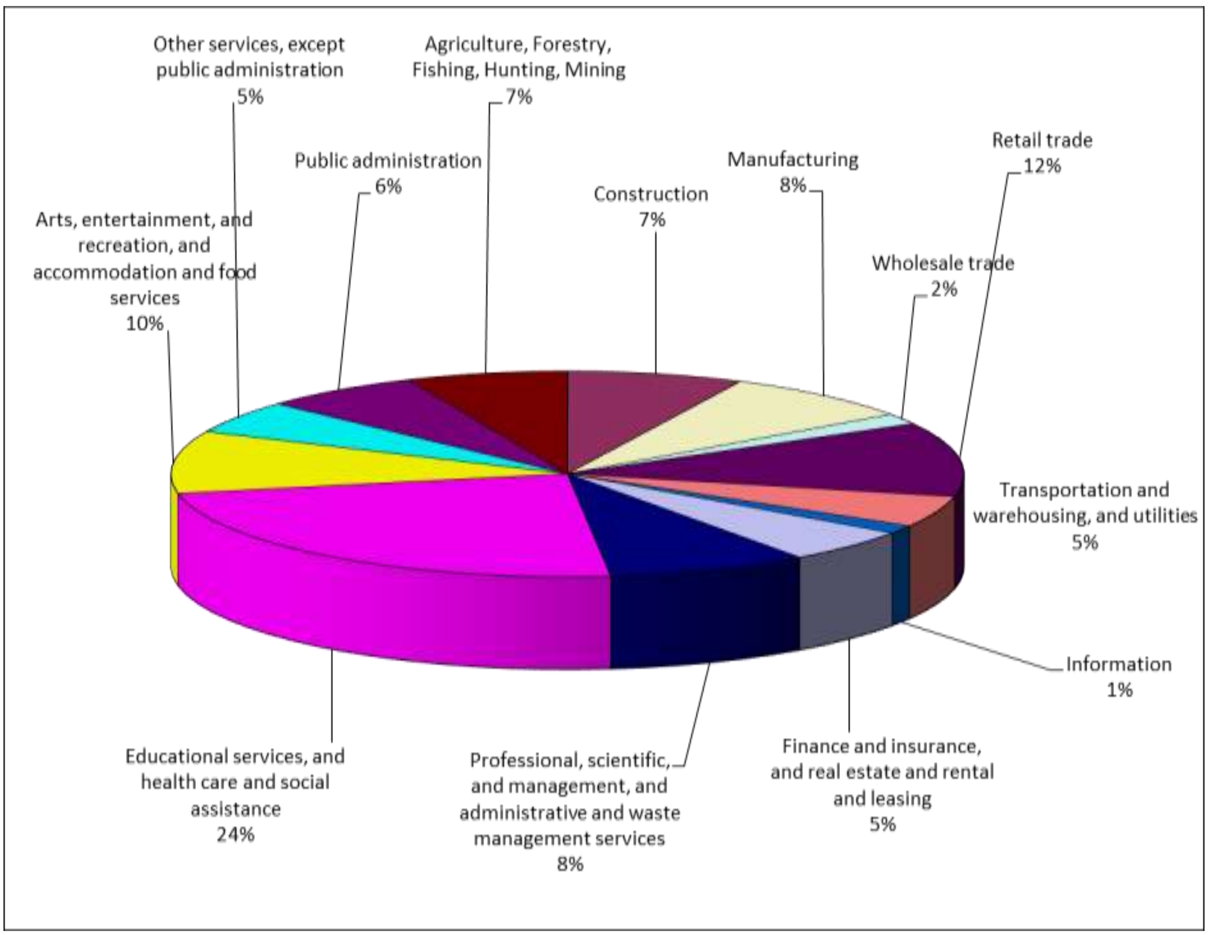


Figure 7-5. Industry in Siskiyou County

The county benefits from a variety of business activity. Major businesses include Siskiyou County government offices, CCDA Waters, LLC, College of the Siskiyous, Fairchild Medical Center, U.S. Forest

Service, Electro-Guard, Inc., Mercy Medical Center, Mt. Shasta Resort, Raley's Supermarket, Roseburg Forest Products, Siskiyou Lake Resort, Sugar Creek Ranch, Timber Products Co., and Wal-Mart.

Major educational and research institutions in the county are College of the Siskiyou's and the U.S. Forest Service.

Streams, mountains, and forestland provide a wide array of recreational opportunities in Siskiyou County. The Salmon and Scott Rivers provide boating, bird/wildlife watching, wild-trout fly fishing and other water recreation activities. The Klamath River is a premier fishing and camping destination. Skiing, river rafting, kayaking, hiking, camping, swimming, climbing, hunting and other outdoor activities abound at Mt. Shasta, Castle Crags State Park, Mt. Eddy, Black Butte, Marble Mountain Wilderness, Lake McCloud, Iron Gate Reservoir, Klamath National Forest, Tule Lake National Wildlife Refuge and waterfalls throughout the county. The Siskiyou National Forest in the Klamath Mountains and the Coastal Range provide additional national park and forestland.

8.7.2 Employment Trends and Occupations

According to the 2005-2009 American Community Survey Estimates, about 53.8 percent of Siskiyou County's population is in the labor force. Of the working-age population group (age 16 years and over), 59.4 percent of men and 49.4 percent of women are in the labor force.

Figure 7-6 compares California's and Siskiyou County's unemployment trends from 2001 through 2010. Siskiyou County's unemployment rate was lowest in 2001, at 8 percent. Unemployment rates again dipped to 8 percent in 2006, but have since been on an upward trend and are expected to continue to rise.

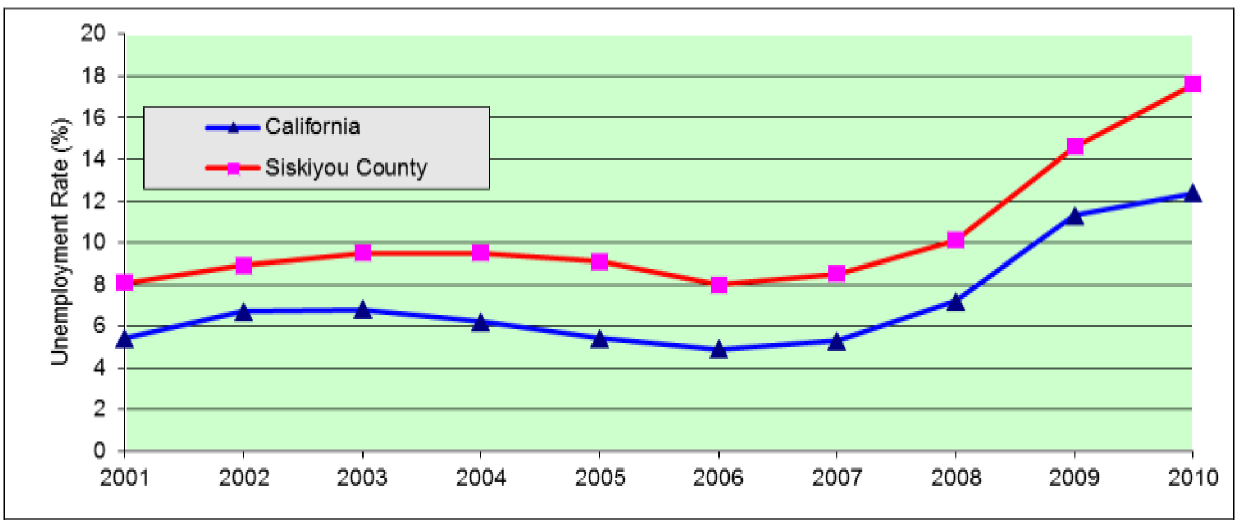


Figure 7-6. California and Siskiyou County Unemployment Rate

Management, professional and related occupations make up 32.6 percent of the jobs in Siskiyou County. The largest employer in the county is Siskiyou County government, where the major occupations are administration, management and professional in nature and include Public Works and the Sherriff's Department. Only about 3.4 percent of the employment in Siskiyou County is in farming, fishing and forestry occupations (see *Figure 7-7*).

The U.S. Census estimates that 72.1 percent of Siskiyou County workers commute alone (by car, truck or van) to work, and mean travel time to work is 20 minutes (the state average is 27 minutes).

8.8 FUTURE TRENDS IN DEVELOPMENT

The County and its cities have adopted comprehensive or general plans that govern land use decision and policy making their jurisdictions. Decisions on land use will be governed by these programs. This plan will work together with these programs to support wise land use in the future by providing vital information on the risk associated with natural hazards in Siskiyou County.

All municipal planning partners will incorporate by reference the Siskiyou County Hazard Mitigation Plan in their comprehensive or general plans. This will assure that all future trends in development can be established with the benefits of the information on risk and vulnerability to natural hazards identified in this plan. There has been a decrease in population sense 2012 and that has reduced the risk and there has been no significant changes to development that would increase risk in communities.

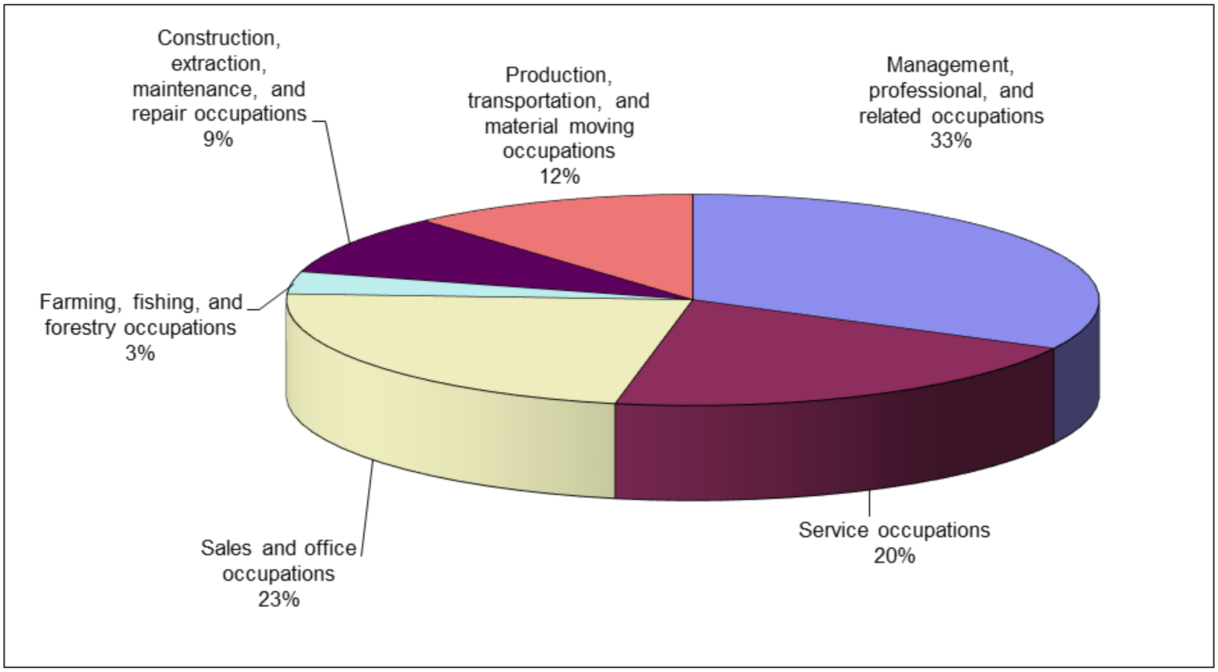


Figure 7-7. Occupations in Siskiyou County

8.9 LAWS AND ORDINANCES

Existing laws, ordinances and plans at the federal, state and local level can support or impact hazard mitigation initiatives identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44CFR, Section 201.6(b)(3)). Pertinent federal and state laws are described below. Each planning partner has individually reviewed existing local plans, studies, reports, and technical information in its jurisdictional annex, presented in Volume 2.

8.9.1 Federal

Disaster Mitigation Act

The Disaster Mitigation Act (DMA) is the current federal legislation addressing hazard mitigation planning. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Grant Program funds are available to communities. This Plan is designed to meet the requirements of DMA, improving the planning partners' eligibility for future hazard mitigation funds.

Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:

Endangered means that a species of fish, animal or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)

Threatened means that a species "is likely to become endangered within the foreseeable future." Regulations may be less restrictive for threatened species than for endangered species.

Critical habitat means "specific geographical areas that are…essential for the conservation and management of a listed species, whether occupied by the species or not."

Five sections of the ESA are of critical importance to understanding it:

Section 4: Listing of a Species—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.

Section 7: Consultation—Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a "consultation." If the listing agency finds that an action will "take" a species, it must propose mitigations or "reasonable and prudent" alternatives to the action; if the proponent rejects these, the action cannot proceed.

Section 9: Prohibition of Take—It is unlawful to "take" an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding or sheltering.

Section 10: Permitted Take—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a "Habitat Conservation Plan."

Section 11: Citizen Lawsuits—Civil actions initiated by any citizen can require the listing agency to enforce the ESA's prohibition of taking or to meet the requirements of the consultation process.

With the listing of salmon and trout species as threatened or endangered, the ESA has impacted most of the Pacific Coast states. Although some of these areas have been more impacted by the ESA than others due to the known presence of listed species, the entire region has been impacted by mandates, programs and policies based on the presumption of the presence of listed species. Most West Coast jurisdictions must now take into account the impact of their programs on habitat.

The Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) provides federally backed flood insurance in exchange for communities enacting floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. The County and most of the partner cities for this plan participate in the NFIP and have adopted regulations that meet the NFIP requirements. At the time of the preparation of this plan, all participating jurisdictions in the partnership were in good standing with NFIP requirements.

8.9.2 State

California General Planning Law

California state law (Cal. Gov. Code §65300 et seq.) requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future public and private land uses. The general plan forms the basis for most local government land use decision-making. It must consist of an integrated and internally consistent set of goals, policies, and implementation measures. It must focus on issues of the greatest concern to the community and be written in a clear and concise manner. Local government actions—such as those relating to land use allocations, annexations, zoning, subdivision, design review, redevelopment and capital improvements—must be consistent with the plan.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970 to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision-making process.

For any project under CEQA's jurisdiction with potentially significant environmental impacts, agencies must identify mitigation measures and alternatives by preparing an environmental impact report and may approve only projects with no feasible mitigation measures or environmentally superior alternatives.

Assembly Bill 162: Flood Planning

This California State Assembly Bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the California Department of Water Resources (DWR). Upon the next revision of the housing element, the conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purposes of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards including:

- Flood hazard zones
- Maps published by FEMA, DWR, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, California Emergency Management Agency, etc.
- Historical data on flooding
- Existing and planned development in flood hazard zones.

The general plan must establish goals, policies and objectives to protect from unreasonable flooding risks including:

- Avoiding or minimizing the risks of flooding new development
- Evaluating whether new development should be located in flood hazard zones
- Identifying construction methods to minimize damage.

Assembly Bill 162 establishes procedures for the determination of available land suitable for urban development, which may exclude lands where FEMA or DWR has determined that the flood management infrastructure is not adequate to avoid the risk of flooding.

Assembly Bill 2140: General Plans: Safety Element

This bill provides that the state may allow for more than 75 percent of public assistance funding under the California Disaster Assistance Act only if the local agency is in a jurisdiction that has adopted a local hazard mitigation plan as part of the safety element of its general plan. The local hazard mitigation plan needs to include elements specified in the legislation. In addition this bill requires California Emergency Management Agency to give federal mitigation funding preference to cities and counties that have adopted such plans. The intent of the bill is to encourage cities and counties to create and adopt hazard mitigation plans.

Assembly Bill 70: Flood Liability

This bill provides that a city or county may be required to contribute a fair and reasonable share to compensate for property damage caused by a flood to the extent that it has increased the state's exposure to liability for property damage by unreasonably approving new development in a previously undeveloped area that is protected by a state flood control project, unless the city or county meets specified requirements.

Assembly Bill 32: The California Global Warming Solutions Act

Assembly Bill 32 establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020 (a reduction of approximately 25 percent from forecast emission levels) with further reductions to follow. The law requires the state Air Resources Board to do the following:

- Establish a program to track and report greenhouse gas emissions.
- Approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions from sources of greenhouse gas emissions.
- Adopt early reduction measures to begin moving forward.
- Adopt, implement and enforce regulations—including market mechanisms such as “cap and-trade” programs—to ensure that the required reductions occur.

The Air Resources Board recently adopted a statewide greenhouse gas emissions limit and an emissions inventory, along with requirements to measure, track, and report greenhouse gas emissions by the industries it determined to be significant sources of greenhouse gas emissions.

Senate Bill 97: Guidelines for Greenhouse Gas Emissions

Senate Bill 97, enacted in 2007, amends the CEQA to clearly establish that greenhouse gas emissions and their effects are appropriate subjects for CEQA analysis. It directs the Governor’s Office of Planning and Research to develop draft CEQA guidelines for the mitigation of greenhouse gas emissions or their effects and directs the California Natural Resources Agency to certify and adopt the CEQA guidelines.

California State Building Code

California Code of Regulations Title 24 (CCR Title 24), also known as the California Building Standards Code, is a compilation of building standards from three sources:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from national model code standards to meet California conditions
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes, adopted to address particular California concerns.

The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the processes related to the adoption, approval, publication, and implementation of California’s building codes. These building codes serve as the basis for the design and construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.

Standardized Emergency Management System

CCR Title 19 establishes the Standardized Emergency Management System (SEMS) to standardize the response to emergencies involving multiple jurisdictions. SEMS is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use SEMS in order to be eligible for state funding of response-related personnel costs under CCR Title 19 (Sections 2920, 2925 and 2930). Individual agencies' roles and responsibilities contained in existing laws or the state emergency plan are not superseded by these regulations.

California State Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan in order to be eligible for certain disaster assistance and mitigation funding. The intent of the *California State Hazard Mitigation Plan* is to reduce or prevent injury and damage from hazards through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and future mitigation strategies. The plan will be updated annually to reflect changing conditions and new information, especially information on local planning activities. This plan was helped used to develop our plan along with the annexes. We outlined our strategies and planning efforts based off this plan.

Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. There are four key actions in the executive order:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies by early 2009. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

8.9.3 Cities and County

Each planning partner has prepared a jurisdiction-specific annex to this plan (see Volume 2). In preparing these annexes, each partner completed a capability assessment that looked at its regulatory, technical and financial capability to carry out proactive hazard mitigation. Refer to these annexes for a review of regulatory codes and ordinances applicable to each planning partner.

CHAPTER 9.

DAM FAILURE

9.1 GENERAL BACKGROUND

9.1.1 Causes of Dam Failure

Dam failures in the United States typically occur in one of four ways (see *Figure 7-8*):

- Overtopping of the primary dam structure, which accounts for 34 percent of all dam failures, can occur due to inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors.
- Foundation defects due to differential settlement, slides, slope instability, uplift pressures, and foundation seepage can also cause dam failure. These account for 30 percent of all dam failures.
- Failure due to piping and seepage accounts for 20 percent of all failures. These are caused by internal erosion due to piping and seepage, erosion along hydraulic structures such as spillways, erosion due to animal burrows, and cracks in the dam structure.
- Failure due to problems with conduits and valves, typically caused by the piping of embankment material into conduits through joints or cracks, constitutes 10 percent of all failures.

The remaining 6 percent of U.S. dam failures are due to miscellaneous causes. Many dam failures in the United States have been secondary results of other disasters, such as earthquakes, landslides, extreme storms, massive snowmelt, equipment malfunction, structural damage, foundation failures, and sabotage. The most likely disaster-related causes of dam failure in Siskiyou County are earthquakes, excessive rainfall and landslides.

Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable by a program of regular inspections. Terrorism and vandalism are serious concerns that all operators of public facilities must plan for; these threats are under continuous review by public safety agencies.

DEFINITIONS

Dam—Any artificial barrier, together with appurtenant works, that does or may impound or divert water, and that either (a) is 25 feet or more in height from the natural bed of the stream or watercourse at the downstream toe of the barrier (or from the lowest elevation of the outside limit of the barrier if it is not across a stream channel or watercourse) to the maximum possible water storage elevation; or (b) has an impounding capacity of 50 acre-feet or more. (CA Water Code, Division 3.)

Dam Failure—An uncontrolled release of impounded water due to structural deficiencies in dam.

Emergency Action Plan—A document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize property damage and loss of life. The plan specifies actions the dam owner should take to alleviate problems at a dam. It contains procedures and information to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency situation. It also contains inundation maps to show emergency management authorities the critical areas for action in case of an emergency. (FEMA 64)

High Hazard Dam—Dams where failure or operational error will probably cause loss of human life. (FEMA 333)

Significant Hazard Dam—Dams where failure or operational error will result in no probable loss of human life but can cause economic loss, environmental damage or disruption of lifeline facilities, or can impact other concerns. Significant hazard dams are often located in rural or agricultural areas but could be located in areas with population and significant infrastructure. (FEMA 333)

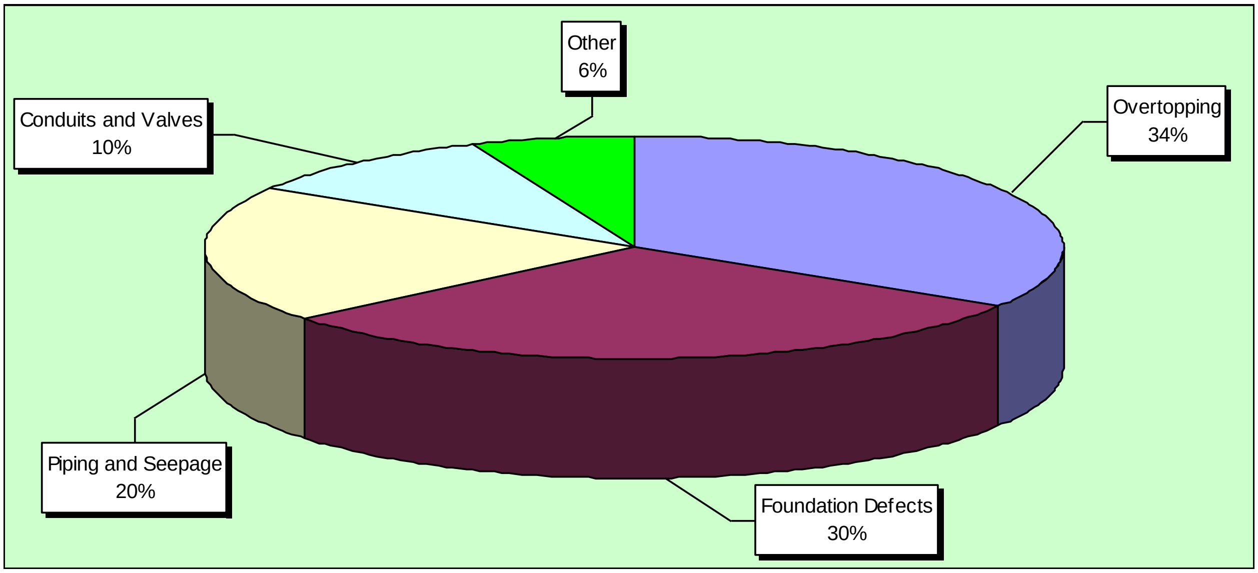


Figure 7-8. Historical Causes of Dam Failure

9.1.2 Regulatory Oversight

The potential for catastrophic flooding due to dam failures led to passage of the National Dam Safety Act (Public Law 92-367). The National Dam Safety Program requires a periodic engineering analysis of every major dam in the country. The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect the lives and property of the public.

California Division of Safety of Dams

California's Division of Safety of Dams (a division of the Department of Water Resources) monitors the dam safety program at the state level. When a new dam is proposed, Division staff inspect the site. When an application is received, the Division reviews the plans to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for known geologic conditions. After approval of the application, the Division inspects the construction to ensure that the work is done in accordance with the approved plans. After construction, the Division inspects each dam on an annual basis to ensure that it is performing as intended and is not developing problems. Roughly a third of these inspections include in-depth instrumentation reviews. The Division periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California (DWR Website, 2007).

U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers is responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety (U.S. Army Corps of Engineers, 1997).

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) has the largest dam safety program in the United States. The FERC cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. There are 3,036 dams that are part of regulated hydroelectric projects are in the FERC program. Two-thirds of these are more than 50 years old. As dams age, concern about their safety and integrity grows, so oversight and regular inspection are important. FERC staff inspects hydroelectric projects on an unscheduled basis to investigate the following:

Potential dam safety problems

Complaints about constructing and operating a project

Safety concerns related to natural disasters

Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent consulting engineer, approved by the FERC, must inspect and evaluate projects with dams higher than 32.8 feet, or with a total storage capacity of more than 2,000 acre-feet.

FERC staff monitors and evaluates seismic research in geographic areas where there are concerns about seismic activity. This information is applied in investigating and performing structural analyses of hydroelectric projects in these areas. FERC staff also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC staff visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication *Engineering Guidelines for the Evaluation of Hydropower Projects* guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.

The FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations.

9.2 HAZARD PROFILE

9.2.1 Past Events

According to the California State Hazard Mitigation Plan, there have been nine dam failures in the state since 1950, none of them in Siskiyou County. Overtopping caused two of the failures, and the others were caused by seepage or leaks. One failure, the 1963 Baldwin Hills Dam Failure, resulted in three deaths because the leak turned into a washout. The historical record indicates that California has had about 45 failures of non-federal dams. The failures occurred for a variety of reasons, the most common being overtopping. Other reasons include shortcomings in the dams or an inadequate assessment of surrounding geomorphologic characteristics.

California’s first notable dam failure was in 1883 in Sierra County, and the most recent failure was in 1965. The most catastrophic event was the failure of William Mulholland’s St. Francis Dam, which failed in 1928 and killed an estimated 450 people. San Francisquito Canyon, which was flooded in the event, was home to hundreds of transients who were not accounted for in the death estimate.

9.2.2 Location

According to California Department of Water Resources Dam Safety Program, there are 22 dams in Siskiyou County, as listed in **TABLE 7-6**. Two are operated by federal agencies, and the remainder are under the jurisdiction of the state.

**TABLE 7-6.
DAMS IN SISKIYOU COUNTY**

Name	National ID #	Water Course	Owner	Year Built	Dam Type	Crest Length (feet)	Height (feet)	Storage Capacity (acre-feet)	Drainage area (sq. mi.)
Barton	CA00928	White Slough	Madison Valley Investment Partners	1964	Earth	570	13	160	52
Bass Lake	CA00498	Lit Shasta R trib.	California Department of Fish & Game	1949	ERTH	1110	18	223	108
Box Canyon	CA00889	Sacramento River	Siskiyou County	1969	GRAV	1000	204	26,000	430
Campbell Lake	CA00495	Shackleford Creek	J & J Menke	1929	ERRK	65	19	350	35
Cloak Lake	CA00927	Lit Shasta R trib.	Madison Valley Investment Partners	1955	ERTH	432	13	123	25
Copco #1	CA00323	Klamath River	PacifiCorp	1922	GRAV	415	132	77,000	1000
Copco #2	CA00324	Klamath River	PacifiCorp	1925	GRAV	148	37	55	5
Dwight Hammond	CA00929	Lit Shasta R trib.	Hammond Lake Irrigation Assoc.	1959	ERTH	720	25	348	58
East Boulder	CA82442	E. Boulder Cr	Forest Service	1937	GRAV	63	7	200	0.8
Fiock#2	CA00502	Lit Shasta R trib.	Robert J. Cena	1946	ERTH	890	14	318	40
George Fiock #1	CA00501	Lit Shasta R trib.	The Kuck Brothers	1954	ERTH	725	19	223	38
Greenhorn	CA00826	Greenhorn Creek	City of Yreka	1960	ERTH	1300	28	251	25
Iron Gate	CA00325	Klamath River	PacifiCorp	1962	ERRK	745	188	58,000	1,000
Juanita Lake	CA00040	Musgrave Creek trib.	California Department of Fish & Game	1964	ERTH	907	20	348	55
Kangaroo Lake	CA10217	Rail Creek	Forest Service	1876	ROCK	69	12	168	--
Montague #2	CA01135	Oregon Slough trib.	City of Montague	1978	ERTH	1250	41	160	14
Ray Soule Reservoir	CA00496	Lit Shasta R trib.	Skip Soule	1953	ERTH	1100	10	132	13
Shasta River	CA00244	Shasta River	Montague Water Con District	1928	HYDF	1247	29	50,000	1850
Shelley	CA00926	Webb Gulch	Dr. I. Jack Cowley	1952	ERTH	1700	14	364	27
Steamboat Lake	CA00499	Lit Shasta R trib.	California Department of Fish & Game	1968	ERTH	655	12	2700	304
Suzanne Lake	CA00930	Lit Shasta R trib.	M&M Mariani	1962	ERTH	1966	12	89	17
Trout Lake	CA00500	Lit Shasta R trib.	California Department of Fish & Game	1960	ERTH	650	12	2108	176

9.2.3 Frequency

Dams are constructed with safety features known as “spillways.” Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events, often referred to as “design failures,” result in increased flooding potential downstream. The “residual risk” associated with dams is the risk beyond that for which safeguards have been implemented. However, the probability of any type of dam failure is low in today’s regulatory and dam safety oversight environment. Dam failure events usually coincide with events such as earthquakes, landslides and excessive rainfall and snowmelt.

9.2.4 Severity

Dam failure can be catastrophic to all life and property downstream. The U.S. Army Corps of Engineers developed the classification system shown in Table 7-7 for the hazard potential of dam failures. The Corps of Engineers hazard rating system is based only on the potential consequences of a dam failure; it does not take into account the probability of such failures.

TABLE 7-7.
CORPS OF ENGINEERS HAZARD POTENTIAL CLASSIFICATION

Hazard Category[a]	Direct Loss of Life[b]	Lifeline Losses[c]	Property Losses[d]	Environmental Losses[e]
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural location, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

a. Categories are assigned to overall projects, not individual structures at a project.
b. Loss of life potential based on inundation mapping of area downstream of the project. Analyses of loss of life potential should take into account the population at risk, time of flood wave travel, and warning time.
c. Indirect threats to life caused by the interruption of lifeline services due to project failure or operational disruption; for example, loss of critical medical facilities or access to them.
d. Damage to project facilities and downstream property and indirect impact due to loss of project services, such as impact due to loss of a dam and navigation pool, or impact due to loss of water or power supply.
e. Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Source: U.S. Army Corps of Engineers, 1995

9.2.5 Warning Time

Warning time for dam failure depends on the cause of failure. In event of extreme precipitation or massive snowmelt, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, there may be no warning time. A dam’s structural type also affects warning time. Earthen dams do not tend to fail instantaneously. Once a breach is initiated, discharging water erodes the breach until the reservoir water is depleted or the breach resists further erosion. Concrete gravity dams also tend to have a partial breach. The time of breach formation ranges from a few minutes to a few hours (U.S. Army Corps of Engineers, 1997). Several planning partners have established protocols for warning and response to imminent dam failure in the flood warning portion of their emergency operations plans. These protocols are tied to the emergency action plans (EAPs) created by the dam owners.

9.3 SECONDARY HAZARDS

Dam failure can cause severe downstream flooding, depending on the magnitude of the failure. Other potential secondary hazards of dam failure are landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat.

9.4 CLIMATE CHANGE IMPACTS

Dams are designed partly based on assumptions about a river’s flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph changes, then dam operators may be forced to release increased volumes earlier in a storm cycle to maintain required margins of safety. Such early releases can increase flood potential downstream. Throughout the west, communities downstream of dams are already experiencing increases in stream flows from earlier releases from dams.

Dams are constructed with safety features known as “spillways.” Spillway overflow events, often referred to as “design failures,” result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

9.5 EXPOSURE

The Level 2 HAZUS-MH protocol was used to assess the risk and vulnerability to dam failure in the planning area. The model used census data at the block level and dam failure inundation data to estimate potential dam failure impacts. The inundation areas evaluated are for the Iron Gate and JC Boyle Dams on the Klamath River and the Box Canyon Dam on the Sacramento River. These are the only high-risk dams for which flood inundation mapping is available. The JC Boyle Dam is not in Siskiyou County, but it is on the Klamath River in Oregon just upstream of the state border, and its failure would cause inundation within the county. Maps 9-1, 9-2 and 9-3 show the inundation zones for the three dams. Dam failure exposure numbers were generated using Siskiyou County Assessor and parcel data. County assessor data does not include tax exempt structures, such as federal and local government buildings. Where possible, the HAZUS-MH default data was enhanced using local GIS data from county, state and federal sources. All data sources have a level of accuracy acceptable for planning purposes.

9.5.1 Population

The entire population in a dam failure inundation zone is exposed to the risk of a dam failure. The estimated population living in the inundation areas mapped for this risk assessment is 2,045, 4.5 percent of the County’s population. **TABLE 7-8** summarizes the at-risk population in the planning area by city.

9.5.2 Property

The HAZUS-MH model estimated that there are 1,024 structures within the mapped dam failure inundation areas in the planning area. Table 7-9 summarizes the estimated value of exposed buildings. The evaluation estimated $122 million worth of building-and-contents exposure to dam failure inundation, representing 2.7 percent of the total assessed value of the planning area.

9.5.3 Critical Facilities

GIS analysis determined that 57 of the planning area’s critical facilities (8 percent) are in the mapped inundation areas, as summarized in **TABLE 7-10** and **TABLE 7-11**.

TABLE 7-8.
POPULATION AT RISK FROM DAM FAILURE

	Affected Population	% of City Population
Dorris	0	0
Dunsmuir	345	21
Etna	0	0
Fort Jones	0	0
Montague	0	0
Mt. Shasta	0	0
Tulelake	0	0
Weed	0	0
Yreka	0	0
Unincorporated	1,700	7
Total[a]	2,045	4.5

a. Represents the total population in the combined inundation areas all dams for all

TABLE 7-9.
VALUE OF PROPERTY EXPOSED TO DAM FAILURE

	Number of Buildings Exposed	Value Exposed			% of Total Assessed Value
		Building	Contents	Total	
Dorris	0	0	0	0	0
Dunsmuir	187	$16,066,755	$12,658,921	$28,725,676	21%
Etna	0	0	0	0	0
Fort Jones	0	0	0	0	0
Montague	0	0	0	0	0
Mt. Shasta	0	0	0	0	0
Tulelake	0	0	0	0	0
Weed	0	0	0	0	0
Yreka	0	0	0	0	0
Unincorporated	837	$53,172,611	$40,196,229	$93,368,840	3.50%
Total	**1,024**	**$69,239,366**	**52,855,150**	**$122,094,516**	**2.70%**

**TABLE 7-10.
CRITICAL FACILITIES IN DAM FAILURE INUNDATION AREAS**

	Medical & Health Services	Government Function	Protective Function	Schools	Hazardous Materials	Other Critical Function	**Total**
Dorris	0	0	0	0	0	0	0
Dunsmuir	0	0	0	0	0	1	1
Etna	0	0	0	0	0	0	0
Fort Jones	0	0	0	0	0	0	0
Montague	0	0	0	0	0	0	0
Mt. Shasta	0	0	0	0	0	0	0
Tulelake	0	0	0	0	0	0	0
Weed	0	0	0	0	0	0	0
Yreka	0	0	0	0	0	0	0
Unincorporated	3	5	4	3	0	0	15
Total	**3**	**5**	**4**	**3**	**0**	**1**	**16**

**TABLE 7-11.
CRITICAL INFRASTRUCTURE IN DAM FAILURE INUNDATION AREAS**

	Bridges	Water Supply	Wastewater	Power	Communications	Other Infrastructure	**Total**
Dorris	0	0	0	0	0	0	0
Dunsmuir	4	0	0	0	0	0	4
Etna	0	0	0	0	0	0	0
Fort Jones	0	0	0	0	0	0	0
Montague	0	0	0	0	0	0	0
Mt. Shasta	0	0	0	0	0	0	0
Tulelake	0	0	0	0	0	0	0
Weed	0	0	0	0	0	0	0
Yreka	0	0	0	0	0	0	0
Unincorporated	35	1	1	0	0	0	37
Total	**39**	**1**	**1**	**0**	**0**	**0**	**41**

9.5.4 Environment

The environment would be exposed to a number of risks in the event of dam failure. The inundation could introduce many foreign elements into local waterways. This could destroy downstream habitat and have detrimental effects on many species of animals, especially endangered species such as salmon.

9.6 VULNERABILITY

9.6.1 Population

Vulnerable populations are all populations downstream from dam failures that are incapable of escaping the area within the allowable time frame. This population includes the elderly and young who may be unable to get themselves out of the inundation area. The vulnerable population also includes those who would not have adequate warning from a television or radio emergency warning system. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living in areas of potential inundation.

9.6.2 Property

Vulnerable properties are those closest to the dam inundation area. These properties would experience the largest, most destructive surge of water. Low-lying areas are also vulnerable since they are where the dam waters would collect. Transportation routes are vulnerable to dam inundation and have the potential to be wiped out, creating isolation issues. This includes all roads, railroads and bridges in the path of the dam inundation. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

It is estimated that there could be up to $22 million of loss from a dam failure affecting the planning area. This represents 18 percent of the total exposure within the inundation area, or 0.5 percent of the total assessed value of the planning area. **TABLE 7-12** summarizes the loss estimates for dam failure.

TABLE 7-12.
LOSS ESTIMATES FOR DAM FAILURE

City	Building Loss	Contents Loss	**Total Loss**	% of Total Assessed Value
Dorris	0	0	**0**	0
Dunsmuir	$3,576,048	$2,280,691	**$5,856,739**	4.19%
Etna	0	0	**0**	0
Fort Jones	0	0	**0**	0
Montague	0	0	**0**	0
Mt. Shasta	0	0	**0**	0
Tulelake	0	0	**0**	0
Weed	0	0	**0**	0
Yreka	0	0	**0**	0
Unincorporated	$9,343,000	$6,957,000	**$16,300,000**	0.62%
Total	**$12,919,048**	**$9,237,691**	**$22,156,739**	0.50%

9.6.3 Critical Facilities

On average, critical facilities would receive 15.6 percent damage to the structure and 42.3 percent damage to the contents during a dam failure event. The estimated time to restore these facilities to 100 percent of their functionality is 650 days.

9.6.4 Environment

The environment would be vulnerable to a number of risks in the event of dam failure. The inundation could introduce foreign elements into local waterways, resulting in destruction of downstream habitat and detrimental effects on many species of animals, especially endangered species. The extent of the vulnerability of the environment is the same as the exposure of the environment.

9.7 FUTURE TRENDS IN DEVELOPMENT

Land use in the planning area will be directed by general plans adopted under California's General Planning Law. The safety elements of the general plans establish standards and plans for the protection of the community from hazards. Dam failure is currently not addressed as a standalone hazard in the safety elements, but flooding is. The municipal planning partners have established comprehensive policies regarding sound land use in identified flood hazard areas. Most of the areas vulnerable to the more severe impacts from dam failure intersect the mapped flood hazard areas. Flood-related policies in the general plans will help to reduce the risk associated with the dam failure hazard for all future development in the planning area.

9.8 SCENARIO

An earthquake in the region could lead to liquefaction of soils around a dam. This could occur without warning during any time of the day. A human-caused failure such as a terrorist attack also could trigger a catastrophic failure of a dam that impacts the planning area. While the probability of dam failure is very low, the probability of flooding associated with changes to dam operational parameters in response to climate change is higher. Dam designs and operations are developed based on hydrographs with historical record. If these hydrographs experience significant changes over time due to the impacts of climate change, the design and operations may no longer be valid for the changed condition. This could have significant impacts on dams that provide flood control. Specified release rates and impound thresholds may have to be changed. This would result in increased discharges downstream of these facilities, thus increasing the probability and severity of flooding.

9.9 ISSUES

The most significant issue associated with dam failure involves the properties and populations in the inundation zones. Flooding as a result of a dam failure would significantly impact these areas. There is often limited warning time for dam failure. These events are frequently associated with other natural hazard events such as earthquakes, landslides or severe weather, which limits their predictability and compounds the hazard. Important issues associated with dam failure hazards include the following:

- Federally regulated dams have an adequate level of oversight and sophistication in the development of emergency action plans for public notification in the unlikely event of failure. However, the protocol for notification of downstream citizens of imminent failure is performed by the county's emergency plan and the use of Code RED.
- Mapping for federally regulated dams is already required and available; however, mapping for non-federal-regulated dams that estimates inundation depths is needed to better assess the risk associated with dam failure from these facilities.
- Most dam failure mapping required at federal levels requires determination of the probable maximum flood. While the probable maximum flood represents a worst-case scenario, it is generally the event with the lowest probability of occurrence. For non-federal-regulated dams, mapping of dam failure scenarios that are less extreme than the probable maximum flood but have a higher probability of occurrence can be valuable to emergency managers and

community officials downstream of these facilities. This type of mapping can illustrate areas potentially impacted by more frequent events to support emergency response and preparedness.

The concept of residual risk associated with structural flood control projects should be considered in the design of capital projects and the application of land use regulations.

Addressing security concerns and the need to inform the public of the risk associated with dam failure is a challenge for public officials.

The inundation maps are located in each of the Dam's EAP and can be viewed at any time.

CHAPTER 10. DROUGHT

10.1 GENERAL BACKGROUND

> **DEFINITIONS**
>
> **Drought**—The cumulative impacts of several dry years on water users. It can include deficiencies in surface and subsurface water supplies and generally impacts health, well-being, and quality of life.
>
> **Hydrological Drought**—Deficiencies in surface and subsurface water supplies.
>
> **Socioeconomic Drought**—Drought impacts health, well-being and quality of life.

Drought is a prolonged period of dryness severe enough to reduce soil moisture, water and snow levels below the minimum necessary for sustaining plant, animal and economic systems. Droughts are a natural part of the climate cycle.

Drought can have a widespread impact on the environment and the economy, depending upon its severity, although it typically does not result in loss of life or damage to property, as do other natural disasters. The National Drought Mitigation Center uses three categories to describe likely drought impacts:

Agricultural—Drought threatens crops that rely on natural precipitation.

Water supply—Drought threatens supplies of water for irrigated crops and for communities.

Fire hazard—Drought increases the threat of wildfires from dry conditions.

10.1.1 Drought in California

Most of California's precipitation comes from storms moving across the Pacific Ocean. The path followed by the storms is determined by the position of an atmospheric high pressure belt that normally shifts southward during the winter, allowing low pressure systems to move into the state. On average, 75 percent of California's annual precipitation occurs between November and March, with 50 percent occurring between December and February. If a persistent Pacific high pressure zone takes hold over California mid-winter, there is a tendency for the water year to be dry.

A typical water year produces about 100 inches of rainfall over the North Coast, 50 inches of precipitation (combination of rain and snow) over the Northern Sierra, 18 inches in the Sacramento area, and 15 inches in the Los Angeles area. In extremely dry years, these annual totals can fall to as little as one half, or even one third of these amounts.

Defining when drought begins is a function of the impacts of drought on water users, and includes consideration of the supplies available to local water users as well as the stored water they may have available in surface reservoirs or groundwater basins. Different local water agencies have different criteria for defining drought conditions in their jurisdictions. Some agencies issue drought watch or drought warning announcements to their customers. Determinations of regional or statewide drought conditions are usually based on a combination of hydrologic and water supply factors.

10.2 HAZARD PROFILE

Droughts originate from a deficiency of precipitation resulting from an unusual weather pattern. If the weather pattern lasts a short time (a few weeks or a couple months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered to be long-term. It is possible for a region to experience a long-term circulation pattern that produces drought, and to have short-term changes in this long-term pattern that result in short-term wet spells. Likewise, it is possible for a long-term wet circulation pattern to be interrupted by short-term weather spells that result in short-term drought.

10.2.1 Past Events

The California Department of Water Resources has state hydrologic data back to the early 1900s (watersupplyconditions.water.ca.gov or www.water.ca.gov/drought/). The hydrologic data show multi-year droughts from 1912 to 1913, 1918 to 1920 and 1922 to 1924. Since then, three prolonged periods of drought occurred in California, all of which impacted Siskiyou County to some degree:

1929 to 1934 Drought—The 1929 to 1934 drought established the criteria for designing many large Northern California reservoirs. The Sacramento Valley runoff was 55 percent of average for the time period from 1901 to 1996, with only 9.8 million acre-feet received.

1975 to 1977 Drought—California had one of its most severe droughts due to lack of rainfall during the winters of 1976 and 1977. 1977 was the driest period on record in California, with the previous winter recorded as the fourth driest in California's hydrological history. The cumulative impact led to widespread water shortages and severe water conservation measures throughout the state. A federal disaster declaration was declared for some counties, but not for Siskiyou County.

1987-1992 Drought—California received precipitation well below average levels for four consecutive years. While the Central Coast was most affected, the Sierra Nevadas in Northern California and the Central Valley counties were also affected. In 1991, Siskiyou County declared a local drought emergency. By February 1991, all 58 counties in California were suffering from drought conditions, and urban areas as well as rural and agricultural areas were impacted.

2001 Drought—According the California Hazard Mitigation Plan, Siskiyou County was again impacted by drought conditions in 2001, following several consecutive dry years.

2013-2014 Drought – The County had a drought declaration and passed a Resolution for proclaiming a local emergency due to drought conditions and imminent threat to the county. The City of Montague was in extreme peril of possibly losing their water source for the city. They also had a proclaimed emergency for the event.

2018 Drought – The County had to proclaim a local emergency for drought due to dry conditions and lack of precipitation could present problems for drinking and water supplies in the cities and towns as well as the unincorporated areas, and low-income communities heavily dependent on agriculture employment may suffer heightened unemployment and economic hardship. The County found it appropriate response is beyond the capability of the county.

10.2.2 Location

The National Oceanic and Atmospheric Administration (NOAA) has developed several indices to measure drought impacts and severity and to map their extent and locations:

The ***Palmer Crop Moisture Index*** measures short-term drought on a weekly scale and is used to quantify drought's impacts on agriculture during the growing season.

The ***Palmer Z Index*** measures short-term drought on a monthly scale. *Figure 7-9* shows this index for March 2011.

The ***Palmer Drought Index (PDI)*** measures the duration and intensity of long-term drought-inducing circulation patterns. The intensity of drought during a given month is dependent on current weather patterns plus the cumulative patterns of previous months. The PDI can respond rapidly to changes in weather patterns. *Figure 7-10* shows this index for March 2011.

The ***Palmer Hydrological Drought Index (PHDI)*** measures the short and long term drought indicator blend percentiles 25% palmer hydrologic index 20% 24 Month Precipitation 20% 12 Month up to August 11^{th} 2018

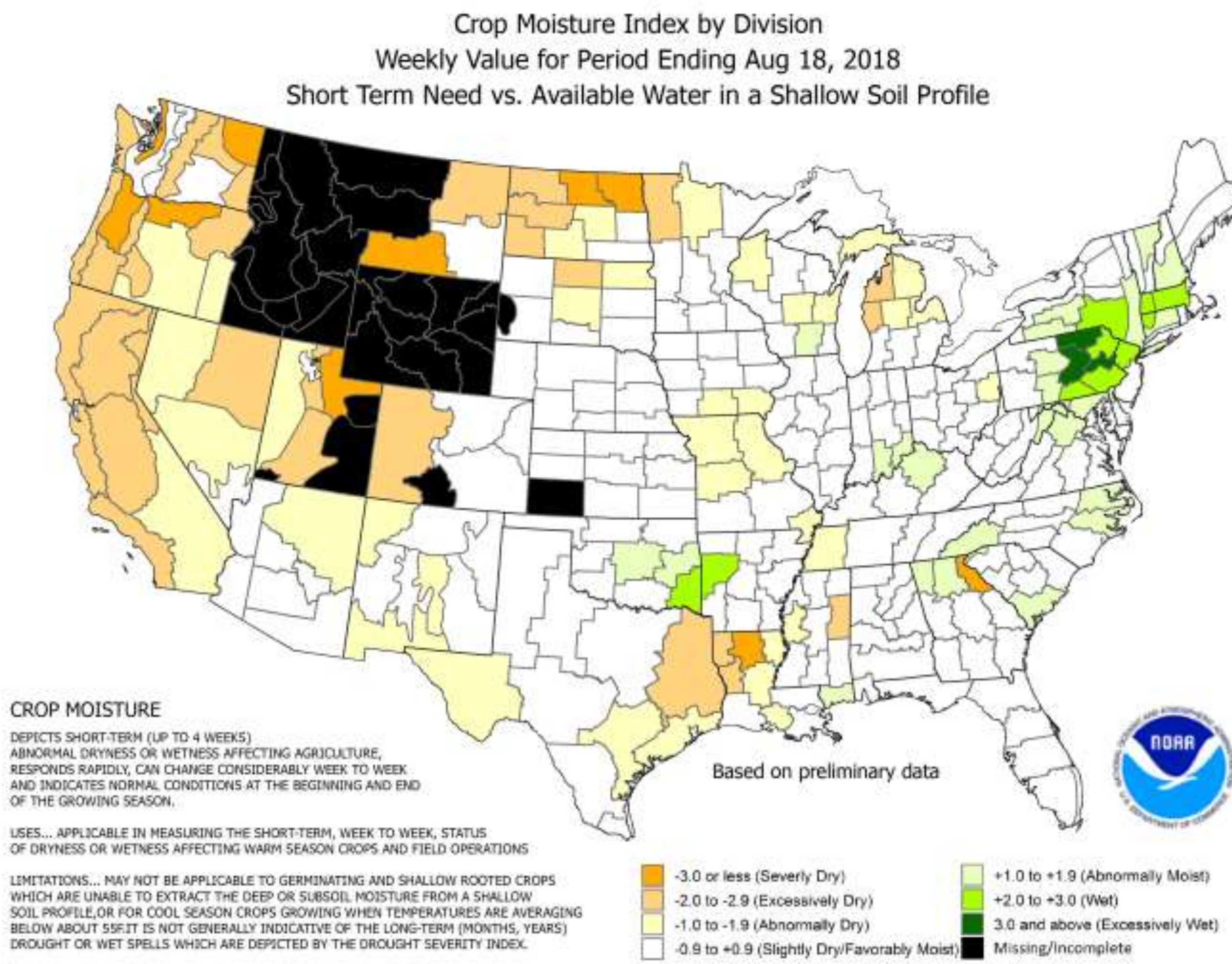


Figure 7-9. Palmer Z Index Short-Term Drought Conditions (August 2018)

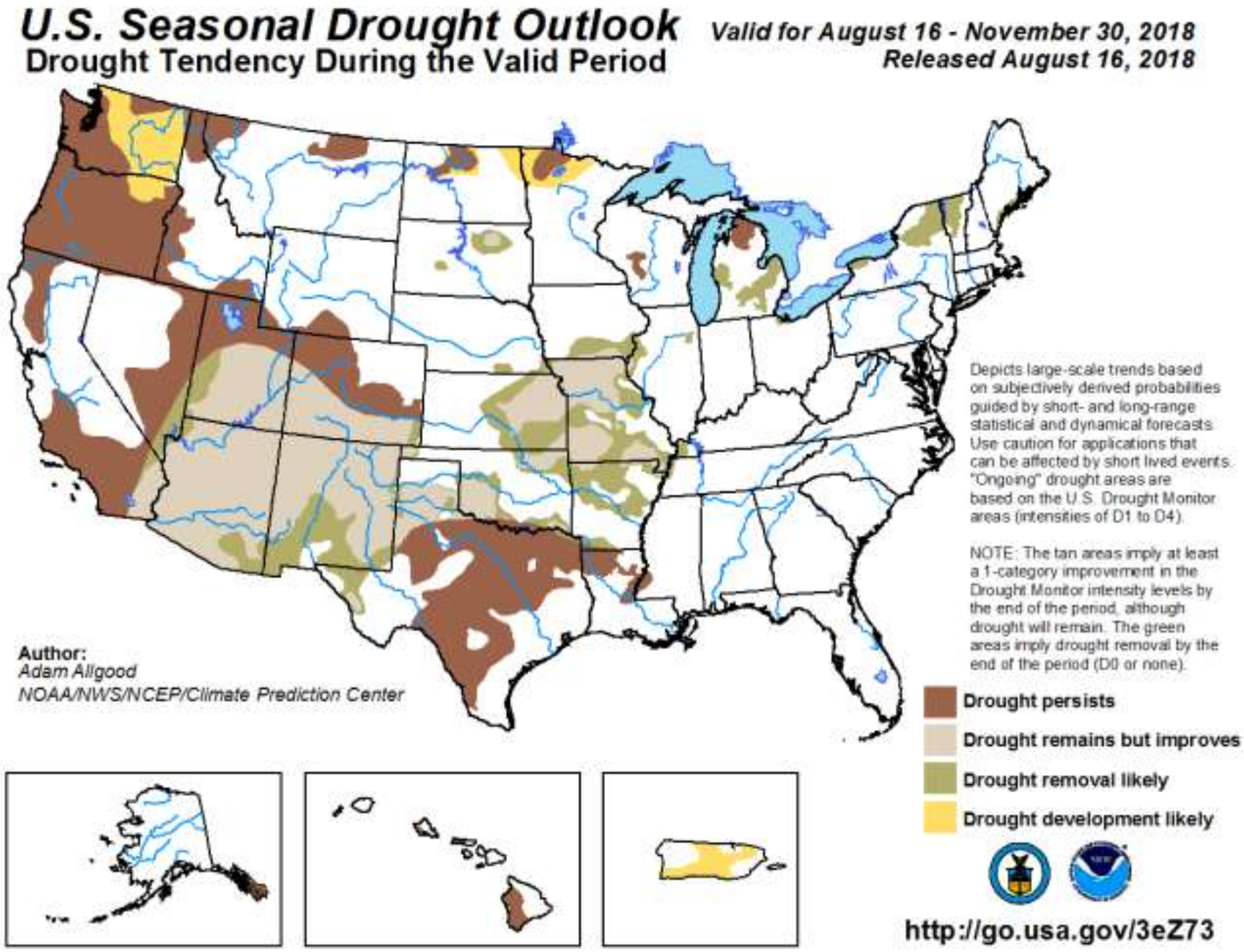


Figure 7-10. Palmer Drought Index Long-Term Drought Conditions (August 2018)

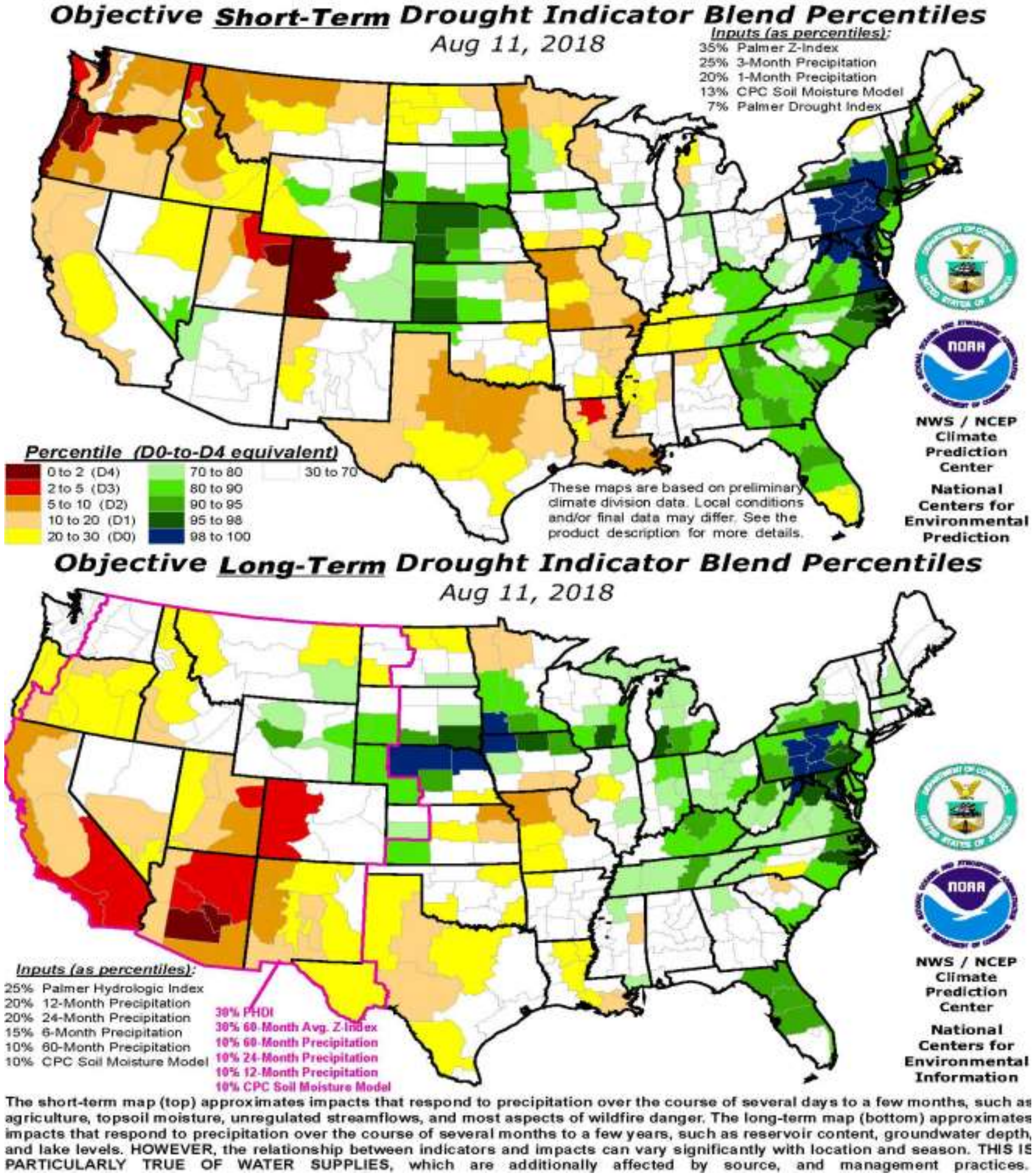


Figure 7-11. Short and Long term Drought Indicator Blend Percentiles 24 month. August 11th 2018

10.2.3 Frequency

Historical drought data for the Siskiyou County region indicate there have been two significant droughts in the last 20 years. This equates to a drought every 10 years on average, or a 10-percent chance of a drought in any given year.

10.2.4 Severity

The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts. Droughts are not usually associated with direct impacts on people or property, but they can have significant impacts on agriculture, which can impact people indirectly. When measuring the severity of droughts, analysts typically look at economic impacts on a planning area.

Unlike most disasters, droughts normally occur slowly but last a long time. On average, the nationwide annual impacts of drought are greater than the impacts of any other natural hazard. They are estimated to be between $6 billion and $8 billion annually in the United States and occur primarily in the agriculture, transportation, recreation and tourism, forestry, and energy sectors. Social and environmental impacts are also significant, although it is difficult to put a precise cost on these impacts.

Drought affects groundwater sources, but generally not as quickly as surface water supplies, although groundwater supplies generally take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Shallow wells are more susceptible than deep wells. Reduced replenishment of groundwater affects streams. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation and after snowmelt ends. Reduced groundwater levels mean that even less water will enter streams when steam flows are lowest.

A drought impacts all people in affected areas. A drought can result in farmers not being able to plant crops or the failure of planted crops. This results in loss of work for farm workers and those in related food processing jobs. Other water-dependent industries are commonly forced to shut down all or a portion of their facilities, resulting in further layoffs. A drought can harm recreational companies that use water (e.g., swimming pools, water parks, and river rafting companies) as well as landscape and nursery businesses because people will not invest in new plants if water is not available to sustain them.

10.2.5 Warning Time

Droughts are climatic patterns that occur over long periods of time. Only generalized warning can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions.

Empirical studies conducted over the past century have shown that meteorological drought is never the result of a single cause. It is the result of many causes, often synergistic in nature; these include global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast with warm, dry air resulting in less precipitation.

Scientists at this time do not know how to predict drought more than a month in advance for most locations. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depends on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of weather systems on the global scale.

10.3 SECONDARY HAZARDS

The secondary hazard most commonly associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends. Many areas of Siskiyou County are susceptible to drying out during drought and being at risk of wildfire (see *Figure 7-12*).

Figure 7-12. Dry Hills and Shrub Lands in Northern Siskiyou County

10.4 CLIMATE CHANGE IMPACTS

The long-term effects of climate change on regional water resources are unknown, but global water resources are already experiencing the following stresses without climate change:

- Growing populations
- Increased competition for available water
- Poor water quality
- Environmental claims
- Uncertain reserved water rights
- Groundwater overdraft
- Aging urban water infrastructure.

With a warmer climate, droughts could become more frequent, more severe, and longer-lasting. From 1987 to 1989, losses from drought in the U.S. totaled $39 billion (OTA, 1993). More frequent extreme events such as droughts could end up being more cause for concern than the long-term change in temperature and precipitation averages.

The best advice to water resource managers regarding climate change is to start addressing current stresses on water supplies and build flexibility and robustness into any system. Flexibility helps to ensure a quick response to changing conditions, and robustness helps people prepare for and survive the worst conditions. With this approach to planning, water system managers will be better able to adapt to the impacts of climate change.

10.5 EXPOSURE

All people, property and environments in the Siskiyou County planning area would be exposed to some degree to the impacts of moderate to extreme drought conditions.

10.6 VULNERABILITY

Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists because water is integral to the ability to produce goods and provide services. Drought can affect a wide range of economic, environmental and social activities. The vulnerability of an activity to the effects of drought usually depends on its water demand, how the demand is met, and what water supplies are available to meet the demand. California's 2005 Water Plan indicates that water demand in the state will increase through 2030. Although the Department of Water Resources predicts a modest decrease in agricultural water use, the agency anticipates that urban water use will increase by 1.5 to 5.8 million acre-feet per year.

10.6.1 Population

The planning partnership has the ability to minimize any impacts on residents and water consumers in the county should several consecutive dry years occur. No significant life or health impacts are anticipated as a result of drought within the planning area.

10.6.2 Property

No structures will be directly affected by drought conditions, though some structures may become vulnerable to wildfires, which are more likely following years of drought. Droughts can also have significant impacts on landscapes, which could cause a financial burden to property owners. However, these impacts are not considered critical in planning for impacts from the drought hazard.

10.6.3 Critical Facilities

Critical facilities as defined for this plan will continue to be operational during a drought. Critical facility elements such as landscaping may not be maintained due to limited resources, but the risk to the planning area's critical facilities inventory will be largely aesthetic. For example, when water conservation measures are in place, landscaped areas will not be watered and may die. These aesthetic impacts are not considered significant.

10.6.4 Environment

Environmental losses from drought are associated with damage to plants, animals, wildlife habitat, and air and water quality; forest and range fires; degradation of landscape quality; loss of biodiversity; and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes and vegetation. However, many species will eventually recover from this temporary aberration. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity. Although environmental losses are difficult to quantify, growing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects.

10.6.5 Economic Impact

Economic impact will be largely associated with industries that use water or depend on water for their business. For example, landscaping businesses were affected in the droughts of the past as the demand for service significantly declined because landscaping was not watered. Agricultural industries will be impacted if water usage is restricted for irrigation.

10.7 FUTURE TRENDS IN DEVELOPMENT

Each municipal planning partner in this effort has an established comprehensive plan that includes policies directing land use and dealing with issues of water supply and the protection of water resources. These plans provide the capability at the local municipal level to protect future development from the impacts of drought. All planning partners reviewed their general plans under the capability assessments performed for this effort. Deficiencies identified by these reviews can be identified as mitigation actions to increase the capability to deal with future trends in development.

The California Department of Water Resources is moving forward with aggressive water conservation programs to reduce the state's water demand and consumption. The goal is to reduce per capita water consumption by 20 percent by 2020. Conservation efforts include the following:

- Encouraging increased widespread implementation of cost-effective conservation programs by urban and agricultural water suppliers
- Helping water agencies develop water shortage contingency plans so they are prepared for future dry conditions or supply interruptions
- Implementing programs to conserve water in landscaping and helping irrigation districts, farmers, and managers of large urban landscapes stretch their available water by providing daily information on plant water needs.

10.8 SCENARIO

An extreme multiyear drought more intense than the 1976-1977 and 1987-1992 droughts could impact the region with little warning. Combinations of low precipitation and unusually high temperatures could occur over several consecutive years. Intensified by such conditions, extreme wildfires could break out throughout Siskiyou County, increasing the need for water. Surrounding communities, also in drought conditions, could increase their demand for water supplies relied upon by the planning partnership, causing social and political conflicts. If such conditions persisted for several years, the economy of Siskiyou County could experience setbacks, especially in water dependent industries.

10.9 ISSUES

The planning team has identified the following drought-related issues:

- Identification and development of alternative water supplies, such as drought water banks
- Utilization of groundwater recharge techniques to stabilize the groundwater supply
- The probability of increased drought frequencies and durations due to climate change
- The promotion of active water conservation even during non-drought periods.

CHAPTER 11.
EARTHQUAKE

11.1 GENERAL BACKGROUND

11.1.1 How Earthquakes Happen

An earthquake is the vibration of the earth's surface following a release of energy in the earth's crust. This energy can be generated by a sudden dislocation of the crust or by a volcanic eruption. Most destructive quakes are caused by dislocations of the crust. The crust may first bend and then, when the stress exceeds the strength of the rocks, break and snap to a new position. In the process of breaking, vibrations called "seismic waves" are generated. These waves travel outward from the source of the earthquake at varying speeds.

California is seismically active because of movement of the North American Plate and the Pacific Plate. The movement of these tectonic plates creates stress that can be released as earthquakes.

Earthquakes tend to reoccur along faults, which are zones of weakness in the crust. Even if a fault zone has recently experienced an earthquake, there is no guarantee that all the stress has been relieved. Another earthquake could still occur.

Faults are more likely to have earthquakes on them if they have more rapid rates of movement, have had recent earthquakes along them, experience greater total displacements, and are aligned so that movement can relieve accumulating tectonic stresses. A direct relationship exists between a fault's length and location and its ability to generate damaging ground motion at a given site. In some areas, smaller, local faults produce lower magnitude quakes, but ground shaking can be strong, and damage can be significant as a result of the fault's proximity to the area. In contrast, large regional faults can generate great magnitudes but, because of their distance and depth, may result in only moderate shaking in the area.

Geologists classify faults by their relative hazards. Active faults, which represent the highest hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 11,000 years). Potentially active faults are those that displaced layers of rock from the Quaternary period (the last 1,800,000 years). Determining if a fault is "active" or "potentially active" depends on geologic evidence, which may not be available for every fault. Although there are probably still some unrecognized active faults, nearly all the movement between the two plates, and therefore the majority of the seismic hazards, are on the well-known active faults. However, inactive faults, for which no displacements have been recorded, maintain the potential to reactivate or experience displacement along a branch sometime in the future. Earthquake activity throughout California could cause tectonic movement along currently inactive fault systems.

DEFINITIONS

Earthquake—The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth or a contact zone between tectonic plates.

Epicenter—The point on the earth's surface directly above the hypocenter of an earthquake. The location of an earthquake is commonly described by the geographic position of its epicenter and by its focal depth.

Fault—A fracture in the earth's crust along which two blocks of the crust have slipped with respect to each other.

Focal Depth—The depth from the earth's surface to the hypocenter.

Hypocenter—The region underground where an earthquake's energy originates

Liquefaction—Loosely packed, water-logged sediments losing their strength in response to strong shaking, causing major damage during earthquakes.

11.1.2 Earthquake Classifications

Earthquakes are classified according to the amount of energy released as measured by magnitude or intensity scales. Currently the most commonly used scales are the moment magnitude (Mw) scale, and the modified Mercalli intensity scale. Estimates of moment magnitude roughly match the local magnitude scale (ML) commonly called the Richter scale. One advantage of the moment magnitude scale is that, unlike other magnitude scales, it does not saturate at the upper end. That is, there is no value beyond which all large earthquakes have about the same magnitude. For this reason, moment magnitude is now the most often used estimate of large earthquake magnitudes. **TABLE 7-13** presents a classification of earthquakes according to their magnitude. **TABLE 7-14** compares the moment magnitude scale to the modified Mercalli intensity scale.

11.1.3 Ground Motion

Earthquake hazard assessment is also based on expected ground motion. This involves determining the annual probability that certain ground motion accelerations will be exceeded, then summing the annual probabilities over the time period of interest. The most commonly mapped ground motion parameters are the horizontal and vertical peak ground accelerations (PGA) for a given soil or rock type. Instruments called accelerographs record levels of ground motion due to earthquakes at stations throughout a region. These readings are recorded by state and federal agencies that monitor and predict seismic activity.

Maps of PGA values form the basis of seismic zone maps that are included in building codes such as the International Building Code. Building codes that include seismic provisions specify the horizontal force due to lateral acceleration that a building should be able to withstand during an earthquake. PGA values are directly related to these lateral forces that could damage “short period structures” (e.g. single-family dwellings). Longer period response components determine the lateral forces that damage larger structures with longer natural periods (apartment buildings, factories, high-rises, bridges). **TABLE 7-15** lists damage potential by PGA factors compared to the Mercalli scale.

11.1.4 Effect of Soil Types

The impact of an earthquake on structures and infrastructure is largely a function of ground shaking, distance from the source of the quake, and liquefaction, a secondary effect of an earthquake in which soils lose their shear strength and flow or behave as liquid, thereby damaging structures that derive their support from the soil. Liquefaction generally occurs in soft, unconsolidated sedimentary soils. A program called the National Earthquake Hazard Reduction Program (NEHRP) creates maps based on soil characteristics to help identify locations subject to liquefaction. **TABLE 7-16** summarizes NEHRP soil classifications. NEHRP Soils B and C typically can sustain ground shaking without much effect, dependent on the earthquake magnitude. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E and F. In general, these areas are also most susceptible to liquefaction.

11.2 HAZARD PROFILE

Earthquakes can last from a few seconds to over five minutes; they may also occur as a series of tremors over several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties generally result from falling objects and debris, because the shocks shake, damage or demolish buildings and other structures. Disruption of communications, electrical power supplies and gas, sewer and water lines should be expected. Earthquakes may trigger fires, dam failures, landslides or releases of hazardous material, compounding their disastrous effects. Small, local faults produce lower magnitude quakes, but ground shaking can be strong and damage can be significant in areas close to the fault. In contrast, large regional faults can generate earthquakes of great magnitudes but, because of their distance and depth, they may result in only moderate shaking in an area.

**TABLE 7-13.
EARTHQUAKE MAGNITUDE CLASSES**

Magnitude Class	Magnitude Range (M = magnitude)
Great	M > 8
Major	7 <= M < 7.9
Strong	6 <= M < 6.9
Moderate	5 <= M < 5.9
Light	4 <= M < 4.9
Minor	3 <= M < 3.9
Micro	M < 3

**TABLE 7-14.
EARTHQUAKE MAGNITUDE AND INTENSITY**

Magnitude (Mw)	Intensity (Modified Mercalli)	Description
1.0—3.0	I	I. Not felt except by a very few under especially favorable conditions
3.0—3.9	II—III	II. Felt only by a few persons at rest, especially on upper floors of buildings. III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it is an earthquake. Standing cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0—4.9	IV—V	IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like a heavy truck striking building. Standing cars rocked noticeably.
5.0—5.9	VI—VII	VI. Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. VII. Damage negligible in buildings of good design and construction; slight in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken.
6.0—6.9	VII—IX	VIII. Damage slight in specially designed structures; considerable damage in ordinary buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	VIII and higher	X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly. XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

**TABLE 7-15.
MERCALLI SCALE AND PEAK GROUND ACCELERATION COMPARISON**

Mercalli Scale	Potential Damage	Estimated PGA
I	None	0.017
II-III	None	0.017
IV	None	0.014-0.039
V	Very Light	0.039-0.092
VI	None to Slight; USGS-Light	0.02-0.05
	Unreinforced Masonry-Stair Step Cracks; Damage to Chimneys; Threshold of Damage	0.04-0.18
VII	Slight-Moderate; USGS-Moderate	0.05-0.10
	Unreinforced Masonry-Significant; Cracking of parapets	0.08-0.16
	Masonry may fail; Threshold of Structural Damage	0.10-0.34
VIII	Moderate-Extensive; USGS: Moderate-Heavy	0.10-0.20
	Unreinforced Masonry-Extensive Cracking; fall of parapets and gable ends	0.16-0.65
IX	Extensive-Complete; USGS-Heavy	0.20-0.50
	Structural collapse of some un-reinforced masonry buildings; walls out of plane. Damage to seismically designed structures	0.32-1.24
X	Complete ground failures; USGS- Very Heavy (X+); Structural collapse of most un-reinforced masonry buildings; notable damage to seismically designed structures; ground failure	0.50-1.00

**TABLE 7-16.
NEHRP SOIL CLASSIFICATION SYSTEM**

NEHRP Soil Type	Description	Mean Shear Velocity to 30 m (m/s)
A	Hard Rock	1,500
B	Firm to Hard Rock	760-1,500
C	Dense Soil/Soft Rock	360-760
D	Stiff Soil	180-360
E	Soft Clays	< 180
F	Special Study Soils (liquefiable soils, sensitive clays, organic soils, soft clays >36 m thick)	

11.2.1 Past Events

Table 7-17 lists past seismic events that have impacted Siskiyou County.

TABLE 7-17.
HISTORICAL EARTHQUAKES IMPACTING THE PLANNING AREA

Year	Magnitude	Fault/Epicenter	Region Impacted
1828[a]	Unknown	Undetermined	Northern California
1906	7.8	San Francisco	California
1923	7.2	Off coast, Humboldt County, CA	Northern California and coast
1954	6.5	Eureka, CA	Northern California
1980	7.2	Off coast, Humboldt County, CA	Northern California and coast
1993	6.0	Klamath Falls, OR	Southern Oregon, Northern California (particularly Tulelake and Dorris)
1995	6.0	Off coast, Humboldt County, CA	Northern California and coast

a. According to research by Lawrence Buchner, a severe earthquake occurred in Siskiyou County in 1828, although its magnitude is unknown. According to "Old Man Ruffy," a Karok Indian who died in 1930 at an age of about 110, "The ground went this way and that way. Mountains fell down. Trees fell down, and many big ponds of water (lakes) were formed high up in the mountains." (Eschscholtzia, 1965).

11.2.2 Location

The impact of an earthquake is largely a function of the following components:

- Ground shaking (ground motion accelerations)
- Liquefaction (soil instability)
- Distance from the source (both horizontally and vertically).

Mapping that shows the impacts of these components was used to assess the risk of earthquakes within the planning area. While the impacts from each of these components can build upon each other during an earthquake event, the mapping looks at each component individually. The mapping used in this assessment is described below.

Shake Maps

A shake map is a representation of ground shaking produced by an earthquake. The information it presents is different from the earthquake magnitude and epicenter that are released after an earthquake because shake maps focus on the ground shaking resulting from the earthquake, rather than the parameters describing the earthquake source. An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region, depending on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust. A shake map shows the extent and variation of ground shaking in a region immediately following significant earthquakes.

Ground motion and intensity maps are derived from peak ground motion amplitudes recorded on seismic sensors (accelerometers), with interpolation based on estimated amplitudes where data are lacking, and site amplification corrections. Color-coded instrumental intensity maps are derived from empirical relations between peak ground motions and Modified Mercalli intensity. Two types of shake map are typically generated from the data:

A probabilistic seismic hazard map shows the hazard from earthquakes that geologists and seismologists agree could occur. The maps are expressed in terms of probability of exceeding a certain ground motion, such as the 10-percent probability of exceedance in 50 years. This level of ground shaking has been used for designing buildings in high seismic areas. Maps 11-1 and 11-2 show the estimated ground motion for the 100-year and 500-year probabilistic earthquakes in Siskiyou County.

Earthquake scenario maps describe the expected ground motions and effects of hypothetical large earthquakes for a region. Maps of these scenarios can be used to support all phases of emergency management. The only scenario map available for the Siskiyou County planning area was a Klamath Falls fault scenario. The event mapped was a 6.5-magnitude event with an epicenter 20 miles northeast of Dorris. Map 11-3 shows the potential damage from this event.

NEHRP Soil Maps

NEHRP soil types define the locations that will be significantly impacted by an earthquake. NEHRP Soils B and C typically can sustain low-magnitude ground shaking without much effect. The areas that are most commonly affected by ground shaking have NEHRP Soils D, E and F. Map 12-4 shows NEHRP soil classifications in the county.

Liquefaction Maps

Soil liquefaction maps are useful tools to assess potential damage from earthquakes. When the ground liquefies, sandy or silty materials saturated with water behave like a liquid, causing pipes to leak, roads and airport runways to buckle, and building foundations to be damaged. In general, areas with NEHRP Soils D, E and F are also susceptible to liquefaction. If there is a dry soil crust, excess water will sometimes come to the surface through cracks in the confining layer, bringing liquefied sand with it, creating sand boils. Currently, there are no liquefaction maps available for the Siskiyou County planning area. Creation of this type of data would provide a significant enhancement to the seismic risk assessment of the planning area. Once this data becomes available, the seismic risk assessment for the planning area should be updated.

11.2.3 Frequency

The Northern California Earthquake Data Center (NCEDC) identifies 10 seismic events with a magnitude of 5.0 or higher felt in Siskiyou County between 1984 and 1996 (see **TABLE 7-18**). None of these events caused significant damage in the County. This averages to almost 1 seismic event per year. The Northern California area, including Siskiyou County, is in a moderate-risk area, with a majority of the County having a 2-percent probability in a 50-year period of ground shaking from a seismic event exceeding 0.48 percent of gravity (see *Figure 7-13*).

TABLE 7-18. RECENT EARTHQUAKES MAGNITUDE 5.0 OR GREATER FELT WITHIN SISKIYOU COUNTY					
Date	Time	Latitude	Longitude	Depth (Miles)	Magnitude
1984/09/08	06:16:40.60	44.4480	-114.1530	10	5.38
1984/10/18	15:30:23.60	42.3750	-105.7200	33	5.69
1993/09/21	03:28:55.63	42.316	-122.0670	10.30	5.98
1993/09/21	05:45:38.30	42.2030	-122.1690	5.0	5.98
1993/09/21	06:14:46.76	42.2640	-122.0980	5.0	5.02
1993/12/04	22:15:21.75	42.2730	-122.0250	5.0	5.49
1994/02/03	09:05:03.80	42.7510	-110.9830	5.0	6.18
1994/02/04	02:42:12.10	42.7130	-111.0400	5.0	5.48
1994/06/07	13:30:04.10	44.5100	-114.0480	10.0	5.55
1996/05/03	04:04:22.00	47.7500	-121.8600	4.10	5.32

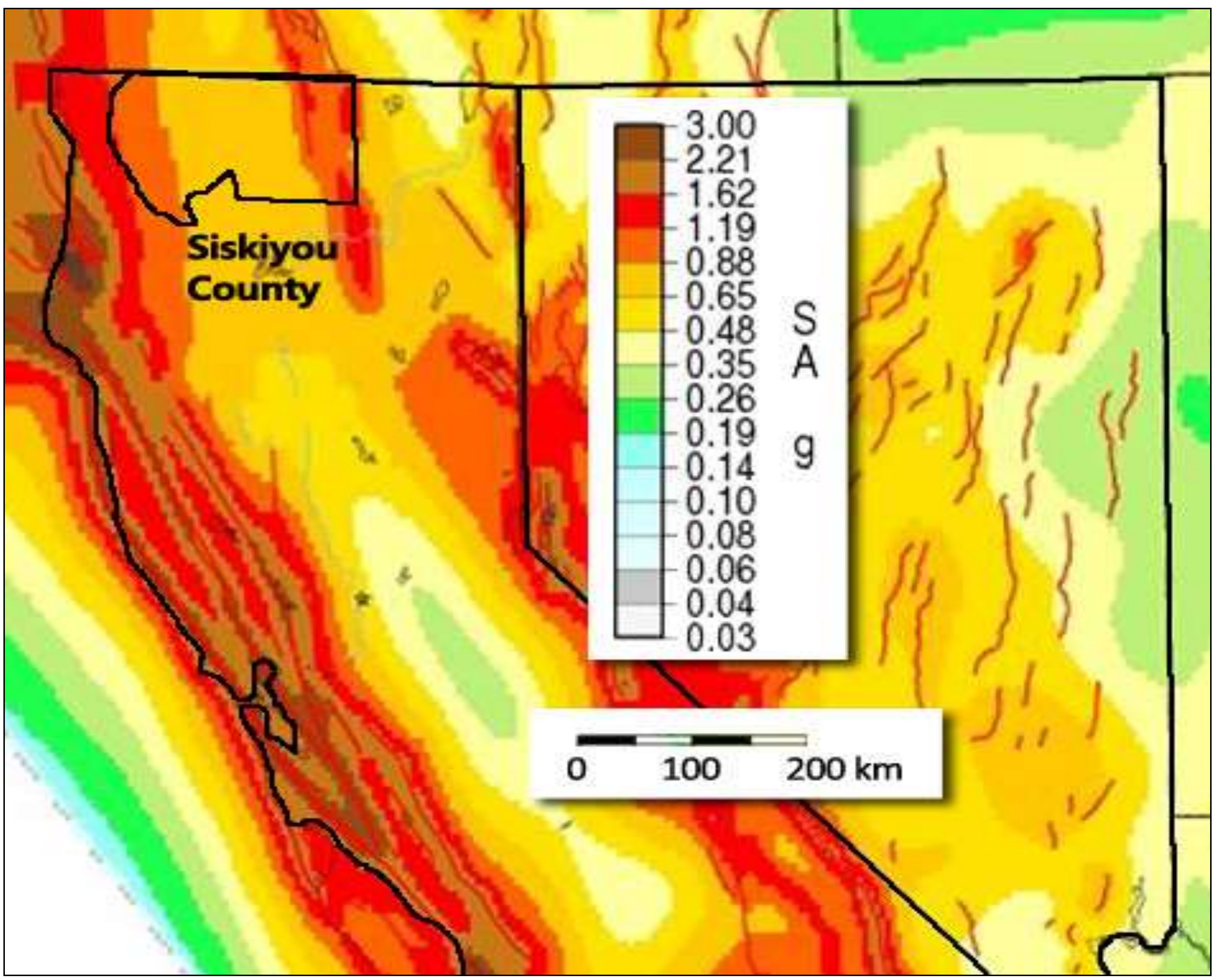


Figure 7-13. PGA with 2-Percent Probability of Exceedance in 50 Years

11.2.4 Severity

The severity of an earthquake can be expressed in terms of intensity or magnitude. Intensity represents the observed effects of ground shaking on people, buildings, and natural features. The USGS has created ground motion maps based on current information about several fault zones. These maps show the PGA that has a certain probability (2 percent or 10 percent) of being exceeded in a 50-year period. The PGA is measured in numbers of g's (the acceleration associated with gravity). *Figure 7-13* shows the PGAs with a 2-percent exceedance chance in 50 years in northern California. The region around Siskiyou County is a low to moderate risk area.

Magnitude is related to the amount of seismic energy released at the hypocenter of an earthquake. It is determined by the amplitude of the earthquake waves recorded on instruments. Whereas intensity varies depending on location with respect to the earthquake epicenter, magnitude is represented by a single, instrumentally determined value for each earthquake event.

In simplistic terms, the severity of an earthquake event can be measured in the following terms:

- How hard did the ground shake?
- How did the ground move? (Horizontally or vertically)
- How stable was the soil?
- What is the fragility of the built environment in the area of impact?

11.2.5 Warning Time

There is currently no reliable way to predict the day or month that an earthquake will occur at any given location. Research is being done with warning systems that use the low energy waves that precede major earthquakes. These potential warning systems give approximately 40 seconds notice that a major earthquake is about to occur. The warning time is very short but it could allow for someone to get under a desk, step away from a hazardous material they are working with, or shut down a computer system.

11.3 SECONDARY HAZARDS

Earthquakes can cause large and sometimes disastrous landslides and mudslides. River valleys are vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Soil liquefaction occurs when water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink into what was previously solid ground. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people. Earthen dams and levees are highly susceptible to seismic events and the impacts of their eventual failures can be considered secondary risks for earthquakes.

11.4 CLIMATE CHANGE IMPACTS

The impacts of global climate change on earthquake probability are unknown. Some scientists say that melting glaciers could induce tectonic activity. As ice melts and water runs off, tremendous amounts of weight are shifted on the earth's crust. As newly freed crust returns to its original, pre-glacier shape, it could cause seismic plates to slip and stimulate volcanic activity according to research into prehistoric earthquakes and volcanic activity. NASA and USGS scientists found that retreating glaciers in southern Alaska may be opening the way for future earthquakes (NASA, 2004).

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms could experience liquefaction during seismic activity due to the increased saturation. Dams storing increased volumes of water due to changes in the hydrograph could fail during seismic events. There are currently no models available to estimate these impacts.

11.5 EXPOSURE

11.5.1 Population

The entire population of Siskiyou County is potentially exposed to direct and indirect impacts from earthquakes. The degree of exposure is dependent on many factors, including the age and construction type of the structures people live in, the soil type their homes are constructed on, their proximity to fault location, etc. Whether directly impacted or indirectly impact, the entire population will have to deal with the consequences of earthquakes to some degree. Business interruption could keep people from working, road closures could isolate populations, and loss of functions of utilities could impact populations that suffered no direct damage from an event itself.

11.5.2 Property

The Siskiyou County Assessor estimates that there are 22,144 buildings in Siskiyou County, with a total assessed value of $4.4 billion (estimates do not include federal and local government buildings.) Since all structures in the planning area are susceptible to earthquake impacts to varying degrees, this total represents the countywide property exposure to seismic events. Most of the buildings (85 percent) are residential.

11.5.3 Critical Facilities and Infrastructure

All critical facilities in Siskiyou County are exposed to the earthquake hazard. Table 7-2 and Table 7-3 list the number of each type of facility by jurisdiction. Hazardous materials releases can occur during an earthquake from fixed facilities or transportation-related incidents. Transportation corridors can be disrupted during an earthquake, leading to the release of materials to the surrounding environment. Facilities holding hazardous materials are of particular concern because of possible isolation of neighborhoods surrounding them. During an earthquake, structures storing these materials could rupture and leak into the surrounding area or an adjacent waterway, having a disastrous effect on the environment.

11.5.4 Environment

Secondary hazards associated with earthquakes will likely have some of the most damaging effects on the environment. Earthquake-induced landslides can significantly impact surrounding habitat. It is also possible for streams to be rerouted after an earthquake. This can change the water quality, possibly damaging habitat and feeding areas. There is a possibility of streams fed by groundwater drying up because of changes in underlying geology.

11.6 VULNERABILITY

Earthquake vulnerability data was generated using a Level 2 HAZUS-MH analysis. Once the location and size of a hypothetical earthquake are identified, HAZUS-MH estimates the intensity of the ground shaking, the number of buildings damaged, the number of casualties, the damage to transportation systems and utilities, the number of people displaced from their homes, and the estimated cost of repair and clean up.

11.6.1 Population

Three population groups are particularly vulnerable to earthquake hazards:

Linguistically Isolated Populations—–An estimated 1,650 residents in the planning area census blocks on NEHRP D and E soils do not speak English as their native language. This is about 11 percent of all residents in these census blocks. Problems arise when there is an urgent need to inform non-English speaking residents of an earthquake event. They are vulnerable because of difficulties in understanding hazard-related information from predominantly English-speaking media and An estimated agencies.

Population Below Poverty Level—Approximately 2,240 households in the planning area census blocks on NEHRP D and E soils are listed as being below the poverty level. This is about 35 percent of all households in these census blocks. These households may lack the financial resources to improve their homes to prevent or mitigate earthquake damage. Poorer residents are also less likely to have insurance to compensate for losses in earthquakes.

Population Over 65 Years Old— An estimated 1,230 residents in the planning area census blocks on NEHRP D and E soils are over 65 years old. This is about 8 percent of all residents in these census blocks. This population group is vulnerable because they are more likely to need special medical attention, which may not be available due to isolation caused by earthquakes. Elderly residents also have more difficulty leaving their homes during earthquake events and could be stranded in dangerous situations.

Impacts on persons and households in the planning area were estimated for the 100-year and 500-year earthquakes through the Level 2 HAZUS-MH analysis. **TABLE 7-19** summarizes the results.

TABLE 7-19.
ESTIMATED EARTHQUAKE IMPACT ON PERSON AND HOUSEHOLDS

	Number of Displaced Households	Number of Persons Requiring Short-Term Shelter
100-Year Earthquake	1	1
500-Year Earthquake	23	16

11.6.2 Property

Property losses were estimated through the Level 2 HAZUS-MH analysis for the 100-year and 500-year earthquakes. Although the Klamath scenario shake map did not show sufficient damage potential to warrant modeling in HAZUS, this choice could be changed in the future should liquefaction maps become available for the planning area. The availability of this type of data would significantly enhance any HAZUS modeling. Table 7-20 shows the results for structural loss, representing damage to building structures, and non-structural loss, representing the value of lost contents and inventory, relocation, income loss, rental loss and wage loss. The total of the two types of losses is also shown in the tables. A summary of the property-related loss results is as follows:

For a 100-year probabilistic earthquake, the estimated damage potential is $6.9 million, or 0.16 percent of the total assessed value for the planning area.

For a 500-year probabilistic earthquake, the estimated damage potential is $73.8 million, or 1.68 percent of the total assessed value for the planning area.

**TABLE 7-20.
EARTHQUAKE BUILDING LOSS POTENTIAL—PROBABILISTIC**

	Estimated Earthquake Loss Value					
	100- Year Probabilistic Earthquake			500- Year Probabilistic Earthquake		
Jurisdiction	Structural	Non-Structural	**Total**	Structural	Non-Structural	**Total**
Yreka and vicinity	$745,307	$164,239	$909,546	$8,064,582	$2,466,300	$10,530,882
Dunsmuir, Weed, Mount Shasta area	$2,548,378	$641,343	$3,189,722	$22,493,749	$6,969,510	$29,463,259
West County including Etna & Fort Jones	$849,563	$186,507	$1,036,070	$7,919,399	$2,352,093	$10,271,491
East County including Dorris, Montague, Tulelake	$1,467,472	$337,700	$1,805,171	$18,179,102	$5,312,783	$23,491,885
Total	**$5,610,721**	**$1,329,78**	**$6,940,50**	**$56,656,831**	**$17,100,686**	**$73,757,517**

The HAZUS-MH analysis also estimated the amount of earthquake-caused debris in the planning area for the 100-year and 500-year earthquakes, as summarized in Table 7-21.

**TABLE 7-21.
ESTIMATED EARTHQUAKE-CAUSED DEBRIS**

	Debris to Be Removed (tons)
100-Year Earthquake	3,000
500-Year Earthquake	27,000

Building Age

The California State Building Code Council identifies significant milestones in building and seismic code requirements that directly affect the structural integrity of development in California. Using these time periods, the planning team used HAZUS to identify the number of structures within the County by date of construction. Table 7-22 shows the results of this analysis. The number of structures does not reflect the number of total housing units, as many multi-family units and attached housing units are reported as one structure. *Figure 7-14* and *Figure 7-15* show typical historic buildings within the planning area.

Soft-Story Buildings

A soft-story building is a multi-story building with one or more floors that are “soft” due to structural design. If a building has a floor that is 70-percent less stiff than the floor above it, it is considered a soft-story building. This soft story creates a major weak point in an earthquake. Since soft stories are typically associated with retail spaces and parking garages, they are often on the lower stories of a building. When they collapse, they can take the whole building down with them, causing serious structural damage that may render the structure totally unusable (see Figure 7-16).

**TABLE 7-22.
AGE OF STRUCTURES IN SISKIYOU COUNTY**

Time Period	Number of Current County Structures Built in Period	Significance of Time Frame
Pre-1940	3,240	Before 1933, there were no explicit earthquake requirements in building codes. State law did not require local governments to have building officials or issue building permits.
1940-1959	4,276	In 1940, the first strong motion recording was made.
1960-1979	6,544	In 1960, the Structural Engineers Association of California published guidelines on recommended earthquake provisions. In 1975, significant improvements were made to lateral force requirements.
1980-1999	5,532	In 1994, the Uniform Building Code was amended to include provisions for seismic safety.
2000-2010	2,552	Seismic code is currently enforced.
2010-2018	4770	Seismic code is currently enforced
Total	**26,914**	

Figure 7-14. The Creamery Building (1912) in Fort Jones

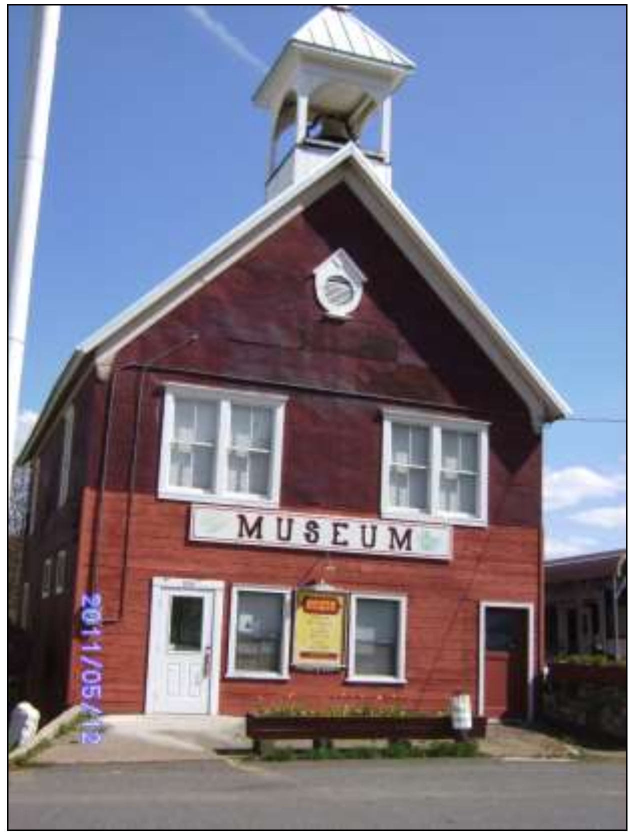


Figure 7-15. Historic Etna Museum (Original Town Hall)

Figure 7-16. Soft-Story Damage from Earthquake

These floors can be especially dangerous in earthquakes, because they cannot cope with the lateral forces caused by the swaying of the building during a quake. As a result, the soft story may fail, causing what is known as a soft story collapse. Soft-story collapse is one of the leading causes of earthquake damage to private residences. Exposure associated with soft story construction in the planning area is not currently known. This type of data will need to be generated to support future risk assessments of the earthquake hazard.

11.6.3 Critical Facilities and Infrastructure

Level of Damage

HAZUS-MH classifies the vulnerability of critical facilities to earthquake damage in five categories: no damage, slight damage, moderate damage, extensive damage, or complete damage. The model was used to assign a vulnerability category to each critical facility in the planning area except hazmat facilities and "other infrastructure" facilities, for which there are no established damage functions. **TABLE 7-23** summarizes the results.

Time to Return to Functionality

HAZUS-MH estimates the time to restore critical facilities to fully functional use. Results are presented as probability of being functional at specified time increments: 1, 3, 7, 14, 30 and 90 days after the event. For example, HAZUS-MH may estimate that a facility has 5 percent chance of being fully functional at Day 3, and a 95-percent chance of being fully functional at Day 90. The analysis of critical facilities in the planning area was performed for the 100-year earthquake event. Table 7-24 summarizes the results.

TABLE 7-23.
CRITICAL FACILITY VULNERABILITY TO 100-YEAR EARTHQUAKE EVENT

Category	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Medical and Health	10	54	0	0	0
Government Functions	0	70	0	0	0
Protective Functions	27	18	0	0	0
Schools	15	102	0	0	0
Other Critical Functions	36	10	0	0	0
Bridges	366	0	0	0	0
Water supply	14	0	0	0	0
Wastewater	1	0	0	0	0
Total	**469**	**254**	**0**	**0**	**0**

TABLE 7-24.
FUNCTIONALITY OF CRITICAL FACILITIES FOR 100-YEAR EVENT

Category	# of Critical Facilities	Probability of Being Fully Functional (%)					
		at Day 1	at Day 3	at Day 7	at Day 14	at Day 30	at Day 90
Medical and Health	64	40	42	94	96	99	100

TABLE 7-24.
FUNCTIONALITY OF CRITICAL FACILITIES FOR 100-YEAR EVENT

Category	# of Critical Facilities	Probability of Being Fully Functional (%) at Day 1	at Day 3	at Day 7	at Day 14	at Day 30	at Day 90
Government/Shelters	70	40	42	94	96	99	100
Protective Functions	45	41	42	95	96	99	100
Schools	117	41	43	95	96	99	100
Other Critical functions	46	99	100	100	100	100	100
Bridges	366	100	100	100	100	100	100
Water supply	14	98	99	100	100	100	100
Wastewater	1	98	99	100	100	100	100
Total/Average	**723**	**70**	**71**	**97**	**98**	**100**	**100**

11.6.4 Environment

The environment vulnerable to earthquake hazard is the same as the environment exposed to the hazard.

11.7 FUTURE TRENDS IN DEVELOPMENT

Land use in the planning area will be directed by general plans adopted under California’s General Planning Law. The safety elements of the general plans establish standards and plans for the protection of the community from hazards including seismic hazards. The information in this plan provides the participating partners a tool to ensure that there is no increase in exposure in areas of high seismic risk. Development in the planning area will be regulated through building standards and performance measures so that the degree of risk will be reduced. The geologic hazard portions of the planning area are heavily regulated under California’s General Planning Law. The International Building Code establishes provisions to address seismic risk.

11.8 SCENARIO

With faults limited to the eastern portions of Siskiyou County and into southern Oregon, the potential scenarios for damaging earthquake events are unlikely. However, an earthquake does not have to occur within Siskiyou County to have a significant impact on the people, property and economy of the county.

Any seismic activity of 6.0 or greater on known or unknown faults within the planning area would have significant impacts throughout the county. Potential warning systems could give approximately 40 seconds’ notice that a major earthquake is about to occur. This would not provide adequate time for preparation. Earthquakes of this magnitude or higher would lead to massive structural failure of property on NEHRP C, D, E, and F soils. With close to 50 percent of the structures within the County constructed prior seismic safety provisions in the national building codes, the percentage of structures damaged would be high. Levees and revetments built on these poor soils would likely fail, representing a loss of critical infrastructure. These events could cause secondary hazards, including landslides and mudslides that would further damage structures. River valley hydraulic-fill sediment areas are also vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Soil liquefaction would occur in water-saturated sands, silts or gravelly soils.

11.9 ISSUES

Important issues associated with an earthquake include but are not limited to the following:

More information is needed on the exposure and performance of soft-story construction within the planning area.

Approximately 50 percent of the planning area's building stock was built prior to 1975, when seismic provisions became uniformly applied through building code applications.

Based on the modeling of critical facility performance performed for this plan, a high number of facilities in the planning area are expected to have complete or extensive damage from scenario events. These facilities are prime targets for structural retrofits.

Critical facility owner should be encouraged to create or enhance Continuity of Operations Plans using the information on risk and vulnerability contained in this plan.

Geotechnical standards should be established that take into account the probable impacts from earthquakes in the design and construction of new or enhanced facilities.

Any existing earthen levees and revetments are most likely located on soft, unstable soil. These soils are prone to liquefaction, which would severely undermine the integrity of these facilities.

There are a large number of earthen dams within the planning area. Dam failure warning and evacuation plans and procedures should be reviewed and updated to reflect the dams' risk potential associated with earthquake activity in the region.

Earthquakes could trigger other natural hazard events such as dam failures and landslides, which could severely impact the county.

A worst-case scenario would be the occurrence of a large seismic event during a flood or high-water event. Levee failures could happen at multiple locations, exacerbating the impacts of the individual earthquake event.

The availability of liquefaction maps would significantly enhance the HAZUS seismic model.

CHAPTER 12.

FLOOD

12.1 GENERAL BACKGROUND

A floodplain is the area adjacent to a river, creek or lake that becomes inundated during a flood. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined in a canyon.

When floodwaters recede after a flood event, they leave behind layers of rock and mud. These gradually build up to create a new floor of the floodplain. Floodplains generally contain unconsolidated sediments (accumulations of sand, gravel, loam, silt, and/or clay), often extending below the bed of the stream. These sediments provide a natural filtering system, with water percolating back into the ground and replenishing groundwater. These are often important aquifers, the water drawn from them being filtered compared to the water in the stream. Fertile, flat reclaimed floodplain lands are commonly used for agriculture, commerce and residential development.

DEFINITIONS

Flood—The inundation of normally dry land resulting from the rising and overflowing of a body of water.

Floodplain—The land area along the sides of a river that becomes inundated with water during a flood.

100-Year Floodplain—The area flooded by a flood that has a 1-percent chance of being equaled or exceeded each year. This is a statistical average only; a 100-year flood can occur more than once in a short period of time. The 1-percent annual chance flood is the standard used by most federal and state agencies.

Return Period—The average number of years between occurrences of a hazard (equal to the inverse of the annual likelihood of occurrence).

Riparian Zone—The area along the banks of a natural watercourse.

Connections between a river and its floodplain are most apparent during and after major flood events. These areas form a complex physical and biological system that not only supports a variety of natural resources but also provides natural flood and erosion control. When a river is separated from its floodplain with levees and other flood control facilities, natural, built-in benefits can be lost, altered, or significantly reduced.

12.1.1 Measuring Floods and Floodplains

The frequency and severity of flooding are measured using a discharge probability, which is a statistical tool used to define the probability that a certain river discharge (flow) level will be equaled or exceeded within a given year. Flood studies use historical records to determine the probability of occurrence for the different discharge levels. The flood frequency equals 100 divided by the discharge probability. For example, the 100-year discharge has a 1-percent chance of being equaled or exceeded in any given year. The "annual flood" is the greatest flood event expected to occur in a typical year. These measurements reflect statistical averages only; it is possible for two or more floods with a 100-year or higher recurrence interval to occur in a short time period. The same flood can have different recurrence intervals at different points on a river.

The extent of flooding associated with a 1-percent annual probability of occurrence (the base flood or 100-year flood) is used as the regulatory boundary by many agencies. Also referred to as the special flood hazard area (SFHA), this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities. Many communities have maps that show the extent and likely depth of flooding for the base flood. Corresponding water-surface elevations describe the elevation of water that will result from a given discharge level, which is one of the most important factors used in estimating flood damage.

12.2.2 Floodplain Ecosystems

Floodplains can support ecosystems that are rich in quantity and diversity of plant and animal species. A floodplain can contain 100 or even 1000 times as many species as a river. Wetting of the floodplain soil releases an immediate surge of nutrients: those left over from the last flood, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive and larger species enter a rapid breeding cycle. Opportunistic feeders (particularly birds) move in to take advantage. The production of nutrients peaks and falls away quickly; however the surge of new growth endures for some time. This makes floodplains particularly valuable for agriculture. Species growing in floodplains are markedly different from those that grow outside floodplains. For instance, riparian trees (trees that grow in floodplains) tend to be very tolerant of root disturbance and very quick-growing compared to non-riparian trees.

12.1.3 Effects of Human Activities

Because they border water bodies, floodplains have historically been popular sites to establish settlements. Human activities tend to concentrate in floodplains for a number of reasons: water is readily available; land is fertile and suitable for farming; transportation by water is easily accessible; and land is flatter and easier to develop. But human activity in floodplains frequently interferes with the natural function of floodplains. It can affect the distribution and timing of drainage, thereby increasing flood problems. Human development can create local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream's capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event. Human activities can interface effectively with a floodplain as long as steps are taken to mitigate the activities' adverse impacts on floodplain functions.

12.1.4 Federal Flood Programs

National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. For most participating communities, FEMA has prepared a detailed Flood Insurance Study (FIS). The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood and the 0.2-percent annual chance flood (the 500-year flood). Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principle tool for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.

Siskiyou County entered the NFIP on May 17, 1982. Structures permitted or built in the County before then are called "pre-FIRM" structures, and structures built afterwards are called "post-FIRM." The insurance rate is different for the two types of structures. The effective date for the current countywide FIRM is January 19, 2011. This map is a DFIRM (digital flood insurance rate map).

Six incorporated cities in Siskiyou County also participate in the NFIP. The county and cities are currently in good standing with the provisions of the NFIP. Compliance is monitored by FEMA regional staff and by the California Department of Water Resources under a contract with FEMA. Maintaining compliance under the NFIP is an important component of flood risk reduction. All planning partners that participate in the NFIP have identified initiatives to maintain their compliance and good standing.

The Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:

- Reduce flood losses.
- Facilitate accurate insurance rating.
- Promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

Figure 7-17 shows the nationwide number of CRS communities by class as of May 1, 2010, when there were 1,138 communities receiving flood insurance premium discounts under the CRS program.

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 66 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

There are no communities in Siskiyou County currently participating in the CRS program. However, many of the mitigation actions identified in Volume 2 of this plan are creditable activities under the CRS program. Therefore successful implementation of this plan offers the potential for the communities to join the program. Most of the flood-prone jurisdictions participating in this plan have included joining the CRS program as a potential mitigation action.

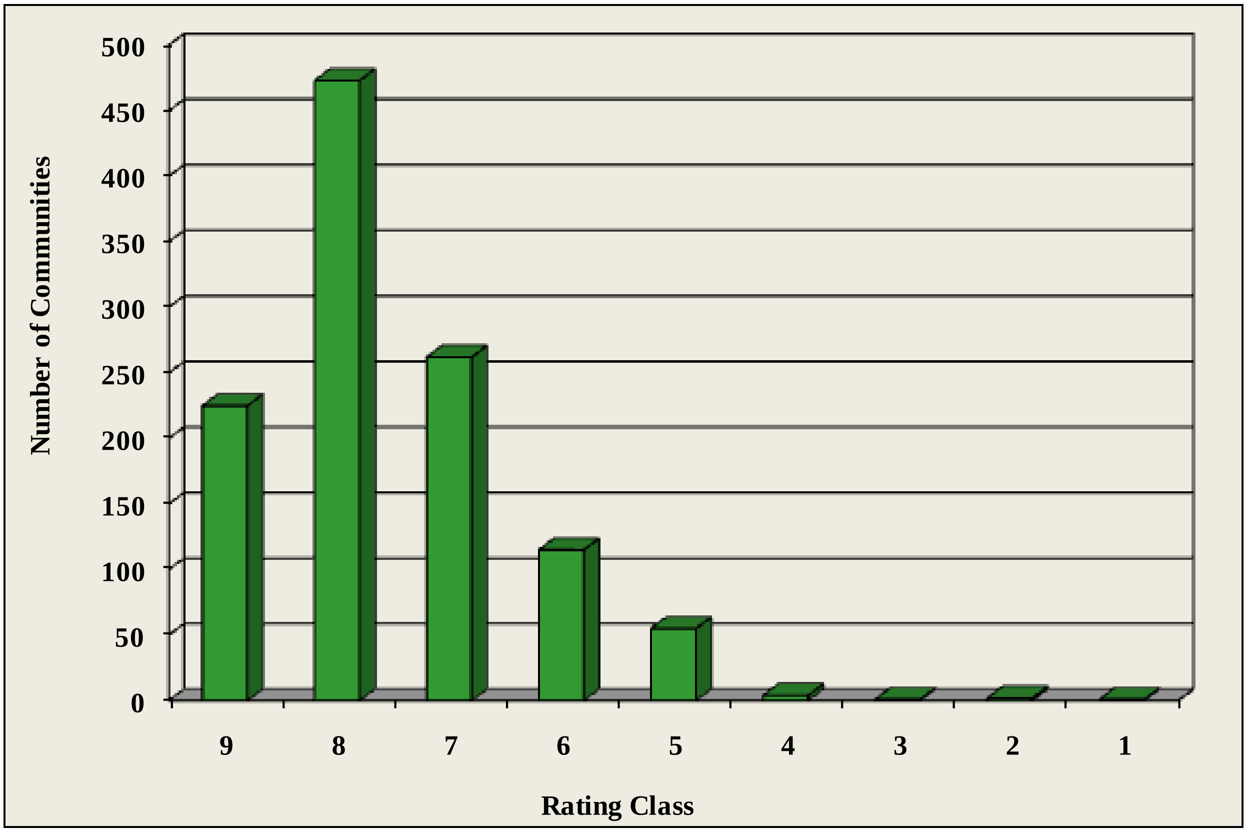


Figure 7-17. CRS Communities by Class Nationwide as of May 1, 2010

12.2 HAZARD PROFILE

Flooding in Siskiyou County is typically caused by high-intensity, short-duration (1 to 3 hours) storms concentrated on stream reaches often with already saturated soils. Two types of flooding are typical:

Flash floods that occur suddenly after a brief but intense downpour. They move rapidly, end suddenly, and can occur in areas not generally associated with flooding (such as subdivisions not adjacent to a water body and areas serviced by underground drainage systems). Although the duration of these events is usually brief, the damage they cause can be severe. Flash floods cannot be predicted accurately and happen whenever there are heavy storms.

Riverine floods described in terms of their extent (including the horizontal area affected and the vertical depth of floodwater) and the related probability of occurrence (expressed as the percentage chance that a flood of a specific extent will occur in any given year).

Siskiyou County is located almost entirely within the mountainous Siskiyou drainage area that courses through high-relief, deeply-cut river canyons with narrow floodplains. Tremendous amounts of water move through these river canyons, and flooding is predominantly confined within the traditional riverine valleys. Locally, some natural or manmade levees separate channels from floodplains and cause independent overland flow paths. Occasionally, railroad, highway or canal embankments form barriers, resulting in ponding or diversion of the flow. Some localized flooding not associated with stream overflow can occur where there are no drainage facilities to control flows or when runoff volumes exceed the design capacity of drainage facilities.

Rain-on-snow events also contribute to Siskiyou County's flood hazards. Rain-on-snow flooding develops when warm rains fall on previously accumulated snow on saturated ground, causing layers of snow to melt and run off in conjunction with the rain. Rain-on-snow induced floods typically occur in late winter or early spring and are generally widespread. Storm fronts with freezing levels above 7,000 feet cause heavy rainfall over large areas of the county. These flood-producing storms typically occur between October and March.

12.2.1 Past Events

Siskiyou County has a long history of flood events. Well-chronicled histories of flooding date to the settlement of the areas in and around the County. Newspaper archives from the Siskiyou Daily News and the Yreka Journal indicate flood events in the following years:

1852	1881	1948-49	1994
1861	1890	1955	1997
1862	1904	1961	2005
1864	1926	1964	2006
1867	1927	1970	2010
1875	1934	1974	2014
2015	2017		

In 1861 and 1961, the Klamath River in the Seiad Valley crested 37.5 feet above the low water mark. In February 1927, the Salmon River rose 45 feet at Somes Bar and the Klamath River rose 51 feet at the mouth of the Salmon River. The 1997 flood caused road failures on national forest lands, resulting in repairs costing over $40 million. The 1955 Christmas flood washed out over 30 bridges in Siskiyou County, and landslides and washouts blocked transportation access in many areas. Some residents were without power and road access for over a month.

Flood frequencies for most of these events cannot be determined, although the floods of 1861 and 1890 were probably the highest known for the period from 1861 to 1927. The flooding in 1964 was the most serious, causing considerable damage along the Klamath River, where bridges were washed out and structures in Happy Camp and the Seiad Valley were flooded.

One of the most recent events, in December 2005-January 2006, was categorized as a 15-year event. Heavy precipitation resulted in widespread soil saturation, causing heavy runoff into stream and creek channels. In most situations, the heavy inundation of water washed out roads, bridges and culverts, and damaged fence lines, eroded stream banks and impacted low-lying agricultural land. Highway 96, the main transportation access for western Siskiyou and northern Humboldt Counties was obstructed by heavy debris slides and water overflows. Access throughout the County was hindered as floodwaters breached swollen creek beds and culverts were unable to handle the flows.

Since 1964, eight presidential-declared flood events in the County have caused in excess of $25 million in property damage. Additional damages include agriculture crop damages. Table 7-25 summarizes flood events in the planning area since 1964. Area-specific flooding summaries are provided in the following sections.

Table 7-25.
Siskiyou County Flood Events

Date	Declaration #	Type of event	Estimated Damage[a]
01/02/2017	4301	Severe Winter Storms, Flooding, Debris and Mudflows	NA
02/01/2017	4308	Severe Winter Storms, Flooding, Debris and Mudflows	NA
10/12/2015	--	Severe Winter Storms, Flooding	NA
02/06/2015		Severe Storms, Flooding	NA
12/14/2014	1884	Severe Winter Storms, Flooding, Debris and Mudflows	NA
03/08/2010		Severe Winter Storms, Flooding, Debris and Mudflows	NA
02/03/2006	1628	Severe Storms, Flooding, Mudslides and Landslides	$7,000,000
1/4/1997	1155	Severe Storms, Flooding	$5,500,000
3/12/1995	1046	Severe Winter Storms, Flooding, Mudslides and Landslides	$11,241,379
2/3/1993	979	Severe Winter Storms, Flooding, Mudslides and	NA
12/11/1992	—	Flooding—Wind—Winter Weather	$1,315
2/16/1992	—	Flooding—Winter Weather	$9,090
1/25/1974	412	Severe Storms, Flooding	NA
1/16/1973	—	Flooding—Severe Storm/Thunder Storm	$86,206
1/12/1973	—	Flooding—Severe Storm/Thunder Storm	$35,714
2/16/1970	283	Severe Storms, Flooding	NA
12/24/1964	183	Heavy Rains, Flooding	$1,785,714

a. Data obtained from Spatial Hazard Events and Losses Database for the United States (SHELDUS)

NA = Information is not available

Dunsmuir Area

Dunsmuir has experienced the six largest floods on the upper Sacramento River since 1911. These occurred, in decreasing order of magnitude, in January 1974, February 1940, January 1914, December 1964, March 1916 and December 1955. Discharge from the 1974 event was estimated to have a recurrence interval of approximately 50 years. The 1964 event was estimated to have a recurrence interval of 15 years. Damage from the 1974 flood in Dunsmuir was estimated to be $4.2 million, with 25 homes destroyed. A bridge connecting downtown constricted flow from the Sacramento River, causing an increase in water surface elevation of approximately 3 feet upstream of the bridge. The backwater effect only extended a short distance upstream because of the steep channel slope. An unnamed creek that enters the City of Dunsmuir near Oak Street and Elinore Way has overflowed and caused widespread shallow flooding of city streets and street-level homes. Although this unnamed creek has a small drainage area, the floodwaters have high velocities due to the steep slopes, and flow paths are unpredictable due to the street pattern and topography.

McCloud Area

A significant flood occurred in the unincorporated area of McCloud between December 1996 and January 1997. Over 11 inches of precipitation fell on a deep snow pack, triggering flooding of Panther and Squaw Valley Creeks. Anecdotal evidence suggests that flooding was the worst to occur in the area in over 50 years. Panther Creek experienced flows heavily laden with sediment, but Squaw Valley Creek experienced relatively clear flows carrying considerable woody debris.

Etna Area

In the City of Etna, flooding has occurred along Etna Creek in 1955, 1964, and 1974. The largest flood occurred in December 1964, with a recurrence interval of 50 years. The January 1974 flood was estimated to have a recurrence interval of 30 years, based on flow records for the Scott River. The principal flood problem on Etna Creek is that the main channel capacity has been blocked by natural dams, shifting most of the flow out onto the floodplain. The dams are caused by debris lodging in the channel, followed by the buildup of cobbles and gravel. Etna Creek's main channel must be cleared of debris, gravel, rocks and vegetation after each major flood event. The overbank flow is mainly on the left-bank floodplain between the creek and the low bank where the majority of the city is located. The overflows vary due to the location of vegetation and obstructions. During past flood events, efforts have been made to divert the creek back into the main channel by building levees of river rock and gravel. These efforts have not been successful.

Fort Jones Area

In the Fort Jones area, five substantial floods have occurred between 1953 and 1974. The largest flood occurred in January 1974, with an estimated recurrence interval of 50 years. During large flood events, the channel capacity of Moffett Creek is exceeded in the vicinity of Marble View Avenue and the overflow spreads out onto the very flat floodplain and continues flowing as a broad, shallow sheet flow. Much of the residential area of Fort Jones is subject to this shallow flooding. Sheet flow tends to pond behind the Scott River Road embankment, where some overtops the road and returns to the channel.

Montague Area

Historical flood data is lacking for Montague, but local residents report that a combination of culverts in place prior to a bridge built over the Oregon Slough in 1965 were inadequate to pass floodwaters. Water was observed ponding upstream until it ran over the road, causing road and embankment erosion. The current bridge is adequate to convey a 100-year flood event. Trees and debris collected behind the Yreka Western Railroad Bridge during the flood of 1964 and the culverts through the embankments could not carry the flow, which resulted in erosion of the embankment. The 1974 flood reached the levee of the old sewage treatment pond, but bank erosion was not evident.

Weed Area

According to local residents and city officials, the largest flood in Weed occurred in January 1974. Flooding also occurred in December 1964. Due to the lack of magnitude and duration data, no frequencies can be determined for these flood events. Overflow from Boles Creek and North Fork Boles Creek caused shallow flooding during the 1974 event as culvert capacities were exceeded. Water from this event also ponded upstream from the US Highway 97 embankment. Local runoff and stormwater issues have caused shallow flooding in the vicinity of the Weed Convalescent Hospital, but no major flooding has occurred from Beaughton Creek.

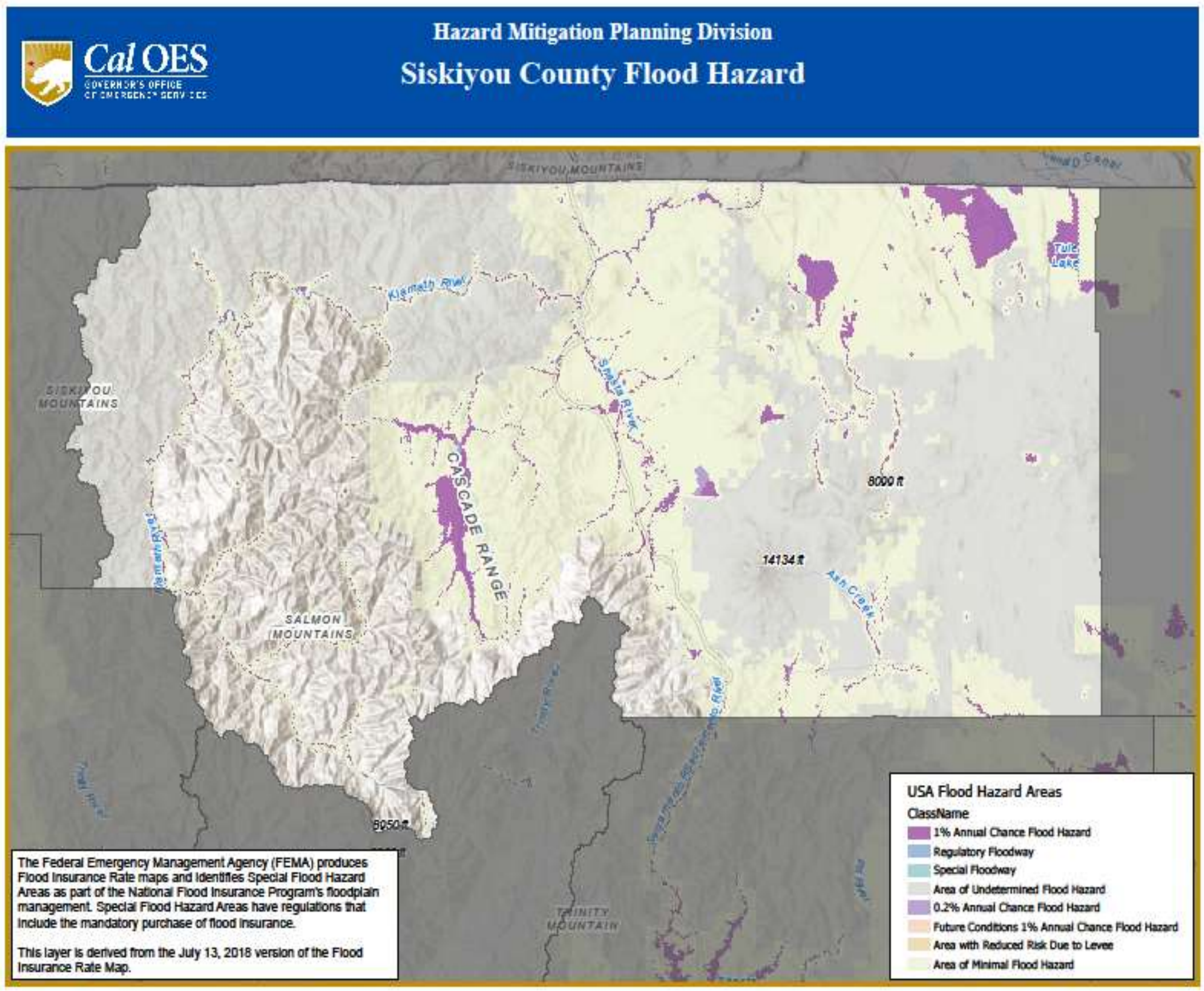
Yreka Area

Flood problems on Yreka Creek have historically consisted of damage to bridges and erosion of stream banks. The erosion has in turn caused problems with structures along the banks. Yreka Creek caused flooding of the buildings along Main Street in 1861 and in 1927 flooding damaged water mains, barns, garages, outbuildings and a newly constructed sewer line. Humbug Gulch has also contributed to flooding along the city streets and in 1964 the stream flooded several houses at Yama, North and Gold Streets.

12.2.2 Location

Major floods in portions of Siskiyou County have been extensively documented by gage records, high water marks, damage surveys and personal accounts. This documentation was the basis for FEMA's January 19, 2011 Siskiyou County FIRMs. The 2011 Flood Insurance Study is the sole source of data used in this risk assessment to map the extent and location of the flood hazard, as shown in Map 12-1.

Map 12-1



12.2.3 Frequency

Siskiyou County experiences episodes of river and small stream flooding nearly every winter. The major floods have resulted from intense winter weather and rainstorms between October and March. Large floods that can cause property damage typically occur every three to seven years. The more urbanized portions of the county annually experience nuisance flooding and groundwater ponding related to storm water drainage issues.

12.2.4 Severity

The principal factors affecting flood damage are flood depth and velocity. The deeper and faster flood flows become, the more damage they can cause. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high velocity flows and transporting debris and sediment. Flood severity is often evaluated by examining peak discharges; Table 7-26 lists peak flows used by FEMA to map the floodplains of Siskiyou County.

TABLE 7-26.
SUMMARY OF PEAK DISCHARGES WITHIN SISKIYOU COUNTY

	Discharge (cubic feet/second)			
Source/Location	10-Year	50-Year	100-Year	500-Year
Cottonwood Creek at Henley Horn Brook Rd	4,300	8,000	10,100	16,200
Greenhorn Creek at Yreka	900	1,800	2,200	3,700
Indian Creek from Doolittle Creek confluence	15,000	27,500	34,500	55,500
Klamath River at Elk Creek Confluence	73,000,	164,000	220,000	405,000
Klamath River at Town of Klamath	17,000	59,000	92,000	230,000
Moffett Creek at Ft. Jones	3,400	7,000	8,000	12,000
Sacramento River at Dunsmuir	13,000	22,000	27,000	40,000
Scott River Downstream from Moffett Creek	19,400	39,000	49,000	81,000
Shasta River at Edgewood Rd Bridge	4,800	9,400	11,700	20,000
Yreka Creek at Sewage Treatment Plant	3,000	6,000	8,000	14,000

In the predominantly high relief areas of Siskiyou County, the effects of flooding are often confined to areas immediately adjacent to the waterways. As waterways grow in size, from local drainages up to the primary rivers of the County, so grows the threat of flood and the extent of potential impacts. In some areas, the lack of broad, floodplain topography reduces flood hazards and the scope of flood impact, yet this "channeling" of the water into a narrow confinement does produce major impacts on culverts, bridges and other structures that divert or channel water flows.

A majority of flood related hazards in Siskiyou County are transportation related. Floodwaters do not normally cause road closure due to inundation by water settling in broad floodplains. Roads are typically closed due to varying degrees of erosion-related washout. At the minimum, road shoulders are compromised due to high levels of runoff and rill erosion from intense precipitation. Roads may be reduced to travel in only one direction at a time. At the most severe levels, entire roadways are undercut and eroded due to high river discharges for great distances where roads parallel flooding rivers. In these instances, bridge facilities can be threatened or lost because of debris impacting the bridge structures. In either case, road damage and road closures affect the transportation infrastructure of the County, interrupting the movement of people, supplies, and services while reducing productivity because of increased commute time. Particularly along the Klamath River corridor, communities can become isolated and inaccessible for periods of time. The County's public safety response is affected as well, slowing the arrival of sheriff deputies and other emergency response personnel.

Flood related erosion can cause damage to homes, businesses, and government structures, including damage to ancillary structures, utilities, and parking facilities. Structural foundation undercutting is the most prevalent form of damage to structures. Structures can also be damaged from trees falling as a result of water-logged soils.

Agriculture is the primary economy in Siskiyou County and is located considerably in flood-prone areas. Irrigation equipment is often damaged and fences can be washed away or mired in debris. Another impact is to perennial crops which can be spoiled with silt and flood debris. Agricultural areas such as the Scott Valley (see *Figure 7-18*) are subject to shallow flooding that can significantly impact agricultural production. Additionally, fish habitats and riparian zones can be severely impacted—affecting the strength of runs of salmon and steelhead species.

Figure 7-18. The Broad, Flat Scott Valley Is Subject to Shallow Flooding

Electrical power outages often occur as the result of flooding and the interruption of power causes many problems. The effects of lost electricity are elaborated upon in the severe weather chapter of this document. Lost power is usually a precursor to the closure of government offices, or the offices may be subject to reduced schedules. Public schools may also be closed or on a delayed start schedule as well.

12.2.5 Warning Time

Due to the sequential pattern of meteorological conditions needed to cause serious flooding, it is unusual for a flood to occur without warning. Warning times for floods can be between 24 and 48 hours. Flash flooding can be less predictable, but potential hazard areas can be warned in advanced of potential flash flooding danger.

12.3 SECONDARY HAZARDS

The most problematic secondary hazard for flooding is bank erosion, which in some cases can be more harmful than actual flooding. This is especially true in the upper courses of rivers with steep gradients, where floodwaters may pass quickly and without much damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in. Flooding is also responsible for hazards such as landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous materials spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers or storm sewers.

12.4 CLIMATE CHANGE IMPACTS

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example historical data are used for flood forecasting models and to forecast snowmelt runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted. Climate change is already impacting water resources, and resource managers have observed the following:

Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.

Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.

Extreme climatic events will become more frequent, necessitating improvement in flood protection, drought preparedness and emergency response.

Rising snowlines caused by climate change will allow more mountain area to contribute to peak storm runoff. High frequency flood event s (e.g. 10 -year floods) in particular will likely increase with a changing climate. Along with reductions in the amount of the snowpack and accelerated snowmelt, scientists project greater storm intensity, resulting in more direct runoff and flooding. Changes in watershed vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams, and affecting habitat and water quality. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts.

As hydrology changes, what is currently considered a 100-year flood may strike more often, leaving many communities at greater risk. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, floodways, bypass channels and levees, as well as the design of local sewers and storm drains.

12.5 EXPOSURE

The Level 2 HAZUS-MH protocol was used to assess the exposure to flooding in the planning area. The model used census data at the block level and FEMA floodplain data to estimate potential flooding impacts. Flood exposure numbers were generated using Siskiyou County Assessor and parcel data. County assessor data does not include tax exempt structures, such as federal and local government buildings. Where possible, the HAZUS-MH default data was enhanced using local GIS data from county, state and federal sources. All data sources have a level of accuracy acceptable for planning purposes.

12.5.1 Population

Population counts of those living in the floodplain were generated by analyzing county assessor and parcel data that intersect with the 100-year and 500-year floodplains identified on FIRMs. Using GIS, residential structures on properties that intersect the floodplain were identified, and an estimate of population was calculated by multiplying the residential structures by the average Siskiyou County household size of 2.4 persons per household. Using this approach, it was estimated that the exposed county population is 3,602 within the 100-year floodplain (8 percent of the total county population) and

5,292 within the 500-year floodplain (12 percent of the total). For the unincorporated areas, it is estimated that the exposed population is 2,725 within the 100-year floodplain (6 percent of the total unincorporated county population) and 3,256 within the 500-year floodplain (7 percent of the total)..

12.5.2 Property

TABLE 7-27 and **TABLE 7-28** summarize the area and number of structures in the floodplain by municipality. The HAZUS-MH model determined that there are 1,908 structures within the 100-year floodplain and 2,921 structures within the 500-year floodplain (not including federal and local government structures). In the 100-year floodplain, about 80 percent of these structures are in unincorporated areas. Eighty percent are residential, and 20 percent are non-residential.

TABLE 7-29 and **TABLE 7-30** summarize the estimated value of exposed buildings in the 100- and 500-year floodplains within the planning area. This methodology estimated $282 million worth of building-and-contents exposure to the 100-year flood, representing 6.4 percent of the total assessed value of the planning area, and $423 million worth of building-and-contents exposure to the 500-year flood, representing 9.6 percent of the total. Estimates do not include federal and local government structures.

Some land uses are more vulnerable to flooding, such as single-family homes, while others are less vulnerable, such as agricultural land or parks. Many parcels in the 100-year floodplain are zoned for agricultural uses. These are favorable, lower-risk uses for the floodplain. Current, land use information is not available in a format that can support this risk assessment. Data such as buildable lands and/or vacant parcels within the floodplain would be valuable date to support future updates to this risk assessment.

12.5.3 Critical Facilities and Infrastructure

TABLE 7-31 through **TABLE 7-34** summarize critical facilities and infrastructure in the 100-year and 500-year floodplains. The following sections provide details on exposed critical infrastructure.

Roads

The following major roads in Siskiyou County pass through the 100-year floodplain and thus are exposed to flooding:

- Interstate 5
- Highway 139
- Highway 161
- Highway 263
- Highway 89
- Highway 96
- Highway 97
- Highway 3

Some of these roads are built above the flood level, and others function as levees to prevent flooding. Still, in severe flood events these roads can be blocked or damaged, preventing access to some areas (see *Figure 7-19*).

TABLE 7-27.
AREA AND STRUCTURES WITHIN THE 100-YEAR FLOODPLAIN

	Area in Floodplain (acres)	Number of Structures in Floodplain		
		Residential	Non Residential	**Total**
Dorris	0	0	0	**0**

Dunsmuir	90	63	4	**67**
Etna	132	36	6	**42**
Fort Jones	191	168	20	**188**
Montague	36	0	0	**0**
Mt. Shasta	0	0	0	**0**
Tulelake	0	0	0	**0**
Weed	44	7	3	**10**
Yreka	504	78	31	**109**
Unincorporated	134,091	1,136	356	**1,492**
Total	**135,089**	**1,488**	**420**	**1,908**

TABLE 7-28.
AREA AND STRUCTURES WITHIN THE 500-YEAR FLOODPLAIN

	Area in Floodplain (acres)	Number of Structures in Floodplain		
		Residential	Non Residential	**Total**
Dorris	0	0	0	**0**
Dunsmuir	123	156	9	**165**
Etna	163	45	8	**186**
Fort Jones	216	196	32	**228**
Montague	85	37	3	**40**
Mt. Shasta	0	0	0	**0**
Tulelake	0	0	0	**0**
Weed	206	18	15	**33**
Yreka	710	399	150	**549**
Unincorporated	136,854	1,353	367	**1,720**
Total	**138,357**	**2,204**	**584**	**2,921**

TABLE 7-29.
VALUE OF EXPOSED BUILDINGS WITHIN 100-YEAR FLOODPLAIN

	Estimated Flood Exposure ($)			% of Total Assessed Value
	Structure	Contents	**Total**	
Dorris	0	0	0	0.00%
Dunsmuir	4,298,969	3,050,039	7,349,008	5.40%
Etna	3,299,153	2,436,106	5,735,259	9.40%
Fort Jones	13,064,504	9,848,571	22,913,075	46.20%
Montague	0	0	0	0.00%

Mt. Shasta	0	0	0	0.00%
Tulelake	0	0	0	0.00%
Weed	833,206	683,316	1,516,522	0.60%
Yreka	14,928,754	12,966,402	27,895,156	3.90%
Unincorporated	121,342,268	95,069,836	216,412,104	8.30%
Total	**157,766,854**	**124,054,268**	**281,821,122**	**6.40%**

TABLE 7-30.
VALUE OF EXPOSED BUILDINGS WITHIN 500-YEAR FLOODPLAIN

	Estimated Flood Exposure ($)			% of Total Assessed Value
	Structure	Contents	Total	
Dorris	0	0	0	0.00%
Dunsmuir	11,493,500	8,181,237	19,674,737	14.40%
Etna	4,712,438	3,564,856	8,277,294	13.50%
Fort Jones	16,589,425	12,681,693	29,271,118	59.00%
Montague	2,411,448	1,731,608	4,143,056	5.80%
Mt. Shasta	0	0	0	0.00%
Tulelake	0	0	0	0.00%
Weed	4,673,045	4,353,719	9,026,764	3.90%
Yreka	59,441,062	49,438,150	108,879,212	15.10%
Unincorporated	137,264,641	106,765,395	244,030,036	9.30%
Total	**236,585,559**	**186,716,657**	**423,302,216**	**9.60%**

TABLE 7-31.
CRITICAL FACILITIES IN THE 100-YEAR FLOODPLAIN

Jurisdiction	Medical and Health Services	Government Function	Protective	Hazardous Materials	Schools	Other	**Total**
Dorris	0	0	0	0	0	0	**0**
Dunsmuir	0	0	0	0	0	1	**1**
Etna	0	0	0	0	0	0	**0**
Fort Jones	0	7	0	0	2	1	**13**
Montague	0	0	0	0	0	0	**0**
Mt. Shasta	0	0	0	0	0	0	**0**
Tulelake	0	0	0	0	0	0	**0**
Weed	0	0	0	0	0	0	**0**
Yreka	0	2	0	0	2	1	**5**

**TABLE 7-31.
CRITICAL FACILITIES IN THE 100-YEAR FLOODPLAIN**

Jurisdiction	Medical and Health Services	Government Function	Protective	Hazardous Materials	Schools	Other	**Total**
Unincorporated	4	16	3	0	7	10	**40**
Total	**4**	**25**	**3**	**0**	**11**	**13**	**59**

**TABLE 7-32.
CRITICAL FACILITIES IN THE 500-YEAR FLOODPLAIN**

Jurisdiction	Medical and Health Services	Government Function	Protective	Hazardous Materials	Schools	Other	**Total**
Dorris	0	0	0	0	0	0	**0**
Dunsmuir	0	0	0	0	0	1	**1**
Etna	0	0	0	0	0	0	**0**
Fort Jones	0	7	1	0	2	0	**13**
Montague	0	0	0	0	0	0	**0**
Mt. Shasta	0	0	0	0	0	0	**0**
Tulelake	0	0	0	0	0	0	**0**
Weed	1	0	0	0	0	0	**1**
Yreka	7	2	3	0	4	1	**17**
Unincorporated	6	21	5	0	8	10	**50**
Total	**14**	**30**	**9**	**0**	**14**	**12**	**82**

**TABLE 7-33.
CRITICAL INFRASTRUCTURE IN THE 100-YEAR FLOODPLAIN**

Jurisdiction	Bridges	Water Supply	Wastewater	Power	Communications	Other	Total
Dorris	0	0	0	0	0	0	0
Dunsmuir	3	0	0	0	0	0	**3**
Etna	0	0	0	0	0	0	**0**
Fort Jones	2	5	0	0	0	1	**8**
Montague	0	0	0	0	0	0	**0**
Mt. Shasta	0	0	0	0	0	0	**0**
Tulelake	0	0	0	0	0	0	**0**
Weed	2	0	0	0	0	0	**2**
Yreka	9	0	0	0	0	0	**9**

**TABLE 7-33.
CRITICAL INFRASTRUCTURE IN THE 100-YEAR FLOODPLAIN**

Jurisdiction	Bridges	Water Supply	Wastewater	Power	Communications	Other	Total
Unincorporated	105	0	1	0	0	0	**106**
Total	**121**	**5**	**1**	**0**	**0**	**1**	**128**

**TABLE 7-34.
CRITICAL INFRASTRUCTURE IN THE 500-YEAR FLOODPLAIN**

Jurisdiction	Bridges	Water Supply	Wastewater	Power	Communications	Other	**Total**
Dorris	0	0	0	0	0	0	**0**
Dunsmuir	3	0	0	0	0	0	**3**
Etna	0	0	0	0	0	0	**0**
Fort Jones	2	5	0	0	0	0	**7**
Montague	0	0	0	0	0	0	**0**
Mt. Shasta	0	0	0	0	0	0	**0**
Tulelake	0	0	0	0	0	0	**0**
Weed	2	0	0	0	0	0	**2**
Yreka	9	0	0	0	0	0	**9**
Unincorporated	105	0	1	0	0	0	**106**
Total	**121**	**5**	**1**	**0**	**0**	**0**	**127**

Figure 7-19. Horse Creek Road, January 4, 2006

Bridges

Flooding events can significantly impact road bridges. These are important because often they provide the only ingress and egress to some neighborhoods. An analysis showed that there are 121 bridges that are in or cross over the 100-year floodplain and 106 bridges in the 500-year floodplain.

Water and Sewer Infrastructure

Water and sewer systems can be affected by flooding. Floodwaters can back up drainage systems, causing localized flooding. Culverts can be blocked by debris from flood events, also causing localized urban flooding. Floodwaters can get into drinking water supplies, causing contamination. Sewer systems can be backed up, causing wastewater to spill into homes, neighborhoods, rivers and streams.

Levees

Siskiyou County has several miles of earthen levees and revetments, some of which are managed by the Siskiyou County Flood Control District; the exact length of the levees is undetermined. There are also levees on many smaller rivers, streams and creeks that protect small areas of land. Many of the levees are older and were built under earlier flood management goals. Many of these older levees are exposed to scouring and failure due to old age and construction methods.

12.5.4 Environment

Flooding is a natural event, and floodplains provide many natural and beneficial functions. Nonetheless, with human development factored in, flooding can impact the environment in negative ways. Migrating fish can wash into roads or over dikes into flooded fields, with no possibility of escape. Pollution from roads, such as oil, and hazardous materials can wash into rivers and streams. During floods, these can settle onto normally dry soils, polluting them for agricultural uses. Human development such as bridge abutments and levees, and logjams from timber harvesting can increase stream bank erosion, causing rivers and streams to migrate into non-natural courses.

12.6 VULNERABILITY

Many of the areas exposed to flooding may not experience serious flooding or flood damage. This section describes vulnerabilities in terms of population, property, infrastructure and environment.

12.6.1 Population

A geographic analysis of demographics, using the HAZUS-MH model and data from the U.S. Census Bureau and Dun & Bradstreet, identified populations vulnerable to the flood hazard as follows:

- **Economically Disadvantaged Populations**—It is estimated that 15 percent of the people within the 100-year floodplain are economically disadvantaged, defined as having household incomes of $10,000 or less.
- **Population over 65 Years Old**—It is estimated that 8 percent of the population in the census blocks that intersect the 100-year floodplain are over 65 years old. Approximately 10 percent of the over-65 population in the floodplain also have incomes considered to be economically disadvantaged and are considered to be extremely vulnerable.
- **Population under 16 Years Old**—It is estimated that 5 percent of the population within census blocks located in or near the 100-year floodplain are under 16 years of age.

HAZUS estimated that a 100-year flood could displace up to 3,577 people, with 1,868 of those people needing short-term shelter.

12.6.2 Property

HAZUS-MH calculates losses to structures from flooding by looking at depth of flooding and type of structure. Using historical flood insurance claim data, HAZUS-MH estimates the percentage of damage to structures and their contents by applying established damage functions to an inventory. For this analysis, local data on facilities was used instead of the default inventory data provided with HAZUS-MH.

The analysis is summarized in **TABLE 7-35** for the 100-year flood event. It is estimated that there would be $83 million of flood loss from a 100-year flood event in the planning area. This represents 28 percent of the total exposure to the 100-year flood and 1.9 percent of the total assessed value for the county.

National Flood Insurance Program

TABLE 7-36 lists flood insurance statistics that help identify vulnerability in Siskiyou County. Seven jurisdictions in the planning area participate in the NFIP, with 525 flood insurance policies providing over $99 million in insurance coverage. According to FEMA statistics, 69 flood insurance claims were made between January 1, 1978 and July 31, 2011, for a total of $523,791, an average of $7,591 per claim.

Properties constructed after a FIRM has been adopted are eligible for reduced flood insurance rates. Such structures are less vulnerable to flooding since they were constructed after regulations and codes were adopted to decrease vulnerability. Properties built before a FIRM is adopted are more vulnerable to flooding because they do not meet code or are located in hazardous areas. The first FIRMs in Siskiyou County were available in 1979 in the City of Dunsmuir.

TABLE 7-35.
ESTIMATED FLOOD LOSS FOR THE 100-YEAR FLOOD EVENT

	Estimated Flood Loss			% of Total Assessed Value
	Structural	Contents	Total	
Dorris	0	0	0	0
Dunsmuir	513,000	297,000	810,000	0.59%
Etna	701,000	847,000	1,548,000	2.53%
Fort Jones	1,098,000	1,348,000	2,446,000	4.93%
Montague	0	0	0	0.00%
Mt. Shasta	0	0	0	0.00%
Tulelake	0	0	0	0.00%
Weed	918,000	1,130,000	2,048,000	0.88%
Yreka	2,412,000	4,829,000	7,241,000	1.00%
Unincorporated	34,481,000	34,133,000	68,614,000	2.62%
Total	**40,204,000**	**42,735,000**	**82,939,000**	**1.89%**

TABLE 7-36.
FLOOD INSURANCE STATISTICS FOR SISKIYOU COUNTY

	Date of Entry Initial FIRM Effective Date	# of Flood Insurance Policies as of 7/02/2019	Insurance in Force	Total Annual Premium	Claims, 1/1/1978 – 7/02/2019	
					Number	Value
Dunsmuir	12/4/1979	33	$5,860,100	$31,849	21	$148,051
Etna	3/4/1980	17	$3,230,200	$9,380	1	$0
Fort Jones	4/15/1980	71	$11,446,600	$45,121	6	$4,213
Montague	9/17/1980	0	0	0	0	$0
Weed	1/20/1982	4	$686,500	$3,590	0	$0
Yreka	11/18/1981	64	$13,376,200	$72,841	3	$0
Unincorporated	5/17/1982	336	$65,070,700	$258,150	38	$371,527
Total		**525**	**$99,670,300**	**$420,931**	**69**	**$523,791**

The following information from flood insurance statistics is relevant to reducing flood risk:

The use of flood insurance in Siskiyou County is below the national average. Only 27.5 percent of insurable buildings in the county are covered by flood insurance. According to an NFIP study, about 49 percent of single-family homes in special flood hazard areas are covered by flood insurance nationwide.

The average claim paid in the planning area represents about 5 percent of the 2010 average assessed value of structures in the floodplain.

The percentage of policies and claims outside a mapped floodplain suggests that not all of the flood risk in the planning area is reflected in current mapping. Based on information from the

NFIP, 79.8 percent of policies in the planning area are on structures within an identified SFHA, and 20.2 percent are for structures outside such areas.

Repetitive Loss

A repetitive loss property is defined by FEMA as an NFIP-insured property that has experienced any of the following since 1978, regardless of any changes in ownership:

Four or more paid losses in excess of $1,000

Two paid losses in excess of $1,000 within any rolling 10-year period

Three or more paid losses that equal or exceed the current value of the insured property.

Repetitive loss properties make up only 1 to 2 percent of flood insurance policies in force nationally, yet they account for 40 percent of the nation’s flood insurance claim payments. In 1998, FEMA reported that the NFIP’s 75,000 repetitive loss structures have already cost $2.8 billion in flood insurance payments and that numerous other flood-prone structures remain in the floodplain at high risk. The government has instituted programs encouraging communities to identify and mitigate the causes of repetitive losses. A recent report on repetitive losses by the National Wildlife Federation found that 20 percent of these properties are outside any mapped 100-year floodplain. The key identifiers for repetitive loss properties are the existence of flood insurance policies and claims paid by the policies.

FEMA-sponsored programs, such as the CRS, require participating communities to identify repetitive loss areas. A repetitive loss area is the portion of a floodplain holding structures that FEMA has identified as meeting the definition of repetitive loss. Identifying repetitive loss areas helps to identify structures that are at risk but are not on FEMA’s list of repetitive loss structures because no flood insurance policy was in force at the time of loss. Map 12-2 shows the repetitive loss areas in Siskiyou County. FEMA’s list of repetitive loss properties identifies Siskiyou County planning area as of July 2, 2019. The breakdown by jurisdiction is presented in **Error! Reference source not found.**.

Jurisdiction	Participating	#NFIP-Insured RL Properties
Dorris	N	n/a
Dunsmuir	Y	0
Etna	Y	0
Fort Jones	Y	0
Montague	Y	0
Mt. Shasta	N	n/a
Tulelake	N	n/a
Weed	Y	0
Yreka	Y	0
Unincorporated	Y	0

None of the properties on the repetitive loss list are outside the County’s special flood hazard area. They likely were flooded by flood events typical for the floodplain reflected in the current mapping. The dates of loss coincide with major flood events that have impacted the planning area. Therefore it can be concluded that the overall cause of repetitive flooding is the same as has been identified for the river basins in which each repetitive loss area is found. It can also be concluded that the entire mapped floodplain can be and is subject to repetitive flooding. Therefore the Planning Team has defined the repetitive loss area to be contiguous with the currently mapped and regulated 100-year floodplain.

12.6.3 Critical Facilities and Infrastructure

HAZUS-MH was used to estimate the flood loss potential to critical facilities. Using depth/damage function curves to estimate the percent of damage to the building and contents of critical facilities, HAZUS-MH correlates these estimates into an estimate of functional down-time (the estimated time it will take to restore a facility to 100 percent of its functionality). This helps to gauge how long the planning area could have limited usage of facilities deemed critical to flood response and recovery. On average, critical facilities would receive 12.4 percent damage to the structure and 31.8 percent damage to the contents during a 100-year flood event. The estimated time to restore these facilities to 100 percent of their functionality is 515 days.

12.6.4 Environment

The environment vulnerable to flood hazard is the same as the environment exposed to the hazard. Loss estimation platforms such as HAZUS-MH are not currently equipped to measure environmental impacts of flood hazards. The best gauge of vulnerability of the environment would be a review of damage from past flood events. Loss data that segregates damage to the environment was not available at the time of this plan. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates.

12.7 FUTURE TRENDS

The county has experienced slow growth over the past decade, from a population of 44,301 in 2000 to 43606 in 2016. Economic problems in the past three years have impacted growth in the County, with some areas experiencing negative growth. Siskiyou County and its planning partners are optimistic that marginal, sustained growth will return to the county as the state and national economies strengthen.

The County and its planning partners are equipped to handle future growth within flood hazard areas. All municipal planning partners have general plans that address frequently flooded areas in their safety elements. All partners have committed to linking their general plans to this hazard mitigation plan. This will create an opportunity for wise land use decisions as future growth impacts flood hazard areas.

All municipal planning partners participating in the NFIP recognize the incentive to adopt consistent, appropriate, higher regulatory standards in communities with the highest degree of flood risk. All municipal planning partners have committed to maintaining their good standing under the NFIP through initiatives identified in this plan. Communities participating or considering participation in the CRS program will be able to refine this commitment using CRS programs and templates as a guide.

12.8 SCENARIO

The primary water courses in Siskiyou County have the potential to flood at irregular intervals, generally in response to a succession of intense winter rainstorms. Storm patterns of warm, moist air usually occur between October and March. A series of such weather events can cause severe flooding in the planning area. The worst-case scenario is a series of storms that flood numerous drainage basins in a short time. This could overwhelm the response and floodplain management capability within the planning area. Major roads could be blocked, preventing critical access for many residents and critical functions. High in-channel flows could cause water courses to scour, possibly washing out roads and creating more isolation problems. In the case of multi-basin flooding, the County would not be able to make repairs quickly enough to restore critical facilities and infrastructure.

12.9 ISSUES

The planning team has identified the following flood-related issues relevant to the planning area:

The accuracy of the existing flood hazard mapping produced by FEMA in reflecting the true flood risk within the planning area is questionable. This is most prevalent in areas protected by levees not accredited by the FEMA mapping process.

The extent of the protection provided by flood control facilities (dams, dikes and levees) is not known due to the lack of an established national policy on flood protection standards.

Land use information in a format that is compatible for HAZUS applications would significantly enhance the risk assessment for the flood hazard.

Older levees are subject to failure or do not meet current building practices for flood protection.

The risk associated with the flood hazard overlaps the risk associated with other hazards such as earthquake, landslide and fishing losses. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.

There is no degree of consistency of land-use practices and regulatory floodplain management scope within the planning area.

Changes in the climate could impact flood conditions in Siskiyou County.

More information is needed on flood risk to support the concept of risk-based analysis of capital projects.

There needs to be a sustained effort to gather historical damage data, such as high water marks on structures and damage reports, to measure the cost-effectiveness of future mitigation projects.

Ongoing flood hazard mitigation will require funding from multiple sources.

There needs to be a coordinated hazard mitigation effort between jurisdictions affected by flood hazards in the county.

Floodplain residents need to continue to be educated about flood preparedness and the resources available during and after floods.

The concept of residual risk should be considered in the design of future capital flood control projects and should be communicated with residents living in the floodplain.

The promotion of flood insurance as a means of protecting private property owners from the economic impacts of frequent flood events should continue.

Existing floodplain-compatible uses such as agricultural and open space need to be maintained. There is constant pressure to convert these existing uses to more intense uses within the planning area during times of moderate to high growth.

The economy affects a jurisdiction’s ability to manage its floodplains. Budget cuts and personnel losses can strain resources needed to support floodplain management.

CHAPTER 13.
LANDSLIDES AND OTHER EARTH MOVEMENTS

13.1. GENERAL BACKGROUND

A landslide is a mass of rock, earth or debris moving down a slope. Landslides may be minor or very large, and can move at slow to very high speeds. They can be initiated by storms, earthquakes, fires, volcanic eruptions or human modification of the land.

Mudslides (or mudflows or debris flows) are rivers of rock, earth, organic matter and other soil materials saturated with water. They develop in the soil overlying bedrock on sloping surfaces when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt. Water pressure in the pore spaces of the material increases to the point that the internal strength of the soil is drastically weakened. The soil's reduced resistance can then easily be overcome by gravity, changing the earth into a flowing river of mud or "slurry." A debris flow or mudflow can move rapidly down slopes or through channels, and can strike with little or no warning at avalanche speeds. The slurry can travel miles from its source, growing as it descends, picking up trees, boulders, cars and anything else in its path. Although these slides behave as fluids, they pack many times the hydraulic force of water due to the mass of material included in them. Locally, they can be some of the most destructive events in nature.

DEFINITIONS

Landslide—The sliding movement of masses of loosened rock and soil down a hillside or slope. Such failures occur when the strength of the soils forming the slope is exceeded by the pressure, such as weight or saturation, acting upon them.

Mass Movement—A collective term for landslides, debris flows, falls and sinkholes.

Mudslide (or Mudflow or Debris Flow)— A river of rock, earth, organic matter and other materials saturated with water.

All mass movements are caused by a combination of geological and climate conditions, as well as the encroaching influence of urbanization. Vulnerable natural conditions are affected by human residential, agricultural, commercial and industrial development and the infrastructure that supports it.

13.2. HAZARD PROFILE

Landslides are caused by one or a combination of the following factors: change in slope of the terrain, increased load on the land, shocks and vibrations, change in water content, groundwater movement, frost action, weathering of rocks, and removing or changing the type of vegetation covering slopes. In general, landslide hazard areas are where the land has characteristics that contribute to the risk of the downhill movement of material, such as the following:

- A slope greater than 33 percent
- A history of landslide activity or movement during the last 10,000 years
- Stream or wave activity, which has caused erosion, undercut a bank or cut into a bank to cause the surrounding land to be unstable
- The presence or potential for snow avalanches
- The presence of an alluvial fan, indicating vulnerability to the flow of debris or sediments
- The presence of impermeable soils, such as silt or clay, which are mixed with granular soils such as sand and gravel.

Flows and slides are commonly categorized by the form of initial ground failure. Figure 13-1 through Figure 13-4 show common types of slides. The most common is the shallow colluvial slide, occurring particularly in response to intense, short-duration storms. The largest and most destructive are deep-seated slides, although they are less common than other types.

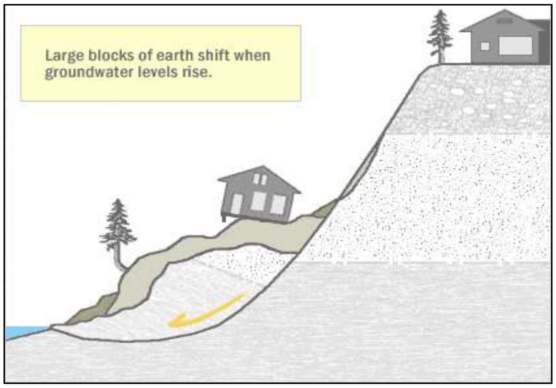


Figure 13-1. Deep Seated Slide

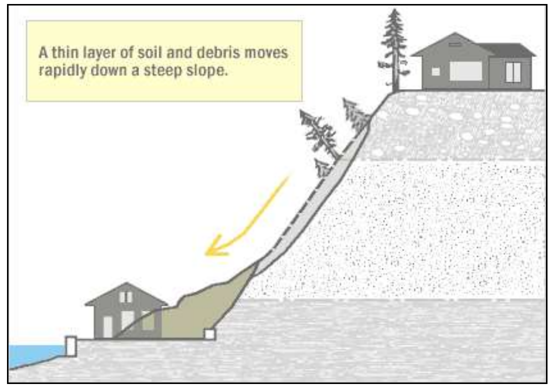


Figure 13-2. Shallow Colluvial Slide

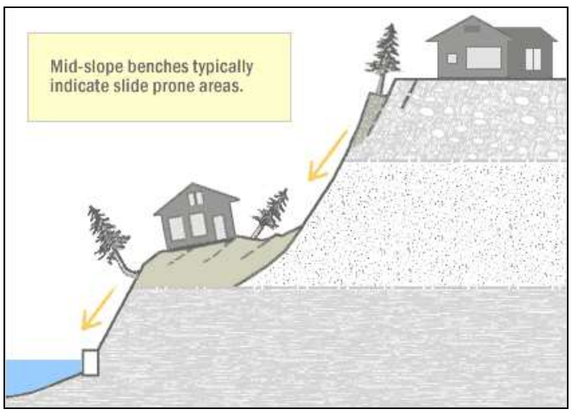


Figure 13-3. Bench Slide

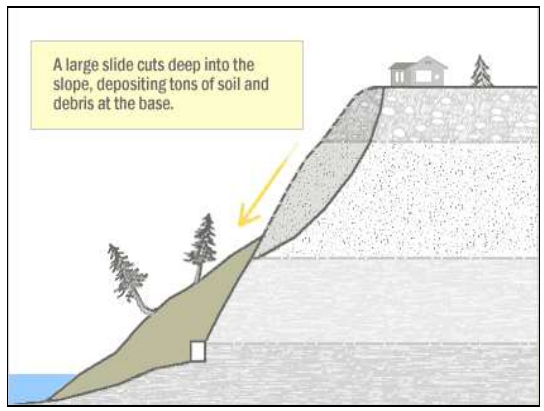
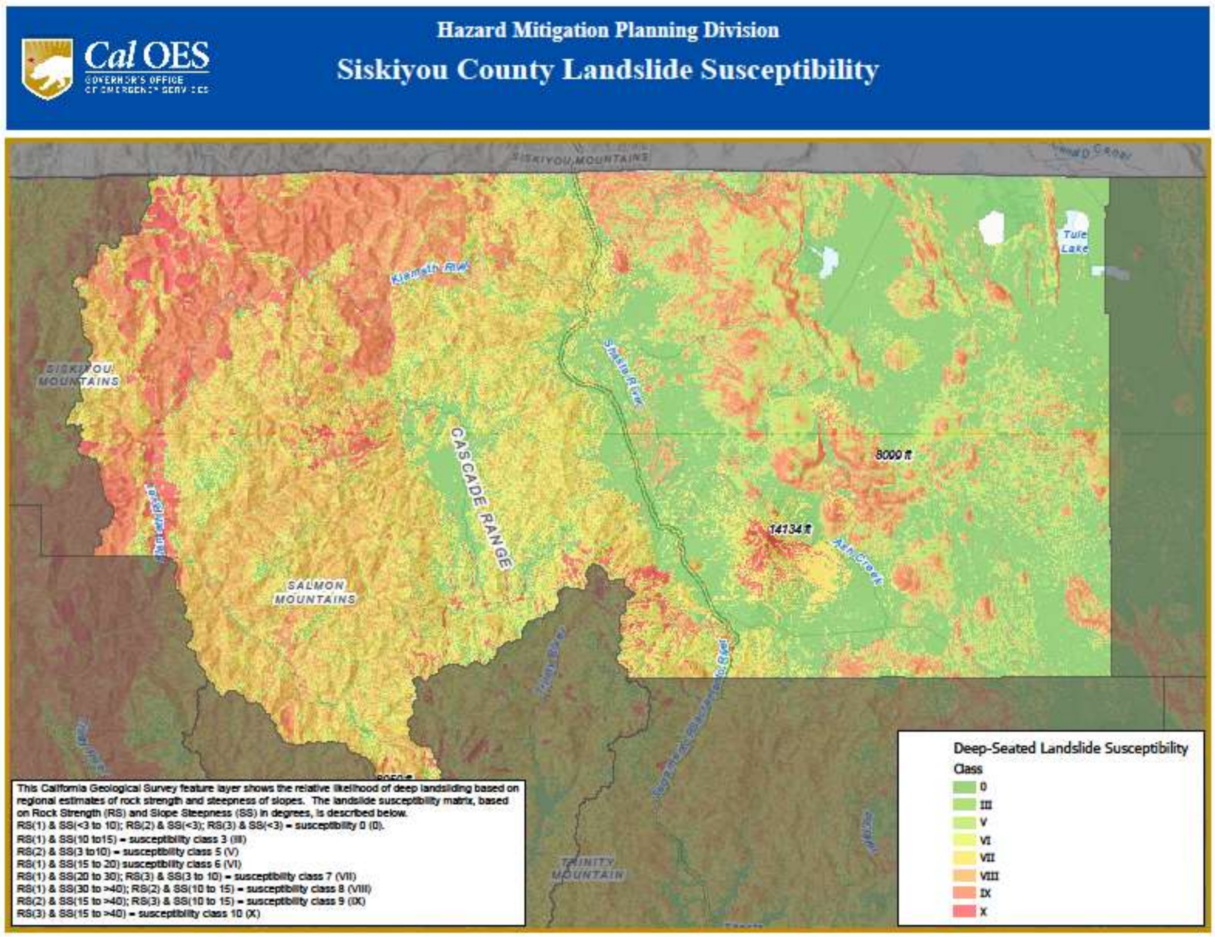


Figure 13-4. Large Slide

Slides and earth flows can pose serious hazard to property in hillside terrain. They tend to move slowly and thus rarely threaten life directly. When they move—in response to such changes as increased water content, earthquake shaking, addition of load, or removal of downslope support—they deform and tilt the ground surface. The result can be destruction of foundations, offset of roads, breaking of underground pipes, or overriding of downslope property and structures. Figure 13-5 shows Siskiyou County landslide susceptibility throughout the county.



Map 13-5

13.2.1 Past Events

The Spatial Hazard Events and Losses Database for the United States (SHELDUS) lists two landslide events in Siskiyou County since 1960: landslide incidents in 1969 resulted in $2.4 million in property damage and one fatality; a mudslide in December 1992 caused about $2,700 in damage. In February 1993, a presidential disaster was declared for mud and landslides affecting the County. Several areas, including Siskiyou County, were impacted by El Nino winter storms resulting in landslides and mudflows from February to April 1995. Mudslides and landslides again impacted the County from December 2005 to January 2006, resulting in disaster declaration DR-1628.

Siskiyou County was most recently included in disaster declaration DR-1884, for a severe winter storm was followed by flooding, debris and mudflows between January 17 and February 6, 2010. The Karuk Tribe, in particular, was impacted by the storm and applied for a Public Assistance (PA) grant to repair Itroop Road in Happy Camp. A 150-foot section of roadway failed after floodwaters and mud flows caused part of the road surface to slide and split open. The road is used by local residents and tribal members going to and from their homes and is the only access for emergency vehicles into the Happy Camp neighborhood. In addition to plans to repair the road, additional drainage is planned to mitigate future flooding and landslides.

In January of 2017 we had back to back disasters resulting in two declared disasters DR-4301 and DR-4308. Had numerous landslides and road closures in the Happy Camp area along with washing out part of the Salmon River Road.

13.2.2 Location

The best available predictor of where slides and earth flows might occur is the location of past movements. Past landslides can be recognized by their distinctive topographic shapes, which can remain in place for thousands of years (see Figure 13-5). Landslides recognizable in this fashion range from a few acres to several square miles. Most show no evidence of recent movement and are not currently active. A small proportion of them may become active in any given year, with movements concentrated within all or part of the landslide masses or around their edges. Dormant mass movement sites can be reactivated by earthquakes or by exceptionally wet weather. Also, because they consist of broken materials and frequently involve disruption of groundwater flow, these dormant sites are vulnerable to construction-triggered sliding.

Figure 13-5. California State Route 3—Fort Jones Road Rock Slide Area

Mudslides due to warm weather have historically impacted communities near Mt. Shasta. Map 13-1 shows identified landslide hazard areas within the county based on historical landslide occurrences, as well as areas that could be expected to slide based on slope and soil makeup. Areas shown as “probable” slide areas were delineated based on slope and soil type. The parameters for these areas are slopes equal to or exceeding 15 percent and Type C, D or E soil types as identified under the National Earthquake Hazards Reduction Program (NEHRP). The County’s mapping of landslide hazards focused on developed portions of the county where there are population centers. Map 13-2 shows the geomorphological characteristics of historical landslides in the sparsely populated Klamath National Forest within the planning area.

13.2.3 Frequency

Landslides are often triggered by other natural hazards such as earthquakes, heavy rain, floods or wildfires, so landslide frequency is often related to the frequency of these other hazards. In Siskiyou County, landslides typically occur during and after major storms, so the potential for landslides largely coincides with the potential for sequential severe storms that saturate steep, vulnerable soils. Landslide events occurred during winter storms of 1993, 1995, 2006, 2010, 2014 and 2017. According to SHELDUS records, the planning area has been impacted by severe storms at least once every few years since 1960. Until better data is generated specifically for landslide hazards, this severe storm frequency is appropriate for the purpose of ranking risk associated with the landslide hazard.

In general, landslides are most likely during periods of higher than average rainfall. The ground must be saturated prior to the onset of a major storm for significant landsliding to occur. Most local landslides occur in January or late winter after the water table has risen during the wet months of November and December.

Landslides follow a pattern of occurrence that typically repeats during heavy winter storms, generally coinciding with El Nino climate events in the Pacific Ocean. Every few years, warm equatorial waters are driven northward, bringing moisture-laden air that results in more frequent and severe winter storms in California. The added weight of rain-saturated slopes and the weakening of slopes caused by the pressure that groundwater exerts on porous hillside materials can trigger slope failure. Improved forecasting of El Nino events now provides advanced warning to better prepare for and respond to potential slope failures.

13.2.4 Severity

Landslides destroy property and infrastructure and can take the lives of people. Slope failures in the United States result in an average of 25 lives lost per year and an annual cost to society of about $1.5 billion. According to FEMA, the December 2005 to January 2006 storms caused in excess of $35 million in property damage across multiple counties due to landslides, mudslides and debris flows. This was about half of all damage caused by the storm. The landslides caused by the storm also caused tens of millions of dollars of damage to road infrastructure.

13.2.5 Warning Time

Mass movements can occur suddenly or slowly. The velocity of movement may range from a slow creep of inches per year to many feet per second, depending on slope angle, material and water content. Some methods used to monitor mass movements can provide an idea of the type of movement and the amount of time prior to failure. It is also possible to determine what areas are at risk during general time periods. Assessing the geology, vegetation and amount of predicted precipitation for an area can help in these predictions. However, there is no practical warning system for individual landslides. The current standard operating procedure is to monitor situations on a case-by-case basis, and respond after the event has occurred. Generally accepted warning signs for landslide activity include:

- Springs, seeps, or saturated ground in areas that have not typically been wet before
- New cracks or unusual bulges in the ground, street pavements or sidewalks
- Soil moving away from foundations
- Ancillary structures such as decks and patios tilting and/or moving relative to the main house
- Tilting or cracking of concrete floors and foundations
- Broken water lines and other underground utilities

- Leaning telephone poles, trees, retaining walls or fences
- Offset fence lines
- Sunken or down-dropped road beds
- Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content)
- Sudden decrease in creek water levels though rain is still falling or just recently stopped
- Sticking doors and windows, and visible open spaces indicating jambs and frames out of plumb
- A faint rumbling sound that increases in volume as the landslide nears
- Unusual sounds, such as trees cracking or boulders knocking together.

13.3. SECONDARY HAZARDS

Landslides can cause several types of secondary effects, such as blocking access to roads, which can isolate residents and businesses and delay commercial, public and private transportation. This could result in economic losses for businesses. Other potential problems resulting from landslides are power and communication failures. Vegetation or poles on slopes can be knocked over, resulting in possible losses to power and communication lines. Landslides also have the potential of destabilizing the foundation of structures, which may result in monetary loss for residents. They also can damage rivers or streams, potentially harming water quality, fisheries and spawning habitat.

13.4. CLIMATE CHANGE IMPACTS

Climate change may impact storm patterns, increasing the probability of more frequent, intense storms with varying duration. Increase in global temperature could affect the snowpack and its ability to hold and store water. Warming temperatures also could increase the occurrence and duration of droughts, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. All of these factors would increase the probability for landslide occurrences.

13.5. EXPOSURE

13.5.1 Population

Population exposed to the landslide hazard was estimated using the structure count of residential buildings within the landslide risk area and applying the census value of 2.4 persons per household for Siskiyou County. Using this approach, the estimated population living in the landslide risk area is 250 and the population living in the probable landslide risk area is 5. The population exposed to landslides identified in the Klamath National Forest geomorphic landslide hazard data set is 8 people.

13.5.2 Property

Table 13-1 shows the number and assessed value of structures exposed to all landslide risk in the planning area. There are 118 structures exposed to the landslide hazard, with an estimated value of $17.2 million. The majority of the exposed structures are residential.

TABLE 13-1.
SISKIYOU COUNTY STRUCTURES IN ALL LANDSLIDE RISK AREAS

	Buildings Exposed	Assessed Value Structure	Contents	Total	% of AV
Dorris	0	0	0	0	0
Dunsmuir	12	$534,457	$374,120	$908,577	0.62%
Etna	0	0	0	0	0
Fort Jones	0	0	0	0	0
Montague	0	0	0	0	0
Mt. Shasta	0	0	0	0	0
Tulelake	0	0	0	0	0
Weed	0	0	0	0	0
Yreka	0	0	0	0	0
Unincorporated	106	$9,077,101	$7,203,839	$16,280,940	0.67%
Total	**118**	**$9,611,558**	**$7,577,959**	**$17,189,517**	**0.39%**

13.5.3 Critical Facilities and Infrastructure

Table 13-2 summarizes the critical facilities exposed to the landslide hazard. No loss estimation of these facilities was performed due to the lack of established damage functions for the landslide hazard. A significant amount of infrastructure can be exposed to mass movements:

- **Roads**—Access to major roads is crucial to life-safety after a disaster event and to response and recovery operations. Landslides can block egress and ingress on roads, causing isolation for neighborhoods, traffic problems and delays for public and private transportation. This can result in economic losses for businesses.
- **Bridges**—Landslides can significantly impact road bridges. Mass movements can knock out bridge abutments or significantly weaken the soil supporting them, making them hazardous for use.
- **Power Lines**—Power lines are generally elevated above steep slopes; but the towers supporting them can be subject to landslides. A landslide could trigger failure of the soil underneath a tower, causing it to collapse and ripping down the lines. Power and communication failures due to landslides can create problems for vulnerable populations and businesses.

13.5.4 Environment

Environmental problems as a result of mass movements can be numerous. Landslides that impact streams may adversely affect fish and wildlife habitat, as well as water quality. Hillsides that provide wildlife habitat can be lost for prolong periods of time due to landslides.

TABLE 13-2.
CRITICAL FACILITIES EXPOSED TO LANDSLIDE HAZARDS

	Number of Exposed Critical Facilities in Risk Area
Medical and Health Services	0
Government/Shelter	1
Protective Function	0
Schools	0
Hazmat	0
Other Critical Function	0
Bridges	3
Water	0
Waste Water	0
Total	**4**

13.6. VULNERABILITY

13.6.1 Population

Due to the nature of census block group data, it is difficult to determine demographics of populations vulnerable to mass movements. In general, all of the estimated 250 persons exposed to higher risk landslide areas are considered to be vulnerable. Tourists traveling in landslide prone areas increase the number of lives endangered by this hazard, as do homes built on view property atop or below bluffs and on steep slopes subject to mass movement.

13.6.2 Property

Although complete historical documentation of the landslide threat in Siskiyou County is lacking, the landslides of 1969, 1993, 1995, 2005, 2010, 2014 and 2017 suggest a significant vulnerability to such hazards. The millions of dollars in damage countywide attributable to mass movement during those storms affected private property and public infrastructure and facilities.

Loss estimations for the landslide hazard are not based on modeling utilizing damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 13-3 shows the general building stock loss estimates in landslide risk areas.

TABLE 13-3.
ESTIMATED BUILDING LOSSES IN THE LANDSLIDE RISK AREAS

Jurisdiction	Building Count	Assessed Value	10% Damage	30% Damage	50% Damage
Dorris	0	0	0	0	$0
Dunsmuir	12	$534,457	$53,446	$160,337	$267,229
Etna	0	0	0	0	$0
Fort Jones	0	0	0	0	$0
Montague	0	0	0	0	$0
Mt. Shasta	0	0	0	0	$0
Tulelake	0	0	0	0	$0
Weed	0	0	0	0	$0
Yreka	0	0	0	0	$0
Unincorporated	106	$9,077,101	$907,710	$2,723,130	$4,538,551
Total	**118**	**$9,611,558**	**$961,156**	**$2,883,467**	**$4,805,779**

13.6.3 Critical Facilities and Infrastructure

There are at least 4 critical facilities exposed to the landslide hazard to some degree. A more in-depth analysis of the mitigation measures taken by these facilities to prevent damage from mass movements should be done to determine if they could withstand impacts of a mass movement.

Several types of infrastructure are exposed to mass movements, including transportation, water and sewer and power infrastructure. Highly susceptible areas of the county include mountain and coastal roads and transportation infrastructure. At this time all infrastructure and transportation corridors identified as exposed to the landslide hazard are considered vulnerable until more information becomes available.

13.6.4 Environment

The environment vulnerable to landslide hazard is the same as the environment exposed to the hazard.

13.7. FUTURE TRENDS IN DEVELOPMENT

The county has experienced moderate growth over the past 10 years, averaging a 0.18-percent annual increase in population from 2000 through 2017. However, economic problems in the past three years impacted growth in the County, with some area experiencing negative growth. Siskiyou County and its planning partners are optimistic that marginal, sustained growth will return to the county as the state and national economies strengthen.

The County and its planning partners are equipped to handle future growth within landslide hazard areas. All municipal planning partners have general plans that address landslide risk areas in their safety elements. All partners have committed to linking their general plans to this hazard mitigation Plan. This will create an opportunity for wise land use decisions as future growth impacts landslide hazard areas.

Additionally, the State of California has adopted the International Building Code (IBC) by reference in its California Building Standards Code. The IBC includes provisions for geotechnical analyses in steep slope areas that have soil types considered susceptible to landslide hazards. These provisions assure that new construction is built to standards that reduce the vulnerability to landslide risk.

13.8. SCENARIO

Major landslides in Siskiyou County occur as a result of soil conditions that have been affected by severe storms, groundwater or human development. The worst-case scenario for landslide hazards in the planning area would generally correspond to a severe storm that had heavy rain and caused flooding. Landslides are most likely during late winter when the water table is high. After heavy rains from November to December, soils become saturated with water. As water seeps downward through upper soils that may consist of permeable sands and gravels and accumulates on impermeable silt, it will cause weakness and destabilization in the slope. A short intense storm could cause saturated soil to move, resulting in landslides. As rains continue, the groundwater table rises, adding to the weakening of the slope. Gravity, poor drainage, a rising groundwater table and poor soil exacerbate hazardous conditions.

Mass movements are becoming more of a concern as development moves outside of city centers and into areas less developed in terms of infrastructure. Most mass movements would be isolated events affecting specific areas. It is probable that private and public property, including infrastructure, will be affected. Mass movements could affect bridges that pass over landslide prone ravines and knock out rail service through the county. Road obstructions caused by mass movements would create isolation problems for residents and businesses in sparsely developed areas. Property owners exposed to steep slopes may suffer damage to property or structures. Landslides carrying vegetation such as shrubs and trees may cause a break in utility lines, cutting off power and communication access to residents.

Continued heavy rains and flooding will complicate the problem further. As emergency response resources are applied to problems with flooding, it is possible they will be unavailable to assist with landslides occurring all over Siskiyou County.

13.9. ISSUES

Important issues associated with landslides in Siskiyou County include the following:

- There are existing homes in landslide risk areas throughout the County. The degree of vulnerability of these structures depends on the codes and standards the structures were constructed to. Information to this level of detail is not currently available.
- Future development could lead to more homes in landslide risk areas.
- Mapping and assessment of landslide hazards are constantly evolving. As new data and science become available, assessments of landslide risk should be re-evaluated.
- The impact of climate change on landslides is uncertain. If climate change impacts atmospheric conditions, then exposure to landslide risks is likely to increase.
- Landslides may cause negative environmental consequences, including water quality degradation.
- The risk associated with the landslide hazard overlaps the risk associated with other hazards such as earthquake, flood and wildfire. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.

CHAPTER 14.
SEVERE WEATHER

14.1. GENERAL BACKGROUND

Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life. It includes thunderstorms, downbursts, tornadoes, waterspouts, snowstorms, ice storms, and dust storms.

Severe weather can be categorized into two groups: those that form over wide geographic areas are classified as general severe weather; those with a more limited geographic area are classified as localized severe weather. Severe weather, technically, is not the same as extreme weather, which refers to unusual weather events are at the extremes of the historical distribution for a given area.

Three types of severe weather events typically impact Siskiyou County: thunderstorms, damaging winds, and cold waves. These types of severe weather are described in the following sections. Flooding issues associated with severe weather are discussed in 0.

14.1.1 Thunderstorms

A thunderstorm is a rain event that includes thunder and lightning. A thunderstorm is classified as "severe" when it contains one or more of the following: hail with a diameter of three-quarter inch or greater, winds gusting in excess of 50 knots (57.5 mph), or tornado.

Three factors cause thunderstorms to form: moisture, rising unstable air (air that keeps rising when disturbed), and a lifting mechanism to provide the disturbance. The sun heats the surface of the earth, which warms the air above it. If this warm surface air is forced to rise (hills or mountains can cause rising motion, as can the interaction of warm air and cold air or wet air and dry air) it will continue to rise as long as it weighs less and stays warmer than the air around it. As the air rises, it transfers heat from the surface of the earth to the upper levels of the atmosphere (the process of convection). The water vapor it contains begins to cool and it condenses into a cloud. The cloud eventually grows upward into areas where the temperature is below freezing. Some of the water vapor turns to ice and some of it turns into water droplets. Both have electrical charges. Ice

<u>DEFINITIONS</u>

Freezing Rain—The result of rain occurring when the temperature is below the freezing point. The rain freezes on impact, resulting in a layer of glaze ice up to an inch thick. In a severe ice storm, an evergreen tree 60 feet high and 30 feet wide can be burdened with up to six tons of ice, creating a threat to power and telephone lines and transportation routes.

Severe Local Storm—"Microscale" atmospheric systems, including tornadoes, thunderstorms, windstorms, ice storms and snowstorms. These storms may cause a great deal of destruction and even death, but their impact is generally confined to a small area. Typical impacts are on transportation infrastructure and utilities.

Thunderstorm—A storm featuring heavy rains, strong winds, thunder and lightning, typically about 15 miles in diameter and lasting about 30 minutes. Hail and tornadoes are also dangers associated with thunderstorms. Lightning is a serious threat to human life. Heavy rains over a small area in a short time can lead to flash flooding.

Tornado—Funnel clouds that generate winds up to 500 miles per hour. They can affect an area up to three-quarters of a mile wide, with a path of varying length. Tornadoes can come from lines of cumulonimbus clouds or from a single storm cloud. They are measured using the Fujita Scale, ranging from F0 to F5.

Windstorm—A storm featuring violent winds. Southwesterly winds are associated with strong storms moving onto the coast from the Pacific Ocean. Southern winds parallel to the coastal mountains are the strongest and most destructive winds. Windstorms tend to damage ridgelines that face into the winds.

Winter Storm—A storm having significant snowfall, ice, and/or freezing rain; the quantity of precipitation varies by elevation.

particles usually have positive charges, and rain droplets usually have negative charges. When the charges build up enough, they are discharged in a bolt of lightning, which causes the sound waves we hear as thunder. Thunderstorms have three stages (see Figure 14-1):

- The *developing stage* of a thunderstorm is marked by a cumulus cloud that is being pushed upward by a rising column of air (updraft). The cumulus cloud soon looks like a tower (called towering cumulus) as the updraft continues to develop. There is little to no rain during this stage but occasional lightning. The developing stage lasts about 10 minutes.
- The thunderstorm enters the *mature stage* when the updraft continues to feed the storm, but precipitation begins to fall out of the storm, and a downdraft begins (a column of air pushing downward). When the downdraft and rain-cooled air spread out along the ground, they form a gust front, or a line of gusty winds. The mature stage is the most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes. The storm occasionally has a black or dark green appearance.
- Eventually, a large amount of precipitation is produced and the updraft is overcome by the downdraft beginning the *dissipating stage*. At the ground, the gust front moves out a long distance from the storm and cuts off the warm moist air that was feeding the thunderstorm. Rainfall decreases in intensity, but lightning remains a danger.

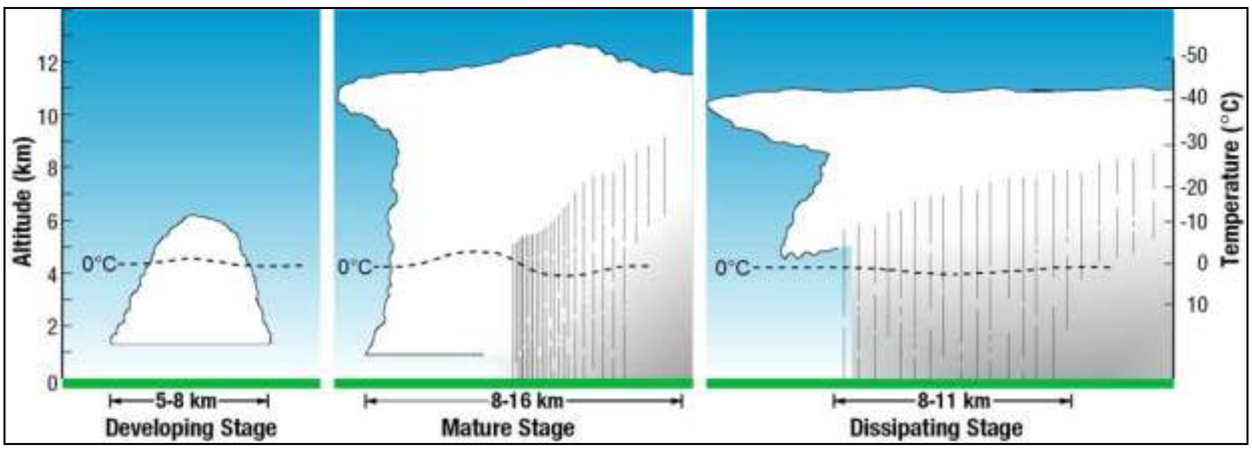


Figure 14-1. The Thunderstorm Life Cycle

There are four types of thunderstorms:

- **Single-Cell Thunderstorms—**Single-cell thunderstorms usually last 20 to 30 minutes. A true single-cell storm is rare, because the gust front of one cell often triggers the growth of another. Most single-cell storms are not usually severe, but a single-cell storm can produce a brief severe weather event. When this happens, it is called a pulse severe storm.
- **Multi-Cell Cluster Storm—**A multi-cell cluster is the most common type of thunderstorm. The multi-cell cluster consists of a group of cells, moving as one unit, with each cell in a different phase of the thunderstorm life cycle. Mature cells are usually found at the center of the cluster and dissipating cells at the downwind edge. Multi-cell cluster storms can produce moderate-size hail, flash floods and weak tornadoes. Each cell in a multi-cell cluster lasts only about 20 minutes; the multi-cell cluster itself may persist for several hours. This type of storm is usually more intense than a single cell storm.
- **Multi-Cell Squall Line—**A multi-cell line storm, or squall line, consists of a long line of storms with a continuous well-developed gust front at the leading edge. The line of storms can be solid, or there can be gaps and breaks in the line. Squall lines can produce hail up to

golf-ball size, heavy rainfall, and weak tornadoes, but they are best known as the producers of strong downdrafts. Occasionally, a strong downburst will accelerate a portion of the squall line ahead of the rest of the line. This produces what is called a bow echo. Bow echoes can develop with isolated cells as well as squall lines. Bow echoes are easily detected on radar but are difficult to observe visually.

- **Super-Cell Storm—**A super-cell is a highly organized thunderstorm that poses a high threat to life and property. It is similar to a single-cell storm in that it has one main updraft, but the updraft is extremely strong, reaching speeds of 150 to 175 miles per hour. Super-cells are rare. The main characteristic that sets them apart from other thunderstorms is the presence of rotation. The rotating updraft of a super-cell (called a mesocyclone when visible on radar) helps the super-cell to produce extreme weather events, such as giant hail (more than 2 inches in diameter), strong downbursts of 80 miles an hour or more, and strong to violent tornadoes. Thunderstorms cover the entire planning area.

14.1.2 Damaging Winds

Damaging winds are classified as those exceeding 60 mph. Damage from such winds accounts for half of all severe weather reports in the lower 48 states and is more common than damage from tornadoes. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles. These winds cover the entire planning area. There are seven types of damaging winds:

- **Straight-line winds**—Any thunderstorm wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- **Downdrafts**—A small-scale column of air that rapidly sinks toward the ground.
- **Downbursts**—A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- **Microbursts**—A small concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph. There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.
- **Gust front—**A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- **Derecho**—A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-cooled air). The word “derecho” is of Spanish origin and means “straight ahead.” Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.

- **Bow Echo**—A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground.

14.1.3 Cold Waves

As defined by the National Weather Service, a cold wave is a rapid fall in temperature within a 24-hour period, requiring substantially increased protection for agriculture, industry, commerce and social activities. Cold waves are formed by large cool air masses accumulating over a region, caused by movements of air streams. Criteria for defining a cold wave are the rate at which the temperature falls and the minimum to which it falls. The minimum-temperature criterion varies with geographic region and time of year.

A cold wave can cause death and injury to livestock and wildlife. Exposure to cold mandates greater caloric intake for all animals, including humans, and if a cold wave is accompanied by heavy and persistent snow, grazing animals may be unable to reach necessary food and water, and die of hypothermia or starvation. Cold waves often necessitate the purchase of fodder for livestock at considerable cost to farmers. Human populations can be inflicted with frostbite when exposed for extended periods of time to cold, which may result in the loss of limbs or damage to internal organs.

Extreme winter cold often causes poorly insulated water pipes to freeze. Even some poorly protected indoor plumbing may rupture as frozen water expands, causing property damage. Fires become more hazardous during extreme cold because broken water mains may make water supplies unreliable, making firefighting more difficult.

Cold waves that bring unexpected freezes and frosts during the growing season in mid-latitude zones can kill plants during the early and most vulnerable stages of growth. This results in crop failure as plants are killed before they can be harvested. Such cold waves have caused famines. Cold waves can also cause soil particles to harden and freeze, making it harder for plants and vegetation to grow. During several summers in 1810s, numerous crops failed due to unusual cold snaps after volcanic eruptions reduced incoming sunlight. These are cover the entire planning area. The average low in Siskiyou county is 27 degrees Fahrenheit anything below this is considered extreme cold.

A cold front can trigger heavy snowfall, which presents numerous hazards:

- Significant damage may occur when heavy, wet snow, with a snow-water ratio of between 6:1 and 12:1, applies a weight in excess of 10 pounds per square foot onto trees or electricity lines.
- An avalanche can occur with a sudden thermal or mechanical impact on snow that has accumulated on a mountain, which causes the snow to rush downhill suddenly. Preceding an avalanche is a phenomenon known as an avalanche wind caused by the approaching avalanche, which adds to its destructive potential.
- Large amounts of snow that accumulate on top of man-made structures can lead to structural failure.
- During snowmelt, acidic precipitation that accumulated in the snow pack is released, harming marine life.

14.2. HAZARD PROFILE

14.2.1 Past Events

Table 14-1 summarizes severe weather events in Siskiyou County since 1990, as recorded by the National Oceanic and Atmospheric Administration (NOAA).

TABLE 14-1.
SEVERE WEATHER EVENTS IMPACTING PLANNING AREA SINCE 1990

Date	Type	Deaths or Injuries	Property Damage
9/23/1990	Thunderstorm/Wind	0	$82,000
Description: Storm produced sustained winds up to 61 mph.			
01/13/1993	Winter Storm	0	$350,000
Description: Severe winter weather impacted most of California including the planning area. Damages within the county were sufficient to trigger a presidential disaster declaration.			
1/15/1999	High Wind	0	None reported
Description: The Weed Remote Automated Weather Station (RAWS) reported a peak gust of 52 mph. A High Wind Warning was issued for CAZ081 (Central Siskiyou County) at 15/1451 PST and cancelled at 16/1330. Although no stations in the zone verified, the Weed RAWS came close with two gusts over 50 mph. The Van Bremmer RAWS, in an adjacent zone at 5310 feet, reported a gust to 62 mph at 15/1945 PST.			
10/15/1999	Extreme Cold	0	Non reported
Description: A Frost Warning was issued for central and western Siskiyou county. Reported low temperatures were in the 30s, so frost probably did occur this morning. Mt. Hebron (CAZ084) reported a low of 19 degrees (15 degrees below normal). This met the freeze warning criteria for the zone, but the very low temperatures did not appear to be widespread.			
10/27/1999	High Wind	0	None reported
Description: Spotter SY57 at Weed reported winds 40 MPH gusting to 68 MPH at 0510 PDT. A wind advisory was issued for this zone at 1018 PDT on 10/27 and cancelled at 2048 PDT on 10/27. The above report was the only one that met High Wind Warning criteria.			
12/9/1999	Heavy Snow	0	None reported
Description: Spotter SY49 northeast of Mt. Shasta City reported 5 inches of new snow. A Heavy Snow Warning was issued for the Mt. Shasta City area (CAZ082) at 1649 PST on 12/8 and cancelled at 0924 PST on 12/9. The criteria for heavy snow in that zone is 5 inches in 12 hours or 7 inches in 24 hours. This appears to have verified.			
3/27/2000	High Wind	0	Minimal
Description: A member of the general public reported the following incident in Happy Camp. At around 1630 on 03/27/00, a rotating dust cloud moved across the roof of a hardware store in Happy Camp. The winds in the cloud stripped off the metal roof of the store and rolled it into a big ball. The store then closed for the day. The dust cloud then continued about 100 yards down Highway 96 before dissipating. The winds observed were significant, but not excessive.			
5/31/2000	Extreme Cold	0	Crop Damage
Description: A major freeze occurred on the morning of 05/31/00 with no warning issued. The Klamath Falls Herald and News reported extensive damage to area crops, especially sugar beets. Beet damage ranged from moderate to a total loss. Attempts were made to have the area declared a Federal Disaster area. Reported low temperatures were in the 20s.			
1/10/2001	High Wind	0	None reported
Description: Spotter SY39 near Black Butte reported estimated winds south 40 to 50 mph. The wind event above was covered with a Wind Advisory in this area, even though the spotter reported winds met warning criteria.			

**TABLE 14-1.
SEVERE WEATHER EVENTS IMPACTING PLANNING AREA SINCE 1990**

Date	Type	Deaths or Injuries	Property Damage
1/1/2001	Heavy Snow	0	None reported
Description: A California Department of Water Resources measuring device reported 13 inches of snow between 1200 and 2400 on 01/10. A Winter Storm Warning was issued for zone CAZ082 for heavy snow at 0455 PST on 01/10/01 and expired at 0449 PST on 01/11/01.			
11/19/2001	High Wind	0	None Reported
Description: The Weed RAWS reported a max sustained wind of 40 mph and a peak gust of 59 mph at 1445 PST on 11/19/01. One other Weed observation verified the warning. A High Wind Warning was issued for CAZ081 effective at the above times.			
11/28/2001	Winter Storm/High wind	0	None reported
Description: Spotter SY84 at 2800 feet reported 4 inches of new snow. Spotter SY12 at 3000 feet reported wind 35-45 mph gusting to 60 mph.			
12/13/2001	Winter Storm	0	0
Description: Spotter SY39 reported near blizzard conditions with south winds 30 to 35 mph and heavy snow.			
3/9/2002	High Wind	0	0
Description: The RAWS at Weed Airport recorded a sustained wind of 43 mph. A High Wind Warning was issued for the Shasta Valley around Weed at 2102 PST on 03/08 and expired at 09/1845 PST. The above observations verified the warning. The Weed RAWS highest sustained and highest peak wind are listed above, but several other observations from the same sensor also met high wind warning criteria.			
3/10/2002	Heavy snow	0	0
Description: Mt. Shasta Ski Park reported 11 inches of snow overnight. A Heavy Snow Warning was issued for California zones CAZ080/082 at 0540 PST on 03/09/02 and expired at 1445 PST on 03/10/02. The above report was the only one received that verified the warning.			
12/14/2002	Winter Storm	0	0
Description: A Winter Storm Warning was issued for zones CAZ080/082 effective at the above times. No verifying reports were received. However, Sand Flat at 6750 feet recorded 10 inches between 1500 PST and 2200 PST, so it is likely that snow was sufficient to verify a warning in parts of the warning area.			
7/23/2003	Thunderstorm/Wind	0	$200,000
Description: A thunderstorm developed over the Scott Valley around this time. While radar reports did not indicate that this storm was severe, a wet microburst propagated from it, bringing estimated 80+ mph winds to the area near the Greenview airport. A subsequent NWS Storm Survey discovered damaged structures and trees, the largest of which were compromised by wood rot. Greenview airport recorded a peak gust of 54 mph with the event. Interviews with residents yielded numerous reports of golf ball sized hail and hourly rainfall totals exceeding 1.50 inches.			
9/3/2003	Lightning	0	None reported
Description: A Red Flag Warning was issued for all of southern Oregon due to a line of thunderstorms approaching from the south containing dry lightning. The line weakened before arrival, but a number of strikes did occur over northern California. However, verification was marginal as the lightning strikes may have not been widespread enough to verify the Red Flag Warning.			
01/01/2004	Blizzard	0	None reported
Description: The Weed RAWS recorded wind gusts 44-53 mph on nearly every observation in this time interval. This, combined with the heavy snow reported by spotters, indicates that blizzard conditions likely did occur during this time interval. An extraordinary winter storm struck Oregon and Northern California on January 1, 2004. A multitude of warnings and advisories were issued to cover this event.			

**TABLE 14-1.
SEVERE WEATHER EVENTS IMPACTING PLANNING AREA SINCE 1990**

Date	Type	Deaths or Injuries	Property Damage
7/26/2006	Thunderstorm/Wind	0	None reported
Description: Spotter SY32 in Happy Camp reported strong winds with light rain, 1.5 inch thick branches were broken off of trees. A Severe Thunderstorm warning was issued for West Central Siskiyou County			
8/6/2006	Hail	0	None reported
Description: Spotter SY135 7 W Montague reported .75 inch hail with a thunderstorm. A Severe Thunderstorm Warning was issued for northeast Siskiyou County			
2/21/2007	Heavy Snow	0	None reported
Description: An unusually cold late winter storm moved into Southern Oregon and Northern California during this interval. Numerous Heavy Snow Warnings were issued for this system along with a number of Snow Advisories. At 3500 feet reported 12 inches of snow in 24 hours.			
7/6/2007	Thunderstorm/Wind	0	Unknown
Description: The Klamath Falls Herald and News reported extensive wind, rain, and hail damage to crops around Butte Valley and Tulelake. Crop damage included 1400 acres of strawberry root stock and several alfalfa and potato fields. Monsoonal moisture combined with strong surface heating made for scattered afternoon and evening thunderstorms on this date. A few of the thunderstorms achieved severe status.			
1/27/2008	Blizzard	0	None reported
Description: Yet another winter storm brought another round of heavy snow to Northern California and Southern Oregon. The snow level dropped to sea level during this event...bringing snow to areas that rarely get any snow. In Northern California, a Winter Storm Warning was issued for California zone CAZ082/083 above 3,000 feet. A spotter in Dorris at 4300 feet reported west winds 30 to 40 mph with visibilities 50 yards.			
11/21/2009	Heavy	0	None Reported
Description: A strong cold front followed by strong cold air advection lowered snow levels between 2000-3000 feet which allowed for 6 to 6.5 inches of snow to be observed within a 12 hour period.			
12/11/2009	Extreme Cold/wind Chill	0	None reported
Description: A frigid Arctic air mass moved into Oregon December 5th and remained over the area through December 12th, when it finally abated as a Pacific system approached the area. Low temperatures in this zone during this interval were generally in the teens. On the coldest nights...the 9th and the 10th, the coldest stations dipped into the single digits. Temperatures warmed on the 11th but remained well below normal...and became more seasonable on the 12th. Numerous broken pipes and other cold-related damage was reported during this interval			
3/8/2010	Severe Winter storm	0	In excess of $200,000
Description: a series of heavy snowstorms impacted the planning area during March. The resulting accumulation of snowfall caused sufficient damages to trigger a presidential disaster declaration for the planning area.			
12/14/2014	Winter Storm	0	None Reported
Description: a series of heavy snow and rain storms impacted the planning area.			
01/02/2017	Winter Storm	0	None Reported
Description: a series of heavy snow and rain storms impacted the planning area			
02/01/2017	Winter Storm	0	None Reported
Description: a series of heavy snow and rain storms impacted the planning area			

14.2.2 Location

Severe weather events have the potential to happen anywhere in the planning area. Communities in low-lying areas next to streams or lakes are more susceptible to flooding. Wind events are most damaging to areas that are heavily wooded.

14.2.3 Frequency

The severe weather events for Siskiyou County shown in Table 14-1 are often related to high winds associated with winter storms and thunderstorms. The planning area can expect to experience exposure to some type of severe weather event at least annually.

14.2.4 Severity

The most common problems associated with severe storms are immobility and loss of utilities. Fatalities are uncommon, but can occur. Roads may become impassable due to flooding, downed trees, ice or snow, or a landslide. Power lines may be downed due to high winds or ice accumulation, and services such as water or phone may not be able to operate without power. Lightning can cause severe damage and injury.

Windstorms can be a frequent problem in the planning area and have been known to cause damage to utilities. The predicted wind speed given in wind warnings issued by the National Weather Service is for a one-minute average; gusts may be 25 to 30 percent higher.

Tornadoes are potentially the most dangerous of local storms, but they are not common in the planning area. If a major tornado were to strike within the populated areas of the county, damage could be widespread. Businesses could be forced to close for an extended period or permanently, fatalities could be high, many people could be homeless for an extended period, and routine services such as telephone or power could be disrupted. Buildings may be damaged or destroyed. California ranks 32nd among states for frequency of tornadoes, 44th for the frequency of tornados per square mile, 36th for injuries, and 31st for cost of damage. The state has no reported deaths from tornadoes.

14.2.5 Warning Time

Meteorologists can often predict the likelihood of a severe storm. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of the storm. Some storms may come on more quickly and have only a few hours of warning time.

14.3. SECONDARY HAZARDS

The most significant secondary hazards associated with severe local storms are floods, falling and downed trees, landslides and downed power lines. Rapidly melting snow combined with heavy rain can overwhelm both natural and man-made drainage systems, causing overflow and property destruction. Landslides occur when the soil on slopes becomes oversaturated and fails.

14.4. CLIMATE CHANGE IMPACTS

Climate change presents a significant challenge for risk management associated with severe weather. The frequency of severe weather events has increased steadily over the last century. The number of weather-related disasters during the 1990s was four times that of the 1950s, and cost 14 times as much in economic losses. Historical data shows that the probability for severe weather events increases in a warmer climate (see Figure 14-2). The changing hydrograph caused by climate change could have a significant impact on the intensity, duration and frequency of storm events. All of these impacts could have significant economic consequences.

14.5. EXPOSURE

14.5.1 Population

A lack of data separating severe weather damage from flooding and landslide damage prevented a detailed analysis for exposure and vulnerability. However, it can be assumed that the entire planning area is exposed to some extent to severe weather events. Certain areas are more exposed due to geographic location and local weather patterns. Populations living at higher elevations with large stands of trees or power lines may be more susceptible to wind damage and black out, while populations in low-lying areas are at risk for possible flooding.

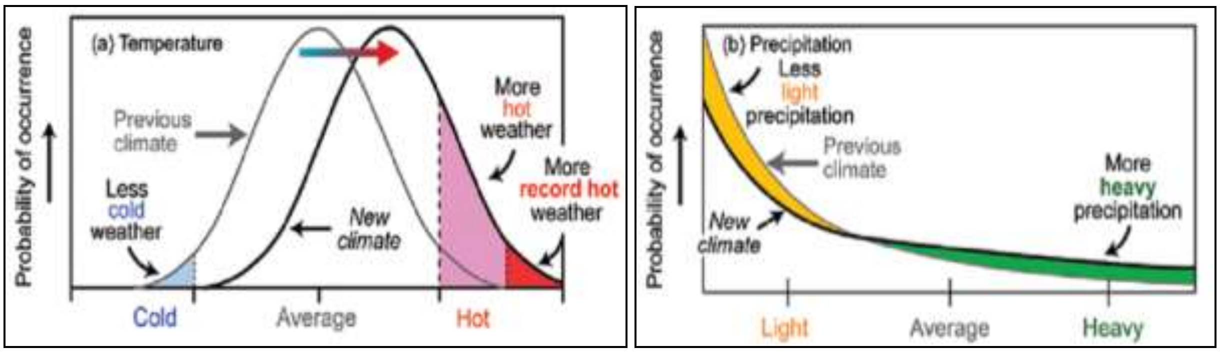


Figure 14-2. Severe Weather Probabilities in Warmer Climates

14.5.2 Property

According to the Siskiyou County Assessor, there are 22,144 buildings within the census tracts that define the planning area. Most of these buildings are residential. Many of the older residential structures were built without the influence of a structure building code that have provisions for wind loads and could therefore be more susceptible to wind damages. All of these buildings are considered to be exposed to the severe weather hazard, but structures in poor condition or in particularly vulnerable locations (located on hilltops or exposed open areas) may risk the most damage. The frequency and degree of damage will depend on specific locations.

14.5.3 Critical Facilities and Infrastructure

All critical facilities exposed to flooding (0) are also likely exposed to severe weather. Additional facilities on higher ground may also be exposed to wind damage or damage from falling trees. The most common problems associated with severe weather are loss of utilities. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water and sewer systems may not function. Roads may become impassable due to ice or snow or from secondary hazards such as landslides.

14.5.4 Environment

The environment is highly exposed to severe weather events. Natural habitats such as streams and trees are exposed to the elements during a severe storm and risk major damage and destruction. Prolonged rains can saturate soils and lead to slope failure. Flooding events caused by severe weather or snowmelt can produce river channel migration or damage riparian habitat. Storm surges can erode beachfront bluffs and redistribute sediment loads.

14.6. VULNERABILITY

14.6.1 Population

Vulnerable populations are the elderly, low income or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. Isolation of these populations is a significant concern. These populations face isolation and exposure during severe weather events and could suffer more secondary effects of the hazard.

14.6.2 Property

All property is vulnerable during severe weather events, but properties in poor condition or in particularly vulnerable locations may risk the most damage. Those in higher elevations and on ridges may be more prone to wind damage. Those that are located under or near overhead lines or near large trees may be vulnerable to falling ice or may be damaged in the event of a collapse.

Loss estimations for the severe weather hazard are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of potential economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 14-2 lists the loss estimates to the general building stock.

TABLE 14-2.
BUILDINGS VULNERABLE TO SEVERE WEATHER HAZARD

City	# Assessed	10% Damage	30% Damage	50% Damage
Dunsmuir	933	$77,740,175	$7,774,018	$23,322,053
Etna	361	$34,279,872	$3,427,987	$10,283,962
Fort Jones	355	$27,813,125	$2,781,313	$8,343,938
Montague	558	$41,485,718	$4,148,572	$12,445,715
Mt. Shasta	1,599	$243,034,523	$24,303,452	$72,910,357
Tulelake	384	$16,921,384	$1,692,138	$5,076,415
Weed	1,003	$125,492,838	$12,549,284	$37,647,851
Yreka	2,797	$394,536,909	$39,453,691	$118,361,073
Unincorporated	13,721	$1,490,464,662	$149,046,466	$447,139,399
Total	**22,144**	**$2,472,179,650**	**$247,217,965**	**$741,653,895**

14.6.3 Critical Facilities and Infrastructure

Incapacity and loss of roads are the primary transportation failures resulting from severe weather, mostly associated with secondary hazards. Landslides caused by heavy prolonged rains can block roads are. High winds can cause significant damage to trees and power lines, blocking roads with debris, incapacitating transportation, isolating population, and disrupting ingress and egress. Snowstorms in higher elevations can significantly impact the transportation system and the availability of public safety services. Of particular concern are roads providing access to isolated areas and to the elderly.

Prolonged obstruction of major routes due to landslides, snow, debris or floodwaters can disrupt the shipment of goods and other commerce. Large, prolonged storms can have negative economic impacts for an entire region.

Severe windstorms, downed trees, and ice can create serious impacts on power and above-ground communication lines. Freezing of power and communication lines can cause them to break, disrupting electricity and communication. Loss of electricity and phone connection would leave certain populations isolated because residents would be unable to call for assistance.

14.6.4 Environment

The vulnerability of the environment to severe weather is the same as the exposure.

14.7. FUTURE TRENDS IN DEVELOPMENT

All future development will be affected by severe storms. The ability to withstand impacts lies in sound land use practices and consistent enforcement of codes and regulations for new construction. The planning partners have adopted the International Building Code in response to California mandates. This code is equipped to deal with the impacts of severe weather events. Land use policies identified in general plans within the planning area also address many of the secondary impacts (flood and landslide) of the severe weather hazard. With these tools, the planning partnership is well equipped to deal with future growth and the associated impacts of severe weather.

14.8. SCENARIO

Severe weather events are frequent in the planning area. The altitude and geography of the county make it susceptible to snow accumulation and extreme cold in winter and thunderstorms and high wind events in spring and summer. A worst-case event would involve prolonged high winds during a winter storm accompanied by large amounts of snow. Such an event would have both short-term and longer-term effects. Initially, schools and roads would be closed due to power outages caused by high winds, snow accumulation and downed tree obstructions. In more rural areas, some subdivisions could experience limited ingress and egress. Prolonged rain could produce flooding due to rain-on-snow effects, overtopped culverts with ponded water on roads, and landslides on steep slopes. Flooding and landslides could further obstruct roads and bridges, further isolating residents.

A second “worst-case-scenario” would involve multiple wildfires triggered by thunderstorm activity during the hot and dry summer months. Multiple events would tax county resources and make it difficult to contain the fires.

14.9. ISSUES

Important issues associated with a severe weather in the Siskiyou County planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to severe weather events such as windstorms and heavy snow loads.
- Above-ground utility infrastructure is susceptible to snow accumulation and high winds
- Redundancy of power supply must be evaluated.

- The capacity for backup power generation is limited.
- Isolated population centers.
- Road closures (both rural roads to isolated communities and Interstate-5)

CHAPTER 15.
VOLCANO

15.1. GENERAL BACKGROUND

A volcano is a vent in the earth's crust through which magma, rock fragments, gases and ash are ejected from the earth's interior. Over time, accumulation of these erupted products on the earth's surface creates a volcanic mountain. Figure 15-1 illustrates how volcanoes formed in the Cascade Range.

A wide variety of hazards are related to volcanoes. The hazards are distinguished by the different ways in which volcanic materials and other debris flow from the volcano. The molten rock that erupts from a volcano (lava) forms a hill or mountain around the vent. The lava may flow out as a viscous liquid, or it may explode from the vent as solid or liquid particles. Ash and fragmented rock material can become airborne and travel far from the erupting volcano to affect distant areas.

Volcanoes can lie dormant for centuries between eruptions. When they erupt, high-speed avalanches of hot ash and rock (called pyroclastic flows), lava flows, and landslides can devastate areas 10 or more miles away. Huge mudflows of volcanic ash and debris called lahars can inundate valleys more than 50 miles downstream. Ash from explosive eruptions, called tephra, can disrupt human activities hundreds of miles downwind, and drifting clouds of fine ash can cause severe damage to the engines of jet aircraft hundreds or thousands of miles away.

DEFINITIONS

Lahar—A rapidly flowing mixture of water and rock debris that originates from a volcano. While lahars are most commonly associated with eruptions, heavy rains, and debris accumulation, earthquakes may also trigger them.

Lava Flow—The least hazardous threat posed by volcanoes. Cascades volcanoes are normally associated with slow moving andesite or dacite lava.

Stratovolcano—Typically steep-sided, symmetrical cones of large dimension built of alternating layers of lava flows, volcanic ash, cinders, blocks, and bombs, rising as much as 8,000 feet above their bases.

Tephra—Ash and fragmented rock material ejected by a volcanic explosion

Volcano—A vent in the planetary crust from which magma (molten or hot rock) and gas from the earth's core erupts.

15.1.1 Volcanos of Siskiyou County

Mount Shasta in Siskiyou County (see Figure 15-2) is a massive compound stratovolcano composed of overlapping cones centered at four or more main vents. It was constructed over a period of more than 100,000 years. Each cone-building period produced pyroxene-andesite lava flows, block-and-ash flows, and mudflows originating mainly at the central vents. Construction of each cone was followed by eruption of domes and pyroclastic flows of more silicic rock at central vents, and of domes, cinder cones, and lava flows at vents on the flanks of the cones.

Mount Shasta's main peak rises to an elevation of 14,162 feet, dominating the landscape of northern California. Shastina is a large subsidiary cone that rises to 12,329 feet on the west flank of the compound volcano. The largest stratovolcano of the Cascade chain at approximately 84 cubic miles, Mount Shasta compares in volume to such massive stratovolcanoes as Mt. Fuji in Japan and Cotopaxi in Ecuador. The mountain hosts five glaciers, including the Whitney Glacier, the largest in California.

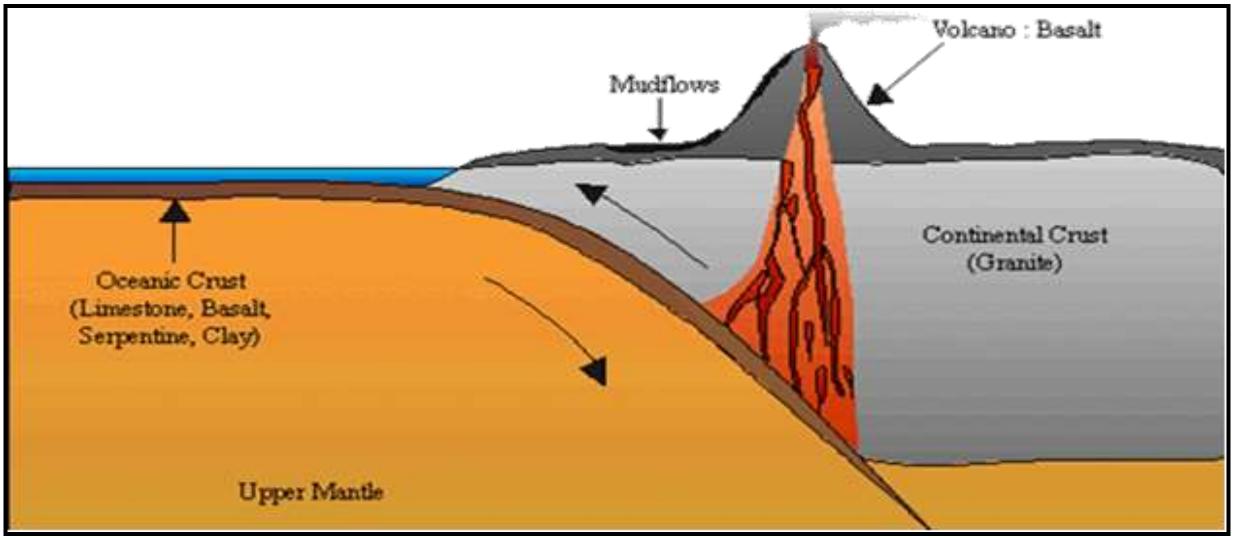


Figure 15-1. The Formation of Cascade Volcanoes

Source: USGS

Figure 15-2. Mount Shasta

Four major cone-building episodes built most of the stratovolcano around separate central vents. The main bulk of the cones built in each of these episodes appears to have accumulated in a short time, lasting perhaps only a few hundred or a few thousand years, during which numerous lava eruptions occurred, mainly from the central vent; the final major eruptions from each of the central craters produced dacite domes and dense-fragment pyroclastic flows. After each episode of rapid cone building, the volcano underwent significant erosion while less frequent eruptions occurred, both from the central vent and from numerous flank vents. The flank eruptions typically produced cinder cones, small monogenetic lava cones, or domes, the latter commonly accompanied by pyroclastic flows. Pyroclastic flows are particularly conspicuous on the west flank of Shastina and its major flank vent, Black Butte.

The Mount Shasta magmatic system has evolved more or less continuously for at least 590,000 years, but the ancestral cone was virtually destroyed by an enormous volcanic sector avalanche and landslide around 300,000 years ago. Only a small remnant of this older edifice remains on the west side of the stratovolcano. Shasta Valley to the north is largely floored by the debris of the sector collapse, likely representing a considerable fraction of the volume of the ancestral cone.

The Sargents Ridge cone, oldest of the four major edifices that formed the present compound volcano after the major sector collapse, is younger than approximately 250,000 years, has undergone two major glaciations, and is exposed mainly on the south side of Mount Shasta. The next younger cone, Misery Hill, is younger than approximately 130,000 years, has been sculpted in one major glaciation, and forms much of the upper part of the mountain. The two younger cones are Holocene: Shastina, west of the cluster of other central vents, was formed mainly between 9,700 and 9,400 years ago; the Hotlum cone, which forms the summit and the north and northwest slopes of Shasta, may overlap Shastina in age, but most of the Hotlum cone is probably younger.

Mount Shasta has continued to erupt at least once every 600 to 800 years for the past 10,000 years. Its most recent eruption probably was in 1786. Evidence for this eruption, recorded from sea by the explorer La Perouse, is somewhat ambiguous, but his description could only have referred to Mount Shasta. A small craterlike depression in the summit dome, containing several small groups of fumaroles and an acidic hot spring, might have formed during that eruption; lithic ash preserved on the slopes of the volcano and widely to the east yields charcoal dates of about 200 years.

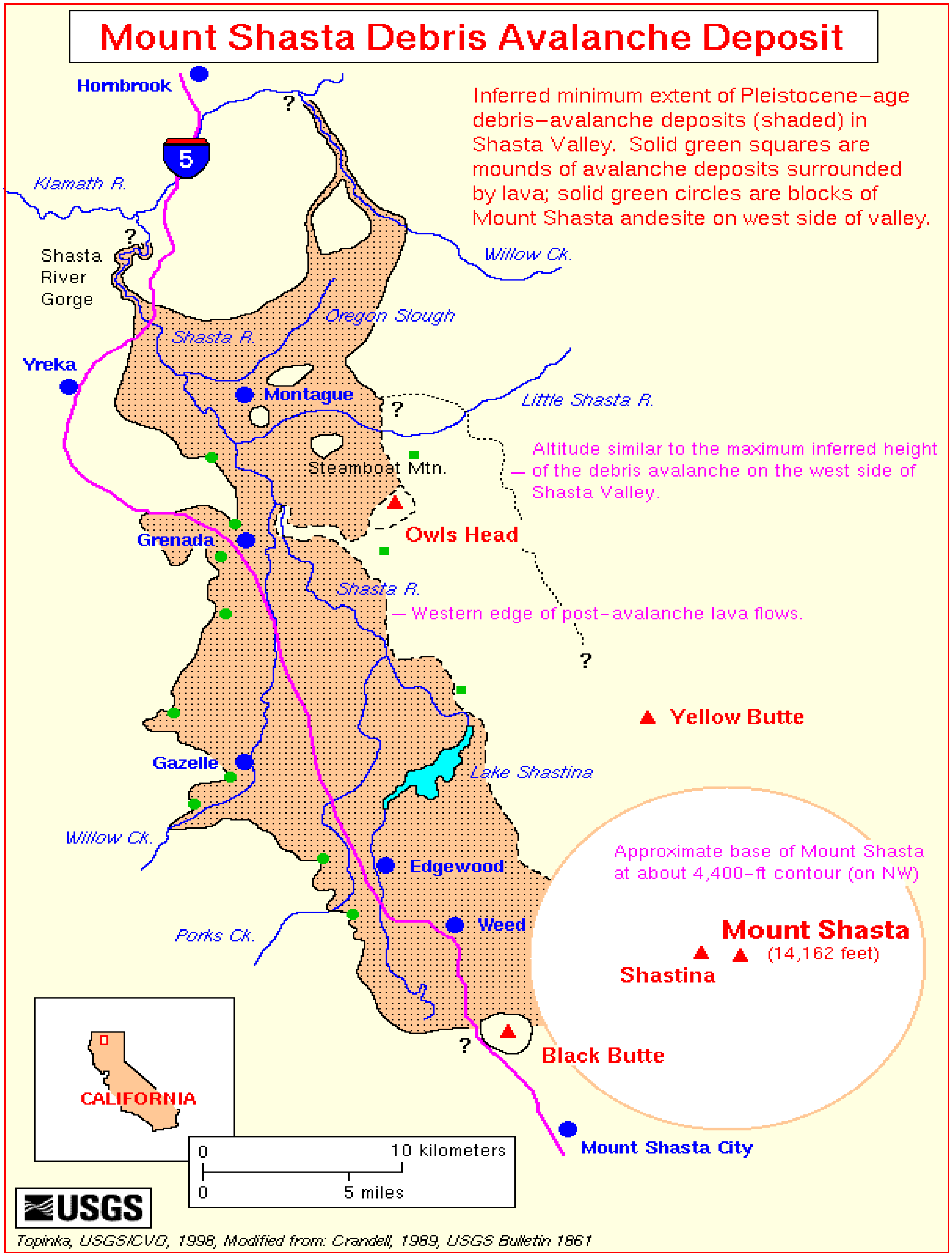
15.1.2 Debris Avalanches

According to the USGS, the deposits of a large debris avalanche extend northward from the base of Mount Shasta across the floor of Shasta Valley in Siskiyou County (see Figure 15-3). The northern extent of the deposit is near Montague, about 30 miles from the summit. The deposits cover about 261 square miles, and their estimated volume is 11 cubic miles, according to the Cascades Volcano Observatory. Radiometric dating suggests that the debris avalanche occurred 300,000 to 380,000 years ago.

Debris avalanches are flowing or sliding, incoherent and chaotic, wet or dry mixtures of soil and rock debris that move downslope from a volcano at a high speed. Volcanic-debris avalanches occur occasionally at large, steep-sided volcanoes and are among the most hazardous of volcanic events. The cause of debris avalanches may be due to the intrusion of magma and earthquake shaking, or the event may occur following a volcanic blast. Steep-sided volcanic cones may also fail due to the influence of gravity after gradual weakening over time by hydrothermal alteration.

Debris avalanches produce thick, hummocky deposits that can extend great distances (see Figure 15-4). Hundreds of mounds, hills, and ridges formed by the deposits are separated by flat areas that slope generally northward. The hills and ridges are formed by large block deposits, which include masses of lava tens to hundreds of feet across, as well as stratigraphic successions of unconsolidated deposits of pyroclastic flows, lahars, tephra, and alluvium, which were carried intact within the debris avalanche.

Flat areas between hills and ridges are underlain by an unsorted and unstratified mudflow-like deposit of sand, silt, clay, and rock fragments derived chiefly from the volcano. Boulders of volcanic rock from Mount Shasta are scattered along the west side of Shasta Valley and in the part of Shasta Valley that lies north of Montague, at heights of as much as 300 feet above the adjacent surface of the debris-avalanche deposits. The boulders represent a lag that was formed after the main body of the avalanche came to rest, when much of the still-fluid deposits drained away and flowed out of Shasta Valley down the Shasta River valley and into the Klamath River.



Source: USGS

Figure 15-3. Extent of Mount Shasta Debris Avalanche Deposits

Source: USGS

Figure 15-4. Hummocky, Volcanic Deposits from Mount Shasta Debris Avalanche

The debris avalanche probably originated in a quick succession of huge landslides of water-saturated rock on the northwest flank of ancestral Mount Shasta, each of which cut progressively deeper into the volcano. Evidence is lacking of similar recent volcanic activity, and the exact cause of the ancient debris avalanches are not known.

Debris avalanches destroy everything in their paths by impact or burial beneath tens of feet of debris. Because debris avalanches occur with little warning and can travel at high speeds, areas that might be affected should be evacuated *before* such avalanches occur. Therefore, local government officials might decide to evacuate some areas in advance of threatened eruption.

15.2. HAZARD PROFILE

15.2.1 Past Events

Figure 15-5 summarizes past eruptions in the Cascade Range. Recent activity includes the following:

- May 18, 1980, Mount St. Helens eruption—After a lateral blast, 23 square miles of volcanic material buried the North Fork of the Toutle River. There were 57 human fatalities.
- May 22, 1915, Lassen Peak eruption—An explosive eruption produced a pyroclastic flow that devastated an area as far as 4 miles northeast of the summit. The eruption also generated lahars that traveled more than 12 miles down Lost Creek and floods that went down Hat Creek.

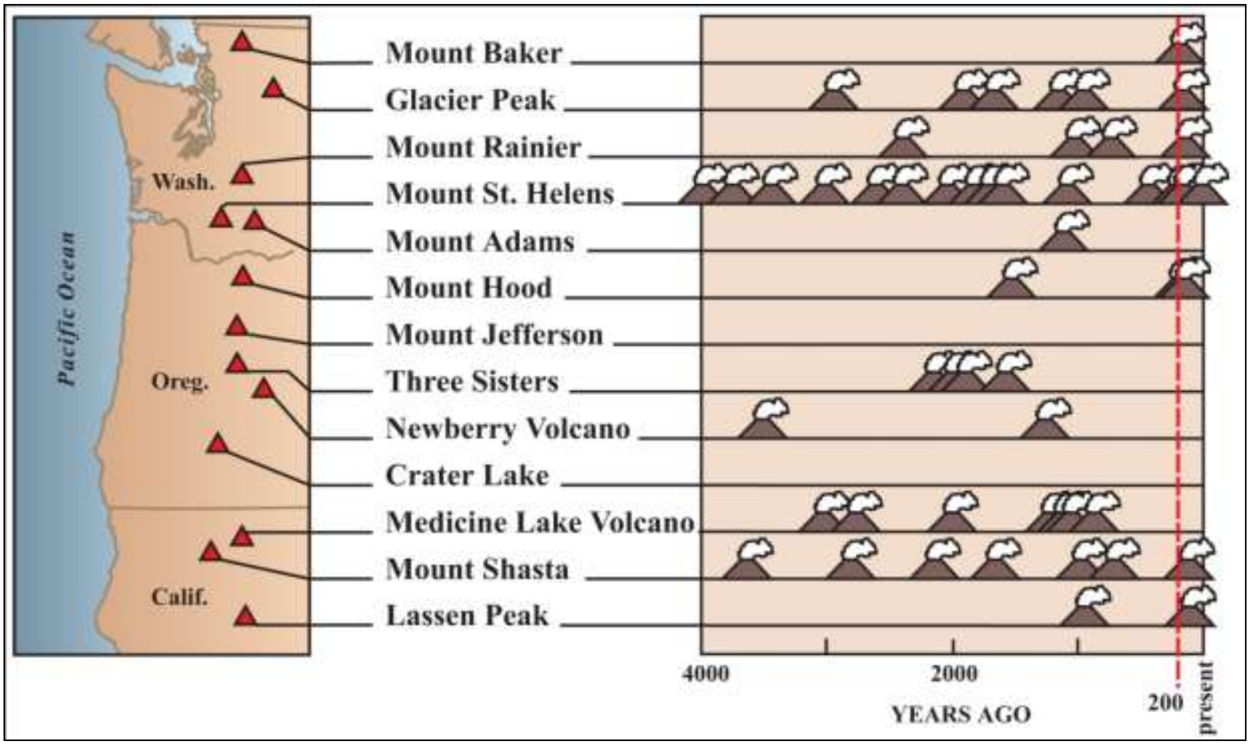


Figure 15-5. Past Eruptions in the Cascade Range

15.2.2 Location

Figure 15-5 shows the location of the Cascade Range volcanoes, most of which have the potential to produce a significant eruption. The Cascade Range extends more than 1,000 miles from southern British Columbia into northern California and includes 13 potentially active volcanic peaks in the U.S. Four major Cascade volcanoes are relatively close to Siskiyou County: Crater Lake is about 80 miles to the north; and Lassen Peak is about 65 miles to the south of the county boundary. Mt. Shasta is in the south-central area of the county and the Medicine Lake Volcano is in the eastern portion of the county. Of additional volcanic importance are the Black Butte Cinder Cone, just west of Mount Shasta and Mount Shastina, a large subsidiary cone on the west flank of Mount Shasta.

15.2.3 Frequency

Many Cascade volcanoes have erupted in the recent past and will be active again in the foreseeable future. Given an average rate of one or two eruptions per century during the past 12,000 years, these disasters are not part of our everyday experience; however, in the past hundred years, Lassen Peak and Mount St. Helens have erupted with terrifying results. Mount Shasta has erupted, on the average, at least once per 800 years during the last 10,000 years, and about once per 600 years during the last 4,500 years. The last known eruption occurred just over 200 years ago. On the basis of its past behavior, Mount Shasta is not likely to erupt large volumes of tephra in the future; areas subject to the greatest risk from air-fall tephra are located mainly east and within about 30 miles of the summit of the volcano. The degree of risk from air-fall tephra decreases progressively as the distance from the volcano increases.

15.2.4 Severity

The explosive disintegration of Mount St. Helens' north flank in 1980 vividly demonstrated the power that Cascade volcanoes can unleash. A 1-inch deep layer of ash weighs an average of 10 pounds per square foot, causing danger of structural collapse. Ash is harsh, acidic and gritty, and it has a sulfuric odor. Ash may also carry a high static charge for up to two days after being ejected from a volcano. When an ash cloud combines with rain, sulfur dioxide in the cloud combines with the rain water to form diluted sulfuric acid that may cause minor, but painful burns to the skin, eyes, nose, and throat.

Eruptions during the last 10,000 years produced lava flows and domes on and around the flanks of Mount Shasta, and pyroclastic flows from summit and flank vents extended as far as 30 miles from the summit. Most of these eruptions also produced large mudflows, many of which reached more than several tens of miles from Mount Shasta. Future eruptions like those of the past could endanger the neighboring communities of Weed, Mount Shasta, McCloud, and Dunsmuir, located at or near the base of Mount Shasta. Such eruptions will most likely produce deposits of ash, lava flows, domes, and pyroclastic flows. Lava flows and pyroclastic flows may affect low- and flat-lying ground almost anywhere near the summit of Mount Shasta, and mudflows may cover valley floors and other low areas as much as several tens of kilometers from the volcano.

Debris avalanches from volcanoes pose significant hazards to people and property. Debris avalanches may occur without warning, move great distances at high speed, cover large areas, initiate later blasts, and, if they enter the sea, cause tsunamis. The Mount St. Helens eruption was the first time eye-witness accounts and photographs documented the emplacement of a large volcanic debris avalanche. The debris-avalanche deposit at Mount St. Helens has provided a basis for interpretation of similar deposits elsewhere and has led to the realization that large-scale gravitational slope failures of volcanoes are more common than previously thought. Since 1980, volcanic hazard assessments have included consideration of hazards posed by debris avalanches in addition to other, more common products of eruptions, such as pyroclastic flows, lahars, lava flows, and tephra.

More than 150 Quaternary debris-avalanche deposits have been identified in recent studies based on geologic literature, topographic maps, and aerial photographs. The studies show that 17 volcanic debris avalanches are known or are inferred to have formed in the last 400 years, about 4 per century. This rate is several times the historical rate for eruptions producing Krakatau-type calderas, one of the most hazardous types of explosive eruptions. The Mount Shasta debris-avalanche deposit covers an area roughly 10 times the volume of the 1980 Mount St. Helens avalanche deposit.

15.2.5 Warning Time

Constant monitoring of all active volcanoes means that there should be more than adequate time for evacuation before an event. Since 1980, Mount St. Helens has settled into a pattern of intermittent, moderate and generally non-explosive activity, and the severity of tephra, explosions, and lava flows have diminished. The continuing eruptions of Mount St. Helens provide an unusual opportunity for scientists to study volcanic activity and to devise and test methods for predicting eruptions. Many successful predictions have been issued for eruptions since June 1980. All episodes, except for one very small event in 1984, have been successfully predicted several days to three weeks in advance. Eruption prediction and information about volcanic activity at Mount St. Helens provide the basis for hazard warnings of eruptive activity to the public and to local governments.

Volcano monitoring involves a variety of measurements and observations designed to detect changes at the surface of a volcano that reflect increasing pressure and stresses caused by the movement of magma within or beneath it. An eruption occurs when magma rises from its source or from a storage reservoir and reaches the Earth's surface. As it rises, the magma fractures overlying rocks, which causes earthquakes, and parts of the volcano deform as magma approaching the surface makes room for itself.

Monitoring active volcanoes chiefly involves the measurement of surface deformation, the investigation of earthquakes generated beneath the volcano, and the study of changes in gas emission rates accompanying the underground movement of magma. Additional geophysical and geochemical information is gathered through sampling of newly erupted lava and tephra, studies of thermal patterns on the dome, surveys of local electrical and magnetic fields, measurements of changes in the Earth's gravity field, examination of photographs, and measurements of temperature at steam vents.

Many of the methods used to monitor volcanoes were developed at the U.S. Geological Survey's Hawaiian Volcano Observatory, where the activity of the Kilauea and Mauna Loa shield volcanoes is monitored. Although the techniques are similar, their application and interpretation have been modified and adapted to the stratovolcanoes of the Cascade Range. Mt. Shasta and the other Cascade Range volcanoes are closely monitored by several groups, including the USGS Cascades Volcano Observatory.

15.3. SECONDARY HAZARDS

The secondary hazards associated with volcanic eruptions are mud flows and landslides. Where volcanic eruptions with flank failures or debris avalanches are located near the ocean or enclosed bodies of water, tsunamis and seiches (waves generated by the sudden displacement of water) may be secondary impacts.

15.4. CLIMATE CHANGE IMPACTS

Large-scale volcanic eruptions can reduce the amount of solar radiation reaching the Earth's surface, lowering temperatures in the lower atmosphere and changing atmospheric circulation patterns. The massive outpouring of gases and ash can influence climate patterns for years. Sulfuric gases convert to sub-micron droplets containing about 75 percent sulfuric acid. These particles can linger three to four years in the stratosphere. Volcanic clouds absorb terrestrial radiation and scatter a significant amount of incoming solar radiation, an effect that can last from two to three years following a volcanic eruption.

15.5. EXPOSURE

Siskiyou County is most exposed to lahars from a Mt. Shasta eruption. Lahars could travel down any of the creeks or valleys that drain Mt. Shasta. Anything in the path of a lahar is potentially exposed to damage. Mount Shasta is not considered to be a large tephra producer like Mount St. Helens. Probabilistic tephra productions maps are not available for Mount Shasta, so analysis of this risk exposure was not performed. It should be assumed that volcanic activity on any of the Southern Cascade Volcanoes could produce some degree of tephra accumulation within the planning area. However, since the degree of that potential is not currently known, this risk assessment focuses on exposure to the lahar hazard within the planning area for the Whitney Creek and Mud Creek drainages.

15.5.1 Population

Population counts of those exposed to the volcano hazard were generated by analyzing census blocks that intersect with the lahar hazard zones. Census blocks do not follow the same boundaries as the lahar zones. Therefore, the methodology used to generate these estimates evaluated the number of buildings within the potential lahar zone, and then estimated the total population by multiplying the number of residential structures by the average Siskiyou County household size of 2.4 persons per household. Using this approach, it was estimated that the exposed population is 9,293 (20 percent of the total county population).

15.5.2 Property

Most of the County would be exposed to ash fall and tephra accumulation in the event of a volcanic eruption. Property located along the lahar inundation areas would be exposed to lahar flows as well as a potential debris avalanche (see Figure 15-3). Table 15-1 lists the total number of Siskiyou County structures located in the lahar zones or debris avalanche zones and their values. The majority of the properties exposed to lahar are in unincorporated Siskiyou County. The Cities of Weed and Montague as well as Lake Shastina CSD could have significant exposure to debris avalanches.

TABLE 15-1.
STRUCTURES EXPOSED TO VOLCANO/LAHAR/DEBRIS AVALANCHE

	Buildings Exposed	Assessed Value			% of Total Assessed Value
		Structure	Contents	Total	
Dorris	0	0	0	0	0
Dunsmuir	0	0	0	0	0
Etna	0	0	0	0	0
Fort Jones	0	0	0	0	0
Montague	558[a]	$41,485,718	$30,267,898	$71,754,174	100.00%
Mt. Shasta	0	0	0	0	0
Tulelake	0	0	0	0	0
Weed	1,003[a]	$125,492,838	$108,474,307	$233,968,148	100.00%
Yreka	0	0	0	0	0
Unincorporated	2,862	$389,519,391	$287,823,099	$677,345,352	25.87%
Total	**4,423**	**$556,497,947**	**$426,565,304**	**$983,067,674**	**22.37%**

a. Structures exposed to potential debris avalanches (see Figure 15-3).

15.5.3 Critical Facilities

Infrastructure exposed to lahar inundation includes bridges that cross the Shasta and Little Shasta Rivers in the lahar zone. All transportation routes are exposed to ash fall and tephra accumulation, which could create hazardous driving conditions on roads and highways and hinder evacuations and response. Seventeen school facilities and six fire stations are exposed to lahar outflow zones. Table 15-2 summarizes the exposed critical facilities in the County.

15.5.4 Environment

The environment is highly exposed to the effects of a volcanic eruption. Even if ash fall from a volcanic eruption were to fall elsewhere, it could still be spread throughout the County by the surrounding rivers and streams. A volcanic blast would expose the local environment to many effects such as lower air quality, and many other elements that could harm local vegetation and water quality.

**TABLE 15-2.
CRITICAL FACILITIES EXPOSED TO LAHAR HAZARDS**

Medical and Health Services	6
Government/Shelters	2
Protective Function	9
Schools	17
Hazmat	0
Other Critical Function	16
Bridges	53
Water	3
Wastewater	0
Total	**106**

15.6. VULNERABILITY

15.6.1 Population

The vulnerability of the population to volcanic eruptions is considered to be fairly low due to the predictability of volcanic activity as well as early warning capability. However, in the event of a volcanic eruption the entire population of Siskiyou County is potentially vulnerable to the damaging effects of volcanic ash fall. The elderly, very young and those who experience ear, nose and throat problems are especially vulnerable to the tephra hazard. Since there is generally adequate warning time before a volcanic event, the population vulnerable to the lahar hazard consists of those who choose not to evacuate or are unable to evacuate, including the elderly and the very young.

15.6.2 Property

There are currently no generally accepted damage functions for volcanic hazards in risk assessment platforms such as HAZUS-MH. Therefore the planning team was not able to generate damage estimates for this hazard. All properties listed in Table 15-1 are vulnerable to the lahar hazard in Siskiyou County. These lahar inundation areas are the outflow areas of past volcanic eruptions and are potential outflow areas for future volcanic eruptions. The most vulnerable structures would be those that are located closest to the lahar outflow areas, those that could be within debris avalanche zones and those that are subject to pyroclastic flows.

Also vulnerable are other properties that are located throughout the County that are subject to ash fall. Among these properties, the most vulnerable structures are those that are not as structurally sound and may collapse under the excessive weight of tephra, particularly when mixed with rainfall or snow.

15.6.3 Critical Facilities

Transportation routes that intersect with the lahar inundation zone are most vulnerable, especially depending on their structural stability. The roads of most concern would be Highways 89 and 97. Any potential impact on Interstate-5 could have huge economic impacts on Siskiyou County as well as the rest of California. The most vulnerable spots are those that directly intersect with a lahar outflow area and are not structurally sound. Those in the direction of wind would also be vulnerable to tephra accumulations.

Utilities are vulnerable to damage from lahars due to the debris that may be carried. Water treatment plants and wastewater treatment plants are vulnerable to contamination from ash fall and debris that may be carried by a lahar. Most vulnerable are those that are located on or near parcels that intersect with the lahar outflow area or those that receive input from area streams and rivers that lahar flow through.

15.6.4 Environment

The environment is especially vulnerable to the effects of a volcanic eruption. Siskiyou County rivers and streams are vulnerable to damage due to ash fall, especially since ash fall can be carried throughout the County by means of the McCloud River, Whitney Creek and Mud Creek. The sulfuric acid contained in volcanic ash could be very damaging to area vegetation, waters, wildlife and air quality. A lahar could be very damaging to area rivers and streams and could redirect water flow and cause changes in water courses.

15.7. FUTURE TRENDS IN DEVELOPMENT

Lahar zones are not identified in the California State Hazard Mitigation Plan. However, most lahar zones follow drainages similar to the 100-year and 500-year floodplains of rivers or creeks. Therefore, land use and development restrictions in known floodplains and drainages adjacent to volcanoes could reduce future exposure and lessen the impacts of a volcanic lahar.

15.8. SCENARIO

In the event of a volcanic eruption in Siskiyou County, there would likely be minimal loss of life, due to adequate warnings. However, there could be a great loss of property, especially in Weed, Mount Shasta, McCloud, Dunsmuir and areas of unincorporated county. There would also be the possibility of severe environmental impacts due to lahar flows in area rivers and streams. The areas subject to the greatest risk from air-fall tephra are located mainly east and within about 50 kilometers of the summit of the volcano. Severe environmental impacts would be anticipated.

15.9. ISSUES

Since volcanic episodes have been fairly predictable in the recent past, there is probably less concern about loss of life than there is concern about loss of property, infrastructure and severe environmental impacts. Preparedness for response and recovery from potential volcanic impacts will be key to reducing the impacts to life and property within the planning area

CHAPTER 16.
WILDFIRE

16.1 GENERAL BACKGROUND

A wildland fire is any uncontrolled fire occurring on undeveloped land that requires fire suppression. Wildland fires can be ignited by natural occurring events such as lightning or by human activity such as smoking, campfires, equipment use, and arson.

> **DEFINITIONS**
>
> **Interface Area—**An area susceptible to wildland fires and where wildland vegetation and urban or suburban development occur together. An example would be smaller urban areas and dispersed rural housing in forested areas.
>
> **Wildland fire**—Fires that result in uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property in non-urban areas. Because of their distance from firefighting resources, they can be difficult to contain and can cause a great deal of destruction.

Wildland fires are costly, compromising watersheds, open space, timber, range, recreational opportunities, wildlife habitats, endangered species, historic and cultural assets, wild and scenic rivers, other scenic assets and local economies, as well as putting lives and property at risk.

Short-term loss caused by a wildland fire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural and economic resources and community infrastructure. Vulnerability to flooding increases due to the destruction of watersheds. The potential for significant damage to life and property exists in areas designated as “Wildland Urban Interface” (WUI) areas, where development is adjacent to densely vegetated areas.

On average, 10,000 wildland fires burn half a million acres in California annually. While the number of acres burned fluctuates from year to year, a trend that has remained constant is the rise in wildland fire-related losses. The challenge is in how to reduce wildland fire losses within a framework of California’s diverse ecosystems.

16.1.1 Local Conditions Related to Wildland fire

How a fire behaves primarily depends on the following:

- **Fuel**—Fuel refers to all combustible material available to burn within a given land area. Fuel types in Siskiyou County include timber, timber with grass understory, grass, brush, oak woodland and desert sage and juniper stands. Each fuel has its own burning characteristics based on moisture content, volume, live-to-dead vegetation ratio, size, arrangement and genetic makeup. Fuel loading is measured in tons per acre. Grass is considered a light fuel with approximately three-quarters of a ton per acre. Thick brush, a heavy fuel, can have a density of over 21 tons per acre. Grass burns rapidly, with a short period of intense, maximum heat output. Brush has a long sustained high heat output, making it more difficult to control. Non-compacted fine fuel such as grass spreads fire rapidly since more of its surface can be heated at one time. Compacted fuel such as pine litter burns more slowly because heat and air only reach the top of the fuel. Fuel arrangement affects how readily fuel burns and fire spreads:

- **Vertical arrangement** refers to the continuity of fuel from the forest floor to the tree canopy. Fuels with a continuous vertical arrangement are known as ladder fuels; they are influential in behavior, often turning a ground fire into a crown fire.
- **Crown or canopy closure** refers to the density of a forest created by treetops, and is very important in the lateral progression of fire through the forest canopy.

Weather—Weather conditions that influence fire behavior include temperature, relative humidity, wind speed and direction, precipitation, atmospheric stability, and aloft winds. When the temperature is high, relative humidity is low, wind speed is increasing and coming from the east-offshore flow, and there has been little or no precipitation so vegetation is dry, conditions are very favorable for extensive and severe wildland fires. These conditions occur more frequently inland where temperatures are higher and fog is less prevalent. During summer, the county's abundant vegetation dries out and becomes hazardous fuel. That fuel combined with a Chinook wind-hot and dry from the Great Basin-can produce extreme fire danger.

Precipitation in Northern California is usually at its lowest from July to September. Thunderstorm activity, which typically begins in June with wet storms, turns dry with little or no precipitation reaching the ground as the season progresses into July and August. Thunderstorms with dry lightning are more prevalent in the eastern portion of the county. July and August are when local winds (slope winds and sea breezes) predominate, with the Pacific jet stream weak and well to the north. By mid or late September, north to northeast winds return to the north half of the planning area, bringing in moist ocean air.

The Siskiyou Mountains can experience twice the number of lightning ignitions that occur in the Cascades or Olympic Mountains. The higher number of lightning ignitions is due to both increased lightning frequency and decreasing summer precipitation patterns characteristic of the Klamath-Siskiyou region. July and August have been reported as the months of greatest number of lightning strikes, but August and September have the highest proportion of actual lightning-caused fire ignitions.

Terrain—Terrain includes slope and elevation. The terrain of a region influences the amount and moisture of fuel; the impact of weather conditions such as temperature and wind; potential barriers to fire spread, such as highways and lakes; and elevation and slope of land forms (fire spreads more easily uphill than downhill).

Time of Day—A fire's peak burning period generally is between 1 p.m. and 6 p.m.

16.1.2 Wildland fire Protection Responsibility in California

Local, state, tribal, and federal organizations have primary legal (and financial) responsibility for wildland fire protection. In many instances, two fire organizations have dual primary responsibility on the same parcel of land—one for wildland fire protection and the other for structural or "improvement" fire protection. Per the *2010 California State Hazard Mitigation Plan*, this layering of responsibility and resulting dual policies, rules, practices and ordinances can cause conflict or confusion. To address wildland fire jurisdictional responsibilities, the California state legislature in 1981 adopted Public Resource Code Section 4291.5 and Health and Safety Code Section 13108.5 establishing the following responsibility areas:

Federal Responsibility Areas (FRAs)—FRAs are fire-prone wildland areas that are owned or managed by a federal agency such as the U.S. Forest Service, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, or U.S. Department of Defense. Primary financial and rule-making jurisdictional authority rests with the federal land agency. In many instances, FRAs are interspersed with private land ownership or leases. Fire protection for developed private property is usually not the responsibility of the federal land management agency; structural protection responsibility is that of a local government agency.

State Responsibility Areas (SRAs)—SRAs are lands in California where the California Department of Forestry and Fire Protection (CAL FIRE) has legal and financial responsibility for wildland fire protection and where CAL FIRE administers fire hazard classifications and building standard regulations. SRAs are defined as lands that meet the following criteria:

- Are county unincorporated areas
- Are not federally owned
- Have wildland vegetation cover rather than agricultural or ornamental plants
- Have watershed and/or range/forage value
- Have housing densities not exceeding three units per acre.
- Where SRAs contain built environment or development, the responsibility for fire protection of those improvements (non-wildland) is that of a local government agency.

Local Responsibility Areas (LRAs)—LRAs include land in cities, cultivated agriculture lands and non-flammable areas in unincorporated areas, and lands that do not meet the criteria for SRA or FRA. LRA fire protection is typically provided by city fire departments, fire protection districts, and counties, or by CAL FIRE under contract to local governments. LRAs may include flammable vegetation and WUI areas where the financial and jurisdictional responsibility for improvement and wildland fire protection is that of a local government agency.

SRAs were originally mapped in 1985 and are reviewed annually for changes or adjustments in boundaries. LRAs were originally mapped in 1996, although this mapping has not changed, many local governments have made similar designations under their own authority

16.2 HAZARD PROFILE

The *2010 California State Hazard Mitigation Plan* provides the following description of wildland fire hazard and risk:

> “The diversity of WUI settings and disagreement about alternative mitigation strategies has led to confusion and different methods of defining and mapping WUI areas. One major disagreement has been caused by terms such as “hazard” and “risk” being used interchangeably. Hazard is the physical condition that can lead to damage to a specific asset or resource. The term fire hazard is related to those physical conditions related to fire and its ability to cause damage, specifically how often a fire burns a given locale and what the fire is like when it burns (its fire behavior). Thus, fire hazard only refers to the potential characteristics of the fire itself. Risk is the likelihood of a fire occurring at a given site (burn probability) and the associated mechanisms of fire behavior that cause damage to assets and resources (fire behavior).”

Risk refers to the likelihood of a hazard and the scale of damage it is expected to produce. There are different risks for various assets/resources subjected to the same hazard. For instance, a wildland fire may cause damage to soils but not cause damage to a large tree. Consequently, risk assessments include hazard, but must also include characterization of the assets/resources.

16.2.1 Past Events

Siskiyou County has an extensive fire history due to the abundance of fuel sources combined with the climate and topography of the planning area. Per CAL FIRE, there have been 681 fires within the State Responsibility Area of Siskiyou County that burned over 15,753 acres since 2012. Table 16-1 lists the number and types of fires from 2012 to 2017. Table 16-2 list the acres burned from 2012-2017. Two of the twenty largest fires in California's fire history have occurred within Siskiyou County. In 2008 the Klamath Theater Complex fire, which was started by lightning, burned 192,038 acres and caused two fatalities. In 2014 the Happy Camp Complex fire which was also caused by lightning burned 134,056 acres, as well as consuming 6 structures.

**TABLE 16-1.
FIRES BY CAUSE—CAL FIRE SISKIYOU UNIT, 2012-2017**

	2017	2016	2015	2014	2013	2012	**Total**
Undetermined	28	18	25	20	11	19	**121**
Lightning	41	20	48	57	57	6	**229**
Campfires	1	9	1	14	0	12	**37**
Smoking	0	2	0	3	1	2	**8**
Debris Burning	23	17	15	7	16	22	**100**
Arson	12	2	6	6	3	1	**30**
Equipment Use	21	7	8	2	6	5	**49**
Playing with Fire	1	3	1	0	2	1	**8**
Vehicle	4	4	0	6	1	**3**	**18**
Railroad	0	1	2	6	0	**0**	**9**
Electrical Power	5	10	5	3	4	1	**28**
Miscellaneous	12	6	2	3	10	11	**44**
Total	**148**	**99**	**113**	**127**	**111**	**83**	**681**

**TABLE 16-2.
ACRES BURNED—CAL FIRE SISKIYOU UNIT, 2012-2017**

	2017	2016	2015	2014	2013	2012	**Total**
Acres	945.69	849.49	519.24	13155.4	132.56	150.8	**15753.24**

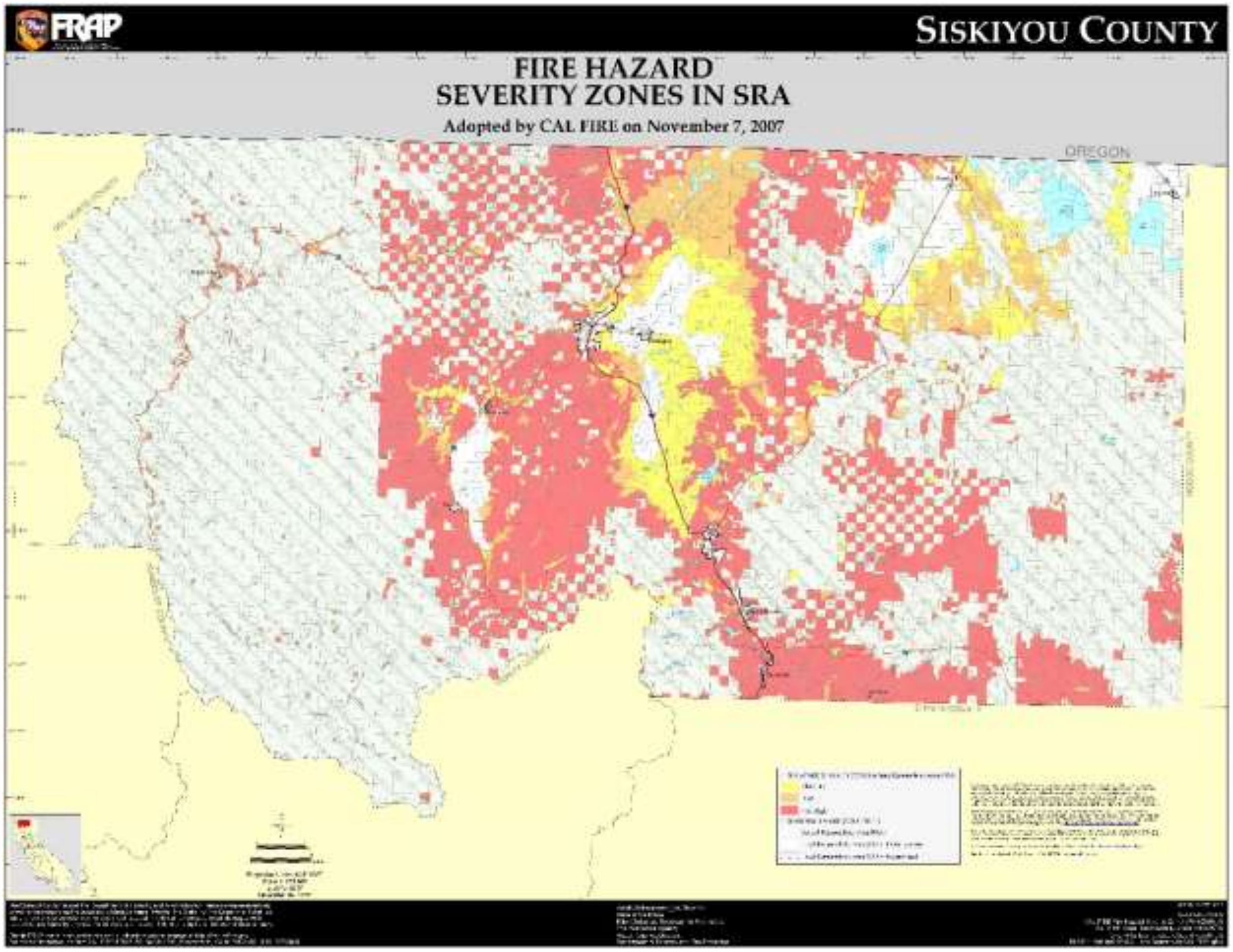
16.2.2 Location

CAL FIRE maps areas of significant fire hazards based on factors such as fuel, weather and terrain. Taking these factors into consideration, a fire hazard severity scale has been devised that characterizes zones by the number of days of moderate, high and extreme fire hazard. These zones, referred to as Fire Hazard Severity Zones (FHSZ), define the application of various mitigation strategies to reduce risk associated with wildland fires.

The FHSZ model is built from existing data and hazard constructs developed by CAL FIRE's Fire and Resource Assessment Program. The model refines the zones to characterize fire exposure mechanisms that cause ignitions to structures. The model characterizes potential fire behavior for vegetation fuels, which are by nature dynamic. Since model results are used to identify permanent engineering mitigations for structures, it is desirable that the model reflect changes in fire behavior over the length of time a structure is likely to be in place. Significant land-use changes need to be accounted for through period maintenance routines.

The model output of fire probability also is based on frequency of fire weather, ignition patterns, expected rate-of spread, and past fire history. It also accounts for flying ember production, and hazards based on the area of influence where embers are likely to land and cause ignitions. This is the principal driver of hazard in densely developed areas. A related concern in built-out areas is the relative density of vegetative fuels that can serve as sites for new spot fires within the urban core and spread to adjacent structures.

In Siskiyou County, approximately 3.2 million acres are in a high, very high or extreme FHSZ. This represents over 75 percent of the area of the County. The geography, weather patterns and vegetation in the Siskiyou County planning area provide ideal conditions for recurring wildland fires. Map 16-1 shows the FHSZ map for Siskiyou County. This map is the basis for this wildland fire risk assessment.



Map 16-1 Siskiyou County Fire Hazard Severity Zones

16.2.3 Frequency

Within the State Responsibility Area of Siskiyou County there has been an average of 109 wildland fires per year since 2010. An average of 2,004 acres per year where damaged by wildland fires within this area.

16.2.4 Severity

Potential losses from wildland fire include human life, infrastructure, structures and other improvements, and natural resources. Smoke and air pollution from wildland fires can be a health hazard, especially for sensitive populations including children, the elderly and those with respiratory and cardiovascular diseases. Wildland fire may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. In addition, wildland fire can lead to ancillary impacts such as landslides in steep ravine areas and flooding due to the impacts of silt in local watersheds.

16.2.5 Warning Time

Wildland fires are often caused by humans, intentionally or accidentally. There is no way to predict when one might break out. Since fireworks often cause brush fires, extra diligence is warranted around the Fourth of July when the use of fireworks is highest. Dry seasons and droughts are factors that greatly increase fire likelihood. Dry lightning may trigger wildland fires. Severe weather can be predicted, so special attention can be paid during weather events that may include lightning. Reliable National Weather Service lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm.

If a fire does break out and spread rapidly, residents may need to evacuate within days or hours. A fire's peak burning period generally is between 1 p.m. and 6 p.m. Once a fire has started, fire alerting is reasonably rapid in most cases. The use of developing technology such as cell phones and applications, social media and two-way radio communications has further contributed to a significant improvement in warning time.

16.3 SECONDARY HAZARDS

Wildland fires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism. Wildland fires cause the contamination of reservoirs, destroy transmission lines and contribute to flooding. They strip slopes of vegetation, exposing them to greater amounts of runoff. This in turn can weaken soils and cause failures on slopes. Major landslides can occur several years after a wildland fire. Most wildland fires burn hot and for long durations that can bake soils, especially those high in clay content, thus increasing the imperviousness of the ground. This increases the runoff generated by storm events, thus increasing the chance of flooding.

16.4 CLIMATE CHANGE IMPACTS

Fire in western ecosystems is determined by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildland fire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildland fire danger by warming and drying out vegetation. When climate alters fuel loads and fuel moisture, forest susceptibility to wildland fires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

Historically, drought patterns in the West are related to large-scale climate patterns in the Pacific and Atlantic oceans. The El Niño–Southern Oscillation in the Pacific varies on a 5- to 7-year cycle, the Pacific Decadal Oscillation varies on a 20- to 30-year cycle, and the Atlantic Multi-decadal Oscillation varies on a 65- to 80-year cycle. As these large-scale ocean climate patterns vary in relation to each other, drought conditions in the U.S. shift from region to region. El Niño years bring drier conditions to the Pacific Northwest and more fires.

Climate scenarios project summer temperature increases between 2ºC and 5°C and precipitation decreases of up to 15 percent. Such conditions would exacerbate summer drought and further promote high-elevation wildland fires, releasing stores of carbon and further contributing to the buildup of greenhouse gases. Forest response to increased atmospheric carbon dioxide—the so-called “fertilization effect”—could also contribute to more tree growth and thus more fuel for fires, but the effects of carbon dioxide on mature forests are still largely unknown. High carbon dioxide levels should enhance tree recovery after fire and young forest regrowth, if sufficient nutrients and soil moisture are available, although the latter is in question for many parts of the western United States because of climate change

16.5 EXPOSURE

16.5.1 Population

Exposed population could not be calculated directly because census block group areas do not coincide with the fire risk areas. However, in July of 2017 census population within Siskiyou County where estimated to be 43,853. This number can be used as the population susceptible to the dangers and risk of exposure to wildland fires within Siskiyou County.

16.5.2 Property

Property damage from wildland fires can be severe and can significantly alter entire communities. Private homes and buildings are especially susceptible wildland fire, as well as timber and range land throughout Siskiyou County. Private industry within the county are also highly susceptible incur significant impacts from wildland fires.

16.5.3 Critical Facilities and Infrastructure

In the event of wildland fire, there would likely be significant damage to infrastructure within Siskiyou County. Most roads would be without damage except in the worst scenarios. Power lines, communication lines and railroads are the most at risk to wildland fire because most of their supporting structures are made of wood and susceptible to burning. Many local water systems throughout Siskiyou County include wooden structure components making them highly susceptible to damage from wildland fires. Pipelines could also be damaged and could provide a source of fuel for fires, as well as a danger to fire fighters.

16.5.4 Environment

Fire is a natural and critical ecosystem process in most terrestrial ecosystems, dictating in part the types, structure, and spatial extent of native vegetation. However, wildland fires can cause severe environmental impacts:

- **Damaged Fisheries—**Critical fisheries can suffer from increased water temperatures, sedimentation, and changes in water quality.

- **Soil Erosion—**The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats.

- **Spread of Invasive Plant Species—**Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes, and become difficult and costly to control.

- **Disease and Insect Infestations—**Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees.

- **Destroyed Endangered Species Habitat—**Catastrophic fires can have devastating consequences for endangered species.

- **Soil Sterilization—**Topsoil exposed to extreme heat can become water repellant, and soil nutrients may be lost. It can take decades or even centuries for ecosystems to recover from a fire. Some fires burn so hot that they can sterilize the soil.

Many ecosystems are adapted to historical patterns of fire occurrence. These patterns, called "fire regimes," include temporal attributes (e.g., frequency and seasonality), spatial attributes (e.g., size and spatial complexity), and magnitude attributes (e.g., intensity and severity), each of which have ranges of natural variability. Ecosystem stability is threatened when any of the attributes for a given fire regime diverge from its range of natural variability.

16.6 VULNERABILITY

Structures, above-ground infrastructure, critical facilities and natural environments are all vulnerable to the wildland fire hazard within Siskiyou County. There is currently no validated damage function available to support wildland fire mitigation planning. Except as discussed in this section, vulnerable populations, property, infrastructure and environment are assumed to be the same as described in the section.

16.6.1 Population

Smoke and air pollution from wildland fires can be a severe health hazard, especially for sensitive populations, including children, the elderly and those with respiratory and cardiovascular diseases. Smoke generated by wildland fire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene). Emissions from wildland fires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather. Public health impacts associated with wildland fire include difficulty in breathing, odor, and reduction in visibility.

Wildland fire may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke.

16.6.2 Property

Damage Inspection Reports can be generated following catastrophic events such as floods, fires and other damaging incidents. Damage inspection Teams can be requested through the Incident Command System (ICS). Damage Inspection Teams (DINS) asses damaged structures and losses during and after emergency incidents. These Teams provide detailed reports to agencies involved in emergency incidents.

16.6.3 Critical Facilities and Infrastructure

Critical facilities of wood frame construction within Siskiyou County are especially vulnerable during wildland fire events. In the event of wildland fire, there would likely be damage infrastructure. Most roads would be without damage except in the worst scenarios. Power lines, communication lines and railroads are also at high risk from wildland fire because of the use of wood in their construction increase the susceptibility to damage and burning. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. Wildland fire can also have a direct impact on bridges especially those with wood construction or decking. Many bridges in areas of high to moderate fire risk are important because they provide the only ingress and egress to large areas and in some cases to isolated neighborhoods.

16.7 FUTURE TRENDS IN DEVELOPMENT

Siskiyou County and the incorporated cities have adopted general plans with associated safety elements pursuant to state laws. Maintaining the abundance of natural resources within Siskiyou County is a high priority for its land use programs and managers. To meet the intent of California state mandates, Siskiyou County and all planning partners are committed to assuring that future growth and development in the planning area take the hazards of wildland fires into account.

16.8 SCENARIO

With any additional interface development, a wildland fire in Siskiyou County would have the potential to cause even greater damage than previous fires. A major conflagration might begin with a wet spring, adding to the fuels that are already present on the forest floor. Flashy fuels would build throughout the spring. A dry summer could follow the wet spring, exacerbated by winds. The summer would continue see the continued onset of insect infestation and tree mortality. Holidays inevitably bring many hikers and campers to the area. Careless campfires, a tossed lit cigarette, or a sudden lighting storm triggering a multitude of fires.

The embers from these fires could be carried by strong winds. The deposition zone for these embers would be deep in the forests and interface zones. Fires that start in flat areas would normally move more slowly, but winds would produce rapid fire growth and long-range spotting. It is not unusual for a wildland fire pushed by wind to burn rapidly burn in one direction and then later change course. This is one of many ways that fires can escape containment, typically during periods when response capabilities are overwhelmed. These long-range spot fires would most likely merge. Suppression resources would be redirected from protecting the natural resources to saving remote subdivisions.

The worst-case scenario in Siskiyou County would probably coincide with an active fire season in the entire American west, spreading resources thin. Firefighters, exhausted or committed to fighting conflagrations in other areas, may be unavailable to assist the County. Many federal assets would be responding to other fires that started earlier in the season. While local fire districts would be valuable in the urban interface areas, they have limited wildland fire capabilities or experience. Even though the existence and spread of the fire would be well known, it may not be possible to respond to it adequately. Thus, an initially manageable fire could become significant before meaningful resources are dispatched or could arrive at the incident.

To further complicate the problem, heavy rains could follow, causing flooding and landslides and releasing tons of sediment into rivers, permanently changing the floodplains of the county and damaging sensitive habitat and riparian areas. Such a fire followed by rain could release millions of cubic yards of sediment into rivers and streams for years, creating new floodplains and changing existing ones. With the forests removed from the watershed, discharges could easily double. Floods that previously would have been expected every 50 years may occur every couple of years. With the streambeds inability to carry this increased discharge because of increased sediment, floodplains and floodplain elevations would increase. These conditions could be intensified due to the impacts of climate change.

16.9 ISSUES

The major issues for wildland fire are the following:

- Isolation of neighborhoods and communities. Several vulnerable and isolated populations are in areas of high and very high risk for wildland fire.
- Public education and outreach to people living in or near the fire hazard zones should include information about and assistance with mitigation activities such as defensible space, and advance identification of evacuation routes and safe zones.
- Wildland fires could cause landslides as a secondary natural hazard.
- A large number of the areas building stock and critical facilities are wood-frame structures in areas of high and very high risk from wildland fire.
- Climate change could affect the wildland fire hazard.
- Future growth into interface areas should continue to be managed.
- Area fire districts need to continue to train on wildland-urban interface events.
- Vegetation management activities. This would include enhancement through expansion of the target areas as well as additional resources.
- Regional consistency of higher building code standards such as residential sprinkler requirements and prohibitive combustible roof standards.

- Fire department water supply in high risk wildland fire areas.
- Expand certifications and qualifications for fire department personnel. Ensure that all firefighters are trained in basic wildland fire behavior, basic fire weather, and that all company officers and chief level officers are trained in the wildland command and strike team leader level.

CHAPTER 17.
PLANNING AREA RISK RANKING

A risk ranking was performed for the hazards of concern described in this plan. This risk ranking assesses the probability of each hazard's occurrence as well as its likely impact on the people, property, and economy of the planning area. The risk ranking was conducted via facilitated brainstorming sessions with the Steering Committee. Estimates of risk were generated with data from HAZUS-MH using methodologies promoted by FEMA. The results are used in establishing mitigation priorities.

17.1. PROBABILITY OF OCCURRENCE

The probability of occurrence of a hazard is indicated by a probability factor based on likelihood of annual occurrence:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor =2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor =1)
- No exposure—There is no probability of occurrence (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area. Table 17-1 summarizes the probability assessment for each hazard of concern for this plan.

TABLE 17-1.
PROBABILITY OF HAZARDS

Hazard Event	Probability (high, medium, low)	Probability Factor
Dam Failure	Low	1
Drought	High	3
Earthquake	Medium	2
Flood	High	3
Landslide	Medium	2
Severe Weather	High	3
Volcano	Low	1
Wildfire	High	3

17.2. IMPACT

Hazard impacts were assessed in three categories: impacts on people, impacts on property and impacts on the local economy. Numerical impact factors were assigned as follows:

- **People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows:

  - High—50 percent or more of the population is exposed to a hazard (Impact Factor = 3)
  - Medium—25 percent to 49 percent of the population is exposed to a hazard (Impact Factor = 2)
  - Low—25 percent or less of the population is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the population is exposed to a hazard (Impact Factor = 0)

- **Property**—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event:
  - High—30 percent or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)
  - Medium—15 percent to 29 percent of the total assessed property value is exposed to a hazard (Impact Factor = 2)
  - Low—14 percent or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)
- **Economy**—Values were assigned based on the percentage of the total ***property value vulnerable*** to the hazard event. Values represent estimates of the loss from a major event of each hazard in comparison to the total assessed value of the property exposed to the hazard. For some hazards, such as wildfire, landslide and severe weather, vulnerability was considered to be the same as exposure due to the lack of loss estimation tools specific to those hazards. Loss estimates separate from the exposure estimates were generated for the earthquake and flood hazards using HAZUS-MH.
  - High—Estimated loss from the hazard is 20 percent or more of the total assessed property value (Impact Factor = 3)
  - Medium—Estimated loss from the hazard is 10 percent to 19 percent of the total assessed property value (Impact Factor = 2)
  - Low—Estimated loss from the hazard is 9 percent or less of the total assessed property value (Impact Factor = 1)
  - No impact—No loss is estimated from the hazard (Impact Factor = 0)

The impacts of each hazard category were assigned a weighting factor to reflect the significance of the impact. These weighting factors are consistent with those typically used for measuring the benefits of hazard mitigation actions: impact on people was given a weighting factor of 3; impact on property was given a weighting factor of 2; and impact on the operations was given a weighting factor of 1.

Table 17-2, Table 17-3 and Table 17-4 summarize the impacts for each hazard.

TABLE 17-2.
IMPACT ON PEOPLE FROM HAZARDS

Hazard Event	Impact (high, medium, low)	Impact Factor	Multiplied by Weighting Factor (3)
Dam Failure	Low	1	3 x 1= 3
Drought	Low	1	3 x 1 = 3
Earthquake	Medium	2	3 x 2 = 6
Flood	Medium	2	3 x 2 = 6
Landslide	Low	1	3 x 1 = 3
Severe Weather	High	3	3 x 3 = 9
Volcano	Medium	2	3 x 2 = 6
Wildfire	High	3	3 x 3 = 9

TABLE 17-3.
IMPACT ON PROPERTY FROM HAZARDS

Hazard Event	Impact (high, medium, low)	Impact Factor	Multiplied by Weighting Factor (3)
Dam Failure	Low	1	2 x 1 = 2
Drought	Low	1	2 x 1 = 2
Earthquake	Medium	2	2 x 2 = 4
Flood	Medium	2	2 x 2 = 4
Landslide	Low	1	2 x 1 = 2
Severe Weather	High	3	2 x 3 = 6
Volcano	Medium	2	2 x 2 = 4
Wildfire	High	3	2 x 3 = 6

TABLE 17-4.
IMPACT ON ECONOMY FROM HAZARDS

Hazard Event	Impact (high, medium, low)	Impact Factor	Multiplied by Weighting Factor (3)
Dam Failure	Low	1	1 x 1 = 1
Drought	Medium	2	1 x 2 = 2
Earthquake	Medium	2	1 x 2 = 2
Flood	Medium	2	1 x 2 = 2
Landslide	Low	1	1 x 1 = 1
Severe Weather	High	3	1 x 3 = 3
Volcano	High	3	1 x 3 = 3
Wildfire	High	3	1 x 3 = 3

17.3. RISK RATING AND RANKING

The risk rating for each hazard was determined by multiplying the probability factor by the sum of the weighted impact factors for people, property and operations, as summarized in Table 17-5.

Based on these ratings, a priority of high, medium or low was assigned to each hazard. The hazards ranked as being of highest concern are severe weather, wildfire and flood. Hazards ranked as being of medium concern are earthquake and drought. The hazards ranked as being of lowest concern are volcano, landslide and dam failure. Table 17-6 shows the hazard risk ranking.

TABLE 17-5.
HAZARD RISK RATING

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Dam Failure	1	(1+ 2+ 3) = 6	1 x 6 = 6
Drought	3	(3+ 2+2) = 7	3 x 7 = 21
Earthquake	2	(6+4+2) = 12	2 x 12 = 24
Flood	3	(6+4+2) = 12	3 x 12 = 36
Landslide	2	(3+2+1) = 6	2 x 6 = 12
Severe Weather	3	(9+6+3) = 18	3 x 18 = 54
Volcano	1	(6+4+3) = 13	1 x 13 = 13
Wildfire	3	(9+6+3) = 18	3 x 18 = 54

**TABLE 17-6.
HAZARD RISK RANKING**

Hazard Ranking	Hazard Event	Category
1	Severe Weather	High
1	Wildfire	High
2	Flood	High
3	Earthquake	Medium
4	Drought	Medium
5	Volcano	Low
6	Landslide	Low
7	Dam Failure	Low

CHAPTER 18.
OTHER HAZARDS OF INTEREST

The hazards that are assessed in 0 through Chapter 16 and rated and ranked in Chapter 17 are those that present significant risks within the Siskiyou County planning area. Additional hazards, both natural and human-caused, were identified by the Steering Committee as having some potential to impact the planning area, but at a much lower risk level than the hazards of concern. These other hazards are identified as hazards of interest.

A short profile of each hazard of interest, including a qualitative discussion of its potential to impact Siskiyou County, is included in the sections below. No formal risk assessment of these hazards was performed, and no mitigation initiatives have been developed to address them. However, all planning partners for this plan should be aware of these hazards and should take steps to reduce the risks they present whenever it is practical to do so.

18.1. AIR QUALITY/SMOKE POLLUTION

While an individual air quality or smoke pollution incident is not as significant as a flood or earthquake, cumulatively, air quality degradation is likely more hazardous to the health of vulnerable populations. Pollutants include smog, soot, particulate matter and toxic air contaminants. Air pollution is a continuous problem, particularly within the densely populated basins. Smoke pollution from wildfires can be a problem in almost any region. Dense smoky air tends to settle in the mountainous valleys of Siskiyou County, making breathing and visibility challenging, especially for those who work outdoors or have respiratory issues. Fortunately, with increasing regulation, toxic emissions are declining throughout the state; however, the reduction in smoke pollution rests with improved wildfire mitigation techniques.

18.2. AVALANCHES

18.2.1 How Avalanches Occur

Avalanches can occur whenever a sufficient depth of snow is deposited on slopes steeper than about 20 degrees, with the most dangerous coming from slopes in the 35- to 40-degree range. Avalanche-prone areas can be identified with some accuracy, since they typically follow the same paths year after year, leaving scarring on the paths. However, unusual weather conditions can produce new paths or cause avalanches to extend beyond their normal paths.

In the spring, warming of the snowpack occurs from below (from the warmer ground) and above (from warm air, rain, etc.). Warming can be enhanced near rocks or trees that transfer heat to the snowpack. The effects of a snowpack becoming weak may be enhanced in steeper terrain where the snowpack is shallow, and over smooth rock faces that may focus meltwater and produce “glide cracks.” Such slopes may fail during conditions that encourage melt.

Wind can affect the transfer of heat into the snowpack and associated melt rates of near-surface snow. During moderate to strong winds, the moistening near-surface air in contact with the snow is constantly mixed with drier air above through turbulence. As a result, the air is continually drying out, which enhances evaporation from the snow surface rather than melt. Heat loss from the snow necessary to drive the evaporation process cools off near-surface snow and results in substantially less melt than otherwise might occur, even if temperatures are well above freezing.

When the snow surface becomes uneven in spring, air flow favors evaporation at the peaks, while calmer air in the valleys favors condensation there. Once the snow surface is wet, its ability to reflect solar energy drops dramatically; this becomes a self-perpetuating process, so that the valleys deepen (favoring calmer air and more heat transfer), while more evaporation occurs near the peaks, increasing the differential between peaks and valleys. However, a warm wet storm can quickly flatten the peaks as their larger surface area exposed to warm air, rain or condensation hastens their melt over the sheltered valleys.

18.2.2 Local Avalanche History

The California State Hazard Mitigation Plan indicates that avalanches are threats to communities, residents and visitors to the high mountain areas of Siskiyou County. Significant events have damaged or destroyed ski resorts at Mt. Shasta, they have also blocked and damaged roadways. The Shasta Avalanche Center at the Shasta-Trinity National Forest in Mt. Shasta provides up-to-date snow conditions and avalanche danger levels. The resources provided by the Center are primarily geared toward the general public who engage in snow-related recreational activities.

According to Eric White, lead climbing ranger and avalanche specialist at the USFS Mt. Shasta Ranger Station, there is only a patchy history of avalanches on Mt. Shasta. There is some data from avalanches in the old Ski Bowl when the Ski Bowl resort was operating, listed on West Wide Avalanche Network. There is little to no information before that and little after the Ski Bowl closed until the Avalanche Center opened in 1998. While hundreds of avalanches occur in the surrounding area every season, there have been only two avalanche fatalities on Mt. Shasta:

- One fatality occurred on April 2, 1983 when three climbers were digging a snow cave on Green Butte at the top of Powder Bowl. Two of the climbers were caught up in the avalanche but survived (one was carried and partially buried, and the other was carried on the surface of the avalanche). The third climber, a 28-year-old male, was carried 600 vertical feet and was buried 5 feet deep. He was found by a probe team 24 hours after the avalanche occurred.
- The other fatality occurred on November 19, 1973. A party of five climbers were heading up Avalanche Gulch after the mountain had received around 5.5 feet of snow and strong winds. November 19 was the first clear day of the month. The climbers were near Helen Lake (at 10,400 feet) in Avalanche Gulch when they triggered the slide at around 3 p.m. Three of the five climbers ended up on the surface of the debris. One climber was buried with just his arm showing but was found by the three other climbers and was dug out unharmed. A search for the fifth climber began the following morning, but poor visibility, high winds, heavy snowfall and avalanche danger caused the search to be abandoned. The body of the 25-year-old male was found 11 months later by some climbers in Avalanche Gulch.

Mt. Shasta’s Ranger Station has recorded close calls involving minor injuries and lost ski equipment on Mt. Shasta, especially in Giddy-Giddy Gulch, Avalanche Gulch, Sun Bowl, Powder Bowl, Old Ski Bowl and Gray Butte. There have been human-triggered avalanches and close calls in other high winter-use areas like Castle Lake, Mt. Eddy and Ash Creek Butte. There was a report of a complete avalanche burial in Ash Creek Butte in 2000, but the snowmobiler was recovered alive by his companions.

Several avalanches have damaged buildings and the lift at the Mt. Shasta Ski Bowl. A massive avalanche in the Old Ski Bowl in 1995, long after the resort had closed, covered the road with deep snow, huge trees and boulders and kept the road closed through the summer of 1995. It also removed a quarter mile of power lines, which have since been replaced by underground wires in the lower portion of the Old Ski Bowl. A USFS climbing ranger mapped the approximate avalanche debris area with GPS a few years ago. Most of the historic avalanche pathways on Mt. Shasta are away from structures and power lines. Some avalanches have occurred on the Everitt Memorial Hwy (County Road A10) without injuries or damage, mostly in the long road cut below Bunny Flat. Avalanches in Powder Bowl on Green Butte have historically crossed the road, but that section of road is closed to automobiles in the winter.

A large avalanche reported near Upper Soda Springs in north Dunsmuir in January 1890 dammed the river and buried a train engine and snowplow on the train tracks. USFS Mt. Shasta Rangers have also heard reports of small avalanches on the Callahan/Cecilville Road and the Forks/Etna Road.

18.2.3 Potential Avalanche Scenario

Serious avalanche concerns include the potential for a mass casualty incident in Avalanche Gulch during late spring when climbing reaches its peak. Hundreds of climbers visit Avalanche Gulch on the weekends in May and June. Recently, five human-triggered slides occurred in Avalanche Gulch in May within an hour of each other and within one square mile.

Another concerning scenario involves avalanches at Castle Lake (or other lakes in the area), where a victim could be buried on the lake and broken ice would create a dangerous rescue situation. Castle Lake and Cliff Lake each have active avalanche pathways that deposit snow into the lakes and are becoming increasingly popular ski/snowboard lines. In an avalanche rescue emergency, the nearest trained ice rescue team could be many miles away. More information about the location and extent of avalanches in Siskiyou County is needed to mitigate any future losses to life and property.

18.3. ENERGY SHORTAGES

The 2000-2001 California electricity crisis brought to light issues about the state’s dependency on out-of-state energy resources and in-state transmission challenges. Since then, the state has taken steps to lessen market manipulation, construct additional transmission systems and implement energy conservation programs, yet California continues to be challenged with population growth and demand for additional power, along with severe weather events that necessitate considerable energy supplies.

The impacts of energy shortages are felt most severely by vulnerable populations. Those who rely on electrical power for life-sustaining medical equipment and the young or elderly subject to extreme heat or severe cold are most vulnerable to the loss of power.

Siskiyou County’s planning partners can increase their ability to cope with energy shortages and power disruptions. Some mitigation actions include strengthening minimum building code standards and requiring backup generators, modifying zoning ordinances for electrical power requirements and improving growth and development trends to better understand future demand for energy. Additionally, the state has developed an online toolkit (California OES, 2003) to help local governments address electric power disruption. This document identifies potential disruptions, types of customers affected and the types of facilities and populations with critical electrical needs.

18.4. FISH DISEASE

Like humans, fish can suffer from disease and parasites. Fish scales and a mucus layer provide a first line of defense from diseases, however pathogens may breach this layer and cause inflammation and infection. Low-grade infections may become fatal when things that cause fish stress, such as natural droughts, pollution, invasive plant or animal species or predators are introduced. The transfer of non-local fish bait can also transmit fish diseases such as whirling disease.

Some diseases may result in mass fish die-offs. A recently discovered disease causes huge fish kills in shallow marine or lake waters. Where large numbers of fish are confined to a relatively small area, excretions from the fish may produce toxins and the fish can develop bleeding lesions causing their scales to fall off in the water. Marine or freshwater microorganisms then feast on the blood and flakes of tissue while the affected fish die. Fish kills by these dinoflagellates are common, and they may also have been responsible for kills in the past that were thought to have had other causes. Mass fish kills like these can be viewed as natural mechanisms for regulating the population of exceptionally abundant fish. To exacerbate the problem, the rate at which the kills occur increases as polluted land runoff increases.

Improving fish habitat and environments is a critical step Siskiyou County's planning partners can take to reduce fish diseases. Some mitigation alternatives include strengthening land management and stormwater runoff management regulations to reduce the amount of pollutants flowing into fish habitats. Another mitigation action involves using cleaner fish, such as wrasses, to attract and remove external parasites from the skin of other fish. Antibiotics and pesticides may also be used to control diseases and parasites in fish.

It is commonly known that the transportation of fish from one location to another is against the law and causes the introduction of fish and parasites alien to the ecosystem. Mitigation opportunities exist to improve angler education about the spread of fish disease and consistent enforcement by agencies responsible for managing fish and fish habitats.

18.5. HAZARDOUS MATERIALS

According to the California State Hazard Mitigation Plan, hazardous materials are substances that are flammable, combustible, explosive, toxic, noxious, corrosive, an oxidizer, an irritant or radioactive. Hazardous material spills or releases can pose a risk to life, health and property. An incident may result in the evacuation of a facility or an entire neighborhood. In addition to the immediate risk from hazardous materials releases to life, public health, air quality, water quality and the environment, long-term public health and environmental impacts may result from sustained use or exposure to certain substances.

Federal laws that regulate hazardous materials include the Superfund Amendments and Reauthorization Act of 1986, the Resource Conservation and Recovery Act of 1976, the October 2007 Hazardous Materials Transportation Act, the Occupational Safety and Health Act, the Toxic Substances Control Act, and the Clean Air Act. California law established the Unified Program, which consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections and enforcement activities of six environmental and emergency response programs. The programs are regulated and overseen by Cal EPA, however local governments are responsible for implementing and enforcing the standards.

Hazardous materials are everywhere in Siskiyou County and are likely accidently released or spilled numerous times each day. Eliminating these widespread substances throughout the county would be nearly impossible, but the threats of an accidental release or spill may be reduced by mitigation. The following required mitigation efforts pertaining to hazardous substances are implemented through state and federal regulation:

- Fixed Facilities:
  - Process hazard analysis through the California Division of Occupational Safety and Health
  - Policies and procedures, hazard communication, and training
  - Placarding and labeling of containers
  - Hazard assessment
  - Security
  - Process and equipment maintenance

  - Mitigating techniques (flares, showers, mists, containment vessels, failsafe devices)
  - Use of inherently safer alternative products
  - Emergency plans and coordination
  - Response procedures
- Transported:
  - Placards and labeling of containers
  - Proper container established for material type
  - Random inspections of transporters
  - Safe handling policies and procedures
  - Hazard communications
  - Training for handlers
  - Permitting
  - Transportation flow studies, e.g., restricting HAZMAT transportation over certain routes.

18.6. NOXIOUS WEEDS

The California Department of Food and Agriculture Plant Health Division is responsible for protecting California's plant and flood supply by keeping invasive species out of the state. The Integrated Pest Control Branch conducts a wide range of pest management and eradication projects; however, some non-native plant species introduced into California spread aggressively and may be able to disrupt agricultural production and ecological systems. Some invasive species are known to cause harmful impacts, including lowering agricultural productivity, altering ecosystem functions (e.g., nutrient cycles, hydrology and wildfire frequency), outcompeting and excluding native plants and animals, and adding to maintenance costs of roads, parks and waterways. Noxious and invasive weeds infest millions of acres in the state and result in hundreds of millions of dollars in control costs and lost productivity. Eradicating weeds at the earliest stages of invasion is widely recognized as more cost-effective and efficient than the long-term commitment of resources to ongoing containment or eliminating established weeds.

Siskiyou County's Environmental and Natural Resource Protection Program promotes and protects the agricultural industry of Siskiyou County and provides leadership in developing policy on issues facing the county's agricultural resources in the following areas related to noxious weed abatement:

- Pesticide use enforcement and environmental monitoring
- Plant protection and quarantine inspection
- Pest detection
- Vegetation management
- Vertebrate pest management
- Nursery inspection
- Seed inspection
- Apiary Inspection
- Integrated pest management.

PART 3 — MITIGATION STRATEGY

CHAPTER 19.
MITIGATION ALTERNATIVES

Catalogs of hazard mitigation alternatives were developed that present a broad range of alternatives to be considered for use in the planning area, in compliance with 44CFR (Section 201.6(c)(3)(ii)). One catalog was developed for each hazard of concern evaluated in this plan. The catalogs for each hazard are listed in Table 19-1 through Table 19-8. The catalogs present alternatives that are categorized in two ways:

- By what the alternative would do:
  - Manipulate a hazard
  - Reduce exposure to a hazard
  - Reduce vulnerability to a hazard
  - Increase the ability to respond to or be prepared for a hazard
- By who would have responsibility for implementation:
  - Individuals
  - Businesses
  - Government.

Hazard mitigation initiatives recommended in this plan were selected from among the alternatives presented in the catalogs. The catalogs provide a baseline of mitigation alternatives that are backed by a planning process, are consistent with the planning partners' goals and objectives, and are within the capabilities of the partners to implement. However, not all the alternatives meet all the planning partners' selection criteria.

**TABLE 19-1.
CATALOG OF MITIGATION ALTERNATIVES—DAM FAILURE**

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
• None	1. Remove dams 2. Remove levees 3. Harden dams	1. Remove dams 2. Remove levees 3. Harden dams
Reduce Exposure		
• Relocate out of dam failure inundation areas.	• Replace earthen dams with hardened structures	1. Replace earthen dams with hardened structures 2. Relocate critical facilities out of dam failure inundation areas. 3. Consider open space land use in designated dam failure inundation areas.
Reduce Vulnerability		
• Elevate home to appropriate levels.	• Flood-proof facilities within dam failure inundation areas	1. Adopt higher regulatory floodplain standards in mapped dam failure inundation areas. 2. Retrofit critical facilities within dam failure inundation areas.
Increase Preparation or Response Capability		
1. Learn about risk reduction for the dam failure hazard. 2. Learn the evacuation routes for a dam failure event. 3. Educate yourself on early warning systems and the dissemination of warnings.	1. Educate employees on the probable impacts of a dam failure. 2. Develop a Continuity of Operations Plan.	1. Map dam failure inundation areas. 2. Enhance emergency operations plan to include a dam failure component. 3. Institute monthly communications checks with dam operators. 4. Inform the public on risk reduction techniques 5. Adopt real-estate disclosure requirements for the re-sale of property located within dam failure inundation areas. 6. Consider the probable impacts of climate in assessing the risk associated with the dam failure hazard. 7. Establish early warning capability downstream of listed high hazard dams. 8. Consider the residual risk associated with protection provided by dams in future land use decisions.

TABLE 19-2.
CATALOG OF MITIGATION ALTERNATIVES—DROUGHT

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	None	Groundwater recharge through stormwater management
Reduce Exposure		
None	None	Identify and create groundwater backup sources
Reduce Vulnerability		
1. Drought-resistant landscapes 2. Reduce water system losses 3. Modify plumbing systems (through water saving kits)	1. Drought-resistant landscapes 2. Reduce private water system losses	1. Water use conflict regulations 2. Reduce water system losses 3. Distribute water saving kits
Increase Preparation or Response Capability		
• Practice active water conservation	• Practice active water conservation	1. Public education on drought resistance 2. Identify alternative water supplies for times of drought; mutual aid agreements with alternative suppliers 3. Develop drought contingency plan 4. Develop criteria “triggers” for drought-related actions 5. Improve accuracy of water supply forecasts 6. Modify rate structure to influence active water conservation techniques

**TABLE 19-3.
CATALOG OF MITIGATION ALTERNATIVES—EARTHQUAKE**

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	None	None
Reduce Exposure		
• Locate outside of hazard area (off soft soils)	• Locate or relocate mission-critical functions outside hazard area where possible	• Locate critical facilities or functions outside hazard area where possible
Reduce Vulnerability		
1. Retrofit structure (anchor house structure to foundation) 2. Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances) 3. Build to higher design	1. Build redundancy for critical functions and facilities 2. Retrofit critical buildings and areas housing mission-critical functions	1. Harden infrastructure 2. Provide redundancy for critical functions 3. Adopt higher regulatory standards
Increase Preparation or Response Capability		
1. Practice "drop, cover, and hold" 2. Develop household mitigation plan, such as creating a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event 3. Keep cash reserves for reconstruction 4. Become informed on the hazard and risk reduction alternatives available. 5. Develop a post-disaster action plan for your household	1. Adopt higher standard for new construction; consider "performance-based design" when building new structures 2. Keep cash reserves for reconstruction 3. Inform your employees on the possible impacts of earthquake and how to deal with them at your work facility. 4. Develop a Continuity of Operations Plan	1. Provide better hazard maps 2. Provide technical information and guidance 3. Enact tools to help manage development in hazard areas (e.g., tax incentives, information) 4. Include retrofitting and replacement of critical system elements in capital improvement plan 5. Develop strategy to take advantage of post-disaster opportunities 6. Warehouse critical infrastructure components such as pipe, power line, and road repair materials 7. Develop and adopt a Continuity of Operations Plan 8. Initiate triggers guiding improvements (such as <50% substantial damage or improvements) 9. Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities. 10. Develop a post-disaster action plan that includes grant funding and debris removal components.

TABLE 19-4.
CATALOG OF MITIGATION ALTERNATIVES—FLOOD

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
1. Clear stormwater drains and culverts 2. Institute low-impact development techniques on property	1. Clear stormwater drains and culverts 2. Institute low-impact development techniques on property	1. Maintain drainage system 2. Institute low-impact development techniques on property 3. Dredging, levee construction, and providing regional retention areas 4. Structural flood control, levees, channelization, or revetments. 5. Stormwater management regulations and master planning 6. Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff
Reduce Exposure		
1. Locate outside of hazard area 2. Elevate utilities above base flood elevation 3. Institute low impact development techniques on property	1. Locate business critical facilities or functions outside hazard area 2. Institute low impact development techniques on property	1. Locate or relocate critical facilities outside of hazard area 2. Acquire or relocate identified repetitive loss properties 3. Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks. 4. Adopt land development criteria such as planned unit developments, density transfers, clustering 5. Institute low impact development techniques on property 6. Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff
Reduce Vulnerability		
1. Retrofit structures (elevate structures above base flood elevation) 2. Elevate items within house above base flood elevation 3. Build new homes above base flood elevation 4. Flood-proof existing structures	1. Build redundancy for critical functions or retrofit critical buildings 2. Provide flood-proofing measures when new critical infrastructure must be located in floodplains	1. Harden infrastructure, bridge replacement program 2. Provide redundancy for critical functions and infrastructure 3 Adopt appropriate regulatory standards, such as: increased freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non-conversion deed restrictions. 4. Stormwater management regulations and master planning. 5. Adopt “no-adverse impact” floodplain management policies that strive to not increase the flood risk on downstream communities.

**TABLE 19-4.
CATALOG OF MITIGATION ALTERNATIVES—FLOOD**

Personal Scale	Corporate Scale	Government Scale
Increase Preparation or Response Capability		
1. Buy flood insurance 2. Develop household mitigation plan, such as retrofit savings, communication capability with outside, 72-hour self-sufficiency during and after an event	1. Keep cash reserves for reconstruction 2. Support and implement hazard disclosure for the sale/re-sale of property in identified risk zones. 3. Solicit cost-sharing through partnerships with other stakeholders on projects with multiple benefits.	1. Produce better hazard maps 2. Provide technical information and guidance 3. Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information) 4. Incorporate retrofitting or replacement of critical system elements in capital improvement plan 5. Develop strategy to take advantage of post-disaster opportunities 6. Warehouse critical infrastructure components 7. Develop and adopt a Continuity of Operations Plan 8. Consider participation in the Community Rating System 9. Maintain existing data and gather new data needed to define risks and vulnerability 10. Train emergency responders 11. Create a building and elevation inventory of structures in the floodplain 12. Develop and implement a public information strategy 13. Charge a hazard mitigation fee 14. Integrate floodplain management policies into other planning mechanisms within the planning area. 15. Consider the probable impacts of climate change on the risk associated with the flood hazard 16. Consider the residual risk associated with structural flood control in future land use decisions 17. Enforce National Flood Insurance Program 18. Adopt a Stormwater Management Master Plan

TABLE 19-5.
CATALOG OF MITIGATION ALTERNATIVES—LANDSLIDE

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
1. Stabilize slope (dewater, armor toe) 2. Reduce weight on top of slope 3. Minimize vegetation removal and the addition of impervious surfaces.	1. Stabilize slope (dewater, armor toe) 2. Reduce weight on top of slope	1. Stabilize slope (dewater, armor toe) 2. Reduce weight on top of slope
Reduce Exposure		
• Locate structures outside of hazard area (off unstable land and away from slide-run out area)	• Locate structures outside of hazard area (off unstable land and away from slide-run out area)	1. Acquire properties in high-risk landslide areas. 2. Adopt land use policies that prohibit the placement of habitable structures in high-risk landslide areas.
Reduce Vulnerability		
• Retrofit home.	• Retrofit at-risk facilities.	1. Adopt higher regulatory standards for new development within unstable slope areas. 2. Armor/retrofit critical infrastructure against the impact of landslides.
Increase Preparation or Response Capability		
1. Institute warning system, and develop evacuation plan 2. Keep cash reserves for reconstruction 3. Educate yourself on risk reduction techniques for landslide hazards.	1. Institute warning system, and develop evacuation plan 2. Keep cash reserves for reconstruction 3. Develop a Continuity of Operations Plan 4. Educate employees on the potential exposure to landslide hazards and emergency response protocol.	1. Produce better hazard maps 2. Provide technical information and guidance 3. Enact tools to help manage development in hazard areas: better land controls, tax incentives, information 4. Develop strategy to take advantage of post-disaster opportunities 5. Warehouse critical infrastructure components 6. Develop and adopt a Continuity of Operations Plan 7. Educate the public on the landslide hazard and appropriate risk reduction alternatives.

TABLE 19-6.
CATALOG OF MITIGATION ALTERNATIVES—SEVERE WEATHER

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	None	None
Reduce Exposure		
None	None	None
Reduce Vulnerability		
1. Insulate house 2. Provide redundant heat and power 3. Insulate structure 4. Plant appropriate trees near home and power lines (“Right tree, right place” National Arbor Day Foundation Program)	1. Relocate critical infrastructure (such as power lines) underground 2. Reinforce or relocate critical infrastructure such as power lines to meet performance expectations 3. Install tree wire	1. Harden infrastructure such as locating utilities underground 2. Trim trees back from power lines 3. Designate snow routes and strengthen critical road sections and bridges
Increase Preparation or Response Capability		
1. Trim or remove trees that could affect power lines 2. Promote 72-hour self-sufficiency 3. Obtain a NOAA weather radio. 4. Obtain an emergency generator.	1. Trim or remove trees that could affect power lines 2. Create redundancy 3. Equip facilities with a NOAA weather radio 4. Equip vital facilities with emergency power sources.	1. Support programs such as “Tree Watch” that proactively manage problem areas through use of selective removal of hazardous trees, tree replacement, etc. 2. Establish and enforce building codes that require all roofs to withstand snow loads 3. Increase communication alternatives 4. Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors. 5. Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines 6. Provide NOAA weather radios to the public

TABLE 19-7.
CATALOG OF RISK REDUCTION MEASURES—VOLCANO

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	None	Limited success has been experienced with lava flow diversion structures
Reduce Exposure		
Relocate outside of hazard area, such as lahar zones	• Locate mission critical functions outside of hazard area, such as lahar zones whenever possible.	Locate critical facilities and functions outside of hazard area, such as lahar zones, whenever possible.
Reduce Vulnerability		
None	• Protect corporate critical facilities and infrastructure from potential impacts of severe ash fall (air filtration capability)	• Protect critical facilities from potential problems associated with ash fall. • Build redundancy for critical facilities and functions.
Increase Preparation or Response Capability		
• Develop and practice a household evacuation plan.	1. Develop and practice a corporate evacuation plan 2. Inform employees through corporate sponsored outreach 3. Develop a cooperative	1. Public outreach, awareness. 2. Tap into state volcano warning system to provide early warning to Siskiyou County residents of potential ash fall problems

**TABLE 19-8.
CATALOG OF MITIGATION ALTERNATIVES—WILDFIRE**

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
• Clear potential fuels on property such as dry overgrown underbrush and diseased trees	• Clear potential fuels on property such as dry underbrush and diseased trees	1. Clear potential fuels on property such as dry underbrush and diseased trees 2. Implement best management practices on public lands.
Reduce Exposure		
1. Create and maintain defensible space around structures 2. Locate outside of hazard area 3. Mow regularly	1. Create and maintain defensible space around structures and infrastructure 2. Locate outside of hazard area	1. Create and maintain defensible space around structures and infrastructure 2. Locate outside of hazard area 3. Enhance building code to include use of fire resistant materials in high hazard area.
Reduce Vulnerability		
1. Create and maintain defensible space around structures and provide water on site 2. Use fire-retardant building materials 3. Create defensible spaces around home	1. Create and maintain defensible space around structures and infrastructure and provide water on site 2. Use fire-retardant building materials 3. Use fire-resistant plantings in buffer areas of high wildfire threat.	1. Create and maintain defensible space around structures and infrastructure 2. Use fire-retardant building materials 3. Use fire-resistant plantings in buffer areas of high wildfire threat. 4. Consider higher regulatory standards (such as Class A roofing) 5. Establish biomass reclamation initiatives
Increase Preparation or Response Capability		
1. Employ techniques from the National Fire Protection Association's Firewise Communities program to safeguard home 2. Identify alternative water supplies for fire fighting 3. Install/replace roofing material with non-combustible roofing materials.	1. Support Firewise community initiatives. 2. Create /establish stored water supplies to be utilized for firefighting.	1. More public outreach and education efforts, including an active Firewise program 2. Possible weapons of mass destruction funds available to enhance fire capability in high-risk areas 3. Identify fire response and alternative evacuation routes 4. Seek alternative water supplies 5. Become a Firewise community 6. Use academia to study impacts/solutions to wildfire risk 7. Establish/maintain mutual aid agreements between fire service agencies. 8. Create/implement fire plans 9. Consider the probable impacts of climate change on the risk associated with the wildfire hazard in future land use decisions

CHAPTER 20.
AREA-WIDE MITIGATION INITIATIVES

20.1. SELECTED COUNTY-WIDE MITIGATION INITIATIVES

The planning partners and the Steering Committee determined that some initiatives from the mitigation catalogs could be implemented to provide hazard mitigation benefits countywide. Table 20-1 lists the recommended countywide initiatives, the lead agency for each, and the proposed timeline. The parameters for the timeline are as follows:

- Short Term = to be completed in 1 to 5 years
- Long Term = to be completed in greater than 5 years
- Ongoing = currently being funded and implemented under existing programs.

20.2. BENEFIT/COST REVIEW

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

Cost ratings were defined as follows:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Benefit ratings were defined as follows:

- **High—**Project will provide an immediate reduction of risk exposure for life and property.
- **Medium—**Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low—**Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

TABLE 20-1.
ACTION PLAN—COUNTYWIDE MITIGATION INITIATIVES

Hazards Addressed	Lead Agency	Possible Funding Sources or Resources	Time Line[a]	Objectives
CW-1—Continue to maintain a countywide hazard mitigation plan website to house the plan and plan updates, in order to provide the public an opportunity to monitor plan implementation and progress. Each planning partner may support the initiative by including an initiative in its action plan and creating a web link to the website.				
All Hazards	County OES	General Fund	Short term/ongoing	1, 5, 7, 8
CW-2—Leverage public outreach partnering capabilities to inform and educate the public about hazard mitigation and preparedness.				
All Hazards	County OES	General Fund	Short term/ongoing	1, 5, 7, 8, 9
CW-3—Coordinate all mitigation planning and project efforts, including grant application support, to maximize all resources available to the planning partnership.				
All Hazards	County OES	General Fund, FEMA mitigation grants	Short term/ongoing	1, 2, 3, 4, 5, 7, 8, 9
CW-4—Support the collection of improved data (hydrologic, geologic, topographic, volcanic, historical, etc.) to better assess risks and vulnerabilities.				
All Hazards	County OES	General Fund, FEMA mitigation grants	Short term/ongoing	1, 3, 5, 7, 8
CW-5—Provide coordination and technical assistance in grant application preparation that includes assistance in cost vs. benefit analysis for grant-eligible projects.				
All Hazards	County OES	General Fund, FEMA mitigation grants	Short term/ongoing	1, 8
CW-6—Where appropriate, support retrofitting, purchase, or relocation of structures or infrastructure located in hazard-prone areas to protect structures/infrastructure from future damage, with repetitive loss and severe repetitive loss properties as priority when applicable.				
All Hazards	County OES	FEMA mitigation grants	Long term	1, 2, 4, 5, 6
CW-7— Continue to maintain the Steering Committee as a viable committee to monitor the progress of the hazard mitigation plan, provide technical assistance to Planning Partners and oversee the update of the plan as necessary.				
All Hazards	County OES	General Fund	Short term/ongoing	1, 8
CW-8— In areas of the County with urban/wildland fire interface exposure, continue to promote access for ingress and egress as part of a defensible space initiative.				
Wildfire	Siskiyou Area Fire Safe Council	FEMA mitigation Grants, Fire Safe Council funding sources	Short term/ongoing	1,5,7,8,9
CW-9— Promote landscape approach to fuel reduction as part of a defensible space initiative in areas with high wildfire exposure.				
Wildfire	Siskiyou Area Fire Safe Council	FEMA mitigation Grants, Fire Safe Council funding sources	Short term/ongoing	1,5,7,8,9

For many of the strategies identified in this action plan, the partners may seek financial assistance under the HMGP or PDM programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define "benefits" according to parameters that meet the goals and objectives of this plan.

20.3. COUNTY-WIDE ACTION PLAN PRIORITIZATION

Table 20-2 lists the priority of each countywide initiative, using the same parameters used by each of the planning partners in selecting their initiatives. A qualitative benefit-cost review was performed for each of these initiatives. There have been no significant changes sense the 2012 plan. They are the same reflection. The priorities are defined as follows:

- **High Priority**—A project that meets multiple objectives (i.e., multiple hazards), has benefits that exceed cost, has funding secured or is an ongoing project and meets eligibility requirements for the HMGP or PDM grant program. High priority projects can be completed in the short term (1 to 5 years).
- **Medium Priority**—A project that meets goals and objectives, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is secured. Medium priority projects will become high priority projects once funding is secured.
- **Low Priority**—A project that will mitigate the risk of a hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or PDM grant funding, and for which the time line for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

**TABLE 20-2.
PRIORITIZATION OF COUNTYWIDE MITIGATION INITIATIVES**

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits equal or exceed Costs?	Is project Grant eligible?	Can Project be funded under existing programs/ budgets?	Priority (High, Med., Low)
CW-1	4	High	Low	Yes	No	Yes	High
CW-2	5	Low	Low	Yes	No	Yes	Med
CW-3	9	Med	Low	Yes	Yes	Yes	High
CW-4	5	High	High	Yes	Yes	No	High
CW-5	2	Med	Low	Yes	Yes	No	High
CW-6	5	High	High	Yes	Yes	No	High
CW-7	2	Low	Low	Yes	No	Yes	High
CW-8	5	High	Low	Yes	Yes	Yes	High
CW-9	5	High	Low	Yes	Yes	Yes	High

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APPENDIX A. ACRONYMS AND DEFINITIONS

August 2018

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ACRONYMS

AB—Assembly Bill

Cal OES—California Office of Emergency Services

CAL FIRE—California Department of Forestry and Fire Protection

CCR—California Code of Regulations

CEQA—California Environmental Quality Act

CFR—Code of Federal Regulations

cfs—cubic feet per second

CIP—Capital Improvement Plan

CRS—Community Rating System

DFIRM—Digital Flood Insurance Rate Maps

DHS—Department of Homeland Security

DMA —Disaster Mitigation Act

EAP—Emergency Action Plan

EPA—U.S. Environmental Protection Agency

ESA—Endangered Species Act

FEMA—Federal Emergency Management Agency

FERC—Federal Energy Regulatory Commission

FHSZ —Fire Hazard Severity Zone

FIRM—Flood Insurance Rate Map

FIS—Flood Insurance Study

FRA—Federal responsibility area

GIS—Geographic Information System

HAZUS-MH—Hazards, United States-Multi Hazard

HMGP—Hazard Mitigation Grant Program

IBC—International Building Code

IRC—International Residential Code

LRA—Local responsibility area

MCI—Multi-Casualty Incident

MM—Modified Mercalli Scale

NEHRP—National Earthquake Hazards Reduction Program

NFIP—National Flood Insurance Program

NOAA—National Oceanic and Atmospheric Administration

NWS—National Weather Service

PDI—Palmer Drought Index

PDM—Pre-Disaster Mitigation Grant Program

PGA—Peak Ground Acceleration

PHDI—Palmer Hydrological Drought Index

RAWS—Remote Automated Weather Station

RWQCB—Regional Water Quality Control Board

SEMS—Standardized Emergency Management System

SFHA—Special Flood Hazard Area

SHELDUS—Special Hazard Events and Losses Database for the US

SPI—Standardized Precipitation Index

USGS—U.S. Geological Survey

DEFINITIONS

100-Year Flood: The term "100-year flood" can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1 percent chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1 percent annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

Acre-Foot: An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Asset: An asset is any man-made or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Base Flood: The flood having a 1% chance of being equaled or exceeded in any given year, also known as the "100-year" or "1% chance" flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program (NFIP) are protected to the same degree against flooding.

Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs, or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as "watersheds" and "drainage basins."

Benefit: A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Benefit/Cost Analysis: A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Building: A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment: A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

Community Rating System (CRS): The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

Critical Area: An area defined by state or local regulations as deserving special protection because of unique natural features or its value as habitat for a wide range of species of flora and fauna. A sensitive/critical area is usually subject to more restrictive development regulations.

Critical Facility: Facilities and infrastructure that are critical to the health and welfare of the population. These become especially important after any hazard event occurs. For the purposes of this plan, critical facilities include:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic and/or water reactive materials;
- Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a hazard event.
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for disaster response before, during, and after hazard events, and
- Public and private utilities, facilities and infrastructure that are vital to maintaining or restoring normal services to areas damaged by hazard events.
- Government facilities.

Cubic Feet per Second (cfs): Discharge or river flow is commonly measured in cfs. One cubic foot is about 7.5 gallons of liquid.

Dam: Any artificial barrier or controlling mechanism that can or does impound 10 acre-feet or more of water.

Dam Failure: Dam failure refers to a partial or complete breach in a dam (or levee) that impacts its integrity. Dam failures occur for a number of reasons, such as flash flooding, inadequate spillway size, mechanical failure of valves or other equipment, freezing and thawing cycles, earthquakes, and intentional destruction.

Debris Avalanche: Volcanoes are prone to debris and mountain rock avalanches that can approach speeds of 100 mph.

Debris Flow: Dense mixtures of water-saturated debris that move down-valley; looking and behaving much like flowing concrete. They form when loose masses of unconsolidated material are saturated, become unstable, and move down slope. The source of water varies but includes rainfall, melting snow or ice, and glacial outburst floods.

Debris Slide: Debris slides consist of unconsolidated rock or soil that has moved rapidly down slope. They occur on slopes greater than 65 percent.

Disaster Mitigation Act of 2000 (DMA); The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster hazard mitigation grant program (HMGP) were established.

Drainage Basin: A basin is the area within which all surface water- whether from rainfall, snowmelt, springs or other sources- flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Drainage basins are also referred to as **watersheds** or **basins**.

Drought: Drought is a period of time without substantial rainfall or snowfall from one year to the next. Drought can also be defined as the cumulative impacts of several dry years or a deficiency of precipitation over an extended period of time, which in turn results in water shortages for some activity, group, or environmental function. A hydrological drought is caused by deficiencies in surface and subsurface water supplies. A socioeconomic drought impacts the health, well-being, and quality of life or starts to have an adverse impact on a region. Drought is a normal, recurrent feature of climate and occurs almost everywhere.

Earthquake: An earthquake is defined as a sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy. Earthquakes can last from a few seconds to over 5 minutes, and have been known to occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as shocks shake, damage, or demolish buildings and other structures.

Exposure: Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Extent: The extent is the size of an area affected by a hazard.

Fire Behavior: Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

Fire Frequency: Fire frequency is the broad measure of the rate of fire occurrence in a particular area. An estimate of the areas most likely to burn is based on past fire history or fire rotation in the area, fuel conditions, weather, ignition sources (such as human or lightning), fire suppression response, and other factors.

Flash Flood: A flash flood occurs with little or no warning when water levels rise at an extremely fast rate

Flood Insurance Rate Map (FIRM): FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the Special Flood Hazard Area (SFHA).

Floodway: Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Floodway Fringe: Floodway fringe areas are located in the floodplain but outside of the floodway. Some development is generally allowed in these areas, with a variety of restrictions. On maps that have identified and delineated a floodway, this would be the area beyond the floodway boundary that can be subject to different regulations.

Fog: Fog refers to a cloud (or condensed water droplets) near the ground. Fog forms when air close to the ground can no longer hold all the moisture it contains. Fog occurs either when air is cooled to its dew point or the amount of moisture in the air increases. Heavy fog is particularly hazardous because it can restrict surface visibility. Severe fog incidents can close roads, cause vehicle accidents, cause airport delays, and impair the effectiveness of emergency response. Financial losses associated with transportation delays caused by fog have not been calculated in the United States but are known to be substantial.

Freeboard: Freeboard is the margin of safety added to the base flood elevation.

Frequency: For the purposes of this plan, frequency refers to how often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

Fujita Scale of Tornado Intensity: Tornado wind speeds are sometimes estimated on the basis of wind speed and damage sustained using the Fujita Scale. The scale rates the intensity or severity of tornado events using numeric values from F0 to F5 based on tornado wind speed and damage. An F0 tornado (wind speed less than 73 miles per hour (mph)) indicates minimal damage (such as broken tree limbs), and an F5 tornado (wind speeds of 261 to 318 mph) indicates severe damage.

Goal: A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a hazard mitigation plan is measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

Geographic Information System (GIS): GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Hazard: A hazard is a source of potential danger or adverse condition that could harm people and/or cause property damage.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster

Hazards U.S. Multi-Hazard (HAZUS-MH) Loss Estimation Program: HAZUS-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The HAZUS-MH software program assesses risk in a quantitative manner to estimate damages and losses associated with natural hazards. HAZUS-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. HAZUS-MH has also been used to assess vulnerability (exposure) for other hazards.

Hydraulics: Hydraulics is the branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrology: Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Intensity: For the purposes of this plan, intensity refers to the measure of the effects of a hazard.

Inventory: The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Landslide: Landslides can be described as the sliding movement of masses of loosened rock and soil down a hillside or slope. Fundamentally, slope failures occur when the strength of the soils forming the slope exceeds the pressure, such as weight or saturation, acting upon them.

Lightning: Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt," usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000ºF. The rapid heating and cooling of air near lightning causes thunder.

Lightning is a major threat during thunderstorms. In the United States, 75 to 100 Americans are struck and killed by lightning each year (see http://www.fema.gov/hazard/thunderstorms/thunder.shtm).

Liquefaction: Liquefaction is the complete failure of soils, occurring when soils lose shear strength and flow horizontally. It is most likely to occur in fine grain sands and silts, which behave like viscous fluids when liquefaction occurs. This situation is extremely hazardous to development on the soils that liquefy, and generally results in extreme property damage and threats to life and safety.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Magnitude: Magnitude is the measure of the strength of an earthquake, and is typically measured by the Richter scale. As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Mass movement: A collective term for landslides, mudflows, debris flows, sinkholes and lahars.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

Mitigation Actions: Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Objective: For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

Peak Ground Acceleration: Peak Ground Acceleration (PGA) is a measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.

Preparedness: Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Presidential Disaster Declaration: These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence: The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of $1000.00; or
- Two paid flood losses in excess of $1000.00 within any 10-year period since 1978 or
- Three or more paid losses that equal or exceed the current value of the insured property.

Return Period (or Mean Return Period): This term refers to the average period of time in years between occurrences of a particular hazard (equal to the inverse of the annual frequency of occurrence).

Riverine: Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

Risk: Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Risk Ranking: This ranking serves two purposes, first to describe the probability that a hazard will occur, and second to describe the impact a hazard will have on people, property, and the economy. Risk estimates for the City are based on the methodology that the City used to prepare the risk assessment for this plan. The following equation shows the risk ranking calculation:

Risk Ranking = Probability + Impact (people + property + economy)

Robert T. Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Sinkhole: A collapse depression in the ground with no visible outlet. Its drainage is subterranean. It is commonly vertical-sided or funnel-shaped.

Special Flood Hazard Area: The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in riverine situations and zone V in coastal situations. The SFHA may or may not encompass all of a community’s flood problems

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

Stream Bank Erosion: Stream bank erosion is common along rivers, streams and drains where banks have been eroded, sloughed or undercut. However, it is important to remember that a stream is a dynamic and constantly changing system. It is natural for a stream to want to meander, so not all eroding banks are “bad” and in need of repair. Generally, stream bank erosion becomes a problem where development has limited the meandering nature of streams, where streams have been channelized, or where stream bank structures (like bridges, culverts, etc.) are located in places where they can actually cause damage to downstream areas. Stabilizing these areas can help protect watercourses from continued sedimentation, damage to adjacent land uses, control unwanted meander, and improvement of habitat for fish and wildlife.

Steep Slope: Different communities and agencies define it differently, depending on what it is being applied to, but generally a steep slope is a slope in which the percent slope equals or exceeds 25%. For this study, steep slope is defined as slopes greater than 33%.

Sustainable Hazard Mitigation: This concept includes the sound management of natural resources, local economic and social resiliency, and the recognition that hazards and mitigation must be understood in the largest possible social and economic context.

Thunderstorm: A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds. Thunderstorms usually produce gusty winds, heavy rains, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry seasons.

Tornado: A tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Tornadoes are often (but not always) visible as funnel clouds. On a local scale, tornadoes are the most intense of all atmospheric circulations, and winds can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long.

Vulnerability: Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Watershed: A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Wildfire: These terms refer to any uncontrolled fire occurring on undeveloped land that requires fire suppression. The potential for wildfire is influenced by three factors: the presence of fuel, topography, and air mass. Fuel can include living and dead vegetation on the ground, along the surface as brush and small trees, and in the air such as tree canopies. Topography includes both slope and elevation. Air mass includes temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount, duration, and the stability of the atmosphere at the time of the fire. Wildfires can be ignited by lightning and, most frequently, by human activity including smoking, campfires, equipment use, and arson.

Windstorm: Windstorms are generally short-duration events involving straight-line winds or gusts exceeding 50 mph. These gusts can produce winds of sufficient strength to cause property damage. Windstorms are especially dangerous in areas with significant tree stands, exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and aboveground utility lines. A windstorm can topple trees and power lines; cause damage to residential, commercial, critical facilities; and leave tons of debris in its wake.

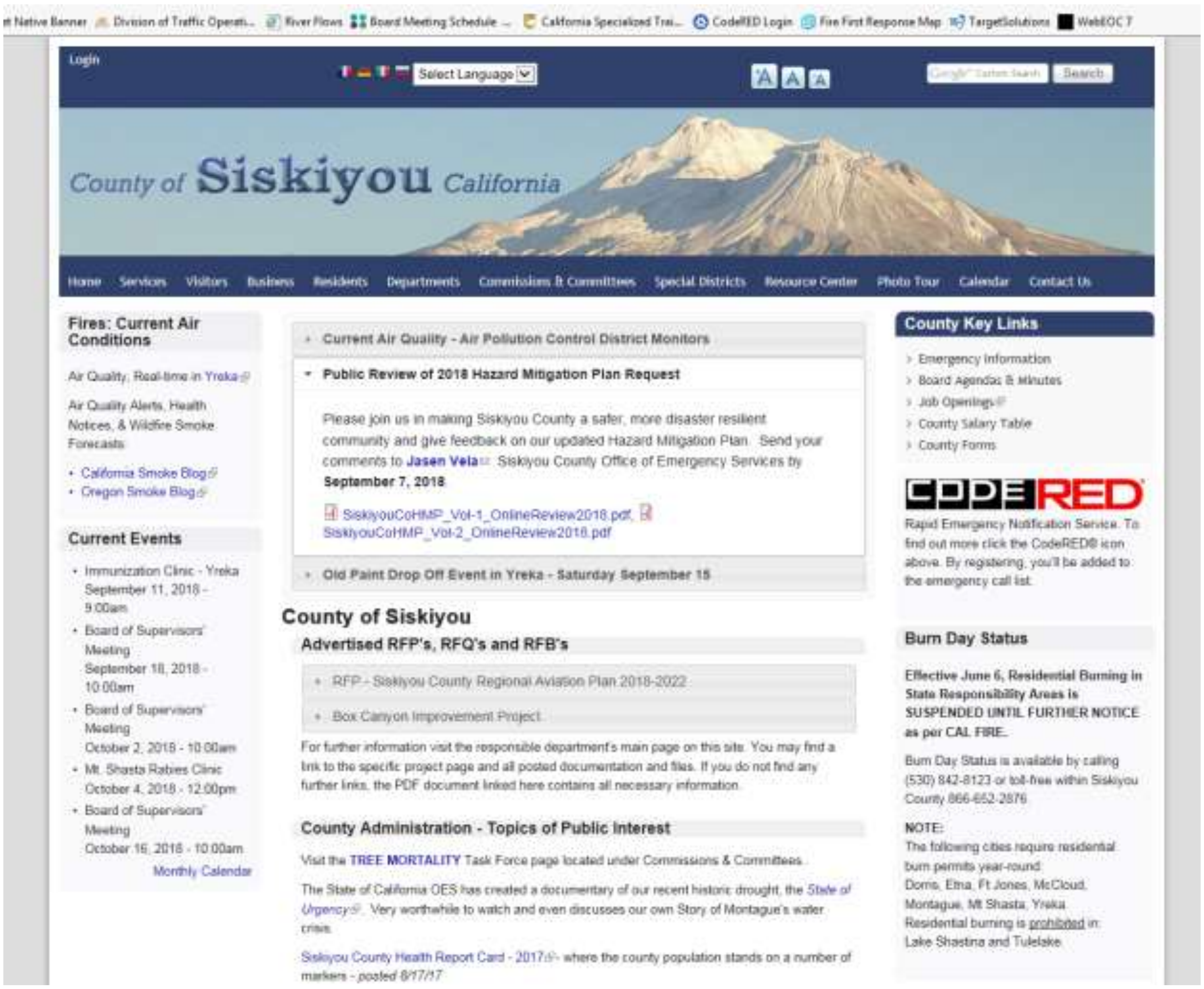
Zoning Ordinance: The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

Siskiyou County
Hazard Mitigation Plan

APPENDIX B. PUBLIC OUTREACH

August 2018

APPENDIX B.
PUBLIC OUTREACH



APPENDIX C. EXAMPLE PROGRESS REPORT

August 2018

APPENDIX C.
EXAMPLE PROGRESS REPORT

Siskiyou County
Hazard Mitigation Plan
Annual Progress Report

Reporting Period: *(Insert reporting period)*

Background: Siskiyou County and participating cities and special purpose districts in the county developed a hazard mitigation plan to reduce risk from all hazards by identifying resources, information, and strategies for risk reduction. The federal Disaster Mitigation Act of 2000 requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. To prepare the plan, the participating partners organized resources, assessed risks from natural hazards within the county, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from natural hazards. By completing this process, these jurisdictions maintained compliance with the Disaster Mitigation Act, achieving eligibility for mitigation grant funding opportunities afforded under the Robert T. Stafford Act. The plan can be viewed on-line at:

http://www.co.siskiyou.ca.us/PHS/emerg/hazard_mitigation.aspx

Summary Overview of the Plan's Progress: The performance period for the Hazard Mitigation Plan became effective on ____, 2011, with the final approval of the plan by FEMA. The initial performance period for this plan will be 5 years, with an anticipated update to the plan to occur before ______, 2016. As of this reporting period, the performance period for this plan is considered to be __% complete. The Hazard Mitigation Plan has targeted __ hazard mitigation initiatives to be pursued during the 5-year performance period. As of the reporting period, the following overall progress can be reported:

- __ out of __ initiatives (__%) reported ongoing action toward completion.
- __ out of __ initiatives (__%) were reported as being complete.
- __ out of __ initiatives (___%) reported no action taken.

Purpose: The purpose of this report is to provide an annual update on the implementation of the action plan identified in the Siskiyou County Hazard Mitigation Plan. The objective is to ensure that there is a continuing and responsive planning process that will keep the Hazard Mitigation Plan dynamic and responsive to the needs and capabilities of the partner jurisdictions. This report discusses the following:

- Natural hazard events that have occurred within the last year
- Changes in risk exposure within the planning area (all of Siskiyou County)
- Mitigation success stories
- Review of the action plan
- Changes in capabilities that could impact plan implementation
- Recommendations for changes/enhancement.

The Hazard Mitigation Plan Steering Committee: The Hazard Mitigation Plan Steering Committee, made up of planning partners and stakeholders within the planning area, reviewed and approved this progress report at its annual meeting held on _____, 201_. It was determined through the plan's development process that a steering committee would remain in service to oversee maintenance of the plan. At a minimum, the Steering Committee will provide technical review and oversight on the development of the annual progress report. It is anticipated that there will be turnover in the membership annually, which will be documented in the progress reports. For this reporting period, the Steering Committee membership is as indicated in Table 1.

TABLE 1.
STEERING COMMITTEE MEMBERS

Name	Title	Jurisdiction/Agency

Natural Hazard Events within the Planning Area: During the reporting period, there were __ natural hazard events in the planning area that had a measurable impact on people or property. A summary of these events is as follows:

- ____________________________
- ____________________________

Changes in Risk Exposure in the Planning Area: *(Insert brief overview of any natural hazard event in the planning area that changed the probability of occurrence or ranking of risk for the hazards addressed in the hazard mitigation plan)*

Mitigation Success Stories: *(Insert brief overview of mitigation accomplishments during the reporting period)*

Review of the Action Plan: Table 2 reviews the action plan, reporting the status of each initiative. Reviewers of this report should refer to the Hazard Mitigation Plan for more detailed descriptions of each initiative and the prioritization process.

Address the following in the "status" column of the following table:

- *Was any element of the initiative carried out during the reporting period?*
- *If no action was completed, why?*
- *Is the timeline for implementation for the initiative still appropriate?*
- *If the initiative was completed, does it need to be changed or removed from the action plan?*

TABLE 2.
ACTION PLAN MATRIX

Action Taken? (Yes or No)	Time Line	Priority	Status	Status (X, O,✓)
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				
Initiative #__—________________________[description]				

TABLE 2.
ACTION PLAN MATRIX

Action Taken? (Yes or No)	Time Line	Priority	Status	Status (X, O,✓)
Initiative #__—______________________[description]				
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Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				
Initiative #__—______________________[description]				

Completion status legend:
- ✓= Project Completed
- O = Action ongoing toward completion
- X = No progress at this time

Changes That May Impact Implementation of the Plan: *(Insert brief overview of any significant changes in the planning area that would have a profound impact on the implementation of the plan. Specify any changes in technical, regulatory and financial capabilities identified during the plan's development)*

Recommendations for Changes or Enhancements: Based on the review of this report by the Hazard Mitigation Plan Steering Committee, the following recommendations will be noted for future updates or revisions to the plan:

- ____________________________
- ____________________________
- ____________________________
- ____________________________
- ____________________________
- ____________________________

Public review notice: *The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the governing boards of all planning partners and to local media outlets and the report is posted on the Siskiyou County Hazard Mitigation Plan website. Any questions or comments regarding the contents of this report should be directed to:*

Insert Contact Info Here

APPENDIX D. PLAN ADOPTION RESOLUTIONS FROM PLANNING PARTNERS

January 2012

APPENDIX D.
PLAN ADOPTION RESOLUTIONS FROM PLANNING PARTNERS

To Be Provided With Final Release

Siskiyou County

HAZARD MITIGATION PLAN
VOLUME 2: PLANNING PARTNER ANNEXES

DRAFT

August 2018

Prepared for:
Siskiyou County Office of Emergency Services
806 South Main
Yreka, California 96097

Siskiyou County
Hazard Mitigation Plan;
Volume 2—Planning Partner Annexes

TABLE OF CONTENTS

Appendices

PART 1— INTRODUCTION

CHAPTER 1.
PLANNING PARTNER PARTICIPATION

1.1. BACKGROUND

The Federal Emergency Management Agency (FEMA) encourages multi-jurisdictional planning for hazard mitigation. Such planning efforts require all participating jurisdictions to fully participate in the process and formally adopt the resulting planning document. Chapter 44 of the Code of Federal Regulations (44CFR) states:

> "Multi-jurisdictional plans (e.g. watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan." (Section 201.6.a(4))

In the preparation of the Siskiyou County Hazard Mitigation Plan, a planning partnership was formed to leverage resources and to meet requirements of the federal Disaster Mitigation Act of 2000 (DMA) for as many eligible local governments in Siskiyou County as possible. The DMA defines a local government as follows:

> "Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity."

There are two types of planning partners in this process, with distinct needs and capabilities:

- Incorporated municipalities (cities and the County)
- Special purpose districts.

1.2. THE PLANNING PARTNERSHIP

Initial Solicitation and Letters of Intent

The planning team solicited the participation of the County and all County-recognized special purpose districts at the outset of this project. A meeting was held on July 28, 2010 at the Siskiyou County Department of Public Health and Community Development in Yreka to identify potential stakeholders for this process. The purpose of the meeting was to introduce the planning process to jurisdictions in the County that could have a stake in the outcome of the planning effort, to solicit planning partners, and to inform potential partners of the benefits of participation. All eligible local governments within the planning area were invited to attend. Various agency and citizen stakeholders were also invited to this meeting. The goals of the meeting were as follows:

- Provide an overview of the Disaster Mitigation Act.
- Provide an update on the planning grant.
- Outline the Siskiyou County plan development work plan.
- Describe the benefits of multi-jurisdictional planning.

- Solicit planning partners.
- Confirm a Steering Committee.

All interested local governments were provided with a list of planning partner expectations developed by the planning team and were informed of the obligations required for participation. Local governments wishing to join the planning effort were asked to provide the planning team with a “notice of intent to participate” that agreed to the planning partner expectations (see Appendix A) and designated a point of contact for their jurisdiction. In all, formal commitment was received from 15 planning partners by the planning team, and the Siskiyou County Planning Partnership was formed.

Maps for each participating city are provided in the individual annex for that city. These maps will be updated periodically as changes to the partnership occur, either through linkage or by a partner dropping out due to a failure to participate.

Planning Partner Expectations

The planning team developed the following list of planning partner expectations, which were confirmed at the kickoff meeting held on July 28, 2010.

- Each partner will provide a “Letter of Intent to Participate.”
- Each partner will support and participate in the selection and function of the Steering Committee overseeing the development of the plan. Support includes allowing this body to make decisions regarding plan development and scope on behalf of the partnership.
- Each partner will provide support for the public involvement strategy developed by the Steering Committee in the form of mailing lists, possible meeting space, and media outreach such as newsletters, newspapers or direct-mailed brochures.
- Each partner will participate in plan development activities such as:
    - Steering Committee meetings
    - Public meetings or open houses
    - Workshops and planning partner training sessions
    - Public review and comment periods prior to adoption.

  Attendance will be tracked at such activities, and attendance records will be used to track and document participation for each planning partner. No minimum level of participation will be established, but each planning partner should attempt to attend all such activities.
- Each partner will be expected to perform a “consistency review” of all technical studies, plans, and ordinances specific to hazards identified within the planning area to determine the existence of plans, studies or ordinances not consistent with the equivalent documents reviewed in preparation of the County plan. For example: if a planning partner has a floodplain management plan that makes recommendations that are not consistent with any of the County’s basin plans, that plan will need to be reviewed for probable incorporation into the plan for the partner’s area.
- Each partner will be expected to review the risk assessment and identify hazards and vulnerabilities specific to its jurisdiction. Contract resources will provide jurisdiction-specific mapping and technical consultation to aid in this task, but the determination of risk and vulnerability will be up to each partner.

- Each partner will be expected to review the mitigation recommendations chosen for the overall county and determine if they will meet the needs of its jurisdiction. Projects within each jurisdiction consistent with the overall plan recommendations will need to be identified, prioritized and reviewed to determine their benefits and costs.
- Each partner will be required to create its own action plan that identifies each project, who will oversee the task, how it will be financed and when it is estimated to occur.
- Each partner will be required to sponsor at least one public meeting to present the draft plan at least two weeks prior to adoption.
- Each partner will be required to formally adopt the plan.

It should be noted that by adopting this plan, each planning partner also agrees to the plan implementation and maintenance protocol established in Volume 1. Failure to meet these criteria may result in a partner being dropped from the partnership by the Steering Committee, and thus losing eligibility under the scope of this plan.

Linkage Procedures

Eligible local jurisdictions that did not participate in development of this hazard mitigation plan may comply with DMA requirements by linking to this plan following the procedures outlined in Appendix B. Linkage is also an option for any planning partner that did not meet its planning partner expectations during the initial plan development process.

1.3. ANNEX-PREPARATION PROCESS

Templates

Templates were created to help the planning partners prepare their jurisdiction-specific annexes. Since special purpose districts operate differently from incorporated municipalities, separate templates were created for the two types of jurisdictions. The templates were created so that all criteria of Section 201.6 of 44CFR would be met, based on the partners' capabilities and mode of operation. Each partner was asked to participate in a technical assistance workshop during which key elements of the template were completed by a designated point of contact for each partner and a member of the planning team. The templates were set up to lead each partner through a series of steps that would generate the DMA-required elements that are specific for each partner. The templates and their instructions can be found in Appendices C and D to this volume of the Hazard Mitigation Plan.

Workshop

A workshop was held for planning partners to learn about the templates and the overall planning process. Topics included the following:

- DMA
- Siskiyou County plan background
- The templates
- Risk ranking
- Developing your action plan
- Cost/benefit review.

The workshop was segregated by special districts and municipalities, in order to better address each type of partner's needs. The sessions provided technical assistance and an overview of the template completion process. Attendance at this workshop was mandatory under the planning partner expectations established by the Steering Committee. This workshop was attended by 11 planning partners.

In the risk-ranking exercise, each planning partner was asked to rank each risk specifically for its jurisdiction, based on the impact of the hazard on the area within its jurisdictional boundary. The concept stressed by this exercise is that each planning partner will have different concerns regarding the hazards addressed by this plan. Cities were asked to base this ranking on probability of occurrence and the potential impact on people, property and the economy. Special purpose districts were asked to base this ranking on probability of occurrence and the potential impact on their constituency, their vital facilities and the facilities' functionality after an event. The methodology followed that used for the countywide risk ranking presented in Volume 1. A principal objective of this exercise was to familiarize the partnership with how to use the risk assessment as a tool to support other planning and hazard mitigation processes. A "tool kit" was provided to each participant that included the following:

- The risk assessment results developed for this plan
- Hazard maps for all hazards of concern
- Special district boundary maps that illustrated the sphere of influence for each special purpose district partner
- The guiding principal, goals and objectives of the plan
- Hazard mitigation catalogs
- Federal funding and technical assistance catalogs
- Historical loss data (SHELDUS, FEMA, Cal OES)
- The California State Hazard Mitigation Plan
- Results from the hazard mitigation survey
- A fact sheet on FEMA Hazard Mitigation Assistance (HMA) grants.

Prioritization

44CFR requires actions identified in the action plan to be prioritized (Section 201.c.3.iii). The planning team and steering committee developed a methodology for prioritizing the action plans that meets the needs of the partnership and the requirements of 44CFR. The actions were prioritized according to the following criteria:

- **High Priority**—Project meets multiple plan objectives, benefits exceed cost, funding is secured under existing programs, or is grant eligible, and project can be completed in 1 to 5 years (i.e., short term project) once funded.
- **Medium Priority**—Project meets at least 1 plan objective, benefits exceed costs, requires special funding authorization under existing programs, grant eligibility is questionable, and project can be completed in 1 to 5 years once funded.
- **Low Priority**—Project will mitigate the risk of a hazard, benefits exceed costs, funding has not been secured, project is not grant eligible, and time line for completion is long term (5 to 10 years).

These priority definitions are dynamic and can change from one category to another based on changes to a parameter such as availability of funding. For example, a project might be assigned a medium priority because of the uncertainty of a funding source, but be changed to high once a funding source has been identified. The prioritization schedule for this plan will be reviewed and updated as needed annually through the plan maintenance strategy.

Benefit/Cost Review

44CFR requires the prioritization of the action plan to emphasize a benefit/cost analysis of the proposed actions. Because some actions may not be implemented for up to 10 years, benefit/cost analysis was qualitative and not of the detail required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant program. A review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to costs and benefits as follows:

- Cost ratings:

High—Existing funding levels are not adequate to cover the costs of the proposed action; implementation would require an increase in revenue through an alternative source (for example, bonds, grants, and fee increases).

Medium—The action could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years.

Low—The action could be funded under the existing budget. The action is part of or can be part of an existing, ongoing program.

- Benefit ratings:

High—The action will have an immediate impact on the reduction of risk exposure to life and property.

Medium—The action will have a long-term impact on the reduction of risk exposure to life and property or will provide an immediate reduction in the risk exposure to property.

Low—Long-term benefits of the action are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

It should be noted that for many of the strategies identified in this action plan, funding might be sought under FEMA's HMGP or PDM programs. Both of these programs require detailed benefit/cost analysis as part of the application process. These analyses will be performed on projects at the time of application preparation. The FEMA benefit-cost model will be used to perform this review. For projects not seeking financial assistance from grant programs that require this sort of analysis, the planning partners reserve the right to define "benefits" according to parameters that meet their needs and the goals and objectives of this plan.

Analysis of Mitigation Initiatives

Each planning partner reviewed its recommended initiatives to classify each initiative based on the hazard it addresses and the type of mitigation it involves. Mitigation types used for this categorization are as follows:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform citizens and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.

1.4. FINAL COVERAGE UNDER THE PLAN

Of the 14 committed planning partners, only 10 fully met the participation requirements specified by the Steering Committee. The principal requirement not met by the other partners was the completion of the jurisdictional annex template following the workshops. Eleven partners attended the workshop, but only 10 subsequently submitted completed templates. Therefore, only those 10 jurisdictions are included in this volume and will seek DMA compliance under this plan. The remaining jurisdictions will need to follow the linkage procedures described in Appendix B of this volume. Table 1-1 lists the jurisdictions that submitted letters of intent and their ultimate status in this plan.

**TABLE 1-1.
PLANNING PARTNER STATUS**

Jurisdiction	Letter of Intent Date	Attended Workshop ?	Completed Template?	Will Be Covered by This Plan?
City of Dorris	8/16/2010	Yes	Yes	Yes
City of Dunsmuir	10/20/2010	No	No	No
City of Etna	10/15/2010	Yes	Yes	Yes
Town of Fort Jones	9/8/2010	Yes	Yes	Yes
City of Montague	9/13/2010	Yes	No	No
City of Mt. Shasta	8/2/2010	Yes	Yes	Yes
City of Tulelake	8/16/2010	Yes	Yes	Yes
City of Weed	7/29/2010	Yes	Yes	Yes
City of Yreka	9/22/2010	Yes	Yes	Yes
Siskiyou County	N/A[a]	Yes	Yes	Yes
Happy Camp Community Services District	9/15/2010	No	No	No
Lake Shastina Community Services District	8/3/2010	Yes	Yes	Yes
McCloud Community Services District	9/10/2010	Yes	Yes	Yes
Happy Camp Sanitary District	6/26/2011	No	No	No

a. A letter of intent was not required for Siskiyou County because the County had committed to the process by securing the grant that funded the planning effort.

PART 2— ANNEXES FOR MUNICIPALITIES

CHAPTER 2.
UNINCORPORATED SISKIYOU COUNTY ANNEX

2.1. HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

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2.2. JURISDICTION PROFILE

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation—**March 22, 1852
- **Current Population—**43,853 as of July 2017
- **Population Growth—**Based on data tracked by the California Department of Finance, Siskiyou County's population growth has been almost negligible since 2000. Between 2000 and 2010, the population grew at a rate of 0.78 percent or less, with small decreases in population occurring from 2006-2007, and 2008-2009 and 2010-2017. Population is down from 2010 to 2017 by 2.3%.
- **Location and Description—**Located in inland northern California, adjacent to the Oregon state line, Siskiyou County is bordered on the west by Del Norte and Humboldt Counties, on the south by Trinity and Shasta Counties, and on the east by Modoc County. Siskiyou County is the fifth largest county by area and 45th in population in the state. At 6,347 square miles, the county has a population density of only 7.1 people per square mile. More than 60 percent of the land in the County is currently managed by federal and state agencies. The majority of this land is in the Klamath, Shasta-Trinity, and Modoc National Forests.

  Siskiyou County is geographically diverse. From towering Mount Shasta (elev. 14,179 feet) in the south central part of the county to lakes and dense forests, as well as desert, chaparral, and steep river canyons. Several major rivers cross the county, including the Klamath, McCloud, and Salmon Rivers, as well as the headwaters to the Sacramento River. Pastoral Scott Valley in the western part of the county has many wide, tree-lined meadows, supporting cattle ranches. The basins of northeastern Siskiyou County, including Butte Valley, Lower Klamath and Tulelake basins, have some of the deepest and richest soils in the state, producing alfalfa, potatoes, horseradish, and brewing barley. Butte Valley nurseries are the leading source of premium strawberry plants in North America. Much of the county is densely forested with pine, fir, incense-cedar, oak, and madrone. The county's natural resources are most often used these days for outdoor recreation as historical logging operations have been largely discontinued due to federal and state environmental regulations.
- **Brief History—**Siskiyou County was created on March 22, 1852, from parts of Shasta and Klamath Counties, and named after the Siskiyou mountain range. Parts of the county's territory were given to Modoc County in 1855.

The county is the site of the central section of the Siskiyou Trail, which ran between California's Central Valley and the Pacific Northwest. The Siskiyou Trail was based on Native American footpaths and was expanded by Hudson's Bay Company trappers in the 1830s. The trail was expanded even further by prospectors during the California Gold Rush.

In 1851, after the discovery of an important gold strike near what is now the City of Yreka, thousands of prospectors flooded the area. This era and setting was described in detail in the semi-autobiographical novel, *Life Amongst the Modocs*, written by Joaquin Miller.

The construction of the Central Pacific Railroad along the path of the Siskiyou Trail in the mid-1880s led to a first wave of tourism, as visitors came to "take the waters" at the county's many summer resorts, and to enjoy the hunting, fishing, and other outdoor recreation activities. The Southern Pacific railroad (successor to the Central Pacific) promoted the scenic beauty of the area by calling its rail line through the area "The Road of a Thousand Wonders."

In the early 1940s, Siskiyou County was home to the semi-serious State of Jefferson movement, which sought to create a new state from several counties of northern California, and several counties of southern Oregon.

- **Climate—**Siskiyou County has the typical hot, dry summers and cool, wet winters characteristic of Mediterranean climates. However, since the latitude of Siskiyou County (41º N to 42º N) is at the northern extreme of the Mediterranean climate zone and is in a mountainous region, it tends to have colder winters than the average Mediterranean region. Hence, Siskiyou County mainly falls within the Mediterranean highland climate region with much of the winter precipitation falling as snow.

  The total annual precipitation in Siskiyou County varies from around 10 inches in the northeast corner to 100 inches or more along the northern part of the western border. In general, the western quarter of the county receives 40 to 60 inches per year below 300 feet and 80 to 100 inches per year at higher elevations. The central half of the county receives 12 to 20 inches below 400 feet and as much as 60 inches in the mountains along the extreme southern border. The eastern quarter of the county receives 40 to 50 inches over some of the mountains and even more on Mt. Shasta, while the Modoc Plateau receives only 10 to 20 inches per year.

  Snowfall parallels the precipitation only in part. There are some areas in both the Upper Klamath Basin and the lower reaches of the stream that receive 10 inches or less of snow per year. Over most of the mountain areas, the annual total is within the range of 50 to 75 inches, and Mt. Shasta receives well over 100 inches, on average, over its upper slopes. The greatest snowfall rate recorded from a single storm occurred on Mt. Shasta when 189 inches fell February 13-19, 1959. The McCloud and Mt. Shasta City areas, at lower elevations, also receive around 100 inches of snow. The large amount of snow in this area results from the local topographic situation. Most intermediate elevations in the county, receive an average of 20 to 30 inches each year.

- **Governing Body Format—**The Siskiyou County Board of Supervisors is the legislative authority for the County. The five members of the Board are elected to four-year terms and will assume the responsibility for the adoption and implementation of this plan. Each member represents a specific geographic district. The Board's duties include identifying and articulating the needs of the citizens of Siskiyou County, and providing a framework for the county's administration to carry out its work efficiently, ensuring that County government responds effectively to the community's needs. The Board of Supervisors adopts and enacts ordinances, resolutions, and motions; appropriates revenue; and adopts budgets.

The Siskiyou County Administrator is responsible for six major functional areas: budget, general administration, personnel, purchasing, risk management, and workers' compensation. The County Administrator also has oversight responsibility for a number of programs/cost centers.

- **Development Trends—**Siskiyou County is one of the three northernmost counties in California, sharing its border with the state of Oregon. The county is the fifth largest in terms of land size but ranks only 44th out of the 58 counties in the state in terms of population.

  As with most communities in California, as well as the nation, Siskiyou County's economy and development activity have been severely impacted by the nationwide recession. Even before that, a number of the historical industries (timber, mining, and the agriculture) in the County had been facing ever increasing pressure from environmental regulations and restrictions on the use of public land.

  Residents of Siskiyou County had a nominal per capita income of $29,538 in 2007, compared to $41,571 throughout California on average. The total median household income in Siskiyou County in 2007 was $35,692, compared to $59,928 throughout California in that same year. Of the 23 other Northern California counties (including Sonoma County), Siskiyou County had the third lowest median income in 1999.

  As of July 2017, Siskiyou County had a population of 43,853 people and 8,685 wage and salary jobs. This is down 2.3% sense April 1 2010. In 2009, total wage and salary jobs fell by nearly 1,000 jobs or 6.9 percent. The only non-farm sector creating jobs was education and health services, and this amounted to only a 0.2 percent increase. The sectors that lost the most jobs during 2009 were professional services (-170 jobs), construction (-160 jobs), government (-150 jobs), and leisure services (-130 jobs). The government sector is the largest sector in the county, accounting for 31 percent of total employment. In 2008 and 2009, Siskiyou County had the 14th highest annual average unemployment rate in California. Total employment percent change from 2015-2016 is 3.9% and persons in poverty between 2012-2016 is at 18.8%.

  In 2010, the population in Siskiyou County was estimated at 44,900; relatively unchanged since 2000 when the population county-wide was 44,301. Of the nine cities in the County, six (Dunsmuir, Etna, Montague, Mount Shasta, Tulelake, and Weed) lost a total of 578 persons. The remaining three (Dorris, Fort Jones, and Yreka) and unincorporated areas of the County gained a total of 1,177 persons for a net increase of 599.

  Since 2012 there hasn't been much development in Siskiyou County. There has been no increase or decrease in risk to the County.

  It is anticipated that over the next several years development activity will remain flat as the County and the state emerge from the current recession. It is hoped that efforts at replacing lost natural resource jobs in green and renewable resources will help expedite the County's recovery and lead to more sustainable employment base.

2.3. JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 2-1 lists all past occurrences of natural hazards in the county. Repetitive loss records are as follows:

- Number of FEMA Identified Repetitive Flood Loss Properties: 0
- Number of Repetitive Flood Loss Properties that have been mitigated: 0

2.4. HAZARD RISK RANKING

Table 2-2 presents the ranking of the hazards of concern.

2.5. CAPABILITY ASSESSMENT

The assessment of the jurisdiction's legal and regulatory capabilities is presented in Table 2-3. The assessment of the jurisdiction's administrative and technical capabilities is presented in Table 2-4. The assessment of the jurisdiction's fiscal capabilities is presented in Table 2-5. Classifications under various community outreach programs are presented in table 2-7.

2.6. HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

Table 2- lists the initiatives that make up the jurisdiction's hazard mitigation plan. Table 2- identifies the priority for each initiative. Table 2-10 summarizes the mitigation initiatives by hazard of concern and the six mitigation types.

The County is in the process of revising it's General Plan which guides county decision making for the future. Part of the revision process is surveying the public about topics that are important to them and how they see the County changing in the next 25 years. Similar to the mapping exercise at a workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the County. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the County and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

The County is in a General Plan revision which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute.

In addition to the General Plan process, the County will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

2.7. FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

The Siskiyou County Office of Emergency Services has included several data collection initiatives in this plan that would greatly enhance the County's understanding of the risks and vulnerabilities in the unincorporated area. To address these knowledge gaps, the county advocates for improved data sets for wildfire, landslide, and volcanic activity hazards.

2.8. HAZARD AREA EXTENT AND LOCATION

Hazard area extent and location maps for the Siskiyou County area are included in Volume 1 of this mitigation plan. These maps are based on the best available data at the time of the preparation of this plan, and are considered to be adequate for planning purposes.

TABLE 2-1.
NATURAL HAZARD EVENTS

Type of Event	Date	Preliminary Damage Assessment
Wildfire Klamathon	7/5/2018	Estimates unavailable
Wildfire Orleans Complex	8/4/2017	Estimates unavailable
Wildfire Salmon August Complex	8/2/2017	Estimates unavailable
Wildfire Miller Complex	9/1/2017	Estimates unavailable
Wildfire Eclipse Complex	7/29/2017	Estimates unavailable
Severe Weather/Flood-DR-4308	1/23/2017	Estimates unavailable
Severe Weather/Flood-DR-4301	1/2/2017	Estimates unavailable
Wildfire Gap	8/28/2016	Estimates unavailable
Wildfire Grade	8/24/2016	Estimates unavailable
Floods	12/9/2014	Estimates unavailable
Wildfire	9/15/2014	Estimates unavailable
Drought	4/10/2014	Estimates unavailable
Wildfire	8/27/2012	Estimates unavailable
Severe Weather-DR-1884	3/8/2010	$3,471,019
Wildfire/Smoke	5/9/2008	Estimates unavailable
Wildfire	7/16/2007	Estimates unavailable
Severe Weather/Flood-DR-1628	2/3/2006	Estimates unavailable
Severe Weather/Flood-DR-1155	1/4/1997	Estimates unavailable
Severe Weather-DR-1046	3/12/1995	Estimates unavailable
Severe Weather-DR-979	2/3/1993	Estimates unavailable
Drought-3023	1/20/1977	Estimates unavailable
Severe Weather/Flood-DR-412	1/25/1974	Estimates unavailable
Severe Weather/Flood-DR-283	2/16/1970	Estimates unavailable
Severe Weather/Flood-DR-183	12/24/1964	Estimates unavailable

**TABLE 2-2.
HAZARD RISK RANKING**

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Wildfire	68
2	Flood	54
3	Severe Weather	51
4	Earthquake	36
5	Drought	26
6	Volcano (lahar/ash fall)	18
7	Dam Failure	18
8	Landslide	16

TABLE 2-3.
LEGAL AND REGULATORY CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Building Code	Y	N	N	Y	2010 California Building Code—Adopted Jan 1, 2011
Zonings	Y	N	N	Y	The Zoning Code, Title 10, of the Siskiyou County Code, was Adopted Feb 28, 1961 by Ord. No. 363 as part of the Siskiyou County Code. Amendments have been made as necessary to present day.
Subdivisions	Y	N	N	Y	Subdivision Map Act per §66410-§66499.58 Government Code of State of California. Additional subdivision provisions in Title 10 of the Siskiyou County Code (Zoning Code). The Land Development Manual - Currently in review by the County Planning Commission—Not Adopted.
Stormwater Management	N	N	N	N	Land Development Manual. Currently in review by the County Planning Commission—Not Adopted.
Post Disaster Recovery	Y	N	N	N	Emergency Operations Plan Vol. 1, Part 13, Adopted November 13, 2007.
Real Estate Disclosure	Y	N	N	Y	CA State Civil Code 1102 requires full disclosure on natural hazard exposure of sale/re-sale of any and all real estate
Growth Management	N	N/A	N/A	N/A	N/A
Site Plan Review	Y	N	N	N	Site plan review is addressed through the Building Permit review process and is ministerial.
Special Purpose (flood management, critical areas)	Y	N	N	Y	Flood Control & Water Conservation District

TABLE 2-3.
LEGAL AND REGULATORY CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Planning Documents					
General or Comprehensive Plan	Y	N	N	Y	Initially adopted in 1949—as the Master General Plan by Board Resolution and at the same time amending multiple existing Ordinances under its collective cover. Later amended in 1968, additional Elements were adopted in 1972, 1973, 1975, 1976, 1984, 1988 and 1993. Amendment to those elements occurred as needed. Most recently - Housing Element amended May 2010 by Resolution 10-98.
Floodplain or Basin Plan	N	N	N	N	Floodplain Manager addresses development within the floodplain only. As per Flood Damage Prevention Program Zoning Code Section 10-10, adopted §1, Ord. 90-32, Effective Dec 13, 1990
Stormwater Plan	N	N	N	N	Land Development Manual. Currently in review by the County Planning Commission—Not yet Adopted.
Capital Improvement Plan	Y	N	N	N	Capital Improvement Plans are adopted, in place and amended for various facilities and projects throughout the County.
Habitat Conservation Plan	Y	N	N	Y	Conservation Element of the General Plan adopted June 1973 by Resolution 1973-5 by the Board of Supervisors.
Economic Development Plan	N	N	N	N	Economic development is partnered through the Siskiyou County Economic Development Council which is private organization and is not part of the County organizational structure. The Economic Commission was developed in 1977.
Emergency Response Plan	Y	N	N	Y	The Siskiyou County Emergency Operations Plan was adopted November 13, 2007.
Shoreline Management Plan	N	N/A	N/A	N/A	N/A
Post Disaster Recovery Plan	Y	N	N	N	Emergency Operations Plan, Vol. 1, Part 13, Adopted November 13, 2007.

**TABLE 2-4.
ADMINISTRATIVE AND TECHNICAL CAPABILITY**

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Public Health/Community Development Dept. & Public Works Dept.
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Health/Community Development—Building Department & Public Works Dept.
Planners or engineers with an understanding of natural hazards	Yes	Public Works Department, Public Health/Community Development Dept.
Staff with training in benefit/cost analysis	Yes	County Auditor
Floodplain manager	Yes	Public Health/Community Development—Building Department—Deputy Director
Surveyors	Yes	Public Works Department - County Engineer, County Surveyor,
Personnel skilled or trained in GIS applications	Yes	Public Health/Community Development—Building Department, Public Works Dept., Agriculture Dept.
Scientist familiar with natural hazards in local area	Yes	Public Health/Community Development—Office of Emergency Services—Deputy Director
Emergency manager	Yes	Public Health/Community Development—Office of Emergency Services—Deputy Director
Grant writers	Yes	Public Health/Community Development—Office of Emergency Services—Deputy Director

**TABLE 2-5.
FISCAL CAPABILITY**

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

**TABLE 2-6.
COMMUNITY OUTREACH.**

THE COUNTY WILL BE PERROMING THESE OUTREACH EVENTS AND WILL INCLUDE MITIGATION EDJUCATION TO THE PUBLIC.

Outreach	
Community Meetings Go Bag planning Schools	
Fire Safe Council Meetings	
PSA’s Emergency Notification System and Testing	
Use of Facebook and Twitter	
Joint Community Hmong Preparedness Meetings for evacuations	

TABLE 2-7.
COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Community Rating System	No	-	-
Building Code Effectiveness Grading Schedule	Yes	2-2	5/17/2011
Public Protection	Yes	9	1995
Storm Ready	Yes	N/A	2016
Firewise	No	-	-

TABLE 2-8.
HAZARD MITIGATION ACTION PLAN FROM THE 2012 PLAN

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
SC-1—Inform and educate the public on hazard mitigation and preparedness via a County-operated website.							
Existing	All Hazards	1,2,5,8	OES	$7,000	General Fund	Short-term	Ongoing
SC 2—Relocate County-owned critical facilities out of identified high hazard risk zones.							
Existing	All Hazards	1,2,4,6	General Services	Unknown	FEMA Hazard Mitigation Grants	Long-term	Ongoing
SC-3—Collect improved data (hydrologic, geologic, topographic, volcanic, historic, etc.) to assess risks and vulnerabilities.							
New and Existing	All Hazards	1,2,3,4,5,7	Public Works, OES	$200,000	Grants, General Fund	Short-term	Ongoing
SC-4—Complete a Volcanic Activity Annex to the Siskiyou County Emergency Operations Plan for the Mt. Shasta and Medicine Lake volcanoes.							
New	Volcano	1,2,3,4,5,7,8, 9	OES	$100,000	Grants, General Fund	Short-term	Completed
SC-5—Retrofit, rehabilitate or replace vulnerable road and bridge facilities and infrastructure throughout Siskiyou County.							
Existing	All Hazards	1,2,4,6,	Public Works	Unknown	FEMA Hazard Mitigation Grants, other grants	Long-term	Ongoing Lake of funding
SC-6—Create a County Hazard Identification and Vulnerability Analysis utilizing enhanced technologies.							
New	All Hazards	3,7	OES	$150,000	Grants, General Fund	Short-term	Ongoing
SC-7—Develop departmental continuity of operations plans and a continuity of government plan.							
New	All Hazards	1,3,4,7	OES	$250,000	Grants, EMPG, General Fund	Short-term	Ongoing
SC-8—Seek land acquisition opportunities for open space use and preservation in areas of high vulnerability due to multiple risk exposure.							
Existing	All Hazards	5,6	Planning Department	Varies per project	FEMA Hazard Mitigation Grants	long-term	Not performed

TABLE 2-8.
HAZARD MITIGATION ACTION PLAN FROM THE 2012 PLAN

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
SC-9—Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe repetitive loss properties as priority when applicable.							
Existing	All Hazards	1,2,4,5,6	All County Departments	High	FEMA Hazard Mitigation Grant funding with local match provided by property owner contribution	long-term	Ongoing
SC-10—Support defensible space for wildfire through projects that create perimeters around homes, structures, and critical facilities through the removal or reduction of flammable vegetation.							
Existing	Wildfire	1,2,4,5	County Fire, OES, Planning Department	Varies per project	FEMA Hazard Mitigation Grants, other grants	Short-term	Working on needing more funding
SC-11—Support hazardous fuels reduction projects that remove vegetative fuels proximate to at-risk structures that, if ignited, pose significant threat to human life, property, and critical facilities.							
Existing	Wildfire	1,2,4,5	County Fire, OES, Planning Department	Varies per project	FEMA Hazard Mitigation Grants, other grants	Short-term	Working on needing more funding
SC-12—Design and construct drainage improvements along Panther Creek through the unincorporated town of McCloud to address repetitive damage from flooding on the adjacent roads and property.							
Existing	Flood	1,2,4	Public Works	$200,000	FEMA Hazard Mitigation Grants, other grants	Short-term	Ongoing
SC-13—Continue to maintain compliance with the National Flood Insurance Program.							
New and existing	Flood	1,2,3,7	Public Works, Building Department	Low	General Fund	Short-term	Ongoing
SC-14—Develop and maintain a county public alert and warning plan.							
Existing	All Hazards	4,5,8,9	OES	Low	General Fund	Short-term	Ongoing with System in place
SC-15—Integrate goals, objectives, and initiatives of the Siskiyou County Hazard Mitigation Plan into existing County regulations and programs where appropriate.							
Existing	All Hazards	1,2,3,5,7	All County regulatory agencies	Unknown	General Fund	Short-term	Ongoing

TABLE 2-8.
HAZARD MITIGATION ACTION PLAN FROM THE 2012 PLAN

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
SC-16—Integrate, where appropriate, risk assessment information from the Siskiyou County Hazard Mitigation Plan into other planning mechanisms available to the County such as the Siskiyou County General Plan.							
New and Existing	All Hazards	All	All County Departments	Low	General Fund	Short-term	Ongoing
SC-17—Continue to support the implementation, monitoring, maintenance, and updating of this Plan.							
New and Existing	All Hazards	All	All County Departments	Low	General Fund, FEMA Hazard Mitigation Grant for 5-year update	Short-term	Ongoing
SC-18—Create and maintain a Siskiyou County disaster database to better understand disaster related trends and impacts.							
New and Existing	All Hazards	3,5,7	OES, Public Works	Low	General Fund	Short-term	Ongoing
SC-19—Update the Siskiyou County Drainage Manual (1974) incorporating the last 37 years of data, statistics and improvements in the field of hydrology to better estimate expected flood flows.							
Existing	Flood	1,7	Public Works	Low	General Fund	Short-term	Ongoing
SC-20—Replace undersized culverts at County maintained roads (particularly those in the Klamath and Scott River watersheds).							
Existing	Flood	1,2,4,6	Public Works	High	General Fund, FEMA Hazard Mitigation Grant	Long-term	Ongoing
SC-21—Consider participation in the Community Rating System (CRS) program.							
New and Existing	Floods	1,2,3,4,5,6,7, 8,9	Planning	Low	General Fund	Short Term	Ongoing
SC-22—Support County-wide initiatives identified in Volume 1 of this Plan.							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	All County Departments	Low	General Fund	Short Term	Ongoing

TABLE 2-9.
MITIGATION STRATEGY PRIORITY SCHEDULE

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]
SC-1	4	Medium	Low	Yes	No	Yes	High
SC-2	4	High	High	Yes	Yes	No	Low
SC-3	6	High	High	Yes	No	No	High
SC-4	8	High	High	Yes	No	No	High

SC-5	4	High	High	Yes	Yes	No	High
SC-6	2	High	High	Yes	No	No	High
SC-7	4	Medium	Medium	Yes	Yes	Yes	High
SC-8	2	High	High	Yes	Yes	No	High
SC-9	5	High	High	Yes	Yes	No	High
SC-10	4	High	High	Yes	Yes	No	High
SC-11	4	High	High	Yes	Yes	No	High
SC-12	3	High	High	Yes	Yes	No	High
SC-13	4	High	Low	Yes	No	Yes	High
SC-14	4	High	Low	Yes	Yes	Yes	High
SC-15	4	High	Low	Yes	Yes	Yes	High
SC-16	9	High	Low	Yes	No	Yes	High
SC-17	9	High	Low	Yes	Yes	Yes	High
SC-18	3	High	Low	Yes	No	Yes	High
SC-19	2	High	Low	Yes	No	No	Med
SC-20	4	High	High	Yes	Yes	No	High
SC-21	9	Med	Low	Yes	No	Yes	Med
SC-22	9	Med	Low	Yes	No	Yes	High

a. See Section 1.3 for definitions of high, medium and low priorities.

**TABLE 2-10.
ANALYSIS OF MITIGATION INITIATIVES**

Hazard Type	Initiative Addressing Hazard, by Mitigation Type[a]					
	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Avalanche	SC-15, SC-16, SC-17, SC-22	SC-2, SC-5, SC-9	SC-1, SC-3, SC-6, SC-18, SC-22	SC-3, SC-6, SC-8	SC-7, SC-14	SC-5
Dam Failure	SC-15, SC-16, SC-17, SC-22	SC-2, SC-5, SC-9	SC-1, SC-3, SC-6, SC-18, SC-22	SC-3, SC-6, SC-8	SC-7, SC-14	SC-5
Drought	SC-15, SC-16, SC-17, SC-22	SC-2, SC-5, SC-9	SC-1, SC-3, SC-6, SC-18, SC-22	SC-3, SC-6, SC-8	SC-7, SC-14	SC-5
Earthquake	SC-15, SC-16, SC-17, SC-22	SC-2, SC-5, SC-9	SC-1, SC-3, SC-6, SC-18, SC-22	SC-3, SC-6, SC-8	SC-7, SC-14	SC-5
Flood	SC-13, SC-15, SC-16, SC-17, SC-19, SC-21, SC-22	SC-2, SC-5, SC-9, SC-13, SC-21	SC-1, SC-3, SC-6, SC-18, SC-19, SC-21, SC-22	SC-3, SC-6, SC-8, SC-21	SC-7, SC-14, SC-21	SC-5, SC-12, SC-20, SC-21
Landslide	SC-15, SC-16, SC-17, SC-22	SC-2, SC-5, SC-9	SC-1, SC-3, SC-6, SC-18, SC-22	SC-3, SC-6, SC-8	SC-7, SC-14	SC-5
Severe Weather	SC-15, SC-16, SC-17, SC-22	SC-2, SC-5, SC-9	SC-1, SC-3, SC-6, SC-18, SC-22	SC-3, SC-6, SC-8	SC-7, SC-14	SC-5
Volcano	SC-4, SC-15, SC-16, SC-17, SC-22	SC-2, SC-4, SC-5, SC-9	SC-1, SC-3, SC-4, SC-6, SC-18, SC-22	SC-3, SC-4, SC-6, SC-8	SC-4, SC-7, SC-14	SC-4, SC-5
Wildfire	SC-15, SC-16, SC-17, SC-22	SC-2, SC-5, SC-9, SC-10, SC-11	SC-1, SC-3, SC-6, SC-18, SC-22	SC-3, SC-6, SC-8, SC-10, SC-11	SC-7, SC-14	SC-5, SC-10, SC-11

a. See Section 1.3 for description of mitigation types

CHAPTER 3.
CITY OF DORRIS ANNEX

3.1. HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

Wayne Frost
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Alternate Point of Contact

Carol McKay
307 S. Main St.
Dorris, CA 96023
Telephone: 530-397-3511
e-mail Address: cityadmin@cot.net

3.2. JURISDICTION PROFILE

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation—**December 21, 1908
- **Current Population—**905 as of 2016
- **Population Growth—**The City has been relatively stable at about 2 percent of the County population for the last 60 years. The trend is that the population will remain relatively unchanged.
- **Location and Description—**The City of Dorris is located in northeastern Siskiyou County along U.S. Highway 97 in northern California, approximately 3 miles south of the Oregon border. The City covers an area of 0.72 square miles and is situated at the northern end of Butte Valley, a high desert plateau known for its agricultural value and wildlife viewing. The elevation of the City is approximately 4,200 feet. Land within the City is relatively flat, with Dorris Hill rising from the valley floor at the northern end of the City. U.S. Highway 97 and the Union Pacific Railroad cross through and divide the town.
- **Brief History—**The town of Dorris was established as a result of the railroad coming through the north part of Butte Valley. Dorris was named for Presley Dorris of the D ranch. Dorris was incorporated in 1908. Several buildings were moved 4 miles from Picard to the Dorris town site. The town grew due mainly to agriculture and timber mills. In 1963 the Town of Dorris was changed to the City of Dorris.
- **Climate—**Dorris is considered a high dessert climate and enjoys an average of 275 days of sunshine annually. The high dry climate provides for warm summers and fairly mild winters. When snow falls, it only occasionally stays on the ground more than 3-4 days. Annual precipitation is 13.06 inches. The average July high temperature is 79.6 degrees and average January low temperature is 22.5 degrees. The fall season is mild with comfortable temperatures.
- **Governing Body Format—**The City is governed by an elected five-member Council. All members serve a four-year term and are elected on alternate even numbered election years. The Mayor is elected by the council to serve a two-year term. The City Administrator is appointed by the Council to oversee daily management and oversees the finance, public works, and community development and administration departments. Police service and fire protection departments report directly to the Council.

- **Development Trends—**The City of Dorris is a typical rural, small American town. The population of 888 allows most residents to know each other in passing and many residents have spent most or all of their lives in Dorris. The character of Dorris is strongly rooted in the agricultural heritage of Butte Valley and the lumber industry of the area.

  Among the most attractive qualities of Dorris is the relatively quiet and safe environment that has been lost in many larger cities of the nation, and the affordability of homes within the community. The qualities of a safe and friendly community continue to make Dorris a pleasant place for families and individuals seeking a peaceful, affordable place to live.

  Residents of Dorris locate or remain here primarily due to the small-town atmosphere, natural beauty of the area, affordable housing and overall quality of life.

  Historically significant employment in the public sector, lumber industry and agriculture will remain unchanged. Due to limited employment opportunities in Dorris, individuals moving into the community tend to be retired or employed elsewhere (e.g. Klamath Falls) and they commute or telecommute to work. Due to the relative isolation of the community, few large industries are expected to move to Dorris. The most likely industries are expected to be small businesses that employ fewer than 20 people.

3.3. JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 3-1 lists all past occurrences of natural hazards in the county. Repetitive loss records are as follows:

- Number of FEMA Identified Repetitive Flood Loss Properties: 0
- Number of Repetitive Flood Loss Properties that have been mitigated: 0

3.4. HAZARD RISK RANKING

Table 3-2 presents the ranking of the hazards of concern.

3.5. CAPABILITY ASSESSMENT

The assessment of the jurisdiction’s legal and regulatory capabilities is presented in Table 3-3. The assessment of the jurisdiction’s administrative and technical capabilities is presented in Table 3-4. The assessment of the jurisdiction’s fiscal capabilities is presented in Table 3-5. Classifications under various community mitigation programs are presented in **Error! Reference source not found.**.

3.6. HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

Table 3-6 lists the initiatives that make up the jurisdiction’s hazard mitigation plan. Table 3-7 identifies the priority for each initiative. Table 3-8 summarizes the mitigation initiatives by hazard of concern and the six mitigation types. Due to insufficient staffing and funding we were not able to integrate information from the 2012 plan into the new plan.

Part of the revision process is surveying the public about topics that are important to them and how they see the City changing in the next 25 years. Similar to the mapping exercise at a workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the City. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the City and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

The City General Plan which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute.

In addition to the General Plan process, the City will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

3.7. FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

The City of Dorris will require a jurisdiction-wide blueprint for reducing the potential losses identified in the risk assessment, based on existing policies, programs and resources, and the City's ability to expand on and improve existing tools and resources. There is a need to evaluate how the City's mitigation measures will be implemented to reduce or avoid long-term vulnerabilities to identified hazards and to develop a detailed project and cost list for each measure.

National Flood Insurance Program

The City of Dorris does not participate in the National Flood Insurance Program.

3.8. ADDITIONAL COMMENTS

The Union Pacific Railroad and Highway 97 bisect the City of Dorris, which could be a problem if the rail or highway is blocked due to an accident. This is an area that the City will need to explore for varying hazard circumstances.

3.9. HAZARD AREA EXTENT AND LOCATION

Hazard area extent and location maps for the City of Dorris are included at the end of this chapter. These maps are based on the best available data at the time of the preparation of this plan, and are considered to be adequate for planning purposes.

TABLE 3-1.
NATURAL HAZARD EVENTS

Type of Event	Date	Preliminary Damage Assessment
Flooding	12/2005	$95,000 City Property only
Severe Weather	Multiple events	Unknown
Wildfires	Multiple events	Unknown

TABLE 3-2.
HAZARD RISK RANKING

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Severe Weather	51
2	Wildfire	45
3	Flood	30
4	Drought	18
5	Earthquake	9
6	Volcano	9
7	Landslide	6
8	Dam Failure	0

TABLE 3-3.
LEGAL AND REGULATORY CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Building Code	Y	N	N	Y	2007 California Building Code
Zonings	Y	N	N	Y	Title 18 Dorris Municipal Code
Subdivisions	Y	N	N	Y	Title 16 Dorris Municipal Code
Stormwater Management	Y	Y	N	Y	Clean Water Act
Post Disaster Recovery	N	N	N	N	—-
Real Estate Disclosure	Y	N	N	Y	California Civil Code 1102
Growth Management	Y	N	N	Y	Dorris General Plan 2007
Site Plan Review	Y	N	N	N	Staff will review and Council will approve plans
Special Purpose (flood management, critical areas)	Y	N	N	N	General Plan Safety Element 2007 for fire, severe weather, flood, seismic
Planning Documents					
General or Comprehensive Plan	Y	N	N	Y	Dorris General Plan adopted Aug. 2007
Floodplain or Basin Plan	N	N	N	N	Dorris is not listed in a floodplain
Stormwater Plan	Y	N	N	Y	Clean Water Act and SB 790
Capital Improvement Plan	Y	N	N	N	City Admin adopted 2010-2014
Habitat Conservation Plan	N	N	N	N	—-
Economic Development Plan	Y	N	N	N	City Admin Economic Development Grant
Emergency Response Plan	Y	N	N	Y	Department of Public Works ERP 2010
Shoreline Management Plan	N	N	N	N	—-
Post Disaster Recovery Plan	N	N	N	N	—-
Other					
Other	Y	N	N	Y	Water Conservation Ordinance Title 13.05

TABLE 3-4.
ADMINISTRATIVE AND TECHNICAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Y	City Contract Engineer and Public Works Department. Community Development Agency
Engineers or professionals trained in building or infrastructure construction practices	Y	City Engineer/Public Works and Community Development Agency
Planners or engineers with an understanding of natural hazards	Y	Same as above
Staff with training in benefit/cost analysis	Y	City Administration/Finance Clerk/Engineer
Floodplain manager	Y	Fire Chief/City Administrator
Surveyors	Y	City Contract Engineer
Personnel skilled or trained in GIS applications	Y	City Contract Engineer
Scientist familiar with natural hazards in local area	N	
Emergency manager	Y	Fire Chief/Public Works Department
Grant writers	Y	Community Development Department/City Admin

TABLE 3-5.
FISCAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Y
Capital Improvements Project Funding	Y
Authority to Levy Taxes for Specific Purposes	Y
User Fees for Water, Sewer, Gas or Electric Service	Y
Incur Debt through General Obligation Bonds	Y
Incur Debt through Special Tax Bonds	Y
Incur Debt through Private Activity Bonds	Y
Withhold Public Expenditures in Hazard-Prone Areas	Y
State Sponsored Grant Programs	Y
Development Impact Fees for Homebuyers or Developers	Y

TABLE 3-6.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
Initiative #D1—Structural and non-structural retrofitting of existing facilities (elevation, floodproofing, storm doors, tie-downs, etc.) for wildfire, seismic, wind or flood hazards (including designs and feasibility studies when included as part of the construction project)							
New and Existing	All	1,2,4,6,7,9	FD	High	Hazard Mitigation Grants	Long-Term	Ongoing
Initiative #D2—Development and initial implementation of vegetative management programs							
New and Existing	Fire, Landslide, Drought, Flood	2,3,5,7,8	City	Low	USDA, FEMA Mitigation Grant, City	Short Term	Ongoing Need more funding
Initiative #D3—Minor structural hazard control or protection projects that may include stormwater management (e.g., culverts, floodgates, retention basins), or landslide stabilization							
New and Existing	Severe Weather, Flood, Earthquake, Landslide	1,2,3,4,6,7	PW and Council	Med	Capital Improvement CDBG Infrastructure	Long Term	Ongoing
Initiative D4#—Undertake Earthquake Study for all “Critical Infrastructure”							
New and Existing	Earthquake	1,2,3,4,7,9	City, Planning	Low	CDBG Grant FEMA	Short Term	Ongoing
Initiative #D5—Enhance/improve City code language and enforcement, including City Building and Fire Codes, to increase compliance with SB 1369 (Defensible Space) and other fire safe requirements in the City, and integrate mitigation plan into the Safety Element of the City’s General Plan							
New and Existing	All	2,3,4,5,7,8,9	City, Planning, FD	Med	General Fund, FEMA, USDA, CDBG	Long Term	Ongoing
Initiative #D6—Continue to participate not only in general mutual-aid agreements, but also in agreements with adjoining jurisdictions for cooperative response to all hazards and disasters							
New and Existing	All Hazards	3,4, 5, 7, 8, 9	FD, PW, Sheriff	Low	County, City and FEMA Grants	Long Term	Ongoing
Initiative #D7—The Fire Department to conduct a mass care and shelter drill, which involves city and county employees, non-government agencies and the public							
New and Existing	All Hazards	2,3,4,5, 7,8,9	FD, City, PL, PW	Low	County, City and FEMA Grants	Annual	Completed
Initiative #D8—Consider participation in the Community Rating System (CRS) program							
New and Existing	Floods	1,2,3,4,5,6,7, 8,9	City	Low	City	Short Term	Ongoing
Initiative #D9—Consider participation in the National Flood Insurance Program (NFIP)							

TABLE 3-6.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
New and Existing	Floods	1,2,3,4,5,6,7, 8,9	City	Low	City	Short Term	Ongoing
Initiative #D10—Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	High	City, FEMA Mitigation Grants	Long Term	Ongoing
Initiative #D11—Support County-wide initiatives identified in Volume 1 of this Plan							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	Low	City	Short Term	Ongoing
Initiative #D12—Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	Low	City, FEMA Mitigation Grants	Short Term	Ongoing

**TABLE 3-7.
MITIGATION STRATEGY PRIORITY SCHEDULE**

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Priority[a]
D1	6	High	Medium	Yes	Yes	Yes	High
D2	5	Med	Low	Yes	Yes	Yes	Med
D3	6	Med	Med	Yes	Yes	Yes	Med
D4	6	Med	Med	Yes	Yes	Yes	Med
D5	7	High	Med	Yes	Yes	Yes	High
D6	6	High	Low	Yes	Yes	Yes	High
D7	7	High	Low	Yes	Yes	Yes	High
D8	9	Med	Low	Yes	No	Yes	Med
D9	9	Low	Low	Yes	No	Yes	High
D10	9	High	High	Yes	Yes	No	High
D11	9	Med	Low	Yes	No	Yes	High
D12	9	Med	Low	Yes	Yes	Yes	High

a. See Section 1.3 for definitions of high, medium and low priorities.

**TABLE 3-8.
ANALYSIS OF MITIGATION INITIATIVES**

	Initiative Addressing Hazard, by Mitigation Type[a]					
Hazard Type	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Dam Failure						
Drought	1, 2, 3 5, 11, 12	1, 2, 10	5, 7, 11, 12	1, 2, 3,	1, 3, 6, 7	1, 2, 3
Earthquake	1, 4, 5, 11, 12	1, 3, 4, 10	4, 5, 11, 12	3, 4	1, 6, 7	1, 3,
Flood	1, 2, 3, 5, 6, 7, 8, 9, 11, 12	1, 2, 3, 8, 9, 10	5, 6, 7, 8, 9, 11, 12	1, 2, 3, 8, 9	6, 7, 8, 9	1, 2, 3, 8
Landslide	1, 2, 3, 5, 11, 12	1, 2, 3, 10	5, 6, 7, 11, 12	2, 3,	6, 7	1, 2, 3
Severe Weather	1, 2, 5, 11, 12	1, 3, 10	5, 6, 7, 11, 12	1, 2, 3	6, 7	1, 2, 3,
Volcano	1, 2, 5, 11, 12	1, 2, 3, 10	5, 6, 7, 11, 12	NA	6, 7	1, 2,
Wildfire	1, 2, 5, 11, 12	1, 2, 10	5, 6, 7, 11, 12	2, 3	5, 6, 7	1, 2, 3

a. See Section 1.3 for description of mitigation types

TABLE 3-10. COMMUNITY OUTREACH WILL BE PERROMING THESE OUTREACH EVENTS AND WILL INCLUDE MITIGATION EDJUCATION TO THE PUBLIC.
Outreach
Community Meetings Go Bag planning Schools
Fire Safe Council Meetings
PSA about Emergency Notification System and Testing
Use of Facebook and Twitter

CHAPTER 4.
CITY OF ETNA ANNEX

4.1. HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
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Alternate Point of Contact
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Assistant Fire Chief & Public Works Dir.
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Etna, CA 96027
Telephone: 530 598 2286
e-mail Address: etnacitypwd@gmail.com

4.2. JURISDICTION PROFILE

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation—**1878
- **Current Population—**716 as of 2016
- **Population Growth—**The population of Etna has decreased from a high of 880 to 771 (2000 census) to the present figure of 737, due almost entirely to the demise of the lumber industry and the spotted owl environmental issue. Etna schools (K-12) lost more than one-third of their ADA; logging families moved away; and businesses closed. Fortunately, the rural ranching area surrounding Etna and served by the Etna Post Office (approximately 1500 pop) has remained more stable, and there is a projection of a small population growth for Etna for the next 20 years. Several new businesses have opened recently and there is a sense of new beginnings.
- **Location and Description—**Etna is located near Etna Creek on the west side of Scott Valley, about 30 miles from the Oregon border, 27 miles from the county seat of Yreka. State Highway 3 runs from Yreka over Forest Mt., through Scott Valley, passing through Fort Jones, (12 miles north of Etna), Etna, and Callahan (13 miles south of Etna), continuing over Scott Mt. to Weaverville. Highway 3 provides the chief ingress/egress from the Valley. Etna’s elevation is 2929 feet above sea level and geographic coordinates are 47º22’26”N, 122º53’49”W. Etna is surrounded on three sides by the Marble Mountains, Trinity Alps, and Siskiyou Mountains. Etna Creek provides an excellent water supply for Etna, with adjudicated water rights dating to the early 1900s. Etna covers a land area of 0.8 square miles. Heavily forested hills abut the city on the west.
- **Brief History—**After Hudson Bay trappers entered Scott Valley in 1836 and decimated the beaver population, the gold miners and farmers appeared in the early 1850s. In 1853, a sawmill was built on the site of present Etna (then called Rough and Ready), followed by a flour mill, stables, a hotel, a brewery, Scott Valley Bank and many large homes. Nearby Aetna Mills suffered a disastrous flood in 1861-62, and those residents and businesses moved to Rough and Ready, which assumed the Aetna Mills name. The town continued to grow and in 1878, was incorporated as a city: Etna Mills. The name was officially changed to Etna in

the 1930s. The first high school north of Red Bluff, CA was opened in 1892 on the second floor of the Denny Bar building (now Scott Valley Pharmacy). Schools, churches, social clubs, a library, and rodeo grounds were added. The city enjoyed prosperity until the slow-down of the mining and lumber industries. Since that time, the city has struggled, successfully, to maintain a viable presence in the Valley. Today, the small city has an excellent new library, a junior Olympic swimming pool, a park where the annual Bluegrass Festival hosts over 800 guests each July, a museum, a 306-seat theater that is garnering much praise, a well-staffed medical clinic, and good schools. The STAGE bus provides Etna-Yreka service four times daily, Monday-Friday. The work force includes education, Forest Service, service jobs, and a large number of residents who commute to Yreka for employment.

- **Climate—**Etna enjoys a highland Mediterranean climate characterized by hot, dry summers, and cold, wet winters, with an average precipitation of 22 inches. Average winter snowfall is about 30 inches, but varies greatly. Mountain snowfall provides a good supply of water year-round, with lowest flows in August and September.
- **Governing Body Format—**The City of Etna is governed by a five-person City Council. This body will assume responsibility for adoption and implementation of this plan. The City employs three full-time employees: a City Clerk responsible for day-to-day operations of the City, a Public Works Director responsible for streets, buildings, water and sewer, and other maintenance tasks, and a Chief of Police. There are also three part-time employees: an assistant clerk, a police administrator, and a maintenance worker. There is a volunteer Fire Department with a chief and 12 to 14 volunteer firefighters. The very active Ambulance Department, which serves the entire Valley, is headed by a director, with 12 to 14 volunteer qualified ambulance personnel. The lack of code enforcement, animal control, and building inspection personnel is presently being addressed by the Council. The General Plan was last updated in 2005; the housing unit was reviewed in March 2011. The Etna Municipal Code, dated 2008, covers administrative ordinances, including a section on Flood Damage Prevention.
- **Development Trends—**There are 362 housing units in Etna, 350 of those are single-family dwellings. The population includes 21.1 percent under 18; 4.7 percent 18-24; 21.4 percent 25-44; 25.1 percent 45-64; and 22.7 percent 65 and older. The median household income in 2010 was $25,179; median family income was $30,461. 19.7 percent of the population live below the poverty level. Housing demands are slow, due to the poor economy—the unemployment rate hovers around 15 percent. Population growth is predicted to be slow, with a possible population of 819 by 2019. There is adequate undeveloped land in Etna to support a population of 1,570 people. The Etna General Plan, adopted in 2005, includes a comprehensive plan to guide community development, including goals, policies, implementation measures, annexation, zoning, subdivision, design review and capital improvement.

4.3. JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 4-1 lists all past occurrences of natural hazards in the county. Repetitive loss records are as follows:

- Number of FEMA Identified Repetitive Flood Loss Properties: 0
- Number of Repetitive Flood Loss Properties that have been mitigated: 0

4.4. HAZARD RISK RANKING

Table 4-2 presents the ranking of the hazards of concern.

4.5. CAPABILITY ASSESSMENT

The assessment of the jurisdiction's legal and regulatory capabilities is presented in Table 4-3. The assessment of the jurisdiction's administrative and technical capabilities is presented in Table 4-4. The assessment of the jurisdiction's fiscal capabilities is presented in Table 4-5. Classifications under various community mitigation programs are presented in Table 4-6.

4.6. HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

Table 4-7 lists the initiatives that make up the jurisdiction's hazard mitigation plan. Table 4-8 identifies the priority for each initiative. Table 4-1 summarizes the mitigation initiatives by hazard of concern and the six mitigation types. Due to the insufficient staff and funding we were not able to integrate information from the 2012 plan in the new plan.

Part of the revision process is surveying the public about topics that are important to them and how they see the City changing in the next 25 years. Similar to the mapping exercise at a workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the City. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the City and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

The City General Plan which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute.

In addition to the General Plan process, the City will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

National Flood Insurance Program

The City of Etna does participate in the National Flood Insurance Program (NFIP) that provides federally backed flood insurance in exchange for communities enacting floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. The County and most of the partner cities for this plan participate in the NFIP and have adopted regulations that meet the NFIP requirements. At the time of the preparation of this plan, all participating jurisdictions in the partnership were in good standing with NFIP requirements.

4.7. HAZARD AREA EXTENT AND LOCATION

Hazard area extent and location maps for the City of Etna are included at the end of this chapter. These maps are based on the best available data at the time of the preparation of this plan, and are considered to be adequate for planning purposes.

TABLE 4-1.
NATURAL HAZARD EVENTS

Type of Event	Date	Preliminary Damage Assessment
Flood	12/2005-1/2006	Over $200,000,
Flood	12/1996-1/1997	No estimates available
Flood	2/1986	No estimates available
Flood	Winter 1974	No estimates available
Flood	12/1964	No estimates available; 1/3 of city flooded

TABLE 4-2.
HAZARD RISK RANKING

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Wildfire	54
2	Flood	30
3	Severe Weather	12
4	Drought	10
5	Earthquake	6
6	Volcano (lahar/ash fall)	6
7	Dam failure	0
8	Landslide	0

TABLE 4-3.
LEGAL AND REGULATORY CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Building Code	Y	N	N	Y	Etna Municipal Code, 2008, Title 15
Zonings	Y	N	N	Y	EMC, 2008, Title 17
Subdivisions	Y	N	N	?	EMC, 2008, Title 16
Stormwater Management	N	N	N	?	NA
Post Disaster Recovery	N	N	N	N	NA
Real Estate Disclosure	N	N	N	N	NA
Growth Management	N	N	N	N	NA
Site Plan Review	N	N	N	N	NA
Special Purpose (flood management, critical areas)	Y	N	N	?	EMC, 2008, Title 14
Planning Documents					
General or Comprehensive Plan	Y	N	N	Y	Etna General Plan, 2005. Adopted the local hazard mitigation plan into the safety element of general plan.
Floodplain or Basin Plan	N	N	N	N	NA
Stormwater Plan	N	N	N	?	Presently being addressed
Capital Improvement Plan	N	N	N	N	NA
Habitat Conservation Plan	N	N	N	N	NA
Economic Development Plan	N	N	N	N	Etna is a member of the Siskiyou County Enterprise Zone
Emergency Response Plan	Y	N	N	Y	Etna Fire Dept., 2009, under revision
Shoreline Management Plan	N	N	N	N	NA
Post Disaster Recovery Plan	N	N	N	N	NA

**TABLE 4-4.
ADMINISTRATIVE AND TECHNICAL CAPABILITY**

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Staff/Personnel Resources	Available for mitigation activities	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Y	Contract service w/city engineer and PMC (private planning company)
Engineers or professionals trained in building or infrastructure construction practices	Y	Contract w/city engineer
Planners or engineers with an understanding of natural hazards	Y	Contract w/city engineer and PMC
Staff with training in benefit/cost analysis	Y	None on staff; available by contract w/private co.
Floodplain manager	Y	City clerk
Surveyors	Y	Contract service with city engineer
Personnel skilled or trained in GIS applications	Y	Contract service with city engineer
Scientist familiar with natural hazards in local area	Y	Contract w/PMC and/or Resource Management (private company)
Emergency manager	Y	Etna Fire Chief
Grant writers	Y	Contract w/Great Northern (private co.)

**TABLE 4-5.
FISCAL CAPABILITY**

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Financial Resources	Accessible or Eligible to Use? To use for mitigation actions.
Community Development Block Grants	Y
Capital Improvements Project Funding	Y
Authority to Levy Taxes for Specific Purposes	Y
User Fees for Water, Sewer, Gas or Electric Service	Y
Incur Debt through General Obligation Bonds	Y
Incur Debt through Special Tax Bonds	Y
Incur Debt through Private Activity Bonds	N
Withhold Public Expenditures in Hazard-Prone Areas	Y
State Sponsored Grant Programs	Y
Development Impact Fees for Homebuyers or Developers	N

TABLE 4-6.
COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Community Rating System	No	N/A	N/A
Building Code Effectiveness Grading Schedule	Unknown	N/A	N/A
Public Protection	Yes	Unknown	Unknown
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

TABLE 4-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
E-1 Feasibility study for complete upgrade of stormwater drain system							
New	Flooding	1,2,3,4,6,7	City	$35,000 High	State, GF, FEMA Mitigation grants	Short term	Ongoing
E-2 Update/construct/retrofit storm drain system in ensure maximum efficiency							
Existing	Flooding	2,3,4,6	City	$500,000 High	Rural USDA, DWR, FEMA HM grants	Short term	Ongoing
E-3 Retrofit sewer mains in floodplain area and extend water main for fire hydrant							
Existing	Fire/ Flood	2,3,6,7	City	$100,000 High	FEMA HMA grant	Short term	Ongoing
E-4 Continue participation and improve class rating in ISO programs (Building Code Effectiveness Grading, Public Protection)							
Existing	Fire/Flood	1,2,4,5,7,8,9	City	Low	Gen Fund	Ongoing	Ongoing
E-5 Add a third reservoir (300,000 gallons) at the water plant for fire protection/drought management							
New	Fire/drought	1,2,3,4,7	City	$300,000 High	USDA Rural, FEMA Mitigation grant, DWR/State prop grants.	Short term	Ongoing
E-6 Clear fuels to provide defensible open space: complete/maintain fuel break close to city boundaries; establish Etna Fire Safe Council							
Existing	Fire	1,2,3,4,5,7,8	City	$20,000 Medium	GF, FEMA Mitigation grants	Short term	Ongoing
E-7 Require private property owners in city limits to maintain defensible space							
Existing	Fire	2,3,4,5,7	City	Low	Gen Fund	Ongoing	Ongoing
E-8 Integrate risk assessment information from Siskiyou County Hazard Mitigation Plan into available City planning documents							
New	All hazards	1,2,4,7,8	City	$10,000 Low	Gen Fund	Short term	Ongoing

TABLE 4-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
E-9—Update Emergency Operations Plan							
Existing	Fire, Floods	1,2,3,4,5,7,8	City	$10,000 Low	Gen Fund	Short term	Ongoing
E-10—Integrate the Hazard Mitigation Plan into the Safety Element of the General Plan							
New	All hazards	1,2,4,5,7,8	City	$10,000 Low	Gen Fund	Short term	Ongoing
E-11—Update Etna Municipal code language and enforcement re: Building and Fire Codes							
Existing	All hazards	1,2,3,4	City	$5,000 Low	Gen Fund	Short term	Ongoing
E-12—Complete or update mutual aid agreements with adjoining entities (City of Fort Jones, Scott Valley Fire Dist., CDF)							
Existing	Fire, Flood, Drought	1,2,8	City	Low	Gen Fund	Short term	Completed
E-13—Develop educational materials re: disaster planning, natural hazard risk, etc.; work with local schools, civic/social entities, Chamber of Commerce, Family Resource Center to educate community in hazard mitigation/disaster preparedness							
New	All hazards	2,4,5,7,8,9	City	$5,000 Low	Gen Fund, Shared cost w/partners	Short term	Ongoing
E-14—Consider participation in the Community Rating System (CRS) program							
New and Existing	Floods	1,2,3,4,5,6,7, 8, 9	City	Low	City	Short Term	Ongoing
E-15—Continue to maintain compliance and good standing in the National Flood Insurance Program (NFIP)							
New and Existing	Floods	1,2,3,4,5,6,7, 8,9	City	Low	City	Short Term	Ongoing
E-16—Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	High	City, FEMA Mitigation Grants	Long Term	Ongoing
E-17—Support County-wide initiatives identified in Volume 1 of this Plan							
New and Existing	All Hazards	1, 2, 3, 4, 5, 6, 7, 8, 9	City	Low	City	Short Term	Ongoing
E-18—Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	Low	City, FEMA Mitigation Grants	Short Term	Ongoing

TABLE 4-8.
MITIGATION STRATEGY PRIORITY SCHEDULE

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]
E-1	6	High	High	Yes	Yes	No	High
E-2	4	High	High	Yes	Yes	No	High
E-3	4	High	High	Yes	Yes	No	High
E-4	7	High	Low	Yes	No	Yes	High
E-5	5	High	High	Yes	Yes	No	High
E-6	7	High	Med	Yes	Yes	No	High
E-7	5	High	Low	Yes	No	Yes	High
E-8	5	Med	Low	Yes	No	Yes	Med
E-9	7	High	Low	Yes	No	Yes	Med
E-10	6	High	Low	Yes	No	Yes	Med
E-11	4	Med	Low	Yes	No	Yes	Med
E-12	3	High	Low	Yes	No	Yes	High
E-13	6	High	Low	Yes	No	Yes	Med
E-14	9	Med	Low	Yes	No	Yes	Med
E-15	9	Low	Low	Yes	No	Yes	High
E-16	9	High	High	Yes	Yes	No	High
E-17	9	Med	Low	Yes	No	Yes	High
E-18	9	Med	Low	Yes	Yes	Yes	High

a. See Section 1.3 for definitions of high, medium and low priorities.

TABLE 4-9.
COMMUNITY OUTREACH

WILL BE PERROMING THESE OUTREACH EVENTS AND WILL INCLUDE MITIGATION EDJUCATION TO THE PUBLIC.

Outreach
Community Meetings Go Bag planning Schools
Fire Safe Council Meetings
PSA about Emergency Notification System and Testing
Use of Facebook and Twitter

TABLE 4-10.
ANALYSIS OF MITIGATION INITIATIVES

Hazard Type	Initiative Addressing Hazard, by Mitigation Type[a] 1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Dam Failure	—	—	—	—	—	—
Drought	E-5, E-17, E-18	E-17	E-9, E-14, E-17, E-18		E-13	E-5
Earthquake	E-17, E-18	E-17	E-17, E-18			
Flood	E-1, E-2, E-4, E-8, E-9, E-15, E-16, E-17, E-18	E-1, E-2, E-11, E-12, E-15, E-16, E-17	E-9, E-14, E-15, E-16, E-17, E-18	E-15, E-16	E-4, E-10, E-13, E-15, E-16	E-2, E-3, E-15
Landslide	—	—-	—	—	—	—
Severe Weather	E-1, E-2, E-3, E-4, E-9, E-17, E-18	E-3, E-17	E-9, E-10, E-14, E-17, E-18	E-6, E-7	E-10, E-11, E-12	E-4, E-6, E-7
Volcano	E-11	, E-17	E-14	E-11	E-9, E-10	
Wildfire	E-4, E-5, E-6, E-7, E-17, E-18	E-3, E-5, E-6, E-7, E-17	E-8, e-9, E-12, E-14, E-17, E-18	E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-12, E-13	E-10, E-13, E-14	E-9, E-10, E-11, E-12, E-14

a. See Section 1.3 for description of mitigation types

CHAPTER 5.
TOWN OF FORT JONES ANNEX

5.1. HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

Christian Sherfy
31 Newton St
Fort Jones, CA 96032
Telephone: 530 468-2261
e-mail Address: ftjonesfire@sisqtel.net

Alternate Point of Contact

Ken Smith
PO Box 40—11960 East Street
Fort Jones, CA 96032
Telephone: 530 468-2281
e-mail Address: ksmith@sisqtel.net

5.2. JURISDICTION PROFILE

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation** March, 1872
- **Current Population—**688 as of 2016
- **Population Growth—**+27.1 percent (mostly due to a prior annexation)
- **Location and Description** The Town of Fort Jones is located in central Siskiyou County in Northern California, 15 miles southwest of Yreka, the county seat. The general area is referred to as Scott Valley and the Town is surrounded predominately by agricultural and forest land.
- **Brief History—**Fort Jones takes its name from a frontier outpost once located less than a mile to the south of the current city limits. The town was originally named Scottsburg (ca. 1850), but was changed to Scottsville shortly thereafter. In 1852, the site was again renamed, this time in honor of Mr. O.C. Wheelock who, with his partners, established one of the area's first commercial enterprises. In 1854, a post office was established and the town was renamed again, becoming known as Ottitewa, the Indian name for the Scott River branch of the Shasta tribe. The name remained unchanged until 1860 when local citizens successfully petitioned the postal department to change the name to Fort Jones.
- **Climate—**The climate data provided by USDA/NRCS list the average annual minimum temperature for Fort Jones as 20º to 25º and the average annual maximum temperature as 85º to 95º. The average annual precipitation is 11 to 39 inches.
- **Governing Body Format—**The City government consists of a five-member City Council, administrative staff, and public works, parks, road, and fire department personnel. The City provides water, sewer, storm drainage and other public works services to properties inside and outside the city limits. The City is directed, administratively and financially, by the City Council in concert with city staff. The City owns numerous properties, buildings, facilities and infrastructure to support the function of the City.
- **Development Trends—**The City has sufficient land within the city limits and sphere of influence to accommodate the expected growth, and the community has sufficient commercial and industrial lands to support that population.

5.3. JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 5-1 lists all past occurrences of natural hazards in the county. Repetitive loss records are as follows:

- Number of FEMA Identified Repetitive Flood Loss Properties: 2
- Number of Repetitive Flood Loss Properties that have been mitigated: 1

5.4. HAZARD RISK RANKING

Table 5-2 presents the ranking of the hazards of concern.

5.5. CAPABILITY ASSESSMENT

The assessment of the jurisdiction’s legal and regulatory capabilities is presented in Table 5-3. The assessment of the jurisdiction’s administrative and technical capabilities is presented in Table 5-4. The assessment of the jurisdiction’s fiscal capabilities is presented in Table 5-5. Classifications under various community mitigation programs are presented in Table 5-6.

5.6. HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

Table 5-7 lists the initiatives that make up the jurisdiction’s hazard mitigation plan. Table 5-8 identifies the priority for each initiative. Table 5-9 summarizes the mitigation initiatives by hazard of concern and the six mitigation types. Due to the insufficient staff and funding we were not able to integrate information from the 2012 plan in the new plan.

Part of the revision process is surveying the public about topics that are important to them and how they see the Town changing in the next 25 years. Similar to the mapping exercise at a workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the Town. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the Town and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

The Town’s General Plan which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute.

In addition to the General Plan process, the Town will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

National Flood Insurance Program

The Tow of Fort Jones does participate in the National Flood Insurance Program (NFIP) that provides federally backed flood insurance in exchange for communities enacting floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. The County and most of the partner cities for this plan participate in the NFIP and have adopted regulations that meet the NFIP requirements. At the time of the preparation of this plan, all participating jurisdictions in the partnership were in good standing with NFIP requirements.

5.7. HAZARD AREA EXTENT AND LOCATION

Hazard area extent and location maps for the Town of Fort Jones are included at the end of this chapter. These maps are based on the best available data at the time of the preparation of this plan, and are considered to be adequate for planning purposes.

TABLE 5-1.
NATURAL HAZARD EVENTS

Type of Event	Date	Preliminary Damage Assessment
Flood	1/1973	$86,206.90 (County)
Flood	1/1997	$5,500,000 (County)
Flood	12/2005	$58,662.(City) $7,000,000 (County)
Wildfire	Multiple events	Approximately $69,000,000

**TABLE 5-2.
HAZARD RISK RANKING**

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Flood	54
1	Wildfire	54
3	Severe Weather	33
4	Drought	18
5	Volcano	6
6	Landslide	3
7	Earthquake	0
8	Dam Failure	0

**TABLE 5-3.
LEGAL AND REGULATORY CAPABILITY**

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Building Code	Y	N	N	Y	Contract w/Siskiyou County
Zonings	Y	N	N	Y	Title 18, Municipal Code
Subdivisions	Y	N	N	N	Title 17, Municipal Code
Stormwater Management	Y	N	N	N	Title 18, Municipal Code
Post Disaster Recovery	Y	N	N	N	Title 2, Municipal Code
Real Estate Disclosure	Y	N	N	Y	CA State Civil Code 1102
Growth Management	Y	N	N	Y	Title 18, Municipal Code
Site Plan Review	Y	N	N	N	Title 18, Municipal Code
Special Purpose (flood management, critical areas)	Y	N	N	N	Title 18, Municipal Code
Planning Documents					
General or Comprehensive Plan	Y	N	N	Y	Fort Jones General Plan
Floodplain or Basin Plan	N	N	N	N	
Stormwater Plan	N	N	N	N	
Capital Improvement Plan	N	N	N	N	
Habitat Conservation Plan	N	N	N	N	
Economic Development Plan	N	N	N	N	
Emergency Response Plan	Y	N	N	N	Fort Jones General Plan
Shoreline Management Plan	N	N	N	N	NA

TABLE 5-3.
LEGAL AND REGULATORY CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Post Disaster Recovery Plan	Y	N	N	N	Fort Jones General Plan

TABLE 5-4.
ADMINISTRATIVE AND TECHNICAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Y	Planners, engineers and other specialists are contracted for job specific work.
Engineers or professionals trained in building or infrastructure construction practices	Y	Contracted for job specific work
Planners or engineers with an understanding of natural hazards	Y	Contracted for job specific work
Staff with training in benefit/cost analysis	Y	City Clerk and staff/ Contracted for job specific work
Floodplain manager	Y	Public Works Director
Surveyors	Y	Contracted for job specific work
Personnel skilled or trained in GIS applications	Y	Contracted for job specific work
Scientist familiar with natural hazards in local area	Y	Contracted for job specific work
Emergency manager	Y	Public Works Director
Grant writers	Y	Contracted for job specific work

TABLE 5-5.
FISCAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Y
Capital Improvements Project Funding	
Authority to Levy Taxes for Specific Purposes	
User Fees for Water, Sewer, Gas or Electric Service	Y
Incur Debt through General Obligation Bonds	Y
Incur Debt through Special Tax Bonds	
Incur Debt through Private Activity Bonds	
Withhold Public Expenditures in Hazard-Prone Areas	
State Sponsored Grant Programs	Y

Development Impact Fees for Homebuyers or Developers	

TABLE 5-6.
COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Community Rating System	No	N/A	N/A
Building Code Effectiveness Grading Schedule	Yes	Unknown	Unknown
Public Protection	Yes	Unknown	Unknown
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

TABLE 5-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
Initiative #FJ1—Increase channel capacity of Moffett Creek by removing utility line dams, vegetation and accumulated sediment.							
Existing	flood	2, 11, 31, 39, 42	Town	$260,000 High	HMGP, PDM, FMA, RFC	Short term	Ongoing
Initiative #FJ2—Clear 100 feet of defensible space for 30 vulnerable homes**.**							
Existing	Wildfire	29, 39, 42	Town	$75,000 Medium	HMPG, PDM	Short term	Ongoing
Initiative #FJ3—Provide 150 acres of shaded fuel break, restore emergency fire road.							
Existing	Wildfire	5, 8, 10, 29, 39, 41	Town	$225,000 High	HMPG, PDM	Short term	Ongoing
Initiative #FJ4—Consider participation in the Community Rating System (CRS) program.							
New and Existing	Floods	1,2,3,4,5,6,7, 8,9	Town	Low	Town	Short Term	Ongoing
Initiative #FJ5—Continue to maintain compliance and good standing in the National Flood Insurance Program (NFIP).							
New and Existing	Floods	1,2,3,4,5,6,7, 8,9	Town	Low	Town	Short Term	Ongoing
Initiative #FJ6—Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority.							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	Town	High	Town, FEMA Mitigation Grants	Long Term	Ongoing
Initiative #FJ7—Support County-wide initiatives identified in Volume 1 of this Plan.							

TABLE 5-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	Town	Low	Town	Short Term	Ongoing
Initiative #FJ8—Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1.							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	Town	Low	Town FEMA Mitigation Grants	Short Term	Ongoing

TABLE 5-8.
MITIGATION STRATEGY PRIORITY SCHEDULE

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]
FJ1	5	High	High	Yes	Yes	No	High
FJ2	3	High	Med	Yes	Yes	No	High
FJ3	6	High	High	Yes	Yes	No	High
FJ4	9	Med	Low	Yes	No	Yes	Med
FJ5	9	Low	Low	Yes	No	Yes	High
FJ6	9	High	High	Yes	Yes	No	High
FJ7	9	Med	Low	Yes	No	Yes	High
FJ8	9	Med	Low	Yes	Yes	Yes	High

a. See Section 1.3 for definitions of high, medium and low priorities.

TABLE 5-9.
ANALYSIS OF MITIGATION INITIATIVES

	Initiative Addressing Hazard, by Mitigation Type[a]					
Hazard Type	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Dam Failure	7, 8	6	7, 8			
Drought	7, 8	6	7, 8			
Earthquake	7, 8,	6	7, 8			
Flood	4, 5, 7, 8	1, 4, 5, 6	4, 5, 7, 8	1, 4, 5	4, 5	5
Landslide	7, 8	6	7, 8			

TABLE 5-9.
ANALYSIS OF MITIGATION INITIATIVES

Hazard Type	Initiative Addressing Hazard, by Mitigation Type[a] 1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Severe Weather	7, 8	6	7, 8			
Volcano	7, 8	6	7, 8			
Wildfire	3, 7, 8	2, 6	3, 7, 8	2	3	3

a. See Section 1.3 for description of mitigation types

TABLE 5-10.
COMMUNITY OUTREACH

WILL BE PERROMING THESE OUTREACH EVENTS AND WILL INCLUDE MITIGATION EDJUCATION TO THE PUBLIC.

Outreach
Community Meetings Go Bag planning Schools
Fire Safe Council Meetings
PSA about Emergency Notification System and Testing
Use of Facebook and Twitter

CHAPTER 6. CITY OF MT. SHASTA ANNEX

6.1 Points of Contact

Primary Contact

Bruce Pope, City Manager
305 N Mt. Shasta Blvd.
Mt. Shasta, CA 96067
(530) 926-7519
bpope@mtshastaca.gov

Alternate Point of Contact

Juliana Lucchesi, City Planner
305 N Mt. Shasta Blvd.
Mt. Shasta, CA 96067
(530) 926-7517
jlucchesi@mtshastaca.gov

Planning Team

City of Mt. Shasta – Staff

Bruce Pope, City Manager
Parish Cross, Police Chief
Rod Bryan, Public Works Director
Matt Melo, Fire Chief
Muriel Terrell, Finance Director
Juliana Lucchesi, City Planner

City of Mt. Shasta – Legislative Bodies

City Council
Planning Commission

Assisting Agencies

Mercy Medical Center
California Highway Patrol
CalFire – Land Use Planning
U.S. Forest Service
Pacific Power

6.1.1 Planning Process

The 2018 update of the City of Mt. Shasta Annex to the Siskiyou County Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP) involved internal review of the previous LHMP, outreach to the public, safety professionals, and community leaders, and revision to the annex to reflect the input received.

The update engaged the public through a three-day public workshop, survey, and public meetings. The input received is recorded in the update and used to develop and prioritize mitigations in the mitigation strategy. The public engaged through the update outreach involved local and regional jurisdictions and agencies; specifically, City of Dunsmuir, McCloud Community Services District, Siskiyou County, and U.S. Forest Service.

6.2 Jurisdictional Profile

Incorporation Date: May 31, 1905

The City of Mt. Shasta is governed by a five-member City Council with four-year terms, with an appointed Mayoral format. The City also maintains a volunteer Planning Commission with judiciary and legislative powers, and multiple volunteer advisory bodies which advise the City Council and Planning Commission. The operations of the City are achieved through a City Manager management system with departments reporting to the City Manager. The City has five main departments; Finance, Fire, Planning, Police, and Public Works.

Population Trends: The City of Mt. Shasta has experienced a net decrease in population between 2010 and 2018. The current total population is 3,383. The City's projected population for the next five years will continue to decrease¬¬ at an average rate of 0.2% (Table 1).

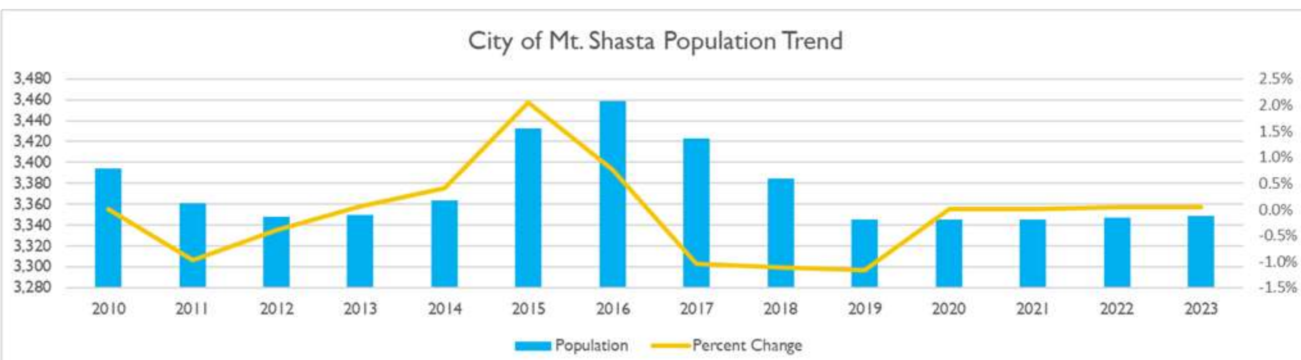


Table 10: California Department of Finance, Demographic Research Unit Population Estimate for Cities, Counties, and the State, 2011-2018, with 2010 Benchmark & Total Estimated and Projected Population for California Counties: July 1, 2010 to July 1, 2060

The City of Mt. Shasta demographic make-up is like the greater Siskiyou County population. The City is primarily white, English is the primary language spoken, and over 50 years of age (Table 2). The population age trends indicate that the City will continue to age with a decrease in percentage of school aged children (5 to 19 years) over the next five years.

The City of Mt. Shasta is considered a disadvantaged community in the state of California. The definition of a disadvantaged community is an area with household incomes at or below 80 percent of the statewide median income. The distribution of income in the community indicates that half of the residents live on an annual income below $35,000 significantly lower than the $63,783 median income for the state. (Table 3).

The transient population due to regional tourism and climate requires additional safety consideration in terms of disasters. This transient population is made-up of international and national tourists, outdoor recreationalists, and regional homeless and has significantly increased in the past 5 years.

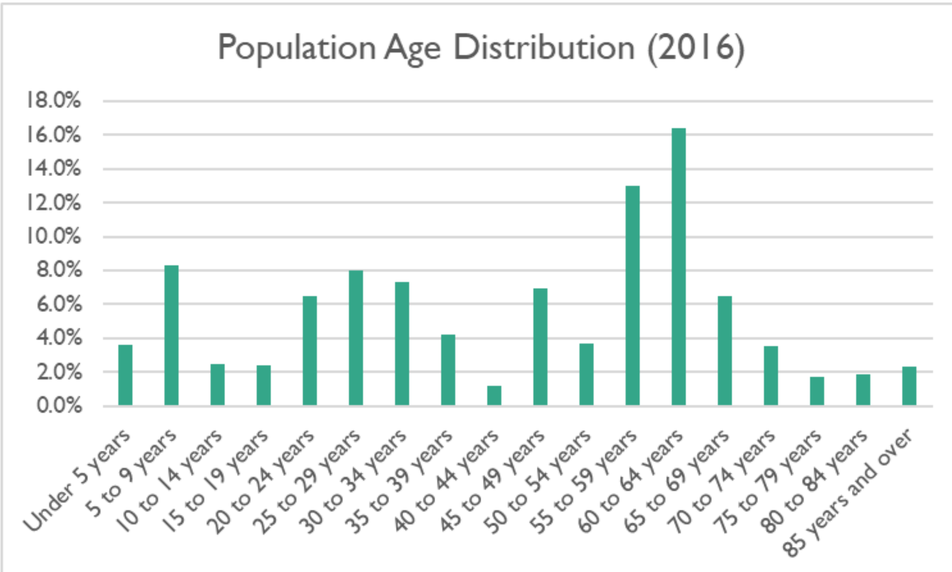


Table 11: United States Census American Community Survey 2016 Estimates for Mount Shasta City

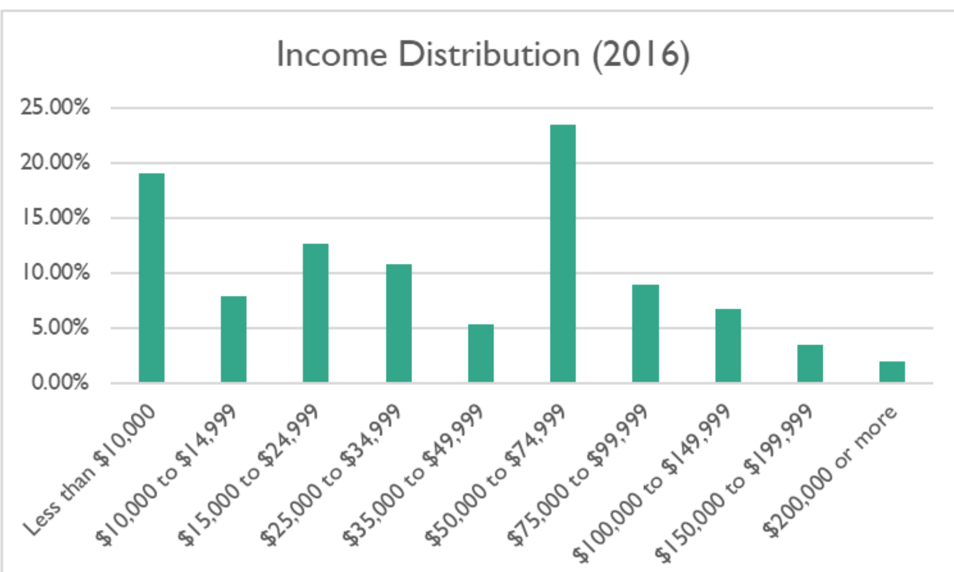


Table 12: United States Census American Community Survey, 2016 Estimates for Mount Shasta City

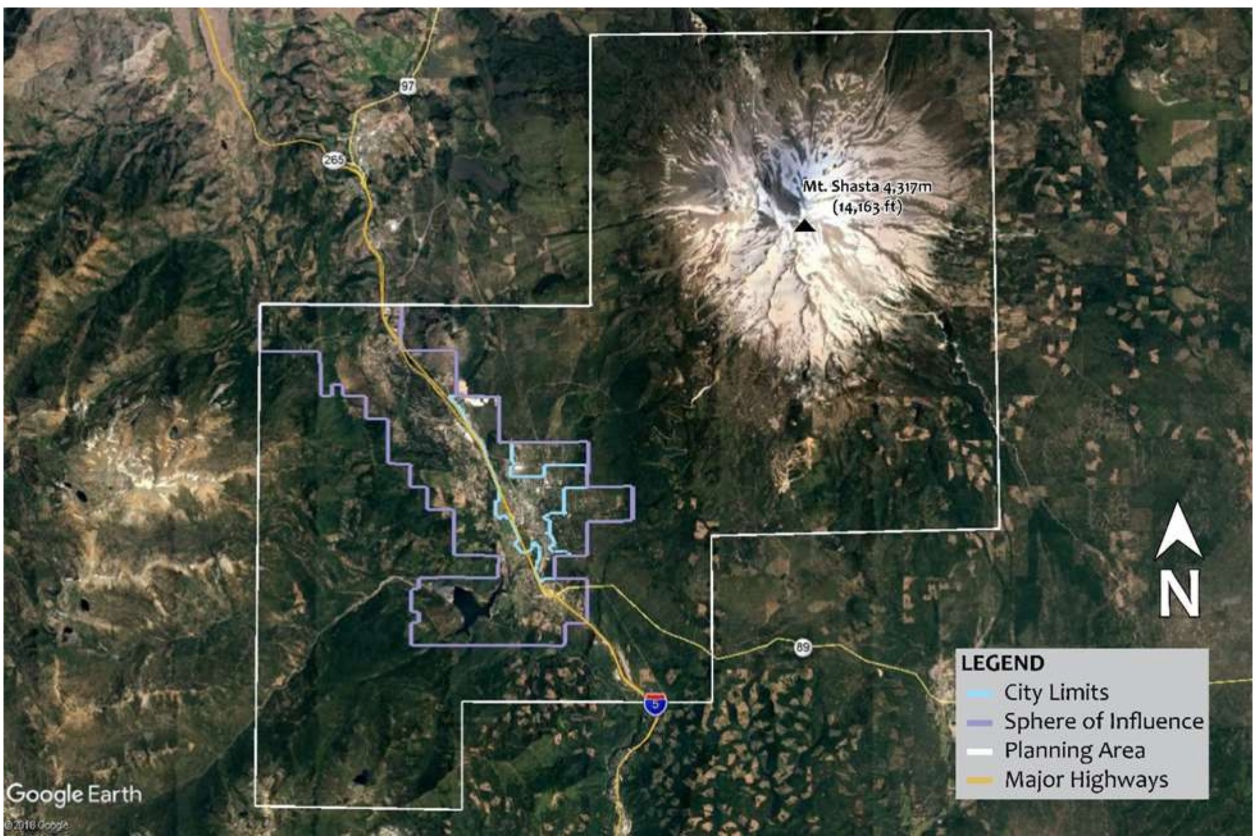
6.2.1 Economic Profile

The City of Mt. Shasta is a tourism-based economy with some permanent employers in the healthcare, technology, and financial services sectors. The tourism industry results in primarily service-based jobs that support spiritualism, outdoor recreation, and hotel industries. Over 60% of the jobs provided in the City of Mt. Shasta are held by individuals living outside the City Limits.

6.3 Planning Area

The City of Mt. Shasta is located at the southwestern base of Mount Shasta at an elevation of 3,500 feet above sea level. The City sits at the Highway 89 and Interstate 5 Interchange. This interchange connects the City with Reno, Nevada, Medford, Oregon, and the rest of southern California. The City is 55 miles north of the City of Redding and 88 miles south of Medford, Oregon which are both the nearest metropolitan areas. The City is located at the headwaters of the Sacramento River. The City is considered the northern boundary of the Upper Sacramento Regional Watershed. The City is surrounded by the Shasta-Trinity National Forest which is managed by the United States Forest Service.

The Planning Area for the Local Hazard Mitigation Plan Update 2018 has been expanded to match the Planning Area of the City's General Plan. The Planning Area includes Federal, State, Private, County, and City owned land. The inclusion of all land holders is to expand planning and safety efforts to protect the Mt. Shasta region.



6.4 Climate Change

The City of Mt. Shasta actively participates in the assessment of climate change on hazard frequency, severity, and the City's ability to recover from future disaster events. The Resilience Dialogues is a program that connects the City with by a multi-disciplinary team to identify climate change factors in the Mt. Shasta region and next steps the City should take to better plan for climate change and disaster resiliency (Appendix A).

The City is highly concerned with the change in severity and frequency of weather events. The City has experienced a significant drop in the number of rain events leading to drought in the region. In addition to less rain events, the severity of these rain events has increased leading to two Federally Declared Disaster in the last two years.

Climate change, outdated forest management practices, and the promotion of fire suppression over the past 50 years has created an environment on the verge of a mega-fire. A mega-fire is a wildfire that exceeds 100,000 acres. The region has not created or enforced strict timber management practices to reduce the fuel load of adjacent forests. The City has also not applied current development practices to ensure new development avoids high fire severity zones or reduces the fire severity rating.

Overall, the issue of climate change is a difficult one to mitigate due to the influence of other jurisdictional practices. Climate change cannot be mitigated by one local jurisdiction. The collaboration and understanding of other communities will be needed. The City of Mt. Shasta aims to improve plans and mitigation strategies to reduce carbon emissions, restore and preserve ecosystem services, and reduce the impact of climate change on weather events. These goals are meant to reduce our city's contribution to climate change with the hope that other jurisdictions reduce their impact.

6.5 Outreach Methods

The City of Mt. Shasta Planning department hosted a workshop, survey, and will present a draft version of the 2018 update to the Planning Commission and City Council of the City of Mt. Shasta. The Planning Commission and City Council meetings are open to the public and the draft update will be circulated publicly prior to both meetings.

Spirit of Mt. Shasta Region Building Resilience Workshop

The City of Mt. Shasta conducted a three-day workshop with 26 participants in March 2017 to collect input from the public, community leaders, and safety professionals concerning Disaster Resilience. The event was advertised and framed as a regional discussion involving the City of Mt. Shasta, City of Dunsmuir, McCloud Community Service District, and Siskiyou County. Technical advisors from the Federal Emergency Management Agency (FEMA), Environmental Protection Agency (EPA), and Metropolitan Transportation Commission/Association of Bay Area Governments facilitated the workshops using Regional Resilience Toolkit. The input from this workshop has shaped how the City views disaster mitigation, operations, and post-disaster recovery; specifically, wildfire (Appendix B).

Participants were asked to identify on maps areas of concern and places that are vulnerable to natural disasters. The main areas that were highlighted by the public and safety professionals were natural landmarks and major highways. The City is surrounding by the Shasta-Trinity Forest managed by the U.S. Forest Service. This forest land provides opportunities for outdoor recreation and natural resource industries. The concern listed in the event stated that these forests have been mismanaged and are a high concern for wildfire.

The second areas listed on the maps were major highways in and out of the region. Interstate 5, Highway 89, and Highway 97 are the only major transportation routes in and out of the region. If any of these transportation routes were disabled, commerce and evacuation routes would be compromised.

The result of the workshop was a list of major themes and four follow-up topic areas. The major themes gleaned from the event were:

- Resilience is more than bouncing back; it is an opportunity to transcend a disaster and create a stronger community and economy.
- The rate of change due to climate change is a substantial challenge. Many of the hazards are not new, but they are occurring more frequently and with more severity, including winter storms, and wildfires
- Planning efforts need to strike a balance between the needs and demands of the community and economy, and between urbanized areas and rural locations.
- Need to improve communication and collaboration across jurisdictions is critical, especially to reduce duplication of jurisdictional and agency plans across the region
- Neighborhood and community engagement and communications surrounding disaster resilience should be improved.
- There is a need to diversify the region's economic industries to be more resilient
    - Establish alternative economies beyond the timber industry and recreational tourism, which could include non-timber forest products, mushroom hunting, arts and music, and a "learning laboratory" for regional colleges and universities that highlight the uniqueness of the Mt. Shasta region
    - Showcase the are as attractive not extractive
    - Manage and adapt for environmental and community benefits; manage the forest and create resilience

Theses major themes have been integrated into the mitigation strategy of the 2018 LHMP update.

City of Mt. Shasta General Plan 2045 Survey

The City of Mt. Shasta is in the process of revising the City's General Plan which guides city decision making for the future. Part of the revision process is surveying the public about topics that are important to them and how they see the City changing in the next 25 years. Similar to the mapping exercise at the workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the City. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the City and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

Additional Outreach Opportunities

The City of Mt. Shasta is in a General Plan revision which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute. The proposed timeline estimates approval of the General Plan in 2020.

In addition to the General Plan process, the City will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

6.6 Review of Previous LHMP

A review of the previous LHMP was conducted initial by City Staff in September of 2017. The City Staff reviewed the previous list of hazards that were assigned priorities and discussed changes to City programs and policies since the LHMP ratification.

The previous LHMP annex for the City of Mt. Shasta lacked all required data and assessments due to errors in the text. Improper filing and connecting of data files have led to a version that is not usable. The mitigation action plan was recovered and action completeness was recorded (Appendix C).

6.7 Capability Assessment

The City excels and meets local, state, and federal expectations related to emergency response and evacuation, but little else. The City's long-term plans address hazards but are not applied to applicable codes and other plans. Based on the Capability Assessment (Appendix D), the City has room for improvement in all four categories.

Planning and Regulations

The 2007 General Plan serves as the City's long-term comprehensive plan. The plan has a specific chapter, called elements, that is dedicated to characterizing and mapping all applicable hazards in the Planning Area. The Safety Element discusses the hazards and offers policies and recommended actions to address these hazards. This element also weaves through the document to ensure that the long-term plan for land use, transportation, and housing adequately address the hazards identified in the Safety Element.

Unfortunately, the coordination and adequate language to address hazards ends with the long-term plans. The City's zoning code and subdivision regulations have not been updated to reflect the goals and policies of the 2007 General Plan. The Municipal Code does provide language on very high fire severity zones but does not guide development away from these zones.

Improvements to planning and regulations could be done to create consistency between the long-term and applied planning tools and meet federal and state requirements. The first improvement would be to bring the planning regulations into conformance with current hazard planning best practices. The City is in the process of revising the General Plan which would include a revision of the subdivision and zoning code.

Administrative and Technical

The City of Mt. Shasta safety personnel and supporting staff can serve the community during and post-disaster. Improvements can be made to staff knowledge and application of hazard mitigation planning. The frequency in which hazard mitigation and preparedness can be increased in all departments that are not safety related.

Many of the hazard and emergency planning efforts are done by safety personnel (i.e. police, water testing staff, and fire) with little involvement of other departments. A greater effort can be made to integrate finance, planning, administrative, and other staff into hazard mitigation and preparedness planning. This would include integrating hazards into department policies and policy documents.

Financial

The financial category of the capability assessment indicates that it is the weakest section. The City does not actively set aside funds for hazard mitigation or disaster recovery. The previous Federally Declared Disasters indicated that the City should begin to set aside funds for quick response to disaster recovery projects.

In addition to the City setting aside funds, determining consistent funding for hazard mitigation projects is a high priority. The City does not effectively utilize local measures, state programs, and federal funding for capital improvement projects that focus on hazard mitigation. The development of an easy to use matrix to rank current capital improvement projects' ability to address hazards should be created to begin the integration of hazards into projects and prioritize these projects more on their ability to mitigate hazards.

Education and Outreach

Education and outreach is the only category in the capability assessment that the City of Mt. Shasta currently invests a significant amount of time and effort in. A review of the education materials is underway with anticipated updates to evacuation routes, emergency preparedness, and mitigating various hazards.

The City could improve in providing more materials concerning flooding from wetlands and storm events, preparing for high winds and storm events, and winter weather safety. Written materials should also be translated into various languages to assist international and non-English speaking visitors and residents.

The outreach can occur in more diverse mediums. Most education and outreach are done through written materials. The greater public could benefit from safety preparedness clinics, interactive safety exercises, and online videos with preparedness information.

National Flood Insurance Program (NFIP)

The City of Mt. Shasta is not located in an area that is eligible for the NFIP. The City does sit in an area prone to springs and wetlands that result in flooding, but these hazards are not recognized under the NFIP.

6.8 Hazard Event History (2013 to Present)

The City of MT. Shasta in the past 5 years has experienced 2 of federally recognized disasters. There were not state declared disasters or fire assistance requests in the Planning Area.

City of Mt. Shasta Hazard Events		
Type of Event	Date	Post Disaster Awarded
California Severe Winter Storms, Flooding, Mudslides (DR-4308)	4/1/2017	$ 40,790.52
California Severe Winter Storms, Flooding, and Mudslides (DR-4301)	2/12/2017	$ 82,046.50

6.9 Risk Assessment

The list of possible hazards that could occur in the Planning Area for the City of Mt. Shasta has remained relatively the same as the previous with the addition of Man-Made Disaster (i.e. railroad derailment, hazardous waste spill), Thunderstorms and Lighting, and dividing Severe Weather into various categories. Severe Weather has been separated into Extreme Temperatures, Winter Storms, and Damaging Winds. IT was important to City Staff to separate the Severe Weather hazard into the parts due to the history of these types of events.

The hazards descriptions area arranged in the high concern to lowest concern. The ranking of the hazard was done through an assessment of the frequency, severity, and history of the events in the Planning Area.

The most recent data and mapping of the below hazards is found in the City of Mt. Shasta 2007 General Plan (Appendix E).

6.9.1 Wildfire

The Wildfire hazard is the greatest hazard risk for the City of Mt. Shasta Planning Area. The impacts of climate change, fire suppression methods, and mismanagement of timberland have resulted in an environment highly prone to wildfire. Wildland and structure fires are both possible in the Planning Area, but the main concern for the City is wildland fires.

All areas of the Planning Area would be impacted from wildfire hazard. Wind, topography, and fuel load would determine the direction and longevity of the fire during the event. The other factor for wildfire probability is the history of the area.

Wildfire is not necessarily a bad hazard. Most of the forested areas in California have been managed with wildfire, but the loss of frequent burning and timber management practices have led to an environment where if a wildfire did break out, it would consume most of the Planning Area. The last recorded major wildfire in the Planning Area was in the 1950's. This long break in fires means the probability of a wildfire is high.

6.9.2 Winter Storms

Winter storms is a subcategory of severe storm weather that was sectioned off due to the high frequency and severity of snow events. Two of the past five winter seasons have resulted in winter weather events that resulted in a high amount of snow dropping in a short time space. This sudden intensity puts a burden on snow removal services and resulted in the collapse of infrastructure.

Traffic flow and electrical systems in the City limits are the most vulnerable to winter storm hazards. Interstate 5 and Highway 89 are two major thoroughfares that transport supplies to the City. The lack of commercial traffic for an extend period can result in loss of essential food and safety supplies and drop in economic activity.

The electrical system in the City of Mt. Shasta is not totally underground. The sudden drop of heavy snow frequently results in the loss of power. In the past five years, the City experience 15 events of lost power with the longest outage lasting 18 hours. This poses a threat to critical facilities such as communication towers, healthcare facilities, and the hospital that must maintain consistent electrical service.

6.9.3 Man-Made Disasters

The proximity of the railroad and major highways results in a high probability and severity of a man-made disaster. Both interstate 5 and the Union Pacific Rail line transport flammable, hazardous chemicals, and petroleum products. The Canterra Loop Spill did not occur in the Planning Area but illustrates the risk that could happen.

The Canterra Loop Spill was a hazardous waste spill in 1991 due to the derailment of a railroad train. The spill resulted in 19,000 gallons of herbicide metam sodium being dumped into the Sacramento River. The incident resulted in a $14 million settlement for environmental and health impacts to the City of Dunsmuir. The restoration of the Sacramento River took 16 years and health impacts to clean-up workers and nearby residents are still being felt.

The same type of event could occur in the Planning Area. The transportation of hazardous compressed gasses and liquid chemicals are a daily occurrence along Interstate 5 and the Union Pacific Rail line. The extent of a hazardous waste incident would depend on the weather and type of hazardous substance. Properties immediate adjacent to the railroad track and interstate and properties within 500 feet of the commerce lines would be negatively impacted. This area is increased in the case of hazardous gas explosions or leaks.

6.9.4 Thunderstorms and Lightning

Thunderstorms and lightning events have increased in recent years due to the formation of "thunder heads" from local and regional fires and the warming of the atmosphere. Thunderstorms and lighting pose a high risk to the City due to the indirect create of wildfires in areas that could be inaccessible due to topography and vegetation and striking electrical system structures and lines. The City in the past year has responded to 12 wildland fires that began from lighting strikes. The increased frequency and the probable severity of a resulting wildfire make this hazard one of the top three for the Planning Area.

6.9.5 Flood

The City of Mt. Shasta flooding potential is localized, and a result of the wetland environment found in most of the incorporated of the City. Within the greater Planning Area, flooding occurs along riparian wetlands accompanying streams and creeks which lead into Lake Siskiyou. The final destination of all surface water in the Planning Area is the Sacramento River formally beginning in Box Canyon after the Dam.

Unincorporated areas along the Sacramento River are prone to flooding and the only areas that are eligible for the National Flood Insurance Program (NFIP). The area below Box Canyon Dam is subject to flood hazard from high precipitation over a short timeframe and failure of the dam. The areas identified in the last flood study (1973) indicated that the land impacted would not result in significant property loss or potential for the loss of human life. This is due to the lack of development in the floodplain.

Flooding due to high rainfall events and the loss of wetland habitat are higher frequency and severity due to the amount of development in the downtown area of the City of Mt. Shasta. A majority of development in 1950’s and 1960’s occurred in the areas that were originally wetlands. The filling in of wetlands and lack of buffers between wetlands and development have increased the amount of property damage from seasonal flooding (Appendix G).

6.9.6 Drought (Tied)

Drought is not listed in the safety section of the 2007 General Plan but is a high concern hazard for the State of California. The Planning Area contains the headwaters of the Sacramento River which is a major waterway used in agricultural industries in the central valley. The amount of water in the river is dependent upon snowpack on the mountains and consistent rain events. The Planning Area has experienced a decrease in both snowpack and consistent rain events.

The possibility of drought directly impacting the City is very low due to the high water table and available groundwater supplies. The concern surrounding the drought hazard is the need of water in other areas of the state. There is a great public fear that the supply will be shipped to other parts of the state and nation to alleviate droughts. The probably of droughts are high due to the increase in drought occurrence in the past five years but the severity of the hazard is low due to current water supplies.

6.9.7 Extreme Temperatures (Tied)

Extreme cold and hot have made their way onto the hazard list. Climate Change and the increase in hardscape due to development has increased the frequency of extreme heat in the summer and extreme cold in the winter. This hazard type is a high concern due to the aging population.

Aging populations and children are more vulnerable to extreme heat and cold than other age demographics. Over-exhaustion and hypothermia are concerns for public health and safety professionals. Extreme temperatures are also difficult to mitigate and avoid in the future.

Based on data from CalAdapt for the Planning Area. The historical annual average maximum temperature is 61.0 Degrees Fahrenheit. The predicted annual mean maximum temperature is 64. 7 Degrees Fahrenheit in the next 20 years. The 3.7 degree difference is significant with little possibility of leveling off or lower in the next 100 years.

The historical annual average minimum temperature is 34.3 Degrees Fahrenheit and will possibly increase to 37.5 Degrees in the next 20 years. Although the minimum temperature is warm and reducing the possibility of extreme cold, there is still a probability of severe drops in temperature for short time spans.

6.9.8 Damaging Winds

Like winter storm event, the City experiences damaging winds seasonally in the winter and spring. The damaging winds pose a threat to overhead electrical systems and dead or dying trees. The frequency and probably of the loss of power due to damaging winds is lower that other hazards, but the damage from falling debris is high.

The Planning Area is heavily wooded including the urban areas. Dropping tree limps have damaged power lines, homes, and business in the past five years. There is no active record of the damage or frequency at this time, but it is a concern based on local history and knowledge.

6.9.9 Volcanic Event

The City of Mt. Shasta earns its name from the active stratovolcano direct east of the City Limits. Mt. Shasta is the most voluminous of the Cascade Range volcanoes and is 4,317 m (14,163 ft) in height. The volcano is between 300,000 and 500,000 years of age based on geologic records recorded the United State Geologic Service (USGS).

The last major eruption is predicted to be approximately 11,000 years ago which created Black Butte and Shastina on the western side of the volcano. Smaller events have occurred near the summit from volcanic vents concentrated mainly on the east side of the summit. USGS does believes that there was a more recent minor eruption 200-300 years ago.

A volcanic event would be the most severe hazard out of all the hazards in the Panning Area. Volcanic gases, ash, volcanic rock, mudflows, landslides and accompanying seismic activity would result in the destruction of property and loss of human life. It is estimated in the 2007 General Plan Safety Element that 60% of privately developed land is within a volcanic hazard area. In addition to direct impact to property, the accompanying activity could result in the destruction of additional property in the Planning Area.

The frequency of a volcanic event is predicted to be once every 600-800 years, making the probability of a volcanic event within the next 300 years being low. The last estimated date of a possible eruption would be 2376 based on data from a 1980 volcanic study.

6.9.10 Dam Failure

Within the Planning Area of the City of Mt. Shasta exists on hydroelectric dam. The Box Canyon Dam separates Lake Siskiyou and Box Canyon in the southwestern portion of the Planning Area. The dam was erected in 1970 and modified in 1984 for electric production. The dam is managed by the Siskiyou County Flood Control and Water Conservation District and the Siskiyou Power Authority.

Lake Siskiyou created by the dam has an estimated 26,000 acre-ft of capacity. The failure of this would result in a drop in electric power availability and flooding of lower stream areas. The majority of the City population would not be impacted by the failure of the dam, but indirectly the recreational nature of Lake Siskiyou would be lost and negatively impact the economy of the City.

Earthquake

The City of Mt. Shasta does not sit on a known fault line and has experience little seismic activity in the last 5 years. The probability of an earthquake event is low but if an event were to occur the severity of that event would be determined by the duration, distance from developed areas, and magnitude.

There have only been two known 4.0 magnitude or higher earthquakes recorded in the area based on a 1994 Faulty Activity study. In the study, it confirms that no active or potentially active faults exist within the Planning Area. Mt. Shasta is known to have minor faults near the summit, but these have no probable activity without a volcanic event.

6.9.11 Landslide

The landslide hazard is the lowest risk for the Planning Area. Landslides are more of a concern as a secondary hazard after an earthquake, wildfire, of volcanic event. The probability of a landslide occurring in the Planning Area is low to nonexistent. Although there are natural ridges and steep elevation climbs, the forest habitat provides erosion protection.

Liquefaction is a probable risk in the center of the City of Mt. Shasta proper. The previous high school facility sank into an adjacent wetland area most likely due to liquefaction of the land. The public library project filled in and addressed this risk with proper fill. The probability of more liquefaction is low with little damage to property due to no development in the wetland and adjacent school athletic fields.

Plan Maintenance

The City of Mt. Shasta will review the LHMP on an annual basis along with our General Plan at the beginning of the calendar year. The review will consist of a status report of what mitigations have been completed in the previous year and prioritize mitigations to be accomplished in the upcoming year.

The LHMP will be amended as the City receives new disaster information and accomplishes mitigations.

Mitigation Strategy

The mitigation strategy for the City of Mt. Shasta is separated in four action types:

Action Type	Description
Local Plans and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.
Education and Awareness Programs	These are actions to inform and educate residents, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs.

Appendix H contains the full list of mitigations set for the 2018 update. The mitigation strategy focuses heavily on education and awareness as a first priority to creating a more hazard resilient community.

Appendix A: Resilience Dialogues Final Synthesis Report

Resilience Dialogues

Final Synthesis Report Mt. Shasta, California

July 2017

Resilience Dialogues Final Synthesis Report

Mt. Shasta, California, USA

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Resilience Dialogues Final Synthesis Report
Mt. Shasta, California, USA

Introduction

This report captures the key outcomes from the Mt. Shasta, California, Resilience Dialogues process, which took place between May 15 and May 26, 2017. The Resilience Dialogues partners with communities to explore their risks from climate variability and change. Using a professionally facilitated, online process to connect community leaders to a network of vetted national experts, the Resilience Dialogues helps them work together to understand risks and lay the groundwork for long-term resilience. The service connects communities with the most appropriate resources, whether from federal agencies, regional networks, or the private sector. The Resilience Dialogues builds on recent federal efforts, such as the Partnership for Resilience & Preparedness, the Climate Data Initiative, the Climate Resilience Toolkit, and the National Climate Assessment. It also leverages nonprofit programs, including the Thriving Earth Exchange and the Community and Regional Resilience Institute. This report captures the following outcomes from the Mt. Shasta Resilience Dialogues process:

- List of key questions that Mt. Shasta community leaders are seeking to answer regarding how to proceed with building climate resilience;
- Highlights of the exchanges between community leaders and subject matter experts (SMEs) from throughout the dialogue;
- Annotated list of tools and resources that could help community leaders answer their key questions;
- Dialogue participant list; and
- Next steps for the consideration of community leaders.

Community Context

The City of Mt. Shasta (population 3,394), located in Siskiyou County, California, is the largest of four communities (Mt. Shasta, McCloud, Weed and Dunsmuir; combined population of 10,000) located at the base of Mt. Shasta. This active volcano has a rich history in Native American culture and is considered one of the Seven Sacred Mountains of the World. As it attracts a large number of visitors, the city is home to a thriving economy supporting spiritual pursuits. The city has a tourism-based economy that is sensitive to climate impacts (e.g. skiing, hiking, mountain-biking, mushroom hunting, bird watching, dirt-biking, ATV riding, RV camping). While its once-thriving timber industry is in decline, extractive resource consumption (timber and water) remains prevalent. Maintaining and improving natural recreation options is a growing focus in the community.

Surrounded by lakes, rivers, forests and mountains, Mt. Shasta is rich in natural capital. This natural capital provides outdoor recreation opportunities and aesthetics, and is a point of local pride and community identity. The community is invested in protecting the region’s vast expanses of coniferous forest, as well as a large number of endangered and special status species that live within unique microclimates in the region. The ecosystem services provided by these resources benefit the economic and environmental well-being of downstream and regional residents of California.

Mt. Shasta is located in a region that is considered a “Disadvantaged or Severely Disadvantaged Community” by the state, and the city government has limited staff and resources for implementing and monitoring resiliency initiatives. These limitations extend to state mandates concerning city services and infrastructure. Most efforts focus on providing basic services (e.g. clean water). Climate preparedness has historically been perceived as a luxury. However, there is great support in the community for environmental sustainability programs.

Key Assets

Key assets possessed by Mt. Shasta include:

- *Community buy-in.* There is a high degree of support in the local community for environmental conservation and sustainability initiatives. This interest could be leveraged to support climate resilience in Mt. Shasta via engagement, volunteerism, and support.
- *Natural capital*. Mt. Shasta is located in an area rich in forests, lakes, rivers, mountains and wildlife. Economic, recreational and aesthetic value placed on these resources could be a starting point for engagement and progress on wider resilience initiatives.
- *Sense of place*. As a small, rural community in a specialized environment, Mt. Shasta possesses a unique identity which could serve as a starting point for messaging and action. The value residents place in the quality and identity of their community could make them more willing to engage on resilience issues that they feel are directly relevant to their lives. Initiatives designed to preserve, protect and enhance the community - and thereby contribute to climate resilience – may have high participation rates due to this intrinsic quality.
- *Size*. Small communities tend to find it easier to communicate and collaborate across departments. A couple of highly motivated organizations and businesses working with the local government can often build community support in a small community more rapidly than in larger metropolitan areas.

Framing Dialogue: List of Key Questions

The purpose of the following questions is to establish a foundation and general direction for Mt. Shasta’s climate adaptation and resilience building efforts following the conclusion of the community’s participation in the Resilience Dialogues. These questions were developed during the first week of the Community Dialogue, through a conversation about Mt. Shasta’s local context, priorities, and questions. The City of Mt. Shasta is primarily interested in strategies and best practices for integrating climate resilience into local plan updates. The community intends to implement these plans as soon as practicable through local initiatives and collaborations that invest in and advance resilient infrastructure and natural resources, and local hazard mitigation. The list presented reflects a number of refinements and additions derived from the exchange between community leaders and subject matter experts (SMEs) during the course of the dialogue.

General

1) Is there a rational sequence of potential resilience building actions that Mt. Shasta could pursue? What obstacles (physical and political) must be addressed before implementation of priorities can happen?

2) What would be a substantive, priority project with multiple co-benefits that the city could tackle immediately to enhance resilience, unite multiple interest groups in the community, and build momentum for future efforts?

Enhancing Community Safety and Resilience: Infrastructure

3) What is the appropriate role of infrastructure and technology (versus policy) in enhancing resilience in Mt. Shasta? How can infrastructure and technology address known climate risks while enhancing sustainability and economic growth?

4) What are local projections for wildfire risk, temperature and precipitation changes? How can vulnerable infrastructure and services be made more resilient to these stresses?

5) What approaches (smart technologies, materials, etc.) should the city adopt to enhance the reliability and longevity of infrastructure investments? What state-of-the-art design standards should be considered?

6) What are representative or informative case studies of efforts to retrofit existing infrastructure and buildings with more resilient designs that the city can or should emulate?

Enhancing Community Safety and Resilience: Capacity

7) What state, federal and nongovernmental opportunities exist to provide additional capacity/manpower for city resilience programs and initiatives?

8) What approaches could Mt. Shasta adapt to streamline and bring efficiency to efforts to prepare for and manage the burden and uncertainty of rising temperatures, increased risk of wildfire, and precipitation extremes? What are methods, case studies and examples from similar towns that Mt. Shasta might consider?

9) What climate resilience initiatives could be adopted by the city within the context of “basic services” (e.g. wildfire risk prevention)? Which options are most attainable?

10) What are best practices for/ examples of successful integration of climate adaptation into hazard mitigation, general plans and local ordinances?

11) What mechanisms, support or incentives can the city/region offer to private land owners to increase conservation practices and easements? Are there frameworks for public input and forums to support private landowners and document strategies that work?

Enhancing Community Safety and Resilience: Financing

12) What frameworks for financing resilience investments have been applied in similar communities?

13) What funding sources (internal or external) could Mt. Shasta leverage for climate adaptation activities?

Engagement and Collaboration

14) What are effective strategies for engaging the private sector in resilience building?

15) Where are opportunities to connect or collaborate with universities for data collection and local climate resilience studies? How can Mt. Shasta pull in trusted scientific expertise and resources?

16) How can regional collaboration be leveraged to build regional resilience? Are there ways to engage with surrounding communities to enhance resilience without specifically referencing climate change?

17) What are good strategies for communicating the economic benefit and community protections that come with climate resilience (e.g., public safety, mitigating fire hazard and local self-determination)? Are there numbers that can be referenced?

18) Given the strong Native American cultural heritage and spirituality associated with the region, what might be opportunities for the city to collaborate with Native American organizations to preserve that character while enhancing environmental stewardship through that lens? Where are opportunities for Mt. Shasta to invite the perspective of tribes in the region?

19) Among which interest groups must trust and collaboration be built? How could the community approach identifying synergies between them?

Ecosystem Services Valuation

20) What methods or models should Mt. Shasta consider to pursue ecosystem services valuation as a mechanism to enhance protection of natural resources (primarily water) and maintain ecosystem function?

21) Who are the trusted experts on developing ecosystem service metrics?

22) Are there examples of ecosystem services valuation being done successfully in communities like Mt. Shasta?

Dialogue Highlights and Resources

Addressing climate change and enhancing climate resilience is a large and complex task that will manifest with a variety of actions to address impacts across multiple sectors. Prioritizing and developing focal points for action is essential, and can provide a roadmap for the pursuit of actionable goals that foster stakeholder collaboration. It is important to identify top priorities and break them down into small doable steps.

Key focus areas identified[1] that present the greatest opportunity or need to make progress on climate adaptation and resilience in Mt. Shasta include:

- Plan Updates.
    - Mt. Shasta is in the process of updating their Hazard Mitigation Plan to meet FEMA standards. The community is also due to update storm-water and drainage

[1] Although it was not explored in detail as part of the Resilience Dialogues process, the inclusion of alternative energy planning was identified as an additional focus area. The presence of Wholesale Solar, Inc. represents an opportunity for the city to engage proactively in this space. Look for funding mechanisms and opportunities to build a relationship with this company to help the city lower greenhouse gas emissions and promote the local green industry.

plans, and indicated a desire to integrate resilience throughout the city's General plan.

- Green Space and Green Infrastructure.
- Community Education and Engagement.
- Natural Resources (Forests and Water)

These key focus areas are discussed in the following sections. They highlight key points and information shared during the course of the Mt. Shasta Resilience Dialogues process.

Community Needs and Potential Climate Impacts

- Community leaders in Mt. Shasta are striving to make climate resilience a lens through which City practices and policies are developed and evaluated. To support this effort, they need to know where to find appropriate data, information and training to facilitate efficient and appropriate actions and expenditures. High-impact, low-cost opportunities are critical to enhance local resilience without stressing limited city capacity and resources.
- To the extent possible, climate resilience should be integrated within existing initiatives focused on providing basic community services. Given limited city staff and resources, approaching resilience from a community-scale systems approach will be essential for turning interest into action.
- A key vulnerability is the potential for interruptions to Interstate-5, the primary road by which the community is accessed.
- Long-term residents of the community have observed fairly drastic short-term weather changes, but cyclical patterns of heavy vs. little precipitation on a decadal scale, with more extremes in recent years and a general warming trend.
- Climate extremes (e.g. flooding, drought, wildfire, extreme weather) may affect the local economy via interruptions to outdoor recreation and natural resource extraction.
- Enhanced fire risk is likely to affect tourism revenue and long-term capital investments like housing and business development. This risk may coincide with changes in vegetation, and may be enhanced or mitigated by the presence of different plant communities (e.g. drought-tolerant vegetation).
- More frequent and extreme flooding and runoff events due to rapid snowmelt, glacial melt or heavy rainfall is increasingly likely, and can impact transportation and cause extensive damage to local infrastructure. Repair costs and downtime could be extensive. The cumulative impacts of nuisance flooding from these events could be significant.

Planning for Resilience

Integrating climate change into city plans (e.g. General Plan, Hazard Mitigation Plan) is an easy, low-to-no cost opportunity for Mt. Shasta to set the stage for achieving longer-term resilience objectives. As the city updates relevant plans, resilience should be made an integral part of meeting stated objectives. For example, in approaching the City's 2020 Vision the community could: examine the stated goals; reflect on what might be done differently in light of specific climate impacts; then alter or change action priorities based on this analysis. Success is most likely when resilience planning is linked directly to on-the-ground actions that are responses to specific threats (e.g. fire-adapted plants or drought mitigation).

When updating these plans to incorporate resilience, consider looking at combinations of events and associated vulnerabilities (e.g. a drought followed by a flood, followed by a heat wave). Plan for hazards with potential magnitudes beyond the usual and pursue actions which increase the overall responsiveness of the community to change.

A key need and goal identified by community leaders is to expand the scope of resilience thinking in the city to include zoning, development, technology and infrastructure management, including improvements, alternative energy programs, and green space dedication and development. Implementation of these initiatives may come at a high price, but planning now will set the stage for future action. The city is well positioned to move forward with such initiatives in terms of will and timing.

SME Suggestions:

- The Capital Improvement Plan (CIP) represents a low-cost opportunity to begin mainstreaming climate thinking into city government operations. Consider creating an evaluation process to judge which projects make it into the CIP and associate budget, and which don't. One or more criteria can be climate-related, e.g. "Does this project reduce key greenhouse gas emissions?" or "Does it reduce a key vulnerability (wildfire risk, heat, flooding, etc.)?"
- Include climate-related or climate-focused stakeholders included in the planning process.
- Openly and actively discuss climate change during public discussions (to the extent it is appropriate and done in a contextually relevant way).
- Including regional climate-related entities in the planning process to help lay the foundation for regional coordination.
- Facilitate co-leadership in plan development between emergency managers and planners.
- Create a plan to integrate new climate information, as it is developed, into plan and strategies.
- Include a discussion of how climate change could affect each hazard in the community.
- Consider climate change as a stand-alone hazard.
- Factor climate change into probability calculations for future hazards.
- Consider structures and assets likely to be vulnerable in future years (e.g. not just those within a static 100-year floodplain).
- Design goals and strategies with future climate change in mind (not just historical occurrences of disasters).
- Integrate strategies that are specifically designed to be viable in a climate-altered future.
- Include climate change-related criteria in the evaluation of proposed strategies (e.g., greenhouse gas reduction potential and adaptation value).

Resources:

- California Adaptation Planning Guide (Local and Regional Actions and Projects, California Natural Resources Agency)
- Climate Adaptation Gap Assessment (from Model Forest Policy Program). Engagement starts by completing a survey, then working with the Program to identify where opportunities exist to easily integrate climate change into city planning. Missy Stults is working with a small town in Michigan which is considering using the resource and can provide more detail.
- Smart Growth Fixes for Climate Adaptation and Resilience (Environmental Protection Agency Office of Sustainable Communities) presents overall and hazard-specific strategies for incorporating resilience into land use and building codes based on strategies that require modest adjustment, major modifications and wholesale change. Consider when thinking through the types of actions that are feasible in the near- and longer-term.
- Quick Starts in Small and Rural Communities (BC Climate Action Toolkit, Canada) is a toolkit with specific sections dedicated to issues like transportation and land use. It has a heavy focus on mitigation, but many strategies are adaptation-relevant.
- The Arkstorm scenario simulation is a useful planning response and recovery actions for extreme events.
- Plan-specific Resources:
    - Hazard Mitigation Plan
        - Integrating Climate Change into Hazard Mitigation Planning: Opportunities,
        - Constraints, and Real-World Examples (Missy Stults): Analysis looking at the different ways a handful of municipalities integrated climate change into hazards planning from including a generic description of how hazards might chance (i.e., become more frequent, more intense, and have shorter return intervals) all the way to analyzing the changes to frequency and intensity for each hazard because of climate change and, as such, selecting actions for inclusion in the local hazard mitigation plan that are climate-smart.
        - Opportunities for embedding climate change into hazard plans (Missy Stults): A table identifying opportunities to integrate climate change into material required by FEMA in each element of a hazard mitigation plan.
        - City of Baltimore Hazard Mitigation Plan: A joint hazard mitigation and climate adaptation plan that was developed in close consultation with FEMA. It is considered one of the most comprehensive attempts to marry the two.
        - Draft guidelines from Office of Planning and Research for implementation
        - Contact staff at Office of Emergency Services (Victoria La Mar-Haas) to discuss guidance for local hazard mitigation plans

- Draft General Plan Guidelines for Safety Element (California SB379) calls on local jurisdictions to integrate climate adaptation into local hazard mitigation plans and safety elements.
- Examples: San Diego and Monterey County Local Hazard Mitigation Plan updates incorporate climate.

- General Plan
  - Examples of integration of climate change throughout General Plan elements can be found in Sonoma, San Luis Obispo, Alameda County, Yolo County and Sacramento County.

Potential Next Steps:

Hold a workshop or training session to bring all city staff and decision makers up-to-speed and on the same page for thinking about climate change impacts and resilience for development and implementation of updated city plans. Resources to consider:

- Guidance on workshops and outreach are included in the California Adaptation Planning Guide (referenced above).
- Thriving Earth Exchange held a workshop in Boulder, CO to help city staff develop a better understanding of climate impacts and broaden thinking about where climate risks and opportunities lie. Contact Melissa Goodwin (Thriving Earth Exchange) for more information.
- *Future Shocks and City Resilience* was a game played in Tempe, AZ which brought together leaders of city departments and challenged them to adopt systems thinking in their operations to enhance local resilience and sustainability. Contact Lauren Keeler (Arizona State University) or Braden Kay (Sustainability Manager, Tempe, AZ) for more information.
  - Paper (Currently undergoing peer review) summarizing the game and its results.
  - Executive summary of the partnership on sustainability and resilience between Arizona State University and the City of Tempe. This could be a useful model for a similar collaboration between Mt. Shasta and a local university.
- Adapting to Climate Change: Managing Federal Lands in a Changing Environment Webinar Series (Southern Oregon Forest Restoration Collaborative) is a natural resources-focused resource which may be valuable.

Community Engagement & Communication

Planning for resilience creates a prime opportunity to educate and engage with the public about the potential for changing conditions, and the actions proposed. Local support could be enhanced if the city can demonstrate that residents' interests are in mind, and that the city is preparing for events based on the best available science and projections. A community social network analysis to map network allies, community stakeholders, and involved parties, along with their respective interests can spark messaging and engagement ideas and serve as a baseline for the social, human and political elements at play in Mt. Shasta. Articulating agreements and divergent issues among stakeholders can help identify trusted voices and unlikely common ties. Meanwhile, building trust between these groups may make it easier to tackle difficult issues. While this trust exists in Mt. Shasta, the need for productive communication to drive this conversation can't be overemphasized.

The large amount of energy in the community for sustainability natural resources conservation is a significant asset for Mt. Shasta. However, community leaders indicated that Mt. Shasta is not traditionally a community of activists. Look for opportunities to implement actions that explicitly engage and leverage the actions of homeowners and citizens (e.g. citizen committees, neighborhood awards, citizen monitoring of high-risk areas, drone use).

A useful way to open and ground a conversation is to invite participants to describe lived experiences. This can help develop a baseline for understanding and visualizing how climate has changed locally and promote responsiveness to conversations about how it could change in the future – and facilitate the development of a common language of resilience. Framing conversations around public safety, hazard mitigation and local self-determination can help bring people to the table.

SME Suggestions:

- Simulations and games can be useful for engaging broader communities on climate risks and response. Goals for such activities include generating new ways of thinking about risk and responses, bringing together a diverse mix of sectors and interests, making climate risks tangible and directly linked to public service/environmental/infrastructure issues, and paving the way for new partnerships and collaborations. Examples:
    - Future Shocks and City Resilience (Tempe, AZ; See section above)
    - Game of Floods (Marin County, CA) is an interactive game that communities can play to address flooding and explore what kinds of strategies a fictional city can use to prepare.
- Consider opportunities to bring together local champions, apply their talents, and enhance the city's capacity to assess and implement programs. For example, Whitefish, Montana, launched a volunteer Climate Action Plan Committee to serve as an advisory group to the city on their energy and water consumption work.
- Keep discussion focused on local impacts to maximize engagement.
- Link climate engagement to concrete impacts and make it project-based. Get a diverse group of people in the room and manage the dialogue, linking it to actions and things already on people's plates.

- If you rely on data for evidence, good data visualization is critical. Show trends for concrete resources (stream gauges, snowpack, wildfire) and let the discussion emerge naturally around how to best manage those impacts.
- Frame resilience in broader terms beyond climate impacts to develop interventions. For example, ask "What happens if our fire season becomes 12 months in length? Or "What is the worst flood we could get in the next 50 years based on indicators?"
- Start with things people care about (health, safety, jobs, etc.) and relate climate change to these priorities. To frame issues in this way, identify:
    - Priority economic sectors (e.g., tourism, recreation)
    - The inputs and conditions needed for success in the sector (e.g., snow for skiing and snowboarding; road access to hiking, mountain biking, mushroom hunting areas; effective natural resource management)
    - The non-climate (e.g., under-valuing of natural resources) and climate stressors (e.g., changing snowfall patterns, floods) that currently adversely affect these inputs and conditions.

Resource:

- The Sierra Climate Adaptation and Mitigation Partnership (CAMP) is one of five regional climate change collaboratives in California. Their website features funding opportunities specifically focused on environmental education.

Collaborations

Tied to community engagement and communication is the establishment and cultivation of strong collaborations among regional stakeholders. To build this network, establish small successes with existing partners and build upon them to generate word of mouth and further action, engaging and incorporating additional allies in the process.

SME Suggestions:

- The National Forest Service has a large presence in Mt. Shasta. They have a number of highly educated employees that live and work in and around the City. The service tends to stay in its own silo from the City, but some efforts to alleviate that have occurred in the last year. There is currently little to no data sharing between the two entities.
- Common collaborators include: Regional Watershed groups, CalFire, National Forest Service, Governor's Office of Planning and Research, Siskiyou Land Trust, California Office of Emergency services, Federal Emergency Management Agency, Chamber of Commerce, Siskiyou County Economic Development Council, and Regional Water Quality Board.
- The Regional Integrated Sciences and Assessments (RISAs) program supports research teams that help expand and build the nation's capacity to prepare for and adapt to climate variability and change. See the California-Nevada Climate Applications Program.

- Higher education institutions
    - Look to planning schools and policy programs (e.g. California State University, Chico or University of California, Davis).
    - Derek Kauneckis (Ohio University) could partner with Mt. Shasta for a Fall Climate Resiliency course to research further what other small communities are doing in this space.

Potential Next Step:

- Identify and engage with trusted collaborators.

Infrastructure and Financing

Community leaders identified green space and green infrastructure as key opportunities to make progress on climate adaptation and resilience planning. Notably, city stormwater and drainage plans are due for updates near-term, and the city intends to include shovel-ready projects to integrate natural drainage and stormwater retention into the cityscape.

SME Suggestions:

- Project return on investment (ROI) and community buy-in can be higher for new development when it addresses risk mitigation, sustainability and economic growth. SMEs advised considering infrastructure development with multiple co-benefits. For example, investments in urban greening, cool paging and cool roofs can limit heat and provide aesthetic value. Especially viable projects may address both risk reduction and economic benefits directly (e.g. jobs) or indirectly (e.g. lower wildfire fighting costs and avoided losses). Examples:
    - Placer County, California, opened a woody biomass plant which reduced fire risk, lessened dependence on fossil fuels, and created jobs.
    - Grand Rapids, Michigan, requires that any work or upgrades to roads must integrate green infrastructure for storm-water management.
- When exploring infrastructure investments in Mt. Shasta, ask whether:
    - Considering the city's natural capital and the nature-based resilience strategies that are available, what is the role of infrastructure and technology?
    - Do planned investments address identified climate risks and community needs? Do they leverage (and sustain) the existing natural capital?
- Peer-to-peer learning opportunities can help support, inspire and connect to innovative strategies and opportunities.
- Engaging with the private sector to finance and develop projects can enhance the reach of resilience activities.

Resources:

- National Complete Streets Coalition (Smart Growth America) provides technical assistance and resources
- The Sierra Climate Adaptation and Mitigation Partnership (CAMP) is one of five regional climate change collaboratives in California. Their website features a variety of funding opportunities.
    - CAMP is situated within the Sierra Business Council and may have relevant insights for engaging the private sector.
- Funding Assistance Options (California State Water Resources Control Board) helps identify relevant state funding sources by project phase and project type.
- The U.S. Climate Resilience Toolkit has a section on potential funding resources.

Potential Next Steps:

- Consider attending regional or national professional events when possible to learn about smallscale community activities.
    - American Planning Association California Chapter
    - Strong Towns is a media organization which seeks to help cities, towns and neighborhoods become financially strong and resilient.
    - National Adaptation Forum

Resilience Opportunities in Natural Resources

To advance resilience priorities in natural resources, build upon linkages that connect economic dependencies to the most apparent direct and indirect threats (e.g. fire and flood risks):

Wildfire and Forest Management

A significant resilience gap in Mt. Shasta and the surrounding areas is a lack of synergy in fire management techniques among various landowners. Advancing climate-resilient forest management and wildfire mitigation strategies was identified as a priority by community leaders which could support regional coalition-building around natural resources and public safety.

There is a high level of political will from private landowners and foresters to preserve natural resources and manage forests and land with a long-term frame of mind. Sustainable conservation strategies are being applied on their properties, but challenges persist in funding, expertise and permitting for the sustained management of natural resources by private land holders. Needs include examples of successful private sustainable land management, collecting and documenting strategies that work, and frameworks for public input and private landowner forums.

Actions taken to reduce wildfire risks are often climate adaptive in drier forests.

SME Suggestions:

- In addition to reducing the likelihood that fire will reach buildings, focus efforts on having them survive fire passage (e.g. through building materials and design, and regulating the proximity of adjacent buildings). Such policies could be incorporated into city zoning and requirements during remodels.
    - For example, Chula Vista, CA set zoning requirements to address fire risk from materials and siting.
- Draw on traditional ecological knowledge concerning past forest structure and species mixes, as well as key understory components that will also support wildlife and wild pollinators.
- Reducing stand densities can help reduce crown fire risks, risks to homes and infrastructure, risk of insect and disease outbreak, and increase drought tolerance.
- Some form of commercial removal may be necessary to facilitate continuous wildfire hazard reduction. Look for opportunities to leverage this activity in a sustainable way.
- Initially, prioritize identifying and working with those who are already predisposed toward conservation activities, i.e. those enjoying co-benefits from standing forest (birding, hunters, timber harvesting, visual/sound buffers).

Resources:

- A cohesive forest strategy that ties to the National Fire Plan was recently finalized by the Southwest Oregon Forest Restoration Collaborative as an effort to develop fire plans that engage various stakeholders, provide grants and develop priorities. This could serve as a model for a similar undertaking in the Mt. Shasta region, and represents an opportunity to collaborate with the Forest Service. For more information, contact Kerry Metlen or Darren Borgias (The Nature Conservancy).
- Ashland, Oregon, has a fully forested watershed and has worked with local groups to educate the public about the risk of wildfire. Collaborations from this effort have led to federal funding for treatment, as well as greater public support. Consider reaching out to colleagues in this community for insights on their process.
- Era of Megafires Presentation (Forest Service Pacific Northwest Research Station) is a publicity and educational tool which can be effective for starting a local discussion.
- The Illinois Valley Timber Assessment can help inform forest planning, generate recommendations to land managers, strengthen public support for forest restoration, and improve project efficiency and effectiveness. This analysis was funded by an Oregon Energy Truest to sustain a local mill. (Terry Fairbanks can answer questions.)
- Pacific Forest Trust works on sustainable forest management practices with private companies.
- Lomakatsi Restoration Project develops and implements forest and watershed restoration projects in northern California. One current project is focused on treating plantations in the Cascade Siskiyou Monument. Contact them for a conversation about how agencies partner with NGOs and educational institutions to generate capacity for building local ecological and restoration workforces.

- EQIP (Natural Resources Conservation Service) helps fund small forest owner efforts to plan and implement sustainable conservation practices. The program is aimed at nonindustrial private forestlands and provides funding for both planning and implementing conservation practices, including reducing fire risks.
- Case Study: Wildfire mitigation actions taken by Flagstaff, Arizona
- Data Basin is a resource for how changing climate might affect local forests. Note: The website is dense, but regular webinars are provided on how to navigate and use the site. Relevant projects include:
    - AdaptWest - A Climate Adaptation Conservation Planning Database for Western North America (the Watershed Climate Data Explorer
    - California Water Planning Information Exchange
    - Conservation Biology Institute Climate Center
- Natural Resources Canada has the most comprehensive site for information on the effect of climate change on individual species
- College of the Siskiyous work-study program
- Incentive/grant programs include EQIP (see above), CalFire, California Office of Emergency Services, and FEMA
- USDA Natural Resources Conservation Service helps small private landowners manage forest resources
- The Nature Conservancy is a great partner for private conservation efforts.
- Comprehensive Fuels Treatment Practices Guide for Mixed Conifer Forests: California, Central and Southern Rockies, and the Southwest: covers the Sierra Nevadas, but the Southern Cascades are likely very similar.
- Synthesis of Knowledge from Woody Biomass Removal Case Studies: See section on the Pacific West Region (page 9)
- CalFire and the Forest Service can be a resource for keeping residents informed during prescribed burning operations.

Potential Next Steps:

- Connect and collaborate with other towns in Siskiyou County to coordinate fire prevention activities. Aim to develop some consensus around what that means in terms of types of treatments and priority areas, and incorporate actions by individual homeowners in a larger plan.
- Collaborate with local groups to educate the public about wildfire risk and facilitate honest conversations, presentations, field trips with strategic stakeholders and the public.
- Promote public acceptance of the actions needed to address wildfire risk. Include discussion of and preparation for impacts from smoke from prescribed burns.
- Consider undertaking a forest asset inventory to highlight areas most worth conserving for smarter resource allocation and to identify the most appropriate policy instruments. To

undertake a less funding-intensive survey, pull in local knowledge via a one-day workshop to identify 1) critical natural resources, 2) those you don't want to lose, and 3) those that would hurt to lose - but you could live without.

  - Common policy instruments include forest conservation tax benefits (especially in the Eastern/Midwestern states), conservation easements and voluntary deed restrictions.

- The establishment of a "wood bank" or "forest fuels to firewood" project was identified as a project which could be accomplished with existing city capacity. Co-benefits could include job creation, meeting local needs for firewood, and minimizing wildfire risk.

Water Resources

Community leaders described Mt. Shasta as a "land of plenty" in terms of water resources. A critical need however, is to enhance knowledge and appreciation for the need to actively conserve and protect water resources in the community.

SME Suggestions:

- Success generated by household involvement will be limited unless companies investing in local water resources are brought to the table to collaborate on efforts. A multi-stakeholder conversation about what water resilience looks like in Mt. Shasta (economically, aesthetically, ethically, ecosystem-centric) will be a valuable start to this conversation.
- Opportunities for community education and engagement regarding water conservation may include:
  - Including water saving tips on people's water bills;
  - Having a rating on the water bill that tells people how much water they use compared to their neighbors;
  - Hosting a neighborhood competition where those who reduce water consumption the most in a sustained way are rewarded (e.g. community ceremony or yard sign);
  - Launching a reality TV/radio show with a local television or radio station to showcase competition to reduce water (or energy) use. See "Energy Smackdown" in Medford, MA;
  - Challenging a sister city to a water conservation competition;
  - Competing in the National League of Cities Water Conservation challenge;
  - Having a city-wide sign on pledge listing 10-12 things for each resident to do over the course of a year. (E.g. water conservation, home insulation, etc.) Each month, organize a campaign that focuses on one of those 10-12 things. Provide pledge stickers to showcase participation. Missy Stults can provide sample pledges.
- A community-climate science engagement workshop with scientists studying regional hydrological systems may be useful for identifying opportunities to advance this issue.

- Consider enlisting a volunteer(s) to collect freely available data and analyze it to discover trends in snowpack and precipitation. Target at least 30 years of data to meaningfully capture and mitigate interannual variability. Looking at the trends and the pattern of departure from an average can show how these elements are changing over time. Such trends help understand not only what is happening to snowpack and surface water availability but why they are changing.

Resources:

- For further reading on what works best in reporting vs. messaging, consider:
  - "Promoting conservation by managing residential outdoor watering evidence from the Truckee Meadows area in Northern Nevada" describes what works best in reporting vs. messaging.
  - The use of simulations is an excellent way to bring attention to an issue, though they require funding. Applicable models include ArkStorm, Drought Tournaments, and Alternative Futures.
- Sno-tel network provides snowpack data. While it doesn't have a station in Mt. Shasta, stations nearby in southern Oregon may suffice.
- WestMap has data for precipitation, minimum temperature, maximum temperature and average temperature by county. Use data for Siskiyou County instead of the hydrological unit (Upper Sacramento Basin).
- Staff at the Desert Research Institute (DRI), part of the Western Regional Climate Center can be a resource for understanding climate observations.
- Derek Kauneckis (Ohio University) and/or Thriving Earth Exchange could support development/implementation of community-science engagement workshops or programing.

Potential Next Steps:

- Confirm and assess city knowledge of local hydrological and meteorological projections over relevant timescales; engage with partners or volunteers to fill any gaps in knowledge.
- Consult with appropriate stakeholders to explore and develop a public engagement activity or program to meet water education and conservation goals.
- Look for and pursue opportunities to highlight and raise awareness of water conservation in city/utility information and products.

Payment for Ecosystem Services (PES)

There was some interest in exploring PES as a way to reframe Mt. Shasta's ecological assets and engage new sectors to advance a conversation about demonstrating the value of Mt. Shasta's natural resources. Currently, they are viewed largely as exportable commodities. While it is a developing science, PES offers a model for adding explicit economic value to environmental public goods. PES can be useful for framing the relative value of prevention vs. post-event response. Note, however, that it is important to not fully "monetize" the environment, but to retain valuation of intrinsic value.

SME Suggestions:

- Exploring climate linkages can help identify what should get valued using PES in order to justify certain interventions and adaptation actions.
- PES be used for everything from watershed services, carbon markets, to public health benefits depending on the service of interest. The most successful valuation schemes, effectively "bundle" benefits to get the highest value for the services they want to protect (i.e., water quality, biodiversity richness, flood protection, etc.).

Resources:

- GecoServ - Gulf of Mexico Ecosystem Services Valuation Database
- Proposed Lone Star Coastal National Recreation Area
    - 2013 Presentation by Jim Blackburn (Blackburn & Carter)

Potential Next Steps

- Engage in a series conversations with individuals knowledgeable in PES to explore the potential and applicability of PES for achieving local priorities. Consider scientists, economists, and groups that have launched successful PES programs.
- Pending results of those conservations, engage with partners to explore development of a pilot PES initiative in Mt. Shasta.

Implementation

Despite staff and resource limitations on the municipal level, Mt. Shasta's place-based pride, engaged community and resident industries might offer a unique blend of resources and capacity to fill in gaps for implementation. Dialogue participants noted that climate implementation work fares best when tied to risk reduction or infrastructure planning; tie strategic development to people's sense of personal and community protection.

SME Suggestions:

- Many measures can be both cost-saving and climate adaptive, e.g. an earlier effort to convert streetlights to LED lights. Look to cast other initiatives in the same light where possible.
- The most defensible decisions and investments will be based on clear historical data and robust projections. Resources:

- Cal-Adapt is a resource for data produced by California's scientific and research community. Their website will soon have high-resolution, verified and scenario-guided climate projection data for the entire state, covering 6km resolution for fire, drought, snowpack and extreme heat.
- The U.S. Climate Resilience Toolkit has good data visualizations for Siskiyou County regarding temperature, precipitation and heating/cooling degree days.

Resources:

- CivicSpark is an AmeriCorps program dedicated to building capacity for local governments to address climate change and water management issues in California.
- The Thriving Earth Exchange can identify and support city engagement with a volunteer Earth and space scientist to advance a city priority.

General Resources

The following are general resources about climate change resilience planning that were referenced during the Mt. Shasta Community Dialogue. Resources listed here span multiple key focus areas and may be cited elsewhere above in a specialized context.

- Thriving Earth Exchange (TEX) can connect Mt. Shasta with a volunteer Earth or space scientist to launch a project tailored to address a local priority.
- Community & Regional Resilience Institute (CARRI)
- Resilient Cities Climate Leadership Academy (Institute for Sustainable Communities) is an opportunity for multiple individuals from a single municipality to get together with sister municipalities from around the nation to explore issues of mutual interest.
- U.S. Climate Resilience Toolkit has case studies, tools, and resources.
- Climate Adaptation: The state of practice in U.S. communities (Abt Associates/ Kresge Foundation) features in-depth actions that municipalities are taking to address climate change
- Climate Adaptation Knowledge Exchange (CAKE) by EcoAdapt
- American Society of Adaptation Professionals
- The National Adaptation Forum is a great event to see what others are doing and network. Held every two years (next in 2019) and provides generous travel funds.

Next Steps for Consideration

The resources and insights throughout this report can serve as the foundation for the planning and implementation of resilience activities in Mt. Shasta moving forward. It is meant to be a tool and resource for wider community and partner engagement in Mt. Shasta. It is not, however, a comprehensive resilience assessment. Further engagement of key community stakeholders will be important to share the outcomes of the dialogues and determine which priorities and next steps are broadly supported. Potential next steps that were explicitly identified within the dialogue are described in detail in the sections above.

The additional list of next steps below was distilled from the dialogue for the consideration of community leaders as they proceed with their resilience building efforts:

1. Hold an interactive workshop to share information about climate change impacts and resilience with city staff and decision makers, with a focus on how to integrate climate resilience considerations into city plan updates and implementation.
2. Explore resources, tools and best practices that can help broaden the integration of resilience into city plans to promote co-benefits from the provision of basic services, and longer-term resilience frameworks.
3. Develop and include shovel-ready projects in city plans that integrate green space and green infrastructure. Seek financing opportunities to support expanded work.
4. Convene a multi-stakeholder conversation to establish a resilience vision for Mt. Shasta and explore opportunities to incorporate a resilience lens into community education and engagement around public safety, wildfire prevention, and water conservation.
5. Focus on leveraging local interest in environmental protection and build a multi-stakeholder coalition of volunteers to advise, collaborate, and engage in local resilience initiatives.
6. Seek to connect and engage with trusted local, regional and national collaborators to enhance capacity, share lessons learned, and advance resilience priorities.
7. Work with the Governor’s Office of Planning and Research to develop an approach to incorporating climate into your local plans. *(Note: Follow-Up Meeting has been scheduled for Juy 21 in Sacramento, CA.)*

The Spirit of Mt. Shasta Region

Building Resilience | Next Steps

Summary

The following document is a summary of technical assistance provided to the City of Mt. Shasta by the U.S. Environmental Protection Agency (EPA), the Federal Emergency Management Agency (FEMA), and the Metropolitan Transportation Commission/Association of Bay Area Governments (MTC/ABAG). The assistance included bringing experts together during a threeday workshop to help the City of Mt. Shasta build resilience to natural disasters both locally and regionally. In addition, the Mt. Shasta workshop provided valuable feedback into the development of a regional resilience workbook and toolkit that will be used by other regions and communities across California and the rest of the nation.

Mt. Shasta applied and received technical assistance from EPA, FEMA, and ABAG/MTC to conduct a regional workshop that would help the city and other partners in the South Siskiyou County area imbed resilience strategies in the local General Plan update, Local Hazard Mitigation Plan, and other planning efforts. In addition, the City of Mt. Shasta used the assistance and workshop to build a robust network of partners around issues of resilience, as well as to kick start outreach to the community and surrounding areas. As of January 2017, the State of California requires jurisdictions to update the next version of their General Plan Safety Element (or a new Local Hazard Mitigation Plan (LHMP)) to include climate adaptation and resilience goals, strategies, and implementation steps (SB 379). Further, state law requires jurisdictions to consider equity as a primary principle in the development of these plans (SB 1000). The City of Mt. Shasta is beginning a two- to three- year process to update their General Plan and will complete an update of their LHMP in May of 2018.

The three-day workshop was held March 7th to 9th, 2018 in Mt. Shasta. The hosts for the workshop included EPA, FEMA, MTC/ABAG, and the City of Mt. Shasta Planning Department. The workshop brought community leaders, residents, and key stakeholders from across the region together to discuss the importance of planning for disaster resilience, with a focus on wildfire hazards. The City of Mt. Shasta will use information gathered at the workshop to update the Safety Element of the city's General Plan, update the LHMP, as well as to continue ongoing partnerships and conversations around specific actions the city and regional partners can take to protect the region from disaster impacts.

This Next Steps Memo provides an overview of the workshop findings and the specific strategies developed during the workshop, identifies the key barriers and challenges to implementing those strategies, and summarizes the priority next steps the city might take.

Primary Takeaways from the Workshop

The workshop included an evening public workshop, a daylong intensive workshop with regional experts, and a wrap up meeting with decision-makers in Mt. Shasta. The first two segments of the workshop were open to the public, but specific interest groups were invited to participate, including Siskiyou County representatives; neighboring cities of McCloud, Dunsmuir, and Weed; California Highway Patrol (CHP); Siskiyou County Sherriff; Great Northern Services; City of Mt. Shasta Planning Commission; United States Forest Service; McCloud Service District; California Department of Forestry and Fire Protection (CAL FIRE); Pacific Power; and California Governor's Office of Emergency Services (CALOES).

Several major themes and takeaways were gathered through the public meeting and focus groups from the three-day workshop:

- Resilience is more than bouncing back; it is an opportunity to **transcend a disaster** and create a stronger community and economy.
- The **rate of change** is a substantial challenge. Many of the hazards are not new, but they are occurring more frequently and with more severity, including winter storms and wildfires.
- Planning efforts need to strike a **balance** between the needs and demands of the community and the economy, and between urbanized areas and rural locations.
- Need to improve **communication and collaboration** across jurisdictions is critical, especially to reduce duplication of jurisdictional and agency plans across the region.
- **Neighborhood and community engagement and communications** surrounding disaster resilience should be improved.
- There is a need to **diversify the region's economic industries** to be more resilient
  - Establish **alternative** economies beyond the timber industry and recreational tourism, which could include non-timber forest products, mushroom hunting, arts and music, and a "learning laboratory" for regional colleges and universities that highlights the uniqueness of Mt. Shasta.
  - Showcase the area as **attractive not ex-tractive**.
  - **Manage and adapt** for environmental and community benefits; manage the forest and create resilience.

Issues & Opportunities

The Community Workshop on the first evening asked participants to identify the things in the community they love and want to protect as well as to discuss some of the major issues and barriers to building resilience to natural disasters.

Things the Community Loves and Wants to Protect (Opportunities)

- Pure water!
- Spiritual history and attraction to the mountain, including the area's tribal, cultural, and historical foundation
- Love of the place and lifestyle is strong: clean air, forest, river and lakes, outdoor recreation, solitude, and night sky
- Natural resources
- Tourism
- Active transportation (bike and pedestrian) options could be improved
- Encourage a "learning laboratory" for research
    - Collaborate with universities to study the impacts and climate changes on the slopes of Mount Shasta
    - Could bring additional funding to the region

Challenges and Barriers to Overcome

Organizational

- Multiple overlapping jurisdictions in the region: local, county, state, and federal
- There is a lack of data and GIS capability in the neighboring communities
- The costs and time related to CEQA analysis is a barrier for a range of projects including resilience projects
- Long timeframe to complete the Mt. Shasta General Plan due to staffing limitations
- Need additional technical assistance to finish Mt. Shasta's planning efforts
- Overall communications between jurisdictions and with the community is inadequate
- High turnover rate for agency staff throughout the region

Community

- Aging population
- Narrow economic markets: tourism and logging – need to diversify
- Community "stressors" that exacerbate disaster vulnerabilities
    - Food desert
    - Mental health problems
    - Domestic violence
    - Homeless and transient population
- Need to work with the Siskiyou County Public Health Division on these stressors and on disaster planning
- Outdoor marijuana growing creates additional risks and environmental impacts from fires, including mobilization of toxics into the air, water, and soil

Physical

- Need to engage private property owners in planning and implementation of disaster resilience projects
- Limited transportation access and potential for freeway closures during natural disasters
- Propane distribution and storage adjacent to the railway creates additional vulnerabilities related to fuel access and availability during disasters
- Water system infrastructure in need of basic upgrades

Vulnerability Assessment

On the second day of the workshop, participants conducted a mock vulnerability assessment using known community assets and specific hazards to determine the most significant challenges. Participants split into three groups that focused on different hazards and assets. Highlights from each group are included below.

Group 1. Goal: Preserve the natural environment
Asset: Wastewater plant **Hazard:** Winter storm
Key Points:

- The wastewater plant is beyond capacity and needs many upgrades.
- Capacity issues create local and downstream impacts to the entire community and visitors.
- The long-term solution will be to build a new wastewater treatment plant.
- Fire mitigation projects are needed to reduce the potential "fuel" nearby to reduce fires.
- The plant is on high ground with a two-day power backup.
- Residents on septic systems and wells experience no direct impacts but need to convey the importance of this issue to everyone, such as disruptions in local business services.

Group 2. Goal: Protect water quality
Asset: Drinking water **Hazard:** Wildfire
Key Points:

- General Issues
    - Ash fall can impact water quality
    - Water availability depleted due to fighting fire
    - Potential inability to reach the water source in the event of a disaster
    - Need to proactively create defensible space

- General need to upgrade drinking water system

- Water system is gravity fed, so power disruptions do not impact supply
    - There are broad and serious consequences if water quality is impacted by fires. Water degradation in any form would hurt Mt. Shasta's reputation and "brand" as a place with clean, untreated, mountain spring water.

3. Goal: Manage forest to reduce ecological damage
Asset: Forest **Hazard**: Wildfire
Key Points:

- Focus on short-term and small-scale, manageable fire mitigation projects
- Historic practices (harvesting) need updating
- Major economic impacts for everyone if forest ecology is threatened (i.e. tourism-based retail, lodging, service industry)
- Who is in charge of planning and implementing fire management projects?
    - Multiple agencies, with various approaches to management
    - There are the same vegetation management/fire mitigation requirements for owners regardless of size (i.e. 2 acres versus 500 acres)
    - Ecological services are of huge value, including for carbon sequestration, water quality, and air purification
    - Resilient forest that can withstand change over time

Identifying Resilience Strategies

Following the risk assessment exercise, participants worked together to create strategies to address the vulnerabilities already identified. Julie Titus, a local consultant who is developing the Siskiyou County Wildfire Protection Plan, presented information about the region's fire history, which set the context for understanding the great risk this region faces from fires and the importance of creating a common fuels management strategy.

Before, During, and After

An important takeaway from this work session is the need to consider resilience with three perspectives: before, during, and after a disaster. This frame allows planners to delineate strategies based on timing and helps the broader community understand the role of planning in addressing vulnerabilities before a disaster and thinking ahead about the aftermath of a disaster. The actual event requires a separate process that focuses on emergency response plans.

Refined Strategy Areas

The following strategy areas are potential organizing concepts for the General Plan or Local Hazard Mitigation Plan (LHMP). These strategy areas encompass all of the assets within the community and can be discussed in terms of their potential vulnerability to various hazards, which for Mt. Shasta are most likely wildfire, winter storms, flooding, drought, and even volcano eruption. As the city develops updates to the General Plan, LHMP, or has input into other regional plans, such as the Community Wildfire Protection Plan, Ecology Center Adaptation Plan, or Integrated Regional Water Management (IRWM) Plan, these strategy areas could help reflect common goals and priority actions across these different plans and efforts.

1. Connected Community

Human capital is a core resource and an essential asset for the city to protect and support both now and into the future. Human capital includes residents, visitors, and city staff, and focuses primarily on planners, disaster professionals, and emergency responders.

2. Critical Services

There are a number of critical services that are essential to a community and need to be protected at a higher level than others, including public facilities and infrastructure that protect life, provide safe and reliable transportation and access, and provide power, water, and communications among others.

3. Built Environment

Buildings, housing, infrastructure, and community-serving facilities such as schools and public facilities are all critical to a thriving community. Understanding how they support the community and pinpointing the potential vulnerabilities within the built environment is essential to establishing a more resilient community.

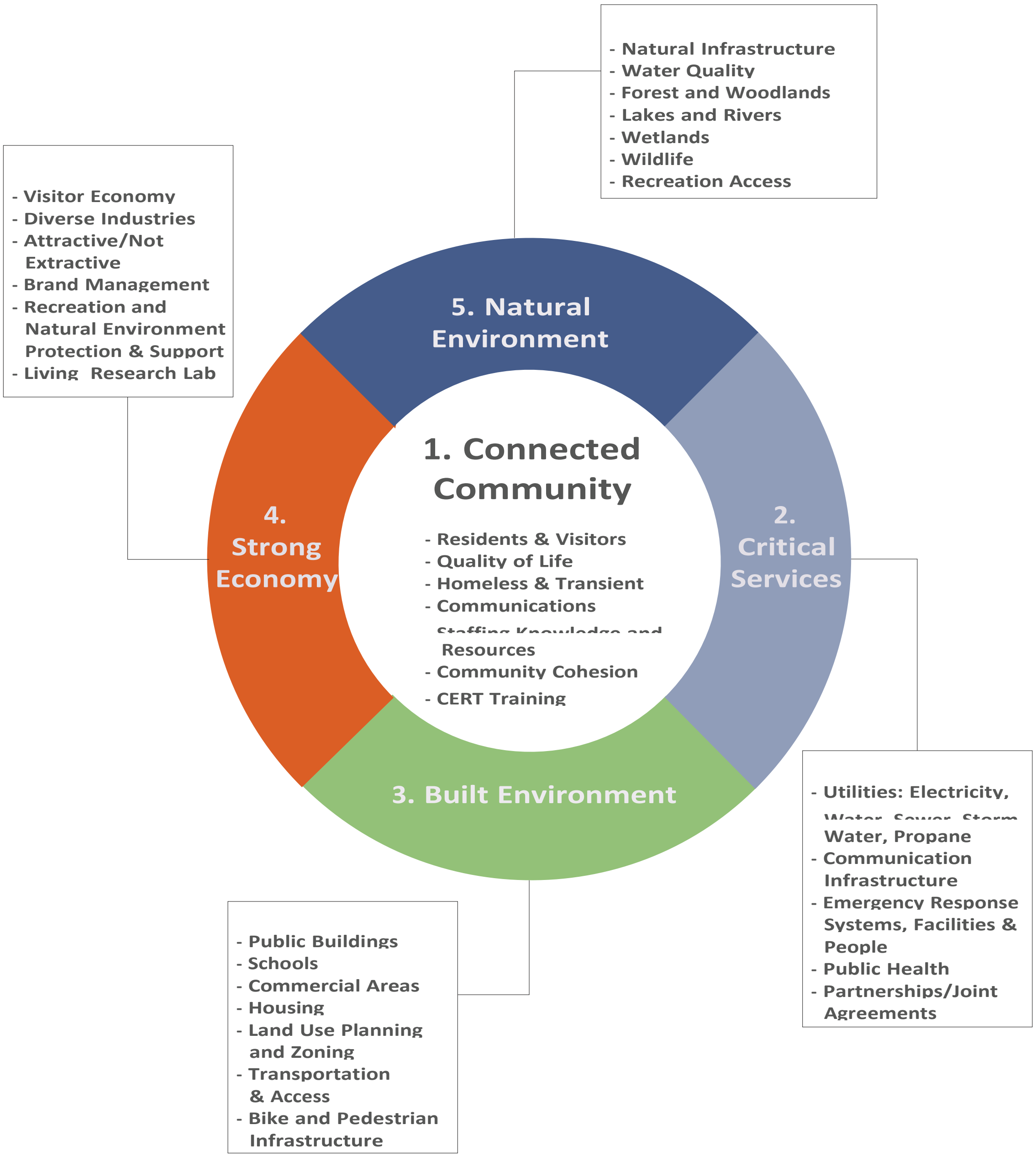
4. Strong Economy

The natural environment supports the region’s economy in the form of visitors who are attracted by the beautiful scenery, spiritual aspects of Mt. Shasta, and a multitude of recreational opportunities. In addition, the region’s extensive forests and history of logging have provided the core economy and job market for the region. The region will need to protect these natural assets as well as the supporting businesses districts both physically and in terms of potential loss of visitors after a disaster.

5. Natural Environment

In addition to the economic value of the environment, the natural environment is a central attraction for residents, supports spiritual life, and provides essential ecological services related to carbon sequestration, wildlife habitat, and drinking water. It is essential to balance the economic elements of the environment with these other fundamental benefits of the surrounding environment.

Strategy Areas



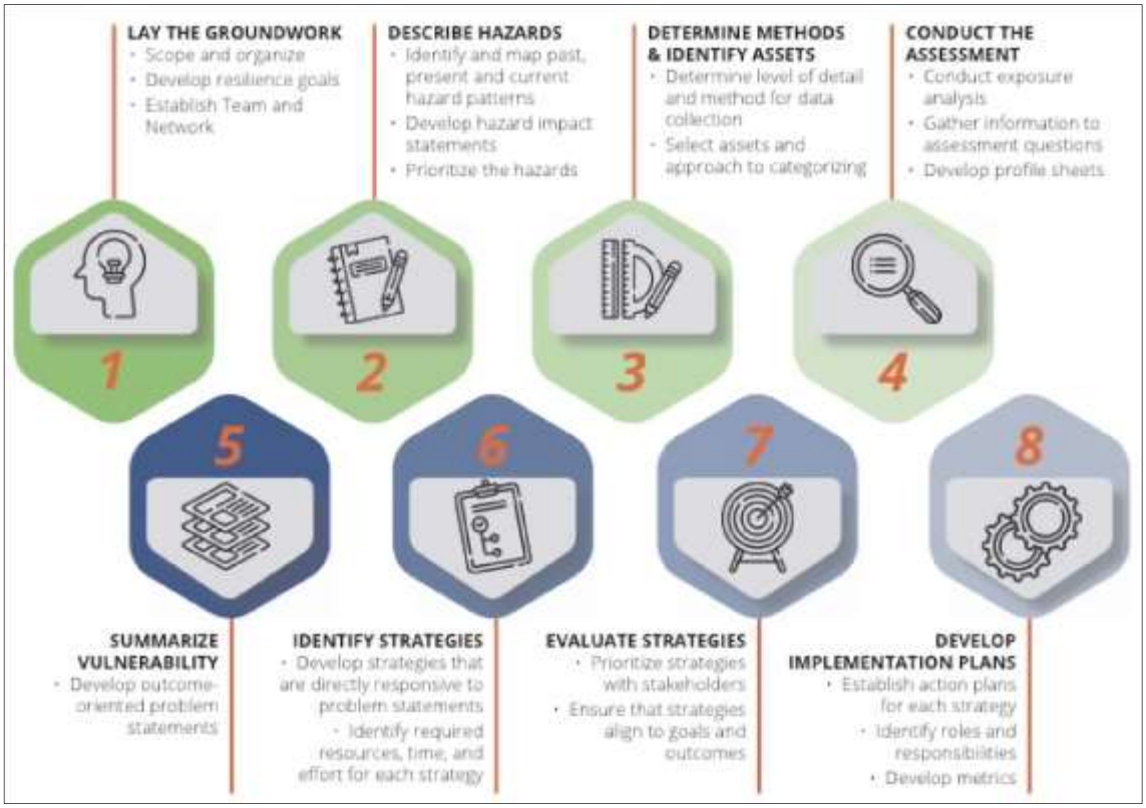
Next Steps

Three primary next steps, which are connected but distinct, were identified during the workshop.

1. Complete the City's Vulnerability Assessment and Strategy Development

The first recommendation is to continue working with the region's experts to complete updates to the Mt. Shasta LHMP and General Plan. Ideally, these plan updates can offer the surrounding cities and other similar California communities a model for resilience planning and action. Specific next steps for plan updates include:

- Build on workshop information, and further refine and update priorities for wildfire hazards and develop an Action Plan to implement.
- Conduct vulnerability assessment and develop strategies for flooding and winter storms.
- Work with partners to map and identify a history of hazards to help to plan and focus resources.
- Identify data gaps and additional research and resource needs to complete detailed planning for the General Plan Safety Element and LHMP.



2. Expand and Solidify a Regional Network

The region will need to more effectively coordinate across jurisdictions, with state and federal agencies, and with non-governmental partners to share knowledge, capabilities, and resources to prepare for future disasters. In addition, this network can be invaluable when catalyzed during and after a disaster.

Build Network Throughout Region

Dunsmuir, Weed, Mt. Shasta and McCloud

- Board of Supervisors
- CALFire
- California Highway Patrol
- California National Guard
- Caltrans
- Chamber of Commerce
- City Police
- City Sherriff
- City Water and Sewer
- Community Resource Centers
- County Departments
- Forest Service
- Hospitals and Clinics
- Local bottling company
- Local radio
- Mount Shasta Unified School District
- Parks and Recreation Departments
- Power Company
- Railroad / Union Pacific
- Redding Red Cross
- Regional Water Act: RWAG
- Resource Conservation District
- Siskiyou County Office of Emergency Services
- Tribal communities

Build Partnerships and Planning Alignment

- For each hazard type, determine critical partners and other planning processes in the immediate region to leverage and align. As noted in the wildfire assessment, CALFIRE and Siskiyou County are essential partners. For example, the City of Dunsmuir developed a Community Wildlife Protection Plan (CWPP) and the county is in the process of developing one as well, which can complement and enhance the city's efforts to plan for wildfires.

Continue Community Outreach and Engagement

- Community engagement with the broader public is important to establish a better understanding of community goals and vision, as well as to help refine and hone disaster resilience priorities. In addition to workshops, the city has already planned several activities to go where the community is rather than asking them to come to planning meetings. These activities, including the following, are good opportunities to build public support:
  - Brew Coffee and Happy Hour Meetings (planned)
  - Volunteer Corps (planned)
  - Community Events
  - Farmers Markets (planned)
- Specific outreach to special interest groups and technical experts in the area is also essential to ensure that final planning products are comprehensive, well-informed, and include broad buy-in. The city could consider several additional activities for these specific stakeholders:
  - One-on-one interviews with key leaders
  - Small group meetings with special interest groups or cohorts of stakeholders,

e.g., hoteliers, or recreation providers, or school leaders.

- Online surveys designed to gather specific information and details

- Ongoing information sharing with the public and stakeholders is essential and should be done via the city's website as well as with news emails and targeted calls.
- Communication materials could be distributed via typical city channels as well as posted at local coffee shops, libraries, hotels, and other locations frequented by the community or visitors.

Branding and Public Relations

- The city could highlight its efforts to build resilience to disasters and make Mt. Shasta a safe place to live, work, and visit. Marketing the city's efforts around resilience can bring more awareness and support for ongoing planning and project investment, as well as brings in new businesses and elevate the community's own image.

3. Build Internal Knowledge, Staff Capacity, and Resources

To effectively complete the first two next steps, the City of Mt. Shasta will need to identify additional resources to assist in planning and implementing for the General Plan and LHMP, including new planning and operational grants related to resilience and risk management, dedicating new funding for high priority projects, and/or developing (and receiving) funding proposals for other agencies such as CALFIRE.

- Identify additional resources and staffing to enable the city (and region) to address resilience plan implementation. This may include, but is not limited to, applying for additional technical assistance grants, operational funding grants, and other grants that would expand technical and staff abilities to conduct planning and implementation.
- Launch Community Emergency Response Team (CERT) training in Mt. Shasta to enable community members to become better educated and prepared for disasters.
- The City of Mt. Shasta should strive to be a model and enabler for LHMP updates and Resilience Planning for the entire South Siskiyou region, which could attract additional funding and support for planning and projects.
- Develop funding plan targeting key initiatives and operational support.
- Conduct internal disaster preparedness training for all city staff to fulfill state requirement and build internal teams and awareness.

Appendix C: Previous Mitigation Plan Assessment

Previous Mitigation Plan Assessment	
Action	Achieved
Equip Police and Fire centers with reliable emergency power	Yes
Identify and implement alternate power sources	No
Undergrounding of utilties	No
Trim back trees form power lines	Yes
Improve existing fire hydrants and water supplies	Yes
Consider becoming a "Firewise" community	No
Maintain mutial aid agreements	Yes
Encourage use of fire-resistant materials and creaiton of defensible space	Yes
Encourage performance based design	No
Support detailed lahar and ash fall studies	No
Consider partificaotion in the Community Rating System program	No
Maintain compliance and good standing under the NFIP	No
Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures form future damage, with repetitive loss and severe loss properties as priority	No
Support County-wide inititatives identified in Volume I of the Plan	Yes
Continue to support the implementation, monitoring, maintenance, and updating of this Plan as identified in Volume I	No

Worksheet 4.1

Capability Assessment Worksheet

Capability Assessment Worksheet

Jurisdiction: City of Mt. Shasta, Siskiyou County, California

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Please indicate which of the following your jurisdiction has in place.

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan	Yes, 2017	The Safety Element contains information on hazards, projects, and actions
Capital Improvements Plan	Yes, 2018	CIP does not discuss hazards
Economic Development Plan	No	
Local Emergency Operations Plan	Yes, 2018	Plan contains hazards but no projects or actions
Continuity of Operations Plan	No	
Transportation Plan	Yes, 2007	Transportation is included in General Plan and coordinates with Safety
Stormwater Management Plan	Yes,	Does not address hazards
Community Wildfire Protection Plan	No	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	No	

Appendix D: City of Mt. Shasta Capability Assessment Worksheet

Building Code, Permitting, and Inspections	Yes/No	Are codes adequately enforced?
Building Code	Yes	Version/Year: 2018 California Building Code
Building Code Effectiveness Grading Schedule (BCEGS) Score	No	Score:
Fire department ISO rating	Yes	Rating: 3/3Y
Site plan review requirements	Yes	Commercial and multi-unit residential require architectural review. Actively enforced
Land Use Planning and Ordinances	**Yes/No**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance	No	No language pertaining to hazards
Subdivision ordinance	No	No language pertaining to hazards
Floodplain ordinance	No	Not in floodplain
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	very high wildfire severity zone ordinance contains language and is enforced
Flood insurance rate maps	No	
Acquisition of land for open space and public recreation uses	Yes	Subdivision Ordinance is not effective nor enforced
Other		

How can these capabilities be expanded and improved to reduce risk?
Improvements can be made to the City's codes to match the work accomplished in long-term plans. An update of the zoning and subdivision codes could make the City more effective at planning for hazards. The Capital Improvements Plan could contain a hazard analysis and hazard prioritization of future projects. Building code should be assessed and rated for hazard response.

Worksheet 4.1

Capability Assessment Worksheet

Administrative and Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level government that can provide technical assistance, indicate so in your comments.

Administration	Yes/No	Describe capability Is coordination effective?
Planning Commission	Yes	Planning Commission is a monthly committee that is effective at coordinating and evaluating plans
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	Programs are response based. Very little proactive effort
Mutual aid agreements	Yes	Mutual aid agreements between police and fire staff with outside agencies
Staff	**Yes/No FT/PT[1]**	**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Chief Building Official	Yes/Contr	Contract employee is not adequate for any of the above.
Floodplain Administrator	No	
Emergency Manager	No	
Community Planner	Yes/FT	Planning staff is not adequate to enforce regulations. Staff is trained on hazards and mitigations. Coordination is effective
Civil Engineer	Yes/Contr	City Engineer Contract has civil engineer capable to meet above questions.
GIS Coordinator	Yes/Contr	City Engineer Contract provides GIS services when needed. Not adequate
Other		

1 Full-time (FT) or part-time (PT) position

Worksheet 4.1

Capability Assessment Worksheet

Technical	Yes/No	Describe capability Has capability been used to assess/mitigate risk in the past?
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	CodeRed is limited to cell phone users who have signed up. Not adequately capable
Hazard data and information	Yes	Not adequate for general public or staff training
Grant writing	Yes	Limited in time and scope of training
Hazus analysis	No	
Other		

How can these capabilities be expanded and improved to reduce risk?
Very little staff training and time is spent specifically on hazard mitigation. Most effort is put toward response. All aspects of City functions could be improved to address hazards on a more frequent basis. Highest priority being communication to the public.

Worksheet 4.1

Capability Assessment Worksheet

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Access/ Eligibility (Yes/No)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	No	CIP does not prioritize or focus on hazard mitigation projects. Little political or fiscal ability to fund through CIP
Authority to levy taxes for specific purposes	Yes	Fire assessment is in place for services. Could be utilized more for hazard mitigaiton projects.
Fees for water, sewer, gas, or electric services	Yes	Has been used for disaster recovery. No hazard mitigation.
Impact fees for new development	No	
Storm water utility fee	Yes	Funds not adequate to support hazard projects
Incur debt through general obligation bonds and/or special tax bonds	No	
Incur debt through private activities	No	
Community Development Block Grant	No	City does not have qualifying income level for hazard projects
Other federal funding programs	No	Post disaster recovery only
State funding programs	No	Post disaster recovery only
Other		

How can these capabilities be expanded and improved to reduce risk?
There is no fiscal support for hazard mitigation programs in the City. Any effort to expand consistent funding sources would be an improvement.

Worksheet 4.1

Capability Assessment Worksheet

Education and Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Mt. Shasta Bioregional Ecology Center focuses on environmental health with a prescribed burn program. Shasta Community Foundation is a nonprofit that collects private donations for disaster recovery
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	Fire safety, evacuation plans, water conservation, and solid waste programs are periodically used
Natural disaster or safety related school programs	Yes	Fire safety and active shooter programs for safety personnel are annual applied
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	No	
Other		

How can these capabilities be expanded and improved to reduce risk?
More education and engagement is always needed to all types of hazards. Specifically, information related to winter weather, fire safety, and storm preparedness. The City can also improve relations with outside organizations that can assist with hazard mitigation and disaster preparedness.

Safe Growth Audit

Use this worksheet to identify gaps in your community's growth guidance instruments and improvements that could be made to reduce vulnerability to future development.

Comprehensive Plan	Yes	No
Land Use		
1. Does the future land-use map clearly identify natural hazard areas?		
The 2007 General Plan does map the natural hazards in the area but does not communicate that to the zoning code.	☑	☐
2. Do the land-use policies discourage development or redevelopment within natural hazard areas?		
The land use policies do not discourage or address natural hazard areas.	☐	☑
3. Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?		
The General Plan discusses development in hazard areas but does not offer recommendations to reduce development in those areas.	☐	☑
Transportation		
1. Does the transportation plan limit access to hazard areas?		
	☐	☑
2. Is transportation policy used to guide growth to safe locations?		
	☐	☑
3. Are movement systems designed to function under disaster conditions (e.g., evacuation)?		
The transportation system is designed for evacuation but mismanagement of auxiliary routes has decreased the system's effectiveness.	☑	☐

Comprehensive Plan (continued)	Yes	No
Environmental Management		
1. Are environmental systems that protect development from hazards identified and mapped?		
	☐	☑
2. Do environmental policies maintain and restore protective ecosystems?		
City Staff encourage the preservation and restoration of protective ecosystems but it is not a formal policy.	☐	☑
3. Do environmental policies provide incentives to development that is located outside protective ecosystems?		
	☐	☑
Public Safety		
1. Are the goals and policies of the comprehensive plan related to those of the FEMA Local Hazard Mitigation Plan?		
This a new state mandate that will be applied to the General Plan revision	☐	☑
2. Is safety explicitly included in the plan' s growth and development policies?		
The Safety Element of the General Plan specifically addresses all hazards in the area and provides policy and actions to mitigate. This element is coordinated with the land use and circulation elements to address growth	☑	☐
3. Does the monitoring and implementation section of the plan cover safe growth objectives?		
	☐	☑

Zoning Ordinance	Yes	No
1. Does the zoning ordinance conform to the comprehensive plan in terms of discouraging development or redevelopment within natural hazard areas?		
	☐	☑
2. Does the ordinance contain natural hazard overlay zones that set conditions for land use within such zones?		
	☐	☑
3. Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use?		
	☐	☑
4. Does the ordinance prohibit development within, or filling of, wetlands, floodways, and floodplains?		
	☐	☑
Subdivision Regulations	**Yes**	**No**
1. Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?		
	☐	☑
2. Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources?		
	☐	☑
3. Do the regulations allow density transfers where hazard areas exist?		
The City does have a density program that is not hazard specific.	☑	☐

Capital Improvement Program and Infrastructure Policies	Yes	No
1. Does the capital improvement program limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?		
	☐	☑
2. Do infrastructure policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards?		
	☐	☑
3. Does the capital improvement program provide funding for hazard mitigation projects identified in the FEMA Mitigation Plan?		
	☐	☑

Other	Yes	No
1. Do small area or corridor plans recognize the need to avoid or mitigation natural hazards?		
	☐	☑
2. Does the building code contain provisions to strengthen or elevate construction to withstand hazard forces?		
Snow load, flooding potential, and development in fire severity zones are accounted for the City's Building standards	☑	☐
3. Do economic development or redevelopment strategies include provisions for mitigation natural hazards?		
	☐	☑
4. Is there an adopted evacuation and shelter plan to deal with emergencies from natural hazards?		
There is an extensive emergency plant that is updated annually	☑	☐

Questions adapted from Godschalk, David R. Practice Safe Growth Audits, *Zoning Practice*, Issue Number 10, October 2009, American Planning Association. http://www.planning.org/zoningpractice/open/pdf/oct09.pdf.

National Flood Insurance Program (NFIP) Worksheet

Use this worksheet to collect information on your community's participation in and continued compliance with the NFIP, as well as identify areas for improvement that could be potential mitigation actions. Indicate the source of information, if different from the one included.

NFIP Topic	Source of Information	Comments
Insurance Summary		
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	0
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	FEMA NFIP or Insurance Specialist	0
How many structures are exposed to flood risk within the community?	Community Floodplain Administrator (FPA)	0
Describe any areas of flood risk with limited NFIP policy coverage	Community FPA and FEMA Insurance Specialist	0
Staff Resources		
Is the Community FPA or NFIP Coordinator certified?	Community FPA	No
Is floodplain management an auxiliary function?	Community FPA	No
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	No services are facilitated by the City due to no river flooding potential
What are the barriers to running an effective NFIP program in the community, if any?	Community FPA	We are not eligible for the program due to no river floodplain.
Compliance History		
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Never been in the program
Are there any outstanding compliance issues (i.e., current violations)?		None that are known
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?		No record of any visit
Is a CAV or CAC scheduled or needed?		Unknown

NFIP Topic	Source of Information	Comments
Regulation		
When did the community enter the NFIP?	Community Status Book http://www.fema.gov/national-flood-insuranceprogram/national-floodinsurance-programcommunity-status-book	We are not in the NFIP program
Are the FIRMs digital or paper?	Community FPA	N/A
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	N/A
Provide an explanation of the permitting process.	Community FPA, State, FEMA NFIP Flood Insurance Manual http://www.fema.gov/flood-insurance-manual Community FPA, FEMA CRS Coordinator, ISO representative CRS manual http://www.fema.gov/library/viewRecord.do?id=2434	N/A
Community Rating System (CRS)		
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	No
What is the community's CRS Class Ranking?	Flood Insurance Manual http://www.fema.gov/flood-insurance-manual	N/A
What categories and activities provide CRS points and how can the class be improved?		N/A
Does the plan include CRS planning requirements	Community FPA, FEMA CRS Coordinator, ISO representative CRS manual http://www.fema.gov/library/viewRecord.do?id=2434	N/A

Appendix E: 2007 General Plan Safety Element

6. SAFETY ELEMENT

A. Introduction

California Government Code Section 65302(g) specifies that general plans include a safety element for the protection of the community from unreasonable risks associated with the effects of various hazards. The list of possible hazards includes: seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence, liquefaction and other seismic hazards; flooding; and wildland and urban fires. A safety element may also address evacuation routes, military installations, peak load water supply requirements, and minimum road widths and clearances around structures as those items relate to fire and geologic hazards.

The fire safety provisions in the safety element should comply with the minimum statewide fire safety standards pertaining to road standards, signing standards for roads and buildings, private water supply reserves, and fuel breaks and greenbelts.

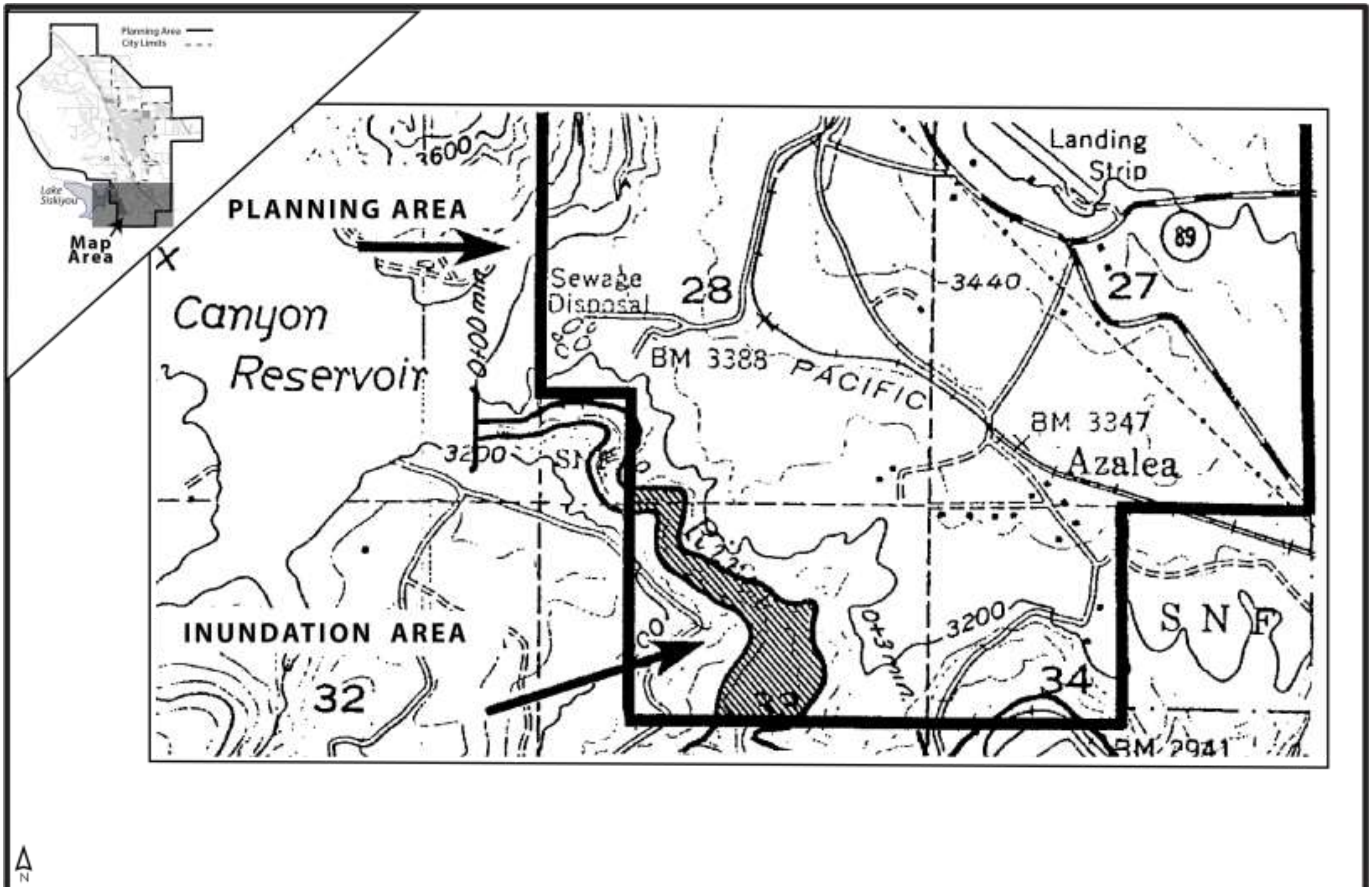
B. Flood Hazards

1. Background

Flood hazard in the planning area is very localized. The hazards are generally limited to riparian areas along streams, the shores of Lake Siskiyou and along the Sacramento River below Box Canyon Dam. The flooding of streams is caused by seasonal flow fluctuations and peak storm events. Flooding that occurs in the planning area generally only affects the immediate vicinity of particular streams.

The Federal Emergency Management Agency has not mapped floodplains in the planning area, with the exception of the shore of Lake Siskiyou and a narrow fringe area along the Sacramento River. Figure 6-1, Flood Hazards, shows the areas subject to inundation.

The Box Canyon area below Lake Siskiyou is subject to flood hazards from high precipitation and from potential dam failure. An inundation study prepared for the County indicates that portions of the canyon area below the dam would be inundated in the event of a dam failure. The study was prepared in 1973 by Olson and Associates Engineering and concluded that, in the planning area, inundated areas would be confined in the inner canyon area.



Source: City of Mount Shasta

FIGURE 6-1
FLOOD HAZARD AREAS

2. General Plan Objectives and Programs: Flood Hazards

Goal SF-1: Protect people and property from flooding.

Policy SF-1.1:

Identify areas subject to inundation

Implementation Measures:

SF-1.1(a): Require that the limits of flooding resulting from a one hundred-year storm event be shown on all permit site plans where lands may be subject to inundation.

SF-1.1(b): When subdivisions or discretionary permits are sought for lands adjoining streams that have had a history of overtopping the banks, require that an assessment be prepared by a qualified engineer or hydrologist to delineate areas likely to be subject to inundation from a one hundred-year storm event.

Policy SF-1.2: Develop a program to identify areas subject to flooding.

Implementation Measures:

SF-1.2(a): As studies related to flooding are prepared and submitted for projects, the Department of Public Works shall maintain a file of such reports and maps for public use.

SF-1.2(b): Each year, upon the annual review and update of the General Plan, any boundaries of flood studies prepared during the previous years shall be identified on a City Flood Sensitive Area map.

C. Geologic Hazards

1. Background

Potential geologic hazards in the area include seismicity (with related impacts such as liquefaction), slope instability and subsidence, and volcanism.

Seismicity

The severity of the impact of an earthquake on a community depends on the intensity and duration of ground shaking and on the occurrence of other seismically-induced phenomena. Factors related to severity include the magnitude of the seismic event, the distance between the community and the event fault, and on local geologic and soil conditions. Potential hazards induced by seismic activity include ground shaking, fault rupture, slope failures and liquefaction.

A fault rupture is an actual crack or breaking of the ground along a fault during an earthquake. Available literature indicates the planning area is subject to low levels of seismicity and low risk of fault surface rupture. The planning area is located in a “moderate” seismicity zone with a possible maximum earthquake intensity of VI or VII on the Modified Mercalli Scale. Earthquakes of this magnitude would be noticeable by the public and could cause minor to moderate structural damage. The planning area has been subject to minor earthquakes.

Historically, there have been only two recorded earthquakes with a Richter magnitude of 4.0 or greater occurring in the immediate Mt. Shasta area. The 1994 Fault Activity Map, prepared by the California Division of Mines and Geology, indicates no active or potentially active faults within the Mt. Shasta
Planning Area. Two faults classified as "potentially active" by the California Division of Mines and Geology exist near the planning area. One is a northsouth trending fault running through the top of Mount Shasta, the other is an east-west trending fault that runs from the top of Mount Shasta to a point north of Black Butte. Because of the active volcanic status of Mount Shasta, these faults are considered potentially active by the California Geological Survey.

Some soils in the planning area may be subject to liquefaction as a result of seismic activity. Liquefaction occurs when earthquakes shake loose, wet, sandy soil. When this occurs, the soils can become almost like quicksand and lose their ability to support structures. Building foundations can sink, break apart or tilt. Gravity-fed pipelines can back up. In the planning area, soils underlain with glacial outwash deposits consisting of sands may be subject to liquefaction.

Pursuant to the Uniform Building Code, the project area is in Seismic Zone 3. Within the provisions of the Uniform Building Code, there are numerous differences between the low seismic risk zones of 0 and 1, the moderate risk zones of 2A and 2B, and the higher risk zones of 3 and 4. These differences include, among others, design force levels, structural connection details, and allowable materials (e.g., whether or not unreinforced masonry is allowed in new construction).

Slope Instability and Subsidence

The terrain of the planning area has primarily low to moderate slopes. During preparation of the Siskiyou County General Plan (1980), reconnaissance mapping was undertaken to identify potential geologic hazards. This mapping revealed no geologic hazards east of Interstate 5 given that slopes are relatively gentle. Mapping of slope instability of areas west of Interstate 5, including lands in the Shasta Trinity National Forest, identified landslide features along Rainbow Ridge and the Box Canyon Gorge. Steep hillsides such as Quail Hill and south of Old McCloud Road, although unmapped as to geologic hazards, may be subject to slope instability due to similar geology as Rainbow Ridge.

There are no known significant subsidence hazards in the planning area. Geologic or hydrologic conditions associated with subsidence are not known to occur in the area. However, some localized subsidence could result from peat oxidation in wetlands.

Volcanic Hazards

The City of Mt. Shasta lies on the southwestern flank of the Mount Shasta volcano, a large, historically active eruptive center in the southern Cascade Mountains. The Mount Shasta volcano has a long but irregular record of eruption. It has erupted at least once every 600-800 years for the past 10,000 years with its most recent eruption having occurred over two hundred years ago in 1786 (Christianson, 1982). The potential volcanic hazards in the vicinity of Mt. Shasta have been detailed in geologic literature. The most pertinent studies were completed since the 1980 eruption of Mount St. Helens in Washington State (Crandell, 1987).

Fumarolic and hot spring activity persist at the summit area of Mount Shasta, which suggests that there is still a body of molten rock below the surface. The eruptive record suggests that the Mount Shasta volcano will probably erupt again in the future, but at a time and with a magnitude that are not possible to predict.

The figure and discussion below outline the types of volcanic-related hazards that could affect the City of Mt. Shasta and its planning area. Various kinds of volcanic activity can endanger life and property both close to and far away from a volcano. Some hazards are more severe than others, depending on the extent of the event, whether people or property are in the way, and the amount of time in which the community is warned of an impending event.

Although most volcanic hazards are triggered directly by an eruption, some hazards may occur when a volcano is quiet. Volcanic-related mudflows (often addressed as a “lahar”; a term from Indonesia) are a mixture of water and rock fragments that sometimes flow down the slopes of volcanoes and into downslope valleys and rivers. Eruptions may directly trigger mudflows by quickly melting snow and ice on the volcano. Mudflows can also be triggered by intense rainfall without being related to an eruption. Mudflows vary in size and speed. **Figure 6-2, Potential Mud Flow Channels**, indicates low-lying areas in the planning area that could potentially experience flows as the result of a volcanically triggered mudflow event. The potential mud flow areas indicated on this figure are not precisely defined and have only been presented as advisory information.

Pyroclastic flows are mixtures of hot gases and dry rock fragments that are blasted away from a vent at high speeds. Most pyroclastic flows consist of a basal flow of gases and coarse fragments that move along the ground, and a turbulent cloud of extremely hot gases and ash that rises above the basal flow. Ash may fall from this cloud over a wide area downwind from the pyroclastic flow.

Landslides may also be triggered on or near a volcano by an eruption or by seismic events related to volcanic forces beneath the surface.

In the case of the Mount Shasta volcano, eruptions during the last 10,000 years produced lava flows around the flanks of the mountain. Pyroclastic flows from summit and flank vents extended as far as 20 kilometers from the summit. Most of these eruptions also produced large mudflows, many of which reached more than several tens of kilometers from the mountain. If a future eruption resembled those of the past, the City of Mt. Shasta and the vicinity, as well as the communities of Weed, McCloud and Dunsmuir, would be endangered. USGS Bulletin 1503 speculated that such eruptions could generate lava and pyroclastic flows that could affect low areas almost anywhere within about 20 kilometers of the summit and mudflows may cover valley floors and other low areas for several tens of kilometers from the volcano [Miller, 1980].

Such a major event could be expected to have significant impacts within the planning area. The City of Mt. Shasta lies in the lower portion of an old, broad pyroclastic and debris fan on the southwest side of the volcano. Cold Creek, Big Springs Creek, and Wagon Creek run along the base of the fan and are likely channels into which any far-traveled flow would empty. The lower portions of the drainages of Cascade Gulch and Avalanche Gulch are likely pathways for flows to travel toward the City.

Development located in these hazard areas may be at risk if a future eruption occurs on the south or west slopes of Mount Shasta. While it is possible to avoid substantial impacts by precluding development in recognized volcanic hazard areas (which amounts to approximately 60 percent of the private land in the planning area), the City has considered a number of factors in adopting its related attitude that the City will not preclude development in lands that may be subject to volcanic hazards. The predicted eruption interval of six to eight hundred years suggests an estimate that Mount Shasta may not erupt until the year 2376, if at all. If the City were to preclude development in potential hazard areas, the City could be required to compensate property owners for condemnation of property. This would be an infeasible fiscal liability in response to a hazard that has such an uncertain potential of occurring.

Hazards due to potential volcanic airfall and volcanic-related earthquakes can be reduced by requiring building foundations, walls and roofs to be properly supported and kept in good repair. Such construction is already required by building codes due to the potential for non-volcanic (i.e., tectonic) seismic hazard potential. Proper geotechnical examinations should assure that foundations are set in well-consolidated deposits or hard rock. Development should be avoided in poorly consolidated substrata, especially in areas with high water tables such as marshes and meadows, as well as in river and stream flood plains. Steeply gabled roofs designed for snow may also be effective for shedding volcanic ash. Flatter-topped buildings should have easy access to the roof and handy shovels to remove debris that might result in excessive roof loads that could cause structural collapse.

Technological advances in volcano monitoring, new and refined volcanohazard assessments, and better warning programs have significantly improved the ability to warn of impending eruptions and related volcanic hazards. However, volcano monitoring technology and warning plans, no matter how timely and accurate, will reduce risks only to the extent that warnings are communicated effectively to emergency personnel and to people who live and work in potentially hazardous areas.

Education of the citizenry, including distribution of pamphlets on possible volcanic hazards, can be an important tool as part of the long-term planning goals and emergency contingency plans for the community.

The general conclusion concerning volcanic risks in the Mt. Shasta area is that it is recognized that there is a long-term potential for volcanic hazards to property and infrastructure in the vicinity, but that there is a very low risk to human life since it is expected that an impending eruption would be detected in ample time to notify and evacuate people. Although it is understood that some low-lying areas in the planning area have a higher potential than other areas for destruction of property that could be caused by volcanic mudflows, etc., the expectation that such an event may not occur for hundreds of years, if ever, leads local agencies to conclude that the potential is not regarded as a constraint to planning and approval of development projects in relatively vulnerable areas.

Liquefaction

The California Geological Society has identified soils in the planning area that may be subject to liquefaction as a result of seismic activity. Soils underlain with glacial outwash deposits consisting of loose sands, silty sands and gravelly sands may be subject to this condition. For example, it is reported that the California Geological Society has discovered soils of this type near the Sisson school site.

2. General Plan Objectives and Programs: Geologic Hazards

Goal SF-2: Assure life and property are adequately protected from seismic hazards in the area.

Policy SF-2.1: Avoid development in areas of steep slope and high erosion potential.

Implementation Measures:

SF-2.1(a): Maintain a maximum density of not more than one dwelling per ten acres of gross land area on slopes in excess of thirty percent.

SF-2.1(b): Amend the land development code to establish special review standards for areas with slopes of greater than thirty percent.

SF-2.1(c): Ensure that site development on steep slopes is designed to avoid creating areas that may be subject to slippage or movement from storm events.

SF-2.1(d): Encourage the use of density transfer to avoid new private construction in areas of steep slopes or high erosion potential.

Goal SF-3: Take prudent steps to maintain emergency services in the event of volcanic activity.

Policy SF-3.1: Periodically update the City's emergency service program to minimize destruction from volcanic activity.

Implementation Measures:

SF-3.1(a): Evaluate power, telephone, water, sewer and other utilities; roads, and landing strips for their location and resistance to the effects of various volcanic hazards, and provide the City Council with recommendations for improvements.

SF-3.1(b): Local, state, and Federal governments should develop contingency plans for a possible volcanic eruption at Mt. Shasta, including provisions for emergency communication.

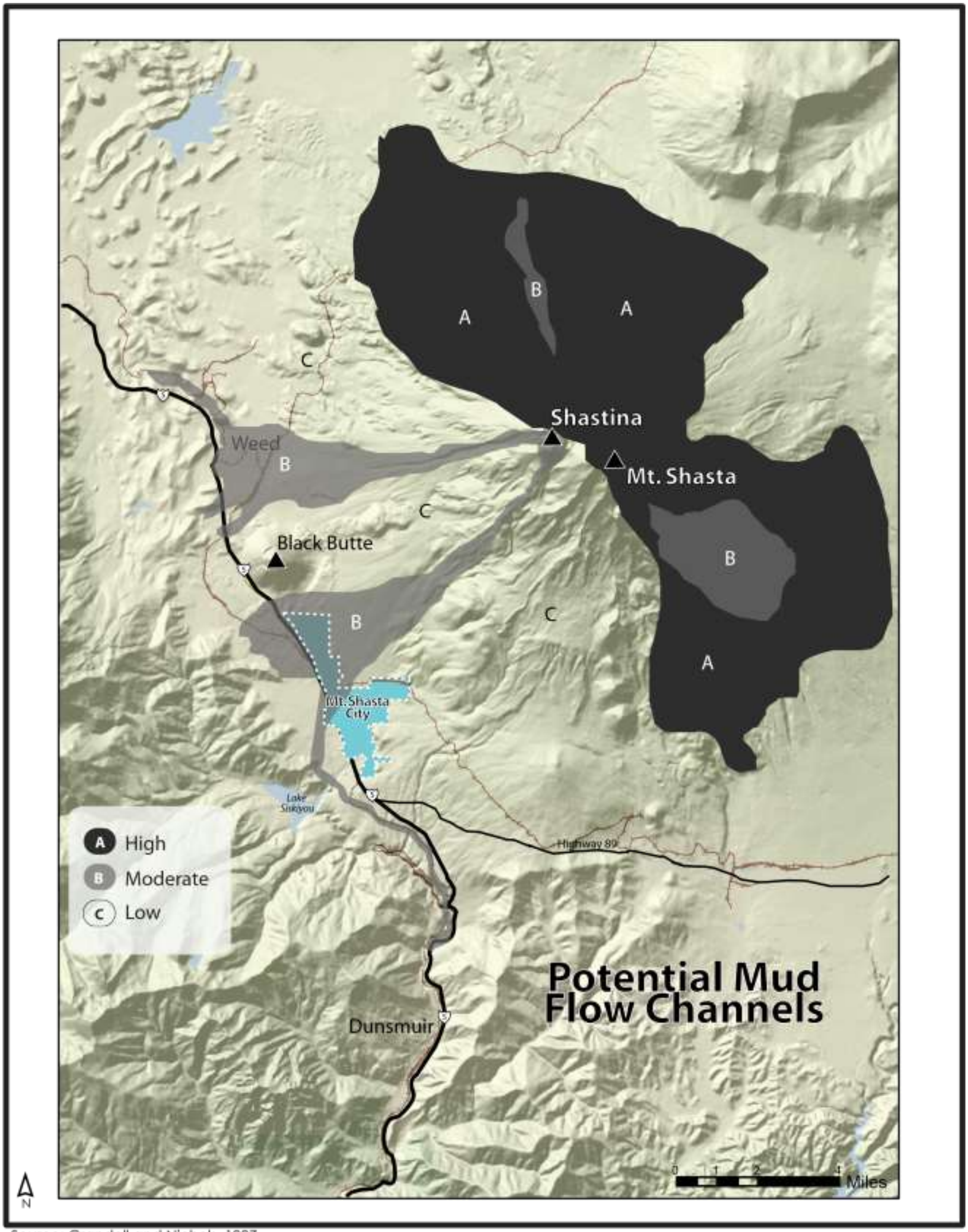
SF-3.1(c): Develop programs to educate residents about preparing for volcanic hazards.

Policy SF-3.2: Take steps to protect public facilities and emergency service providers.

Implementation Measures:

SF-3.2(a): Avoid construction of public or emergency buildings within low-lying areas that may be subject to volcanic flows.

SF-3.2(b): Evaluate and upgrade necessary local codes to accommodate the potential effects of volcanic induced seismic and airfall hazards.



Source: Crandell and Nichols, 1987

FIGURE 6-2

POTENTIAL MUD FLOW CHANNELS

PMC

D. Fire Hazards

1. Background

(Note: Fire protection services are addressed in the Land Use Element.)

Due to the abundance of native vegetation, hillside slopes, dry summers, and the extent of development that is located in the wildland interface, fire hazards within the planning area include the potential for wildland fires as well as structural fires.

Wildland fires present considerable risks to development in areas where a wildland-urban interface exists. A wildland-urban interface is simply the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Given that much of the planning area around the City of Mt. Shasta meets the definition of such an interface, a potential threat to both life and property exists for many residents of the planning area. Even without a loss of life or structures, wildland fires often result in substantial suppression costs, a loss of forest resources, considerable disruption to the surrounding community, and visual scars on the landscape.

In order to better address wildland fire hazards in the vicinity of the City of Mt. Shasta and develop measures to minimize these risks, the Mt. Shasta Fire Safe Council obtained funding for, and coordinated preparation of, the Mt. Shasta Area Community Wildfire Protection Plan (CWPP), dated June 2006 . The CWPP was prepared with the purpose of identifying areas of high priority for fuels reduction treatment, and to provide guidelines for the implementation of a pro-active program that would reduce the potential for loss of life and property resulting from wildfires. The plan also assessed community fire emergency preparedness.

According to the CWPP, areas dominated by chaparral pose the greatest risk for wildfire due to the intensity of the fuel loading, with areas dominated by grass, brush and timber also posing significant risks. The greatest impact to structures, however, would likely occur along the southern and eastern edges of the City where there are not only ample fuels present, but a substantial amount of development as well.

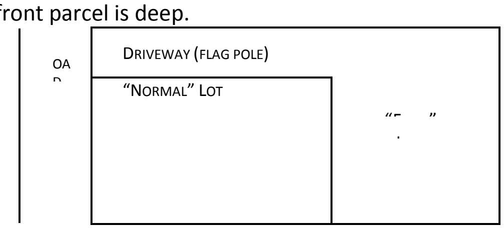
The CWPP proposes a number of measures to minimize risks to life and property resulting from wildfires. These include: the creation of fuel breaks and shaded fuel breaks surrounding the City; forest thinning to reduce the existing fuel load; enforcement of state defensible space requirements; and implementation of a public education campaign. While implementation of these measures would undoubtedly reduce the impact of a wildfire should one occur, there needs to be resolution concerning how much of the program recommended in the CWPP will be generally supported by the City and the general public. Some residents are concerned about the visual impacts of planned projects that would significantly thin forests and develop wide fuel breaks around the community.

Various provisions of State law address fire safety. The City of Mount Shasta is rated as being in a “Very High Fire Hazard Severity Zone” pursuant to California Government Code Section 51179. Jurisdictions and property owners within such zones are required to comply with the requirements of Section 51182 of the Government Code. One such requirement is the maintenance of at least 100 feet of defensible space around structures, or the clearing of all flammable vegetation (with a few exceptions) to the property line should that distance be shorter. Other requirements of the Code are designed to reduce hazards to residences in the event of a wildfire, but are likewise designed to minimize the likelihood of fires spreading outward from a structural fire.

Successful responses to structural fires involve short response time, good water supply, adequate equipment and trained personnel. In areas served by the City's water system, hydrant availability, flow and pressure are generally adequate for fire fighting purposes. Access to development in the planning area is generally adequate with the exception of some "flag lots." In addition, winter snow conditions and railroad crossings may delay response time to structural fires.

FLAG LOTS

Flag lots are a term that applies to parcels that are designed in tandem with another parcel, where one parcel has "normal" road frontage and the other parcel derives its access from a narrower-than-normal strip as long as the front parcel is deep.



In response to a series of devastating fires in the rural foothills of California and the infamous Oakland Hills fire in October 1991, California law has undergone a number of revisions and updates as the Legislature, the California Department of Forestry and Fire Protection, and local fire-fighting organizations strive to improve the means of protecting property and life from fire danger.

Sometimes relatively simple measures can benefit community fire safety. Such measures include requirements for readily-visible street addresses, maintaining public street signs and ensuring that owners of private roads do the same. The use of firebreaks in strategic locations along the wildland-urban interface is also beneficial. Construction standards such as prohibiting flammable roofing materials, encouraging the use of residential sprinkler systems, and ensuring that new developments have adequate water pressure to serve fire hydrants are among the simpler measures that can be implemented. Other key issues are the lengths of dead-end roads to cul-de-sacs and flag lots, and the standards of access roads to accommodate fire-fighting vehicles and ensure the safety of fire-fighting personnel. The Uniform Building Code (UBC) provides for such things as firewall standards and sprinkler systems in certain types of new buildings.

Issues concerning evacuation of neighborhoods in the event of wildfire are addressed below.

2. General Plan Objectives and Programs: Fire Hazards

Goal SF-4: Protect property and life from fire hazards.

Policy SF-4.1: Update City codes to provide for fire protection.

Implementation Measures:

SF-4.1(a): Amend the City's building and land development codes to incorporate fire prevention and wildfire protection measures.

SF-4.1(b): Utilize the expertise and experience of the area fire fighting personnel to recommend a workable program that can be used to gain public cooperation in protecting property and lives against fire hazards.

SF-4.1(c): Require street and address signs to be clearly and legibly displayed for all streets and structures in the City.

SF-4.1(d): Amend the land development code to require adequate fire suppression water supplies for all new development, other than the construction of a single-family home on an existing single family parcel.

SF-4.1(e): Require residents to maintain defensible space around their homes and businesses consistent with state standards.

SF-4.1(f): The City shall review the recommendations of the
Mt. Shasta Area Community Wildfire Protection Plan and, when found to be appropriate and otherwise consistent with City policy, support and/or implement its recommendations.

SF-4.1(g): In evaluating proposed measures for public safety concerning fire hazards, the City will consider, and

will encourage the County to consider, the recommendations and standards set forth in the Fire Hazard Zoning Field Guide.

Policy SF-4.2: Adopt and enforce development standards that provide adequate fire protection.

Implementation Measures:

SF-4.2(a): Avoid individual driveways of more than seventyfive feet in length by requiring as a condition of building permits extra width or mandating a paved, all-weather surface for longer driveways.

SF-4.2(b): Amend the land development code to require that cul-de-sacs serving individual parcels with a length of more than three hundred feet be wide enough to allow for incoming-and outgoingvehicles during a fire emergency. The minimum paved width shall be twenty feet with two four-foot shoulder areas.

SF-4.2(c): Amend the land development code to require special fire agency approvals for any new cul-desac proposed to have a length greater than onequarter of a mile. The City may deny a road design on the basis of single access point and length of cul-de-sac.

SF-4.2(d): Require all new subdivisions when viewed as complete projects to have at least two points of public ingress and egress unless there are overriding considerations agreed to by the fire chief or California Department of Forestry and Fire Protection for allowing only one public access point.

E. Hazardous Materials

1. Background

Hazardous materials consist of injurious substances that may include flammable liquids and gases, poisons, corrosives, explosives, oxidizers, radioactive materials, bio-waste and medical supplies.

Hazardous materials are transported in large volumes on Interstate 5 and on the Union Pacific Railroad (UPRR). Caltrans indicates that nearly every conceivable type of hazardous material is transported over Interstate 5. The most common materials are liquefied petroleum gas and gasoline. Some transportation of hazardous materials occurs on local streets within the planning area, but in much smaller quantities compared to the quantities transported on Interstate 5. UPRR transports hazardous materials through the area. The most common types of materials transported by rail are flammable and nonflammable gases, corrosives and flammable liquids.

The “Cantara Spill” of 1991, which is regarded as one of California’s largest inland ecological disasters, dramatized the hazards associated with transportation of hazardous materials in the area. On July 14, 1991, railcars of a Southern Pacific Railroad train (before the line was acquired by UPRR) derailed just south of the Mt. Shasta planning area at a hairpin turn along the Sacramento River called Cantara Loop. One railcar was ruptured by the fall and spilled approximately 19,000 gallons of a highly toxic compound (metam sodium) into the river. As the chemical moved downstream toward Shasta Lake, it destroyed aquatic life for approximately 36 miles of the river. The river ecosystem slowly recovered, but the spill had a significant impact on the river as well as on the neighboring community of Dunsmuir.

The California Highway Patrol and UPRR both maintain hazardous material response units. However, these units are not locally based and, therefore, the Mt. Shasta Police and Fire Departments and the Mt. Shasta Fire Protection District are expected to respond first to any incidents in the planning area.

Industrial facilities, depending on the nature of their business, may store, use and generate hazardous materials and hazardous waste. Industries that typically have hazardous material issues include metal plating, painting and machining, and manufacturing and testing.

Hazardous materials storage and handling and hazardous waste generation and disposal are regulated by various federal and state regulations. The Resource Conservation and Recovery Act (RCRA) has mandated a national waste management program since 1976. Under RCRA, hazardous waste must be tracked from the time of generation to the point of disposal. A program must be instituted by every generator and handler to manage hazardous waste in a manner that minimizes the present and future threat to the environment and human health. Each hazardous waste generator must register and obtain an identification number from the Environmental Protection Agency under RCRA regulations.

The State Hazardous Waste Control Law is the basic state law that implements the RCRA waste management system. The Department of Toxic Substances Control is the primary regulatory agency administering the state hazardous waste program. DTSC has delegated local agencies to inspect and regulate small generators.

Any business handling hazardous materials (as defined in Section 25500 of the California Health and Safety Code, Division 20, Chapter 6.95) requires a permit (typically from the local fire department) in order to register the business as a hazardous materials handler. Such businesses are also required to comply with California's Hazardous Material Response Plans and Inventory Law (AB 2185). AB 2185 requires immediate reporting of any release or threatened release of a hazardous material to the local administering agency and the State Office of Emergency Services. In addition, any business handling more than 500 pounds of solid, 55 gallons of liquid, or 200 cubic feet of gaseous hazardous material, at any one time, is required under AB 2185 to file a business plan. The business plan must be submitted to the local administering agency of the program. Emergency response procedures should be included in the business plan.

2. General Plan Objectives and Programs: Hazardous Materials

Goal SF-5: Protect people and the environment from hazardous materials exposure.

Policy SF-5.1:

Assure that the use, storage, and transportation of hazardous materials complies with Federal and State regulations.

Implementation Measures:

SF-5.1(a): Working with the State Department of Health and the County Health Department, enforce the applicable provisions of State law related to hazardous material storage.

SF-5.1(b): Ensure that the Fire Department maintains the appropriate "Right-to-Know" records related to storage, use, and disposal of hazardous materials.

Policy SF-5.2: Develop communications with the railroads concerning the transportation of hazardous materials.

Implementation Measures:

SF-5.2(a): Each year during the annual review of the General Plan, send a letter to the appropriate official of the McCloud and Union Pacific Railroad requesting notification of any changes in the status of the railroads' procedures for tracking and transporting hazardous materials in the area.

SF-5.2(b): At least once every three years, coordinate an emergency services exercise with the County

Office of Emergency Services to practice procedures related to a hazardous material spill.

F. Railroad Crossing Safety

1. Background

Collisions at highway-rail crossings are one of the leading causes of death and serious injury associated with railroad operations in the United States.

Two railroad lines are located within the City of Mt. Shasta. The Union Pacific Railroad (UPRR) line through the City (previously operated by Southern Pacific Railroad) is the main north/south railroad through Northern California. Approximately 16 trains per day pass through Mt. Shasta on this interstate line. The McCloud Railway Company (MRC) operates a short-line railroad out of McCloud. The MRC line connects with the UPRR line in Mt. Shasta along North Mt. Shasta Boulevard.

There are a total of seven railroad crossings within the City of Mt. Shasta. Five grade crossings are located along the Union Pacific line. Two crossings are on Nixon Street, and there are crossings of Alma Street, Lake Street and Ream Avenue. All five UPRR crossings are gated. There are two grade crossings for the MRC line; one for Everitt Memorial Highway and one for North Mt. Shasta Boulevard. Both MRC crossings are "passive" and are equipped with flashing lights but no gates.

"Passive" traffic control devices are simply signs and pavement markings that provide warning to vehicles on the street of an upcoming railroad crossing. "Active" traffic control devices are activated by a detection circuit in the railroad track and give warning of an approaching train at the crossing. Typically, the circuit triggers the flashing of lights, the ringing of audible alarms, and the lowering of gates across the street. A warning provided by a train's horn is required as a train approaches both at-grade crossings with active warning devices and crossings with "passive" warning measures.

Locomotive engineers typically sound their horns at least 15 seconds before the train enters a public highway-rail grade crossing. The intent is to sound the horn loud enough and timely for a vehicle on the street approaching the crossing to hear the horn. With the objective of the warning having a sound level of 95 dB(A) at the "motorist decision-making point" 50 feet in advance of the grade crossing, the Federal Railway Administration (FRA) has determined that 108 dB(A) is the optimal sound level for locomotive horns (Federal Railroad Administration, 2005). A horn sound level of 110 dB(A) is the maximum and 96 dB(A) is the minimum sound level. However, such a warning exposes a considerable segment of the local community near the tracks to the blast of the horn as well as the motorists and pedestrians, as intended, who may be approaching the crossing.

The use of train horns as trains approach crossings has raised two particular issues concerning public safety and related noise impacts to neighborhoods around the crossings. These issues are 1) the alternative use of "wayside horns", and 2) the establishment of "quiet zones". These issues are discussed in more detail in the Noise Element of this general plan. However, because the issue is primarily a public safety concern, a related goal and policy statement with an implementation proposal are set forth below in this Safety Element.

2. General Plan Objectives and Programs: Railroad Crossings

Goal SF-6: Maintain public safety at locations where rail and other transportation facilities interface.

Policy SF-6.1: Work with Union Pacific Railroad and the McCloud Railway Company to identify measures to reduce the impact of rail traffic on the City's circulation system.

Implementation Measure:

SF-6.1(a): Evaluate the adequacy of public safety provisions at railroad grade crossings and support improvements where warranted.

Goal SF-7: Maintain adequate levels of public safety at street-rail grade crossings while, when possible, reducing noise impacts involved with warning systems.

Policy SF-7.1: The City will consider the feasibility and means for modifying warning and control systems at selected street-rail grade crossings to reduce related noise impacts, provided that adequate public safety is provided.

Implementation Measure:

SF-7.1(a): The City will consider the feasibility of establishing "quiet zones" and/or the use of wayside horns to reduce train horn noise impacts pursuant to the criteria of the Federal Railroad Administration. A determination to proceed with implementation will be based on the expected adequacy of public safety and cost feasibility.

G. Evacuation and Related Infrastructure

1. Background

Portions of the planning area may need to be evacuated for a number of reasons including wildfire, volcanic activity, or truck or railroad accidents involving significant quantities of hazardous materials. Response and evacuation procedures have been addressed in the City's Emergency Plan, which is updated periodically. The responsibility for day-to-day initial emergency response is that of the Mt. Shasta Fire and Police Departments, the County Sheriff, and the Mt. Shasta Fire Protection District.

General evacuation of the Mt. Shasta area could be required prior to a volcanic eruption. Such an eruption is expected to be preceded by warning signs detected by seismic and other monitoring devices installed in the Mt. Shasta area. As in the case of Mt. Saint Helens, a warning would be issued in ample time prior to an eruption and an orderly evacuation could take place.

Concerning evacuation issues related to wildfire, the need for and scope of evacuation is dependent on the extent and severity of the fire. Evacuation of only a few homes within a threatened area would not typically create a serious traffic control problem. A large scale evacuation, however, may result in significant traffic problems and would require more extensive traffic control measures.

Principal evacuation routes from Mt. Shasta include Interstate 5 north- and southbound and Highway 89 to the southeast. Evacuation routes should be developed with the intent to direct traffic toward the nearest highway. Due to vehicle carrying capacity, the highways are logical routes by which to move people away from endangered areas. In some locations of the planning area, evacuation could be constrained by the lack of access and egress roads into the area, or by the length of dead-end and cul-de-sac roads.

Although most primary roads (e.g., Mt. Shasta Boulevard, Everitt Memorial Highway, Old Stage Road) in the City of Mt. Shasta and the surrounding community are of sufficient width to allow for passage of emergency vehicles and evacuating residents, many of the secondary roads that serve residential areas (e.g., Davis Place Road, Shasta Ranch Road) are narrow and/or may have few if any ingress/egress options. This would make it exceedingly difficult for engines, tankers, and other firefighting equipment to enter the area while residents are evacuating. Traffic control in these less accessible areas would be crucial in the event of fire.

Evacuation planning needs to be concerned about the capacity of local roads in the event of sizable fires. Many of the roads that service areas of residential development, primarily in older neighborhoods, are inadequate to provide safe passage of residents out of some areas and, at the same time, provide good access to emergency vehicles responding to a fire. These roads are often narrow with dense vegetation growing up to the road shoulder. The steepness of roadway grades can also be an issue.

The lack of multiple access and egress to the unincorporated area east of the City is a recognized concern. The County has permitted a substantial amount of residential development that relies upon McCloud Avenue as the only paved street for evacuation and emergency access. Rockfellow Drive, which could provide an important optional route, has not been extended and developed to adequately serve this area.

To ensure the provision of adequate evacuation routes, as well as the provision of adequate access roads for emergency equipment, standards for minimum road widths and maximum access road lengths are prescribed. For example, the California Code of Regulations includes basic wildland fire protection standards of the California Board of Forestry. (California Code of Regulations, Section 1270, et seq.) Standards include provisions that the maximum length of a dead-end road shall not exceed 800 feet for parcels zoned for less than one acre and 1,320 feet for parcels zoned for 1 acre to 4.99 acres in size. Typically, all two-way roads should be constructed to provide a minimum of two nine-foot traffic lanes. The grade for all roads, streets, private lanes and driveways shall not exceed 16 percent. (Many communities limit the grade of roads and driveways to no more than 12 percent. The California Code of Regulations should be consulted for a more-complete discussion of these and other standards.

Evacuation events should be overseen by an “incident commander” and local police and fire departments. Upon initiation of an evacuation, a local law enforcement agency such as the Mt. Shasta Police Department or Siskiyou County Sheriff’s Department would be called upon to mange crowds and traffic and will be designated as the Evacuation Coordinator. The Evacuation Coordinator will select the best routes from the endangered area after considering the nature of the incident, the size of the population to be evacuated, and road capacity and characteristics. Specific evacuation routes will be selected as the emergency situation develops. An evacuation location will be identified. A school, park, or church would generally have enough parking and facilities to serve this purpose. During an incident, residents would be briefed on the situation and instructed on how to properly evacuate, which way to drive out of the area, and where the nearest evacuation point has been established.

(See also the related policies and implementation measures in the “Fire Hazards” section above.)

2. General Plan Objectives and Programs: Evacuation

Goal SF-7: Identify and maintain emergency evacuation routes.

Policy SF-7.1: Working with the County, identify routes to evacuate area residents for different types of emergencies.

Implementation Measure:

SF-7.1(a): Work with the County to establish emergency evacuation routes in the event of different categories of emergencies: severe rain or snow storm, flood, fire, volcanic or seismic.

H. Snow Removal

1. Background

The City of Mount Shasta wishes to ensure the safe and orderly flow of traffic within and through the City. During the winter months, snowfall presents an added challenge to achieving this goal. Snow must be properly managed in order to reduce risks to pedestrians and vehicles, ensure that emergency equipment has access to all areas of the City, and to minimize impacts on commerce and community services.

With approximately 50 miles of roadway and other City-owned right-of-ways to be cleared during each storm event, it can take between eight and twelve hours to clear 12 inches of fresh snowfall. The City typically initiates plowing once the snow reaches a depth of four to six inches, with plowing beginning earlier during storms that pose a greater hazard to the community. The City currently (2006) has seven snowplows, one truck for spreading sand and 11 public works employees responsible for snow removal and safety during storms.

During major snowstorms, the City's primary goal is to provide for the safe and orderly movement of emergency equipment and the traveling public. In these situations, the priority order is typically:

1) Support for emergency response vehicles.
2) Clear main arterial roadways and intersections.
3) Clear collectors.
4) Clear secondary residential streets. 5) Clear City-owned parking lots.

During plowing activities, parking along City streets and right-of-ways is prohibited. This helps ensure that snow removal equipment can operate unimpeded and can clear the City's streets in an efficient and timely manner. For those individuals lacking off-street parking, the City provides a number of "snow parking" areas. These areas are: a small dirt parking lot behind the Sportsman's Den off Castle Street; the public parking lot across from the fire station on West Lake Street; Ivy Street between Mt. Shasta Boulevard and Chestnut Street (south side only); the Little League ballpark on Washington Drive behind Sisson School (near snow parking signs); and the parking lot off of Alma Street between North Mt. Shasta Boulevard and the railroad tracks.

It is the City's intent to clear snow from the entire road width prior to allowing on-street parking to continue. This is accomplished by making multiple passes along each of the City streets. The first pass removes enough snow for the roads to remain open, with subsequent passes widening the traffic lanes. During big storms, this process may continue for several days before on-street parking can resume. So that on-street parking may resume sooner in the downtown area and permit commerce to continue, snow is plowed to the center of the street rather than to the curb. The City subsequently removes the snow berms from the center of the roadways with front end loaders as time and priorities allow.

In order to ensure the safe and orderly flow of traffic through the City during snow events, the City has adopted several ordinances governing snow removal. These ordinances have been codified in Chapter 12.24 of the Mt. Shasta Municipal Code. Two of the more noteworthy sections in this chapter are Section 12.24.030, which prohibits obstructing snow removal equipment with vehicles parked along roadways and in City right-of-ways, and Section 12.24.060, which regulates the dumping of snow from private property onto roadways and City right-of-ways.

Developers should consider snow management at the earliest phase of development planning and incorporate design features to handle snow plowing and storage. Snow storage areas must be designated on site; plowing snow onto public streets is not allowed.

2. General Plan Objectives and Programs: Snow Removal

Goal SF-8: Ensure the safe and orderly flow of traffic through the City during and after winter storm events.

Policy SF-8.1: The City shall enforce rules and regulations that govern the ability of the City to provide roadways unobstructed by snow.

Implementation Measure:

SF-8.1(a): Enforce Chapter 12.24 of the Mt. Shasta Municipal Code.

REFERENCES:

California Code of Regulations, SRA Fire Safe Regulations, Title 14, Section 1270 et seq., 2000.

Christianson, Robert L., Volcanic Hazard Potential in the California Cascades; Martin, R. and Davis J. (editors), <u>Status of Volcanic Prediction and Emergency</u>

Response Capabilities in Volcanic Hazard Zones of California (Sacramento: California Division of Mines and Geology, Special Publication 63, 1982), pp. 41-59.

City of Mt. Shasta, General Plan, 1993.

Crandell, Dwight R. and Nichols, Donald, R., Volcanic Hazards at Mount Shasta (Menlo Park, CA: U.S. Geological Survey, 1987), pamphlet, 21 p.

Federal Railroad Administration, Final Rule on the Use of Locomotive Horns at Highway-Rail Grade Crossings, Federal Register, Vol. 70, No. 80, April 27, 2005.

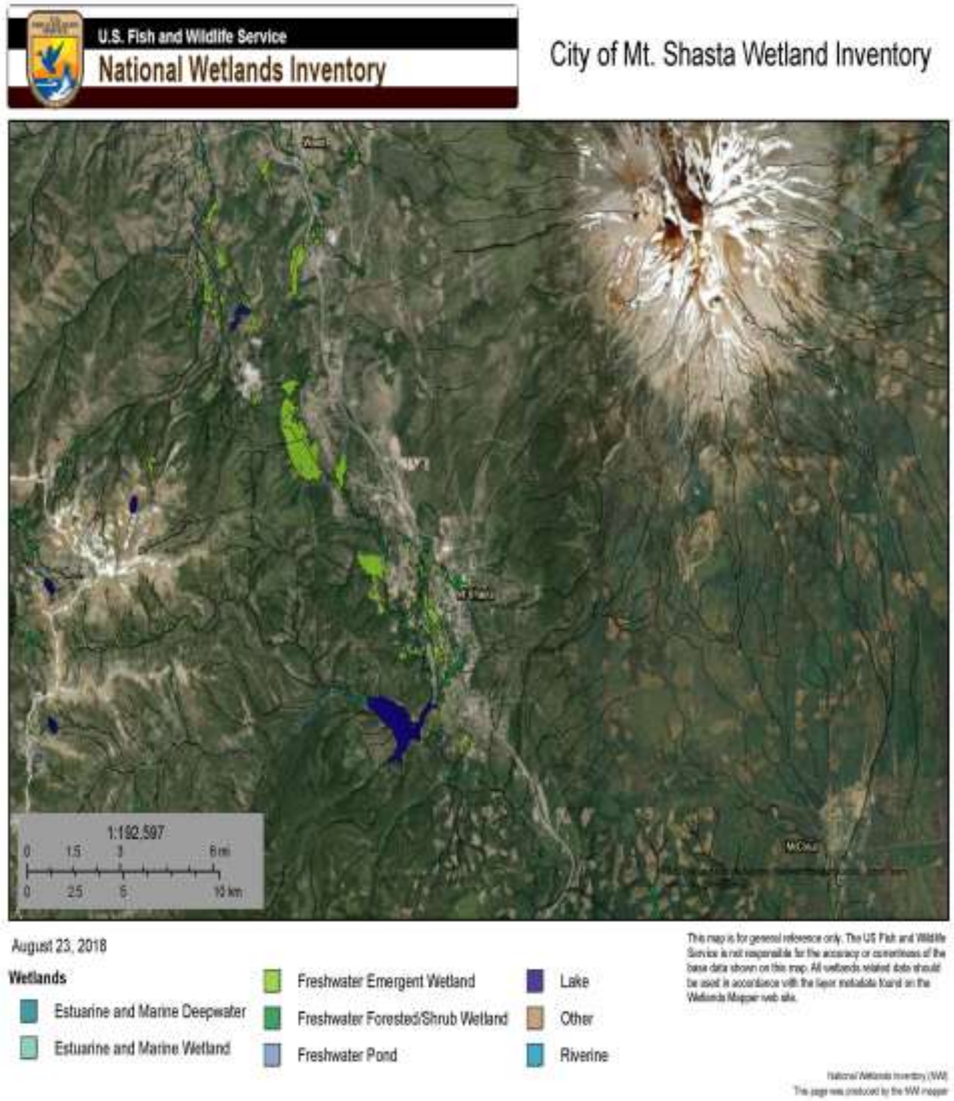
Miller, C. Dan, Potential Hazards from Future Eruptions in the Vicinity of Mount Shasta Volcano (Northern California: U.S. Geological Survey, Bulletin 1503, 1980), 43 p.

Mt. Shasta Area Fire Safe Council, Mt. Shasta Area Community Wildfire Protection Plan, June 2006.

Siskiyou County. General Plan Land Use Element, August 1980.

Appendix F: City of Mt. Shasta Wildfire Severity Zones

Appendix G: City of Mt. Shasta Wetland Inventory



Goal 1: Develop and improve communications with the general public, public safety agencies, and community leaders concerning hazard mitigation, preparedness, and disaster recovery

Objective	Action	Action Type	Priority Level	Action Lead	Funding Source	Completion Timeframe
	Develop and maintain emergency preparedness guides for evacuations	Local Plan and Regulations	High	City Manager	City General Fund, Ford Foundation	Less than 1 year
	Create a central webpage for hazard and evacuation information and materials	Education and Awareness Programs	High	City Manager	City General Fund, Ford Foundation	Less than 1 year
	Ensure all staff are properly trained in Incident Command System (ICS) communication techniques	Education and Awareness Programs	High	City Manager	City General Fund, Ford Foundation	Less than 1 year
	Develop multi-lingual emergency preparedness and evacuation materials that cater to residents and visitors	Education and Awareness Programs	High	City Manager	City General Fund, Ford Foundation	1 to 3 years
Develop a universal communication strategy	Develop hazard specific education and mitigation materials	Education and Awareness Programs	Medium	City Manager	City General Fund, Ford Foundation	1 to 3 years

	Establish a process to coordinate with local, regional, state, and Federal agencies to maintain up-to-date hazard data, maps, and assessments	General	Medium	Planning Department	City General Fund, Ford Foundation	1 to 3 years
Increase hazard education and risk awareness	Develop a "Hazard Awareness Month/Week" in coordination with media to promote hazard awareness	Education and Awareness Programs	Low	City Manager	City General Fund, Ford Foundation	1 to 3 years
	Schedule an annual hazard mitigation brief for wildfire awareness	Education and Awareness Programs	Low	Fire Department	City General Fund, Ford Foundation	Less than 1 year
	Enhance hazard awareness of the private sector, specifically in the housing sector	Education and Awareness Programs	Low	Planning Department	City General Fund, Ford Foundation	1 to 3 years
	Develop and share information related to local hazard vulnerability with housing and business sector	Education and Awareness Programs	Low	Planning Department	City General Fund, Ford Foundation	1 to 3 years

Goal 1: Develop and improve communications with the general public, public safety agencies, and community leaders concerning hazard mitigation, preparedness, and disaster recovery

Objective	Action	Action Type	Priority Level	Action Lead	Funding Source	Completion Timeframe
Increase hazard education and risk awareness	Educate the public on tradeoffs associated with multi-hazard design	Education and Awareness Programs	Low	Planning Department	City General Fund, Ford Foundation	1 to 3 years
	Establish a technical assistance program for residents to access data or resources for mitigation purposes	Education and Awareness Programs	Low	Planning Department	City General Fund, Ford Foundation	3 to 5 years
Goal 2: Increase community capability to mitigate and recover from hazards						
Objective	**Action**	**Action Type**	**Priority Level**	**Action Lead**	**Funding Source**	**Completion Timeframe**
Improve community data to assess vulnerability and level of risk	Obtain local data on parcel, building footprints, critical facility locations to improve risk analysis	Local Plan and Regulations	High	Planning Department	Pre Disaster Mitigation Program	1 to 3 years
	Develop and maintain a database to track community vulnerability	Local Plan and Regulations	High	Planning Department	Pre Disaster Mitigation Program	1 to 3 years
	Develop and keep aerial photography current, especially post disaster	Local Plan and Regulations	Medium	Planning Department	Pre Disaster Mitigation Program	1 to 3 years

	Develop a coordinated GIS database to track permitting, land use patterns, hazard areas, etc.	Local Plan and Regulations	Medium	Planning Department	Pre Disaster Mitigation Program	1 to 3 years
Increase financial stability of the community	Identify strategies to increase consistent, sufficient funding for hazard mitigation and recovery projects	General	High	Finance Department	City General Fund	Less than 1 year
	Develop a list of private, nonprofit, and government funding sources for hazard mitigation and recovery	General	High	Planning Department	City General Fund	Less than 1 year

Goal 2: Increase community capability to mitigate and recover from hazards						
Objective	**Action**	**Action Type**	**Priority Level**	**Action Lead**	**Funding Source**	**Completion Timeframe**
Increase financial stability of the community	Integrate hazards into Capital Improvements Plan	Local Plan and Regulations	Medium	Planning Department	Pre Disaster Mitigation Program, City General Fund	Less than 1 year
	Provide tax disincentives for developing in high hazard areas	Local Plan and Regulations	Medium	Planning Department	City General Fund	3 to 5 years

	Develop tax abatement, public subsidies, and other incentives to encourage private mitigation practices	Local Plan and Regulations	Medium	Finance Department	FEMA Individuals and Households Program, City General Fund	3 to 5 years
	Encourage infill development through tax incentives, streamlined approval process, etc.	Local Plan and Regulations	Medium	Planning Department	City General Fund	Less than 1 year
Incentivize private hazard mitigation efforts	Utilize outreach programs to advise homeowners of risks to life, health, and safety, and facilitate technical assistance programs that address measures that residents can take	Education and Awareness Programs	Low	Planning Department	City General Fund	1 to 3 years
	Establish, maintain, and promote a library section on hazard mitigation techniques for local residents	Education and Awareness Programs	Low	Planning Department	City General Fund	1 to 3 years

	and businesses					
	Develop and offer hazard susceptibility audits of local small businesses	Education and Awareness Programs	Low	City Manager	City General Fund	1 to 3 years
	Complete and showcase a demonstration model showing the use of mitigation techniques for public display	Structure and Infrastructure Projects	Low	Public Works Department	Hazard Mitigation Grant Program, Pre Disaster Mitigation Program, FEMA Individuals and Households Program	3 to 5 years
Increase reliability of evacuation and transportation routes	Inventory and assess condition of transportation routes and alternative routes	Local Plan and Regulations	High	Planning Department	Pre Disaster Mitigation Program	Less than 1 year
	Establish and maintain communication with transportation agencies concerning current and future road improvement projects	Local Plan and Regulations	High	Public Works Department	City General Fund	1 to 3 years

Goal 2: Increase community capability to mitigate and recover from hazards						
Objective	**Action**	**Action Type**	**Priority Level**	**Action Lead**	**Funding Source**	**Completion Timeframe**
Increase reliability of evacuation and transportation routes	Identify, prioritize, and improve infrastructure improvement projects to improve transportation routes	Structure and Infrastructure Projects	High	Public Works Department	Hazard Mitigation Grant Program, Pre Disaster Mitigation Program	1 to 3 years
	Identify and develop green infrastructure improvements to existing and future roadway projects	Structure and Infrastructure Projects	High	Public Works Department	Hazard Mitigation Grant Program, Pre Disaster Mitigation Program	1 to 3 years

Goal 3: Reduce and eliminate the exposure of development to area hazards						
Objective	**Action**	**Action Type**	**Priority Level**	**Action Lead**	**Funding Source**	**Completion Timeframe**
	Develop land use regulations and mechanisms to reduce development in wetlands, high wildfire severity zones, and areas prone to heavy winter storms.	Local Plan and Regulations	Medium	Planning Department	City General Fund	Less than 1 year
	Develop additional building standards for development in flooding, wildfire, and seismic prone areas	Local Plan and Regulations	Medium	Planning Department	Pre Disaster Mitigation Program	1 to 3 years

Create and enforce development regulations to reduce development in hazard areas	Identify and eliminate development in areas experiencing high rebuilding rates from hazards	Structure and Infrastructure Projects	Low	Planning Department	Pre Disaster Mitigation Program, California Disaster Assistance Program, FEMA Individuals and Households Program	1 to 3 years
	Develop internal policies and regulations to protect and restore wetland areas to absorb hazard impacts	Natural Systems Protection	Low	Planning Department	City General Fund	Less than 1 year
Improve critical infrastructure to maintain critical services during and post-disaster	Identify infrastructure vulnerable to hazards	Structure and Infrastructure Projects	High	Planning Department	Pre Disaster Mitigation Program	Less than 1 year
	Develop underground standards for utilities	Local Plan and Regulations	High	Planning Department	Pre Disaster Mitigation Program	1 to 3 years
	Require undergrounding of new utility infrastructure, when physically possible	Local Plan and Regulations	High	Planning Department	Pre Disaster Mitigation Program	1 to 3 years
	Underground existing utilities, whenever physically possible	Structure and Infrastructure Projects	High	Public Works Department	Hazard Mitigation Grant Program, Pre Disaster Mitigation Program	3 to 5 years

Goal 3: Reduce and eliminate the exposure of development to area hazards						
Objective	**Action**	**Action Type**	**Priority Level**	**Action Lead**	**Funding Source**	**Completion Timeframe**
Improve critical infrastructure to maintain critical services during and post-disaster	Work with private utility providers to ensure system redundancy	Structure and Infrastructure Projects	Medium	City Manager	City General Fund	1 to 3 years
Integrate natural systems to improve infrastructure resiliency to hazards	Develop green infrastructure standards for future infrastructure projects	Structure and Infrastructure Projects	High	Public Works Department	Hazard Mitigation Grant Program, Pre	1 to 3 years
	Restore stream and wetland habitat	Natural Systems Protection	Medium	City Manager	Hazard Mitigation Grant Program, Pre Disaster Mitigation Program	1 to 3 years
	Develop green infrastructure standards for commercial development	Structure and Infrastructure Projects	Low	Planning Department	Hazard Mitigation Grant Program, Pre Disaster Mitigation	1 to 3 years

Previous Mitigation Plan Assessment	
Action	Achieved
Equip Police and Fire centers with reliable emergency power	Yes
Identify and implement alternate power sources	No
Undergrounding of utilties	No
Trim back trees form power lines	Yes
Improve existing fire hydrants and water supplies	Yes
Consider becoming a "Firewise" community	No
Maintain mutial aid agreements	Yes
Encourage use of fire-resistant materials and creaiton of defensible space	Yes
Encourage performance based design	No
Support detailed lahar and ash fall studies	No
Consider partificaotion in the Community Rating System program	No
Maintain compliance and good standing under the NFIP	No
Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures form future damage, with repetitive loss and severe loss properties as priority	No
Support County-wide inititatives identified in Volume I of the Plan	Yes
Continue to support the implementation, monitoring, maintenance, and updating of this Plan as identified in Volume I	No

CHAPTER 7.
CITY OF TULELAKE ANNEX

7.1. HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
Brett Nystrom, Director of Public Works
PO Box 847
Tulelake, CA 96134
Telephone: 541-810-1915
e-mail Address: tulelakepublicworks@cot.net

Alternate Point of Contact
Tony Ross, Chief of Police
PO Box 400
Tulelake, CA 96134
Telephone: 530-667-5284
e-mail Address: Tross@tulepd.com

7.2. JURISDICTION PROFILE

The following is a summary of key information about the jurisdiction and its history:

Date of Incorporation: March 1, 1937

Current Population: 1,010 as of the 2010 Census

Population Growth: Based on the U.S. Census Bureau numbers from 2000 to 2010 the population of the City of Tulelake has remained stable in population with less than a 1% fluctuation in population over a ten-year period with the population decreasing from 1,020 to 1,010. According to the California Cities Demographics Statistics, the population has fluctuated from 1,004 to 991, a less than 2% decrease, from 2011 to 2016.

Location and Description: The City of Tulelake lies four miles southeast of the Oregon border along State Highway Route 139. The City is 28 miles southeast of Klamath Falls, Oregon and 147 miles northeast of Redding, California.

Brief History: The City of Tulelake is the result of the Newlands Reclamation Act of 1902. The purpose of the Act was to "reclaim" arid land through construction of federal irrigation projects and reservoirs to provide water for agriculture. Through the Newlands Reclamation Act, the process began to reclaim land by draining swamps, marshes and lakes within the Klamath and Tule Lake Basins by the U.S. Bureau of Reclamation called the "Klamath Project".

The Klamath Project involved the partial drainage and/or construction of three lakes, two major rivers and a network of man-made canals between the 1905 and 1948. As a result, the Tule Lake Basin reclaimed over 13,000 acres of which 80 and 160-acre parcels were awarded to qualified veteran homesteaders through a government land lottery. Developed and built by these “Veteran Homesteader’s”, the City of Tulelake provides business and public services for farming families and travelers. Agriculture and tourism are the City of Tulelake’s main economic resource today.

Climate: Tulelake‘s climate is classified as a steppe climate**.** Annual precipitation is approximately 10 to 15 inches per year. The surrounding forest and mountain precipitation ranges from 15 to 20 inches per year. Fluctuations in climate are from warm, dry summers to cold, severe winters. Temperatures can range from 100˚F in the summer to -35˚F in winter. Average annual rainfall is 10.89 inches; average annual snowfall is 21/1 inches. The average maximum temperature for Tulelake is 62˚F, with the average annual minimum temperature being 31.4˚F.

Governing Body Format: The City of Tulelake, governed by an elected five-member Council, from which the Mayor and Mayor Pro Tem is appointed. The City consists of three departments: Administration, Police and Public Works.

Development Trends: Anticipated development trends for the City of Tulelake are moderate consisting of economic and residential development. There has been a significant amount of infrastructure development done within the past five years for water, sewer, streets and sidewalks. These improvements will allow the city to encourage economic development of new businesses as well as increase the capacity for new and renovated housing. There is a current demand for more housing and business services due to an increase in the job market with new types of agricultural industries moving to the Klamath and Tule Lake Basins.

7.3. JURISDICTION-SPECIAL NATURAL HAZARD EVENT HISTORY

Table 7-1 list all past occurrences of natural hazards in the county. Repetitive loss records are as follows:

- Number of FEMA Identified Repetitive Flood Loss Properties: 0
- Number of Repetitive Floods Loss Properties that have been mitigated: 0

7.4. HAZARD RISK RANKING

Table 7-2 presents the ranking of the hazards of concern.

7.5. CAPABILITY ASSESSMENT

The assessment of the jurisdiction's legal and regulatory capabilities is presented in Table7-3. The assessment of the jurisdiction's administrative and technical capabilities is presented in Table 7-4. The assessment of the jurisdiction's fiscal capabilities is presented in table 7-5. Classifications under various community mitigation programs are presented in Table 7-6.

7.6. HAZARD MITINGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

Table 7-7 lists the initiatives that make up the jurisdiction's hazard mitigation plan. Table 7-8 identifies the priority for each initiative. Table 7-9 summarizes the mitigation initiatives by hazard of concern and the six mitigation types. Due to the insufficient staff and funding we were not able to integrate information from the 2012 plan in the new plan.

Part of the revision process is surveying the public about topics that are important to them and how they see the City changing in the next 25 years. Similar to the mapping exercise at a workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the City. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the City and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

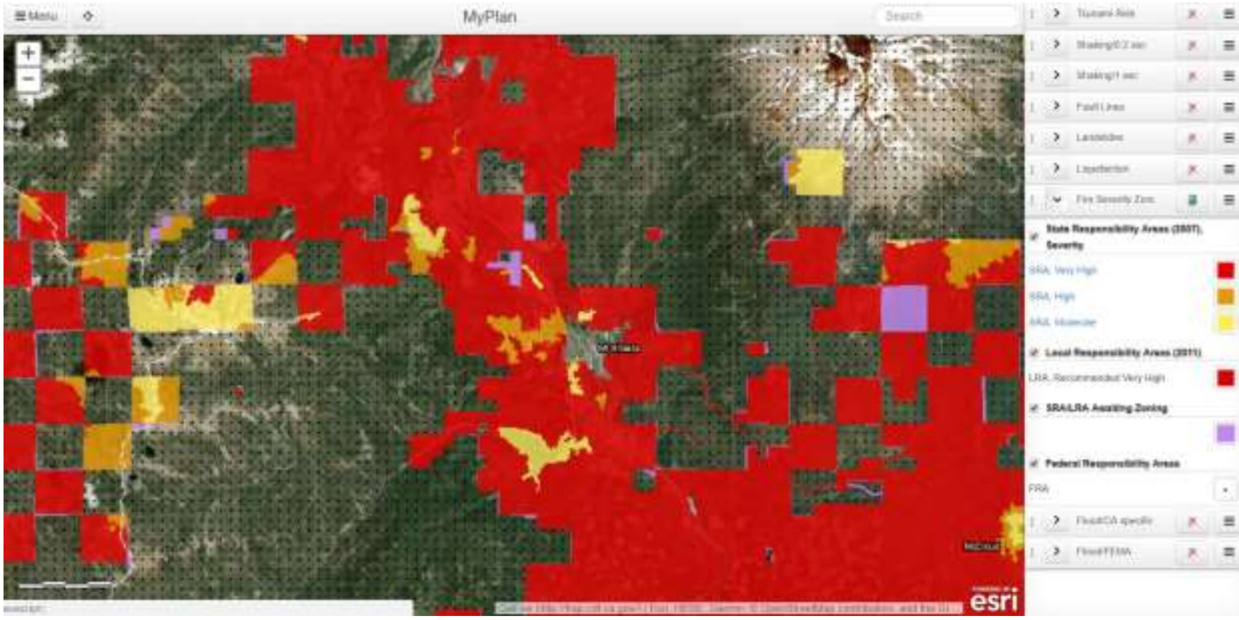
The City General Plan which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute.

In addition to the General Plan process, the City will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

National Flood Insurance Program

The City of Tulelake does not participate in the National Flood Insurance Program.

7.7 FUTURE N



EEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

The City of Tulelake would like to be able to better identify risk and vulnerability through the scientific study of issues related to earthquakes, severe weather and drought. The City could pursue collaborating with state and federal agencies to address these needs.

7.8. ADDITIONAL COMMENTS

The City of Tulelake has ongoing and historical incidences of severe weather events, drought and earthquakes. The City experienced significant damage to buildings and infrastructure during the 1993 earthquake. This required the demolition of several unreinforced block buildings and other older buildings that were not up to earthquake code. Tulelake also has extreme weather events from high winds and storms causing damage to buildings. Today there are still many older buildings that are now not in use that are subject to hazards from storm or earthquake related events. The other event that continually seems to plague the City is extreme droughts. Over the past 8 years, Tulelake experienced droughts in 2010, 2014 and 2015. Droughts severely affect the economy within the City of Tulelake, as a large number of the City residents are dependent upon the surrounding agriculture industry.

Another pending hazard is the possibility of a train derailment within the City limits that could be carrying hazardous materials, damage nearby buildings and hurt residents. The Union Pacific Railroad is within the east side of the City limit and is adjacent to a very busy State Highway Route 139. A train derailment occurred along the main street railroad crossing several years ago which resulted in the railroad crossing being closed to traffic for several months thus impeding Tulelake's main entrance to the City and affecting them economically. An actual train derailment simulation was conducted in 2013 using the example of a hazardous spill of chlorine. At the simulation, experts recommended that the City of Tulelake notify the Siskiyou County Office of Emergency Services if the derailment involved a hazardous mitigation. Due to the remote location where Tulelake is located within Siskiyou County, Tulelake is in a remote area of Siskiyou County and the nearest hazmat unit would potentially by two hours away located in Yreka, California.

7.9. HAZARD AREA EXTENT AND LOCATION

Hazard area extent and location maps for the City of Tulelake are included at the end of this chapter. These maps based on the best available data at the time of the preparation of this plan are considered adequate for planning purposes.

TABLE-1.
NATURAL HAZARD EVENTS

Type of Event	Date	Preliminary Damage Assessment
Drought	2015	$77.537 decrease om water/tax revenues
Severe Weather	2007	$38,500 in tree removal and roof repairs
Drought	2001	$62,500 decrease in water/tax revenues
Earthquake	1993	$364,281 infrastructure repair and replacement; building demolition, replacement and repairs.

TABLE-2.
HAZARD RISK RANKING

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Drought	54
2	Severe Weather	42
3	Earthquake	48
4	Train Derailment	24
5	Wildfire	14
6	Volcano	15
7	Dam Failure	4

TABLE-2.
HAZARD RISK RANKING

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
8	Flood	3
9	Landslide	3

TABLE-3.
LEGAL AND REGULATORY CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Building Code	Y	N	N	Y	Tulelake Municipal Code, Title 17, Sec. 15.04.010
Zonings	Y	N	N	Y	Tulelake Municipal Code, Title 17, Sec. 15.04.010
Subdivisions	Y	N	N	N	Tulelake Municipal Code, Title 17, Sec. 15.04.010
Stormwater Management	Y	Y	N	Y	Managed by Public Works, SB 790 Stormwater Resources Act
Post Disaster Recovery	N	N	N	N	—-
Real Estate Disclosure	Y	N	Y	Y	California Civil Code 1102
Growth Management	Y	N	N	N	
Site Plan Review	Y	N	Y	N	County Code
Special Purpose (flood management, critical areas)	Y	N	N	N	
Planning Documents					
General or Comprehensive Plan	Y	N	N	Y	Currently being updated as necessary
Floodplain or Basin Plan	N	N	N	N	
Stormwater Plan	Y	N	N	Y	Managed by Public Works, SB 790 Stormwater Resources Act
Capital Improvement Plan	Y	N	N	N	Currently being updated as necessary
Habitat Conservation Plan	N	N	N	N	—-
Economic Development Plan	Y	N	N	N	
Emergency Response Plan	Y	N	N	N	Currently being updated as necessary
Shoreline Management Plan	N	N	N	N	—-
Post Disaster Recovery Plan	N	N	N	N	—-

TABLE-4.
ADMINISTRATIVE AND TECHNICAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Y	Project Engineer (PE), Director of Public Works (PW), City Hall Administrator (CHA), Building Inspector (BI)
Engineers or professionals trained in building or infrastructure construction practices	Y	Project Engineer (PE), Building Inspector (BI), Director of Public Works (PW)
Planners or engineers with an understanding of natural hazards	Y	Project Engineer (PE), Building Inspector (BI), Director of Public Works (PW)
Staff with training in benefit/cost analysis	Y	City Hall Administrator (CHA)/Finance Director (FD)
Floodplain manager	N	Project Engineer (PE)/Director of Public Works (PW)
Surveyors	Y	Project Engineer (PE)
Personnel skilled or trained in GIS applications	Y	Project Engineer (PE)
Scientist familiar with natural hazards in local area	N	Other County and Federal Agencies (OCFA)
Emergency manager	Y	Office of Emergency Services Manager (SCOES)
Grant writers	Y	Project Grant Consultant (GC)

TABLE-5.
ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Y
Capital Improvements Project Funding	Y
Authority to Levy Taxes for Specific Purposes	Y, vote required
User Fees for Water, Sewer, Gas or Electric Service	Y
Incur Debt through General Obligation Bonds	Y
Incur Debt through Special Tax Bonds	Y, vote required
Incur Debt through Private Activity Bonds	Y, vote required
Withhold Public Expenditures in Hazard-Prone Areas	N
State Sponsored Grant Programs	Y
Development Impact Fees for Homebuyers or Developers	N
Other	Y

TABLE-6.
COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Community Rating System	N	N/A	N/A
Building Code Effectiveness Grading Schedule	Y	Unknown	Unknown
Public Protection	Y	3	Unknown
Storm Ready	N	N/A	N/A
Firewise	N	N/A	N/A

TABLE-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
Initiative #T-1—Demolition of Clyde Hotel, a two story structure that is collapsing in on itself.							
Existing	Earthquake, Severe Weather, Fire	1,2,3,6,7,8	City, BI, PW, TMCFD	$500,000	HMGP, EPA,USDA & State of CA Grants	Long term	Ongoing
Initiative #T-2—Renovation of City Hall to become code compliant for community meetings upstairs.							
Existing	Earthquake, Severe Weather, Fire	1,2,3,4,5,6,7,8, 9	City, BI, PE, PW	$580,000	HMGP, State of CA & USDA Grants	Long term	Ongoing
Initiative #T-3—Renovation of Public Works shop to become code compliant for employee safety.							
Existing	Earthquake, Severe Weather, Fire	1,2,3,4,6,7,9	City, BI, PE, PW	$350,000	HMGP, EPA, State of CA & USDA Grants	Long term	Ongoing
Initiative #T-4—Require engineered plan sets for retrofitting unreinforced masonry and soft story buildings.							
Existing	Earthquake, Severe Weather, Fire	1,2,3,4,6,7,8	City, BI, PE, PW	$55,000	HMGP, EPA, State of CA, TFFF & USDA Grants	Long term	Ongoing
Initiative #T-5—Create a city wide Emergency Preparedness Plan for natural and/or manmade disasters.							
New	All	1,2,3,4,5,7,8,9	City, PD, TMCFD	$2,000	PDM Grant	Short term	Ongoing
Initiative #T-6-Create evacuation maps with "routes" and "safe zones" to direct City residents during hazard.							
New	All	1,4,5,7,8	PD, TMCFD, City	$3,000	PDM Grant	Short term	Ongoing

TABLE-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
Initiative #T-7—Create a city wide Post Disaster Mitigation Plan.							
New	All	1,2,3,4,6,7,8,	PD, TMCFD, City	$3,000	PDM Grant	Short term	Ongoing
Initiative #T-8—Reinforce and/or replace liners for existing or new sewer ponds to avoid a public health risk.							
New & Existing	Earthquake, Severe Weather, Flood, Landslide	1,2,3,4,6,	City, BI, PW, PE	$3,000,000	HMGP & EPA Grants	Long term	Ongoing
Initiative #T-9—Reinforce, repair and/or replace City above ground water storage tower and below ground tanks.							
New & Existing	Earthquake, Sever Weather, Fire	1,2,3,4,6	City, BI, PW, PE	$3,500,000	HMGP, CDBG, EPA & USDA Grants	Long term	Ongoing
Initiative #T-10—Repair or replace Well House #1 and #3 and Booster Station from a natural or manmade disaster.							
New & Existing	Earthquake, Severe Weather, Fire	1,2,3,4,6,	City	$1,500,000	HMGP, CDBG,EPA & USDA Grants	Long Term	Ongoing
Initiative #T-11—Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority.							
New and Existing	All	1,2,3,4,5,6,7, 8,9	City, BI, PW, PE	$100,000 to $5,000,000	HMGP, CDBG, EPA & USDA Grants	Long Term	Ongoing
Initiative #T-12—Prepare and plan for backup water supplies and storage.							
New and Existing	All	1,2,3,4,5,6,7, 8,9	City, BI, PW, PE, TMCFD	$300,000 to $500,000	PDM Grant	Short Term	Ongoing
Initiative #T-13-Repair or replace water and sewer lines, laterals, backflows and meters.							
New and Existing	All	1,2,3,4,6	City, BI, PW, PE, TMCFD	$2,500,000 to $7,000,000	HMGP, CDBG, EPA & USDA Grants	Long Term	Ongoing
Initiative #T-14—Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1.							
New and Existing	All	1,2,3,4,5,6,7, 8,9	City, PW, PD	$2,500	PDM Grant	Short Term	Ongoing

**TABLE-8.
MITIGATION STRATEGY PRIORITY SCHEDULE**

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]
T-1	6	High	High	Yes	Yes	No	High
T-2	9	High	High	Yes	Yes	No	High
T-3	7	High	Medium	Yes	Yes	No	High
T-4	7	High	Medium	Yes	Yes	No	High
T-5	8	High	Low	Yes	Yes	No	High
T-6	5	High	Low	Yes	Yes	No	High
T-7	7	High	Low	Yes	Yes	No	High
T-8	5	High	High	Yes	Yes	No	High
T-9	5	High	High	Yes	Yes	No	High
T-10	5	High	High	Yes	Yes	No	High
T-11	9	High	Med-High	Yes	Yes	No	Medium
T-12	9	High	Medium	Yes	Yes	No	High
T-13	5	High	High	Yes	Yes	No	High
T-14	9	Med	Low	Yes	Yes	Yes	Medium

a. See Section 1.3 for definitions of high, medium and low priorities.

TABLE -9.
ANALYSIS OF MITIGATION INITIATIVES

	Initiative Addressing Hazard, by Mitigation Type[a]					
Hazard Type	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Dam Failure	5, 6, 7, 8, 9, 10, 12, 14	8, 11, 13	5, 6, 7	11	5, 6 7	1, 2, 3, 4, 8, 9, 10, 11, 12 13
Drought	5, 6, 7, 9, 10, 12, 14	8, 9, 10, 12, 13	5, 6, 7	11	5, 6, 7	12
Earthquake	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	1, 2, 3, 4, 8, 9, 10, 11, 12, 13	5, 6, 7	11	5, 6 7	1, 2, 3, 4, 8, 9, 10, 11, 12 13
Flood	5, 6, 7, 8, 9, 10, 12, 13, 14	1, 2, 3, 8, 9, 10, 12, 13	5, 6, 7	11	5, 6, 7	1, 2, 3, 4, 8, 9, 10, 11, 12 13
Landslide	5, 6, 7, 8, 14	8, 11, 12, 13	5, 6, 7	11	5, 6, 7	8, 11, 12, 13
Severe Weather	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	1, 2, 3, 4, 8, 9, 10, 11, 12, 13	5, 6, 7	11	5, 6, 7	1, 2, 3, 4, 8, 9, 10, 11, 12 13
Train Derailment	5, 6, 7, 11, 14	9, 10, 11, 12, 13	5, 6, 7	11	5, 6, 7	9, 10, 11, 12, 13
Volcano	1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14	1, 2, 3, 4, 8, 9, 10, 11, 12, 13	5, 6, 7		5, 6, 7	1, 2, 3, 4, 8, 9, 10, 11, 12, 13
Wildfire	5, 6, 7, 9, 10, 11, 12, 14	12	5, 6, 7		5, 6, 7	9, 10, 11, 12

a. See Section 1.3 for description of mitigation types

TABLE -10.
COMMUNITY OUTREACH

WILL BE PERROMING THESE OUTREACH EVENTS AND WILL INCLUDE MITIGATION EDJUCATION TO THE PUBLIC.

Outreach
Community Meetings Go Bag planning Schools
Fire Safe Council Meetings
PSA about Emergency Notification System and Testing
Use of Facebook and Twitter

CHAPTER 8.
CITY OF WEED ANNEX

8.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact
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550 Main Street
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Telephone: 530 938-5020
e-mail: stock@ci.weed.ca.us

Alternate Point of Contact
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Weed, CA 96094
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e-mail: steve.duncan@ci.weed.ca.us

8.2 JURISDICTION PROFILE

The following is a summary of key information about the jurisdiction and its history:

Date of Incorporation—January 25, 1961

Current Population—2,750 as of 2016 (2016 American Community Survey U.S. Census)

Population Growth—The City's population decreased by 9.2 percent between 2010 and 2016, due to the Boles Fire, a wildland fire that destroyed 157 single family residences and 8 nonresidential commercial properties in the City of Weed. The City's population is expected to hold relatively steady or increase slightly for the duration of the current planning period. (ref: City of Weed Housing Element)

Location and Description—Weed is a city located at 41°25'27" North, 122°23'4" West (41.424298, -122.384417) in Siskiyou County, just 49 miles south of the California–Oregon border at the junction of Interstate 5 and U.S. Route 97. California State Route 265 also runs through the City, locally known as North Weed Boulevard. Only two blocks long, it is one of the shortest state highways in California. Weed is about 10 miles west-northwest of Mount Shasta, a prominent northern California landmark, and the second tallest volcano in the Cascade Range. The city has a total area of 4.8 square miles.

Brief History—The City of Weed gets its name from the founder of the local lumber mill and pioneer Abner Weed, who discovered that the area's strong winds were helpful in drying lumber. In 1897, Abner Weed bought the Siskiyou Lumber and Mercantile Mill and 280 acres of land in what is now the City of Weed, for $400. By the 1940s, Weed boasted the world's largest sawmill. From its founding in 1901, to as late as the 1980s, Weed was home to a thriving lumber industry. The timber industry declined since the 1950s. Increased regulation led to diminished profits and massive layoffs of mill workers, beginning in earnest by the 1970s. Automation of remaining consolidated milling operations and competition from other timber markets outside the nation hastened the decline in the number of jobs available in logging and related industries. The challenges resulting from this economic and resulting social upheaval were significant in the lives of many Siskiyou County residents. The local timber industry still figures prominently in the local and state economy, though in diminished form from the past.

On September 15th, 2014, a fast-moving wildfire called the “Boles Fire” spread through the City of Weed. The fire, fueled by 40-mph winds, spread within minutes and much of the town suffered major damage. Ultimately the fire tore through three neighborhoods, causing a 16% loss in the city’s single-family housing stock. Beyond housing, the fire took its toll om major infrastructure, including the Roseburg Mill, Catholic Church, Presbyterian Church, and parts of the elementary and high schools. The City of Weed’s water and sewer systems received major damage from the fire. As CAL FIRE stated, “It took 120 minutes to destroy 150 structures”. The result: California’s Governor, Edmund G. Brown, declared the Boles fire in the City of Weed a disaster.

The fire started behind the Boles Creek Apartments in the central part of Weed. Final tallies indicated that 157 single family residences and 8 nonresidential commercial properties, 4 single family residences damaged and 3 nonresidential commercial properties damaged along with 516 acres of land. More than 2,000 citizens had to evacuate, many with little or no warning. Pacific Power announced that 7,678 customers in the communities of Weed and Mt. Shasta lost power because of the fire. Fortunately, there were no fatalities, although three individuals were injured.

Climate—Weed’s climate is mild during summer, when temperatures tend to be in the 60s, and very cold during winter, when temperatures tend to be in the 30s. The warmest month of the year is August, with an average maximum temperature of 85ºF. The coldest month of the year is January, with an average minimum temperature of 24ºF. Temperature variations between night and day tend to be relatively big during summer, with a difference that can reach 37ºF, and moderate during winter, with an average difference of 21ºF. The annual average precipitation is 26 inches of rain; annual average snowfall is 19 inches. The number of days with any measurable precipitation is 78. On average, there are 229 sunny days per year in Weed.

Governing Body Format—The City of Weed has a Council-Manager form of government. The City Council is the legislative body of the City government and is composed of five Council Members elected for overlapping four-year terms. The City Council is responsible for formulating policies for the municipal corporation and approving major actions of key administrative officials, by whom the operating activities are carried out. The Council Members choose one of their own to serve as Mayor for a one-year term. The Mayor presides over meetings of the Council and votes as a member of the Council, but has no veto power. The Mayor, as a representative of the citizens, represents the City government in all official and ceremonial matters.

The Council appoints a City Manager to administer City policy, coordinate the departments of the municipal government, and represent the City in its relations with the public and other governmental jurisdictions.

Development Trends—The anticipated development level for Weed is low to moderate, consisting primarily of residential and commercial development. The residential will be infill and in the south Weed area, with commercial also in south Weed.

8.3 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 8-1 lists all past occurrences of natural hazards in the county. Repetitive loss records are as follows:

Number of FEMA Identified Repetitive Flood Loss Properties: 5

Number of Repetitive Flood Loss Properties that have been mitigated: 1

8.4 HAZARD RISK RANKING

Table 8-2 presents the ranking of the hazards of concern.

8.5 CAPABILITY ASSESSMENT

The assessment of the jurisdiction's legal and regulatory capabilities is presented in Table 8-3. The assessment of the jurisdiction's administrative and technical capabilities is presented in Table 8-4. The assessment of the jurisdiction's fiscal capabilities is presented in Table 8-5. Classifications under various community mitigation programs are presented in Table 8-6.

8.6 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

Table 8-7**Error! Reference source not found.** lists the initiatives that make up the jurisdiction's hazard mitigation plan. Table 8-8 identifies the priority for each initiative. Table 8-9 summarizes the mitigation initiatives by hazard of concern and the six mitigation types. Due to the insufficient staff and funding we were not able to integrate information from the 2012 plan in the new plan.

Part of the revision process is surveying the public about topics that are important to them and how they see the City changing in the next 25 years. Similar to the mapping exercise at a workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the City. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the City and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

The City General Plan which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute.

In addition to the General Plan process, the City will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

National Flood Insurance Program

The City of Weed does participate in the National Flood Insurance Program (NFIP) that provides federally backed flood insurance in exchange for communities enacting floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. The County and most of the partner cities for this plan participate in the NFIP and have adopted regulations that meet the NFIP requirements. At the time of the preparation of this plan, all participating jurisdictions in the partnership were in good standing with NFIP requirements.

8.7 HAZARD AREA EXTENT AND LOCATION

Hazard area extent and location maps for the City of Weed are included at the end of this chapter. These maps are based on the best available data at the time of the preparation of this plan, and are considered to be adequate for planning purposes.

**TABLE 8-1.
NATURAL HAZARD EVENTS**

Type of Event	Date	Preliminary Damage Assessment
Wildland Fire	09/15/2014	48 Million
Severe Winter Storms	03/08/2010	Estimates unavailable
Fire	2008	Estimates unavailable
Severe Storms	02/03/2006	Estimates unavailable
Severe Storm	02/03/1993	Estimates unavailable
Flooding	2/ /1978	Estimates unavailable
Severe Storms	01/25/1974	Estimates unavailable

**TABLE 8-2.
HAZARD RISK RANKING**

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Wildfire	48
2	Severe Weather	39
3	Flood	36
4	Railroad Traffic	18
5	Drought	16
6	Landslide	6
7	Earthquake	6
8	Volcano	3

TABLE 8-3.
LEGAL AND REGULATORY CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Building Code	Y	N	N	Y	Title 24, UBC, UFC
Zonings	Y	N	N	Y	Title 18 WMC, 1963
Subdivisions	Y	N	N	Y	Title 17 WMC, 1963
Stormwater Management	Y	N	N	N	Budget, 2017
Post Disaster Recovery	N	N	N	N	
Real Estate Disclosure	Y	N	N	Y	CA. Civil Code 1102
Growth Management	Y	N	N	Y	City of Weed General Plan
Site Plan Review	Y	N	N	N	Title 18, WMC, 1963
Special Purpose (flood management, critical areas)	N	N	N	N	
Planning Documents					
General or Comprehensive Plan	Y	N	N	Y	General Plan Update 2017
Floodplain or Basin Plan	N	N	N	N	
Stormwater Plan	Y	N	N	N	Adopted 2003
Capital Improvement Plan	Y	N	N	N	Budget, 2018
Habitat Conservation Plan	Y	N	N	Y	General Plan 2017
Economic Development Plan	N	N	N	N	
Emergency Response Plan	N	N	N	N	
Shoreline Management Plan	N	N	N	N	
Post Disaster Recovery Plan	Y	Y	Y	Y	City of Weed Resilience Plan 2016

TABLE 8-4.
ADMINISTRATIVE AND TECHNICAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	No	On contract
Engineers or professionals trained in building or infrastructure construction practices	No	On contract
Planners or engineers with an understanding of natural hazards	No	On contract
Staff with training in benefit/cost analysis	No	
Floodplain manager	Yes	Public Works Director/City of Weed
Surveyors	No	
Personnel skilled or trained in GIS applications	Yes	City Manager, Fire, Police/City of Weed
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes	City Manager, Fire Chief, Police Chief
Grant writers	Yes	City Administrator, Finance, Fire, Police

TABLE 8-5.
FISCAL CAP

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

TABLE 8-6.
COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Community Rating System	Yes	3	2014
Building Code Effectiveness Grading Schedule	Yes	Unknown	Unknown
Public Protection	Yes	Unknown	Unknown
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

TABLE 8-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline
Initiative #—W-01 Establish New Fire Station South Weed						
Existing	All	1, 4, 8	City of Weed	5,000,000 High	City, Grants	Short
Initiative #—W-02 Boles Creek Main Street Mitigation						
Existing	Flood	1, 2, 6	City of Weed	600,000 High	CDBG, HMPG	Short
Initiative #—W-03 Substitute Spring Water Source with Well						
Existing	Fire	1, 2, 4, 7	City of Weed	1,000,000 High	Grants – FEMA-Water Fund	Short
Initiative #—W-04 Backup Generators for Utilities						
Existing	All	1, 2, 4	City of Weed	100,000 High	Grants – FEMA-Water Fund	50 percent complete
Initiative #—W-05 City Wide Fuel Reduction Projects						
New	Fire	1, 2, 4	City of Weed	250,000 High	City, Grants	Long
Initiative #—W-06 Retrofit Bel Air Water Tank						
Existing	Fire	1, 2, 4	City of Weed	450,000 High	Grants - CDBG	Completed 2017
Initiative #—W-07 Improve Highway 97 culvert						
New	Flood	1, 2, 6	State of California	800,000 High	State	Long
Initiative #—W-08 School House Hill Water Storage						
New	Fire	1, 2, 4	City of Weed	1,000,000 High	Grants - FEMA	Completed 2016
Initiative #W-09—Consider participation in the Community Rating System (CRS) program						
New and Existing	Floods	1,2,3,4,5,6,7, 8,9	City	Low	City	Short Term

Initiative #W-10—Continue to maintain compliance and good standing in the National Flood Insurance Program (NFIP)						
New and Existing	Floods	1,2,3,4,5,6,7, 8,9	City	Low	City	Short Term
Initiative #W-11—Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority						
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	High	City, FEMA Mitigation Grants	Long Term
Initiative #W-12—Support County-wide initiatives identified in Volume 1 of this Plan						
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	Low	City	Short Term
Initiative #W-13—Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1						
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	Low	City, FEMA Mitigation Grants	Short Term

TABLE 8-8.
MITIGATION STRATEGY PRIORITY SCHEDULE

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]
W-01	3	High	High	Yes	Yes	No	High
W-02	3	Medium	High	No	Yes	No	Low
W-03	4	High	High	Yes	Yes	No	High
W-04	3	High	High	Yes	Yes	No	High
W-05	3	High	High	Yes	Yes	No	High
W-06	3	High	High	Yes	Yes	No	High
W-07	3	High	High	Yes	Yes	No	High
W-08	3	High	High	Yes	Yes	No	High
W-09	9	Med	Low	Yes	No	Yes	Med
W-10	9	Low	Low	Yes	No	Yes	High
W-11	9	High	High	Yes	Yes	No	High
W-12	9	Med	Low	Yes	No	Yes	High
W-13	9	Med	Low	Yes	Yes	Yes	High

a. See Section 1.3 for definitions of high, medium and low priorities.

TABLE 8-9.
ANALYSIS OF MITIGATION INITIATIVES

Hazard Type	Initiative Addressing Hazard, by Mitigation Type[a] 1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Dam Failure	12, 13	11	12, 13		4, 5, 7	
Drought	12, 13	11	12, 13		4, 5, 7	
Earthquake	12, 13	11	12, 13		3, 4, 5, 7	3
Flood	9, 10, 12, 13	9, 10, 11	9, 10, 12, 13	1, 2, 9, 10	4, 5, 7, 9, 10	1, 2, 9, 10
Landslide	12, 13	11	12, 13		4, 5, 7	
Severe Weather	12, 13	11	12, 13		4, 5, 7	
Volcano	12, 13	11	12, 13		4, 5, 7	
Wildfire	12, 13	6, 8, 11	12, 13		4, 5, 6, 7, 8	6, 8

a. See Section 1.3 for description of mitigation types

TABLE 8-10.
COMMUNITY OUTREACH

WILL BE PERROMING THESE OUTREACH EVENTS AND WILL INCLUDE MITIGATION EDJUCATION TO THE PUBLIC.

Outreach
Community Meetings Go Bag planning Schools
Fire Safe Council Meetings
PSA about Emergency Notification System and Testing
Use of Facebook and Twitter
Joint Community Hmong Preparedness Meetings for evacuations

CHAPTER 9.
CITY OF YREKA ANNEX

9.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

Steve Baker, City Manager

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Yreka, CA 96097

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Alternate Point of Contact

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Yreka, CA 96097

Telephone: 530-841-2386

e-mail Address: casson@ci.yreka.ca.us

9.2 JURISDICTION PROFILE

The following is a summary of key information about the jurisdiction and its history:

Date of Incorporation—April 21, 1857

Current Population—7777 as of January 1, 2017 (Calif. Dept. of Finance)

Population Growth—The City has experienced low to moderate growth, averaging approximately 1 percent.

Location and Description—The City of Yreka is the county seat and largest city in Siskiyou County. Yreka is 320 miles north of San Francisco and 22 miles south of the Oregon border. It covers approximately 10 square miles at an elevation of 2,600 feet. Interstate 5, the primary north-south highway through Northern California, bisects the city. Most of the city's residential and general commercial development, including the downtown area, is west of Interstate 5. Most of the land zoned for industrial development is east of Interstate 5.

Brief History—Yreka's historical roots reach back to the California gold rush, beginning with a gold discovery in 1851. Thousands of prospectors flocked to the area, and a town of tents and shanties quickly developed near the present downtown area. The first house—a log cabin—was built that year, along with the first business: a saloon. Yreka, pronounced "Wy-re-ka", is a Shasta Indian word meaning "North Mountain," a reference to nearby Mt. Shasta. Yreka became the county seat of Siskiyou County, one of the largest counties in California.

Climate—Yreka's climate is Mediterranean: warm during summer with high temperatures in the 90s, and very cold during winter with high temperatures in the 30s. The warmest month of the year is July, with an average maximum temperature of 90ºF. The coldest month of the year is January, with an average minimum temperature of 23ºF. Temperature variations between night and day tend to be big during summer, with a difference that can reach 40ºF, and moderate during winter, with an average difference of 24ºF. The annual average precipitation at Yreka is 19.66 inches. Rainfall is fairly evenly distributed throughout the year. The wettest month of the year is January, with an average rainfall of 3.19 inches.

Governing Body Format—The City is governed by a City Council and uses a Council-Manager governing format. The City has one standing committee, the Planning Commission. There are six departments: Planning, Building, Public Works, Finance, Police and Administration. Legal services are provided by contract. The City is served by a semi-independent volunteer Fire Department with its own governing board.

Development Trends—The City has experienced low to moderate growth, averaging approximately 1 percent. The General Plan was initially adopted in 1979 and was updated in 2003. The City is in transition from a raw materials economy to a services and manufacturing economy and has been since the late 1980s. When the General Plan was updated in 2005, of the more than 1,000 acres of land designated for industrial land use in the City, 363 acres were considered “developed” and 674 acres were recognized as “underdeveloped.”

Road Access—The existing streets are generally in good condition, with adequate width and sufficient structural strength to support occasional large equipment and fire trucks. Some street routes may have limited turn-around capacity and limited width. Areas with these limitations are generally located in the northwest quadrant of the city. Circulation patterns are generally good, with three parallel north-south transportation corridors (Interstate 5, Main St/SR 3, Oregon St). There are numerous east-west connections, with primary routes at Moonlit Oaks (south), Tebbe Street (north), and Miner Street (central). Connections between the east and west sides of the City are limited to four streets: Moonlit Oaks (south), Oberlin Road (central), Foothill Drive/Miner Street (central), and Tebbe Street/SR 3 (north).

Water—The City’s primary water supply is piped approximately 23 miles from Fall Creek at Iron Gate Reservoir. The City’s primary supply line generally follows the Yreka-Ager Road and Foothill Drive alignments into town. The City has one backup well, used for emergency supply, which has recently been upgraded and when used historically has required the issuance of a “boil water” order.

The City maintains numerous water storage tanks with enough capacity to serve residents for 24 hours during summer peak use. Most areas have a looped water line system capable of providing water even in the event of neighborhood disruption or shutoff. Some areas, especially near booster pump stations, experience very high water pressure, over 100 psi. These high pressure zones are generally west of Fairchild Street, near Evergreen school, north Main Street, and near the Fairgrounds.

Floodplain—Yreka Creek flows south to north through the center of the city, and flood hazard areas along the Creek have been identified. The 100-year floodplain impacts a significant portion of town. The City is in the process of making improvements to areas along the creek to remove more properties from the floodplain.

9.3 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

TABLE 1 lists past occurrences of natural hazards in the county. Repetitive loss records are as follows:

Number of FEMA Identified Repetitive Flood Loss Properties: 0 (Several properties appear to be at risk of repetitive flood loss, but to date they have not been designated as such.)

Number of Repetitive Flood Loss Properties that have been mitigated: 0

9.4 HAZARD RISK RANKING

TABLE 2 presents the ranking of the hazards of concern.

9.5 CAPABILITY ASSESSMENT

The assessment of the jurisdiction's legal and regulatory capabilities is presented in **TABLE 3**. The assessment of the jurisdiction's administrative and technical capabilities is presented in **TABLE 4**. The assessment of the jurisdiction's fiscal capabilities is presented in **TABLE 5**. Classifications under various community mitigation programs are presented in **TABLE 6**.

9.6 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

TABLE 7 lists the initiatives that make up the jurisdiction's hazard mitigation plan. **TABLE 8** identifies the priority for each initiative. **TABLE 9** summarizes the mitigation initiatives by hazard of concern and the six mitigation types. Due to the insufficient staff and funding we were not able to integrate information from the 2012 plan in the new plan.

Part of the revision process is surveying the public about topics that are important to them and how they see the City changing in the next 25 years. Similar to the mapping exercise at a workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the City. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the City and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

The City General Plan which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute.

In addition to the General Plan process, the City will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

National Flood Insurance Program

The City of Yreka does participate in the National Flood Insurance Program (NFIP) that provides federally backed flood insurance in exchange for communities enacting floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. The County and most of the partner cities for this plan participate in the NFIP and have adopted regulations that meet the NFIP requirements. At the time of the preparation of this plan, all participating jurisdictions in the partnership were in good standing with NFIP requirements.

9.7 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

The City is situated between mountain passes that are subject to severe winter weather and occasional road closures. Interstate 5, the main transportation arterial, has numerous bridges that are vulnerable to damage from flood, earthquake and similar hazards. The City must maintain its 23 miles of primary water supply pipeline, which also crosses the Klamath River beneath Iron Gate Reservoir. The City would be particularly vulnerable to multiple hazards occurring at the same time, such as an earthquake that damaged access routes and severe weather precluding the ability to access critical supply systems.

9.8 ADDITIONAL COMMENTS

The City of Yreka's downtown and commercial core is bisected by Yreka Creek. A recent flood value analysis estimates that $126 million dollars in improvements is at risk from a 100-year flood event.

9.9 HAZARD AREA EXTENT AND LOCATION

Hazard area extent and location maps for the City of Yreka are included at the end of this chapter. These maps are based on the best available data at the time of the preparation of this plan, and are considered to be adequate for planning purposes.

TABLE 1.
NATURAL HAZARD EVENTS

Type of Event	Date	Preliminary Damage Assessment
Flood DR-1628	12/30/06—1/1/2007	Public ~$ 1 million, Private—unknown

TABLE 2.
HAZARD RISK RANKING

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Wildfire	42
2	Severe Weather	42
3	Flood	27
4	Drought	21
5	Earthquake	16
6	Volcanic Disturbance	14
7	Dam Failure	9
8	Landslide	0

TABLE 3.
LEGAL AND REGULATORY CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Building Code	Y	N	N	Y	CA Building Code, Title 11, YMC, 2015
Zonings	Y	N	N	Y	Title 16, YMC, 2004
Subdivisions	Y	N	N	N	Title 15, YMC 1983
Stormwater Management	Y	N	N	N	Title 11.25 YMC, 2009
Post Disaster Recovery	N	N	N	N	
Real Estate Disclosure	Y	N	N	Y	CA Civil Code 1102
Growth Management	Y	N	N	Y	City of Yreka General Plan (2003)
Site Plan Review	Y				
Special Purpose (flood management, critical areas)	Y	N	N	N	Title 11.34, YMC 1999
Planning Documents					
General or Comprehensive Plan	Y	N	N	Y	12/18/2003, Resolution 2457
Floodplain or Basin Plan	N	Y	N	Y	NCRWQCB Basin Plan
	Y	N	Y	Y	Yreka Creek Master Plan
Stormwater Plan	Y	Y	N	Y	Proposed NPDES Phase II Small MS4
Capital Improvement Plan	Y	N	N	N	5/10-year CIP for water, wastewater, drainage and roads. Updated annually
Habitat Conservation Plan	N	N	N	N	
Economic Development Plan	Y	N	N	N	
Emergency Response Plan	Y	N	N	N	Greenhorn Reservoir Dam Response Plan
Shoreline Management Plan	N	N	N	N	n/a
Post Disaster Recovery Plan	N	N	N	N	

TABLE 4.
ADMINISTRATIVE AND TECHNICAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Y	Director of Public Works, Project Engineer, Planning Director, Management Analyst
Engineers or professionals trained in building or infrastructure construction practices	Y	Building Official, Director of Public Works, Project Engineer
Planners or engineers with an understanding of natural hazards	Y	Building Official, Director of Public Works, Project Engineer, Management Analyst
Staff with training in benefit/cost analysis	Y	Finance Director, Director of Public Works, Project Engineer, Management Analyst
Floodplain manager	Y	Building Official, Management Analyst
Surveyors	N	
Personnel skilled or trained in GIS applications	N	Public Works Director, GIS coordinator, Maintenance Manager, Water Manager
Scientist familiar with natural hazards in local area	N	Contract only
Emergency manager	Y	Police Chief, City Manager
Grant writers	Y	Finance Director, Management Analyst, Grants and Project Analyst

TABLE 5.
FISCAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Y
Capital Improvements Project Funding	Y
Authority to Levy Taxes for Specific Purposes	Y, vote required
User Fees for Water, Sewer, Gas or Electric Service	Y
Incur Debt through General Obligation Bonds	Y, vote required
Incur Debt through Special Tax Bonds	Y, vote required
Incur Debt through Private Activity Bonds	Y, vote required
Withhold Public Expenditures in Hazard-Prone Areas	Unknown
State Sponsored Grant Programs	Y
Development Impact Fees for Homebuyers or Developers	Y

TABLE 6.
COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Community Rating System	N	N/A	N/A
Building Code Effectiveness Grading Schedule	Y	Unknown	Unknown
Public Protection	Y	3	ISO 5/24/2016
Storm Ready	N	N/A	N/A
Firewise	N	N/A	N/A

TABLE 7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost[a]	Sources of Funding	Timeline	Status Update
Initiative #Y 1—Identify primary evacuation routes and “safe zone” collection points where people can gather.							
Existing	All	1,2,4,5,8,9	Fire Safe Councils, Fire & Police Dept.	$10,000 estimate (for map preparation, printing, distribution)	FSC grants	1-2 years	
Initiative #Y 2—Communicate the Emergency Preparedness Manual to staff, the public and key partners.							
Existing	All	1,4,5,8,9	City Police	$1000, estimate (copying)	General Fund	1 year	
Initiative #Y 3—Encourage Community Emergency Response Teams (CERTs) to provide neighborhood coordination and points of contact in an emergency.							
Existing	All	1,4,5,8,9	FSCs, Individuals	Unknown	Grants	1-2 years	
Initiative #Y 4—Purchase additional generators both in the community, for critical operations, and to provide backups for the City’s water and wastewater operations.							
Existing	All, with potential to disrupt power	1,4,9	City, individuals	$250,000	Grants	1-5 years	
Initiative #Y 5—Assess unreinforced masonry buildings. Develop plan to address/mitigate.							
Existing	Earthquake	1,2,3,6,7	Individuals	$10,000+/each (estimate)	FEMA Mitigation Grants	5-10 years	
Initiative #Y 6—Encourage individual homeowners to stock fire gel kits.							
Existing	Fire	5	FSC, Fire Dept.	$2500-$5000/per property	Individual	1-5 years	

TABLE 7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost[a]	Sources of Funding	Timeline	Status Update
	Initiative #Y 7—Assess critical public buildings and mitigate damage potential.						
existing	Earthquake, fire, flood	1,2,3,6,7	City Building, County	$10,000 estimated for assessment, mitigation costs depends on what is found	FEMA Mitigation Grant	2-5 years	Ongoing
	Initiative #Y 8—Stockpile emergency replacement parts and supplies that may be difficult to obtain, such as face masks, fuel filters, air filters, snowmelt chemicals, sand, sandbags, etc.						
Existing	Fire, volcano, flood	1,4,5	City Public Works	$5000	Budget	1-5 years	Ongoing
	Initiative #Y 9—Identify any repetitive flood loss properties. Relocate or reconfigure property to minimize flood exposure.						
Both	Flood, severe weather, dam failure	6	City	$ 5 million +	FEMA HMP, DWR, other	10+ years	Ongoing
	Initiative #Y 10—Acquire and preserve floodplain as open space/greenbelt.						
Both	Flood, severe weather, dam failure	3,6	City	$38 million	FEMA HMP, DWR, parks, other	20+ years	Ongoing
	Initiative #Y 11—Reduce fuel loads in highest fire severity zones. Encourage individuals to establish defensible space. Require annual fuel and weed reduction to minimize fire spread.						
Both	Fire	1, 8	Individuals, Fire Safe Council	$1,000-10,000 per property	Ins. Co., Fire Safe Council, USFS		Current Project working on
	Initiative #Y 11—Fully implement improvements and upgrades recommended in Master Plan of Drainage.						
Both	Flood, severe weather	1,3	City	$20 million	FEMA, DWR, CDBG	10-15 years	Ongoing
	Initiative #Y 12—Develop self-contained communication (i.e. radio backups that are not dependent on power, outside lines, towers, etc.). Develop community emergency notification system (i.e. reverse 911).						
Both	Fire, earthquake, flood	1,4,8,9	City Police and Public Works, Co. EOC.	$250,000	Grants	5 years	Partially completed
	Initiative #Y 13—Develop additional backup water supplies and storage.						
New	Earthquake, drought, fire, flood	1,4	City	$25 million +	USDA, FEMA, CDBG	10-15 years	Ongoing
	Initiative #Y 14—Develop/modernize the Emergency Operations Center at Police Department.						
New	All	1,2,4,9	City	$ 2-5 million, estimate	USDA, CDBG, FEMA,	5-10 years	Completed

TABLE 7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost[a]	Sources of Funding	Timeline	Status Update
Initiative #Y 15—Develop/increase awareness of Evacuation Centers. Develop a plan to obtain from the private sector several weeks' worth of emergency food and water supplies for people and pets.							
n/a	Fire, flood, severe weather, earthquake	1,5,8	Red Cross	$25,000	FEMA, private	1-2 years	Ongoing
Initiative #Y 16—Develop alternate transport mechanism to enable remote access (e.g. to Fall Creek water source) when roads and bridges are impassable (e.g. a shared use or chartered helicopter)							
New	Fire, flood, severe weather, earthquake	1,4,9	City, stakeholders	High	Unknown	Long term	Ongoing
Initiative #Y 17—Develop access to additional emergency heavy equipment resources: backhoes, dump truck, loaders, water truck, fire truck, snow blowers, plows.							
New	Fire, flood, earthquake, severe weather	1,4,9	City	High	FEMA reimbursement if declared emergency	1-2 years	Ongoing
Initiative #Y 18—Consider participation in the Community Rating System (CRS) program.							
New and Existing	Floods	1,2,3,4,5,6, 7,8,9	City	Low	City	Short Term	Ongoing
Initiative #Y 19—Continue to maintain compliance and good standing in the National Flood Insurance Program (NFIP).							
New and Existing	Floods	1,2,3,4,5,6, 7,8,9	City	Low	City	Short Term	Ongoing
Initiative #Y 20—Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority.							
New and Existing	All Hazards	1,2,3,4,5,6, 7,8,9	City	High	City, FEMA Mitigation Grants	Long Term	Ongoing
Initiative #Y 21—Support County-wide initiatives identified in Volume 1 of this Plan.							
New and Existing	All Hazards	1,2,3,4,5,6, 7,8,9	City	Low	City	Short Term	Ongoing
Initiative #Y 22—Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1.							
New and Existing	All Hazards	1,2,3,4,5,6, 7,8,9	City	Low	City, FEMA Mitigation Grants	Short Term	Ongoing

a. Cost estimates are preliminary and need to be refined at the time of project development.

TABLE 8.
MITIGATION STRATEGY PRIORITY SCHEDULE

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]
Y 1	8	Med	Low	Yes	Yes	No	Med
Y 2	8	Med	Low	Yes	Yes	No	Med
Y 3	8	Med	Low	Yes	Yes	No	Low
Y 4	8	High	Med	Yes	Yes	No	High
Y 5	1	Med	Low	Yes	Yes	No	Med
Y 6	1	High	Low	Yes	No	No	Med
Y 7	3	High	Med	Yes	Yes	No	Med
Y 8	3	High	Low	Yes	No	Yes	High
Y 9	2	High	Med	Yes	Yes	No	Med
Y 10	3	High	High	Yes	Yes	No	Med
Y 11	1	High	Med	Yes	Yes	No	Med
Y 12	4	High	Med	Yes	Yes	No	Med
Y 13	5	High	High	No	Yes	No	Med
Y 14	8	High	High	Yes	Yes	No	High
Y 15	5	Med	Low	Yes	No	No	Low
Y 16	3	Med	High	No	No	No	Low
Y 17	4	High	Low	Yes	No	No	High
Y 18	9	Med	Low	Yes	No	Yes	Med
Y 19	9	Low	Low	Yes	No	Yes	High
Y 20	9	High	High	Yes	Yes	No	High
Y 21	9	Med	Low	Yes	No	Yes	High
Y 22	9	Med	Low	Yes	Yes	Yes	High

a. See Section for definitions of high, medium and low priorities.

TABLE 9.
ANALYSIS OF MITIGATION INITIATIVES

Hazard Type	Initiative Addressing Hazard, by Mitigation Type[a] 1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Avalanche	n/a	n/a	n/a	n/a	n/a	n/a
Dam Failure	1, 2, 21, 22	20	1, 2, 3, 15, 21, 22	—	2, 12	—
Drought	21, 22	13, 20	21, 22	—	12, 13	13
Earthquake	5	5, 7, 20	1, 2, 3, 7, 15, 21, 22	10	7, 12, 13, 14, 16, 17	14
Flood	10, 18, 19, 21, 22	4, 9, 10, 18, 19, 20	1, 2, 9, 18, 19, 21, 22	9, 10, 18, 19	4, 8, 16, 17, 18, 19	9, 10, 11, 14, 18, 19
Landslide	n/a	n/a	n/a	n/a	n/a	n/a
Severe Weather	21, 22	5, 7, 9, 20	2, 3, 5, 15, 21, 22	10	8, 12, 13, 14, 15, 17	10, 14
Volcano	21, 22	20	8, 12, 15, 21, 22	—	4, 8, 12, 13, 16	11
Wildfire	11, 21, 22	6, 20	6, 12, 15, 21, 22	—	4, 6, 12, 13, 14, 16, 17	12, 13, 14

a. See Section 1.3 for description of mitigation types

TABLE 10.
COMMUNITY OUTREACH

WILL BE PERROMING THESE OUTREACH EVENTS AND WILL INCLUDE MITIGATION EDJUCATION TO THE PUBLIC.

Outreach
Community Meetings Go Bag planning Schools
Fire Safe Council Meetings
PSA about Emergency Notification System and Testing
Use of Facebook and Twitter
Joint Community Hmong Preparedness Meetings for evacuations

PART 3—
SPECIAL PURPOSE DISTRICT ANNEXES

CHAPTER 10.
LAKE SHASTINA COMMUNITY SERVICES DISTRICT ANNEX

10.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

Michael Wilson, General Manager
16320 Everhart Dr.
Weed, CA. 96094
Telephone: 530 938-3281
E-mail Address: generalmanager@lakeshastina.com

Alternate Point of Contact

Robert Moser, PW Supervisor
16320 Everhart Dr.
Weed, CA. 96094
Telephone: 530 938-3281
E-mail Address: robert@lakeshastina.com

10.2 JURISDICTION PROFILE

Lake Shastina Community Services District is a special purpose district created to provide sewer, water, police and fire services to the area around Lake Shastina in Siskiyou County. A five-member elected board of directors governs the District. The Board assumes responsibility for the adoption of this plan; the general manager will oversee its implementation. As of June 2017, the District serves 1,276 water connections and 1,085 sewer connections, with a staff of 10. The Fire Department is a volunteer department of 19 members and a full-time paid chief. The Police Department has 4 sworn officers and a full-time chief. The jurisdiction's boundary is shown on Figure 10-1. The following is a summary of key information about the jurisdiction:

Population Served—2,852 as of 12/31/2016

Land Area Served—2,200 acres

Value of Area Served—The estimated value of the area served by the jurisdiction is $337,000,000

Land Area Owned—10.5 acres

List of Critical Infrastructure/Equipment Owned by the Jurisdiction:

- 58 miles of water pipeline, 3 water wells, and 4 water storage tanks, 2 booster pump stations.
- 1 Public works yard, equipment, and 10 vehicles
- 79 miles of sewer pipeline, 20 sewer pump stations, 1 wastewater treatment plant
- Building contents and equipment
- 4 fire trucks and contents, 1 rescue rig and contents, 1 fire chief vehicle, 1 pick-up, 24 bunker sets
- 4 Police Vehicles and contents, 1 portable radar trailer, 1 animal control shelter

Total Value of Critical Infrastructure/Equipment—The total value of critical infrastructure and equipment owned by the jurisdiction is $5,429,345

List of Critical Facilities Owned by the Jurisdiction:

- Administration Building $570,000
  - Police and Fire Facility $495,000
  - Medical Clinic $500,000
  - Public Works Shop Building $100,000

Total Value of Critical Facilities—The total value of critical facilities owned by the jurisdiction is $1,665,000

Current and Anticipated Service Trends—Current trends of the District show an aging population with static growth of new homes. The Lake Shastina Area is currently 1/3 built out, meaning that 2/3 of the lots are vacant. Should current economic trends change, then so should the anticipated service area.

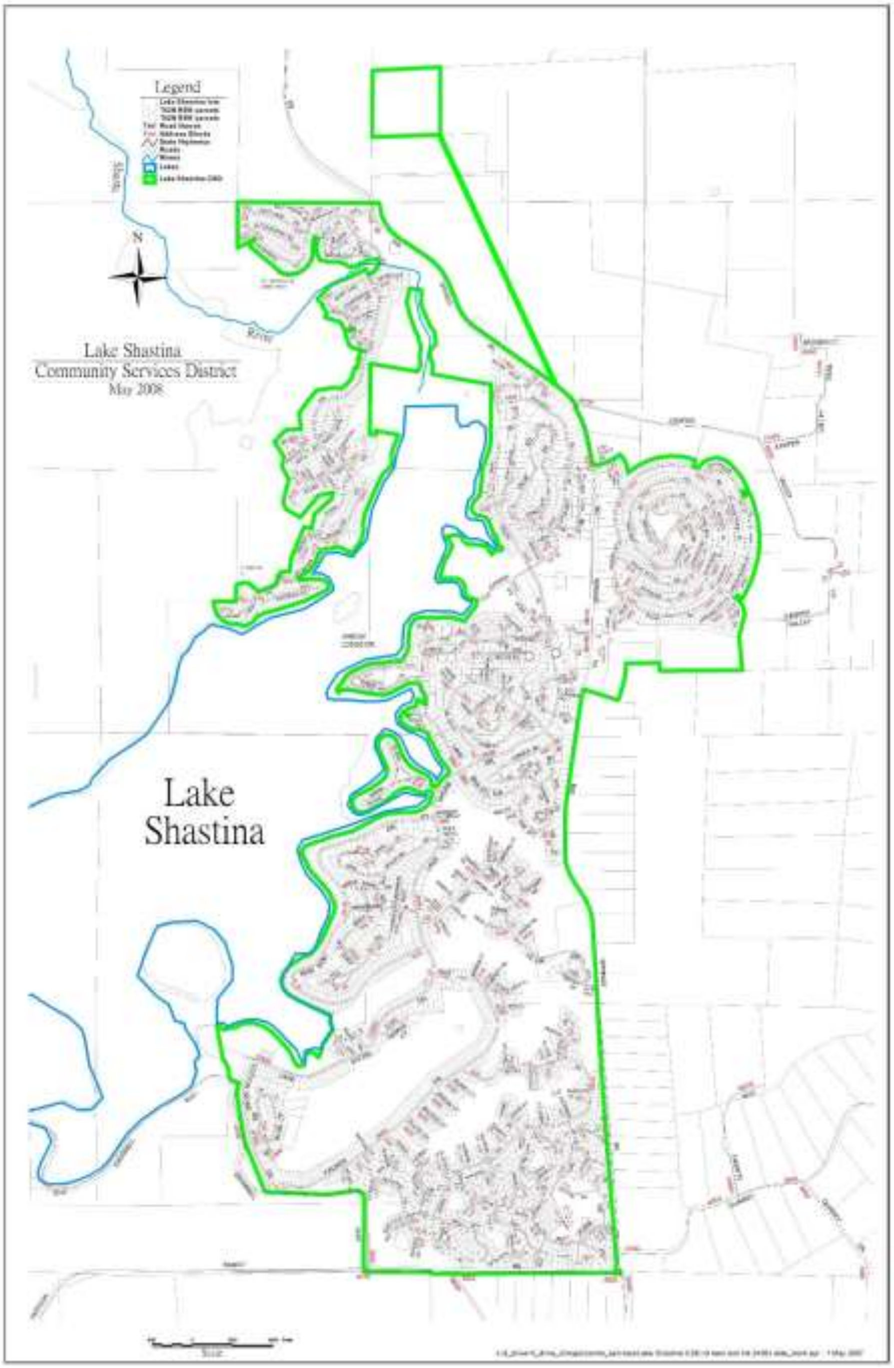

Figure 10-1. Lake Shastina Community Services District Boundary

10.3 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

TABLE 10-1 lists all past occurrences of natural hazards within the jurisdiction.

10.4 HAZARD RISK RANKING

TABLE 10-2 presents the ranking of the hazards of concern.

10.5 APPLICABLE REGULATIONS AND PLANS

The following existing codes, ordinances, policies or plans are applicable to this hazard mitigation plan:

Greater Lake Shastina Emergency Preparedness Handbook

Greater Lake Shastina Fire Safe Council Community Wildfire Protection Plan

County Land Use Ordinance

Lake Shastina Wildland Fire Evacuation Plan 2003

Lake Shastina CSD Water Ordinance

Lake Shastina CSD Sewer Ordinance

County Building Code, Seismic and Related Codes

National Environmental Protection Act

Federal Endangered Species Act.

10.6 CLASSIFICATION IN HAZARD MITIGATION PROGRAMS

The jurisdiction's classifications under various hazard mitigation programs are presented in **TABLE 10-**. Due to the insufficient staff and funding we were not able to integrate information from the 2012 plan in the new plan.

10.7 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

TABLE 10- lists the initiatives that make up the jurisdiction's hazard mitigation plan. **TABLE 10-** identifies the priority for each initiative. **TABLE 10-** summarizes the mitigation initiatives by hazard of concern and the six mitigation types.

Part of the revision process is surveying the public about topics that are important to them and how they see the CSD will be changing in the next 25 years. Similar to the mapping exercise at a workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the CSD. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the CSD and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

The CSD General Plan which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute.

In addition to the General Plan process, the CSD will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

TABLE 10-1.
NATURAL HAZARD EVENTS

Type of Event	Date	Preliminary Damage Assessment
Severe winter storms, flooding, and mudslides DR-4301	2/14/2017	Estimates unavailable
California Boles Fire (FM-5079)	9/15/2014	516 acres, 157 residences and 8 nonresidential buildings
Severe winter Storm DR-1884	3/8/2010	Estimates unavailable
Fire - Hotlum	2006	3,017 acres burned, damage estimates unavailable
Severe winter Storm DR-1628	2/3/2006	Estimates unavailable
Fire - Hoy	2006	1283 acres burned ,damage estimates unavailable
Fire - Shastina	1998	Estimates unavailable

TABLE 10-2.
HAZARD RISK RANKING

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Wildfire	51
2	Severe Weather	42
3	Earthquake	26
4	Drought	20
5	Flood	18
6	Volcano	16
7	Landslide	12
8	Dam Failure	10

TABLE 10-3.
LEGAL AND REGULATORY CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Zonings	Y	N	N	Y	NA
Subdivisions	Y	N	N	N	NA
Stormwater Management	N	N	N	?	NA
Growth Management	N	N	N	N	NA
Planning Documents					
Floodplain or Basin Plan	N	N	N	N	NA
Stormwater Plan	N	N	N	?	Presently being addressed
Capital Improvement Plan	N	N	N	N	NA
Emergency Response Plan	Y	N	N	Y	Fire and Police updates

Table 10-4.
Administrative and Technical Capability
All of these capabilities may be used for mitigation activities in the future

Staff/Personnel Resources	Available for mitigation activities	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Y	Contract service with engineer and PMC (private planning company)
Staff with training in benefit/cost analysis	Y	General Manager
Emergency manager	Y	Police Chief

TABLE 10-5.
FISCAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVITES IN THE FUTURE

Financial Resources	Accessible or Eligible to Use? To use for mitigation actions.
Capital Improvements Project Funding	Y
Authority to Levy Taxes for Specific Purposes	Y
User Fees for Water Service	Y
State Sponsored Grant Programs	Y

**TABLE 10-6.
COMMUNITY CLASSIFICATIONS**

	Participating?	Classification	Date Classified
Public Protection	No	—	—
Storm Ready	No	—	—
Firewise	No	—	—

**TABLE 10-7.
HAZARD MITIGATION ACTION PLAN MATRIX**

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
Initiative LS1—District Police and Fire Seismic Improvements							
Existing	All Hazards	1,2,4,6,8,9	CSD	$300,000 High	District Funds, FEMA Hazard Mitigation Grants	Short-term	Ongoing
Initiative LS2—District Water Well Electrical Generator Additions							
Existing	All Hazards	1,2,4	CSD	$350,000 High	District fund, FEMA Hazard Mitigation Grants	Short-term	Ongoing
Initiative LS3—District Construction of Emergency Operations Center in conjunction with Police and Fire							
New	All Hazards	1,2,4,5,6,8,9	CSD	$650,000 High	District fund, FEMA Hazard Mitigation Grants	Long Term	Ongoing
Initiative LS4—District Fire Engine Upgrade							
New	All Hazards	1,4,8.9	CSD	$550,000 High	District Funds, FEMA Hazard Mitigation Grants	Short-Term	Ongoing
Initiative LS5—District Fire Fuels abatement program							
Existing	Wildfire	1,2,3,4,5,7,8	CSD	$20,000/year High	Homeowners funds, FEMA Hazard Mitigation Grants	Short Term	Some areas completed Ongoing
Initiative LS6—Protect Lake Shastina as a fire suppression resource							
New	Wildfire, Volcano, Dam Failure	2,5,7,8	CSD	$5,000/year Medium	District Funds, Homeowner funds	Short Term	Ongoing

**TABLE 10-7.
HAZARD MITIGATION ACTION PLAN MATRIX**

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
Initiative LS7—Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	High	City, FEMA Mitigation Grants	Long Term	Ongoing
Initiative LS8—Support County-wide initiatives identified in Volume 1 of this Plan							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	Low	City	Short Term	Ongoing
Initiative LS9—Continue to support the implementation, monitoring, maintenance and updating of this Plan as identified in Volume 1							
New and Existing	All Hazards	1,2,3,4,5,6,7, 8,9	City	Low	City, FEMA Mitigation Grants	Short Term	Ongoing

**TABLE 10-8.
MITIGATION STRATEGY PRIORITY SCHEDULE**

Initiative #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]
LS1	6	High	High	Yes	Yes	No	High
LS2	3	High	High	Yes	Yes	No	High
LS3	7	High	High	Yes	Yes	No	High
LS4	4	High	High	Yes	Yes	No	High
LS5	7	High	High	Yes	Yes	Yes	Med
LS6	4	High	Med	Yes	No	Yes	Med
LS7	9	High	High	Yes	Yes	No	High
LS8	9	Med	Low	Yes	No	Yes	High
LS9	9	Med	Low	Yes	Yes	Yes	High

a. See Section 1.3 for definitions of high, medium and low priorities.

**TABLE 10-9.
ANALYSIS OF MITIGATION INITIATIVES**

	Initiative Addressing Hazard, by Mitigation Type[a]					
Hazard Type	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Dam Failure	3, 8, 9	3, 7	3, 6, 8, 9	6	14, 2	1, 3
Drought	8, 9	3, 7	3, 8, 9	6	3, 2	3

TABLE 10-9.
ANALYSIS OF MITIGATION INITIATIVES

Hazard Type	Initiative Addressing Hazard, by Mitigation Type[a] 1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Earthquake	3, 8, 9	1, 3, 7	3, 8, 9	2	1, 4, 2	1, 3
Flood	8, 9	7	3, 8, 9		1, 4	1, 3
Landslide	8, 9	1, 3, 7	3, 8, 9		1, 4, 2	1, 3
Severe Weather	3, 8, 9	1, 3, 7	3, 8, 9	2	1, 4, 2	1, 3
Volcano	3, 8, 9	1, 3, 7	3, 8, 9	6	1, 4, 2	1
Wildfire	3, 8, 9	3, 7	6, 5, 8, 9	5, 6	14, 2	1

a. See Section 1.3 for description of mitigation types

TABLE 10-10.
COMMUNITY OUTREACH

WILL BE PERROMING THESE OUTREACH EVENTS AND WILL INCLUDE MITIGATION EDJUCATION TO THE PUBLIC.

Outreach
Community Meetings Go Bag planning Schools
Fire Safe Council Meetings
PSA about Emergency Notification System and Testing
Use of Facebook and Twitter
Joint Community Hmong Preparedness Meetings for evacuations

CHAPTER 11. MCCLOUD COMMUNITY SERVICES DISTRICT ANNEX

11.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

Kevin Dalton
220 W. Minnesota Ave
McCloud, California 96057
Telephone: 530-964-2017
e-mail Address: Kimberly@ci.mccloudcsd.ca.us

Alternate Point of Contact

Amos McAbier
220 W. Minnesota Ave
McCloud, California 96057
Telephone: 530-964-2017
e-mail Address: Amos@ci.mccloudcsd.ca.us

11.2 JURISDICTION PROFILE

The McCloud Community Services District was formed on August 24, 1965 to provide water, sewer, waste, fire, parks and lighting to the unincorporated area in Siskiyou County. A five-member elected Board of Directors governs the District's operations and appoints a General Manager to manage the administrative functions of the District. The Board assumes the responsibility of this plan and the General Manager will oversee its implementation. As of October 1, 2011 the District serves 741 service connections and 633 sewer connections, with a current staff of 7. Funding comes primarily from rates and revenue bonds. The following is a summary of key information about the jurisdiction:

- **Population Served—**The District provides services to 1,101 persons as of March 2010.
- **Land Area Served—** The District service area consists of 1,700 acres or 2.58 square miles.
- **Value of Area Served—**The estimated value of the area served by the jurisdiction is $87,876,118
- **Land Area Owned—**The District has ownership of approximately 80 acres.
- **List of Critical Infrastructure/Equipment Owned by the Jurisdiction:**
    - Fire Department—Apparatus and equipment housed in a facility located in a natural hazard risk zone. This is the equipment that is essential for delivery of services to the area should a natural hazard occur. 2-engines, 1- squad vehicle, 1-pumper, 1 ambulance and their contents. Estimated replacement cost $1.5 million
    - Water System—25 miles of transmission and distribution pipeline in various diameters, including appurtenances, chlorination station, welded steel water storage tanks, pressure reducing stations and major maintenance equipment (938 Cat Loader, 6 yd. Dump Truck, John Deere Backhoe, Welder truck, flatbed truck and pickup trucks). Estimated cost $30 million.
    - Sewer System—20 miles of sewer collection system with appurtenances and sewer collection ponds and major equipment (sewer vacuum truck) estimated cost $15 million
- **Total Value of Critical Infrastructure/Equipment—**The total value of critical infrastructure and equipment owned by the jurisdiction is $46.5 million

- **List of Critical Facilities Owned by the Jurisdiction:**
  - Intake Springs Structure—Primary source of water to the community, the structure is a reinforced concrete vault. Estimated Cost of Replacement $250,000.
  - Upper Elk Springs—Primary Source of water supply to the community—the structure is a reinforced concrete vault. Estimated Replacement Cost $200,000.
  - Lower Elk Springs—Secondary Source of water supply for the community—the structure is a wood frame structure with a concrete perimeter base. The spring is a gallery and barrier wall with an outlet structure. Estimated replacement Cost $225,000.
  - Transmission Mains from water sources, diameters of 12-inch, 14-inch and 16-inch Steel and ductile iron pipe. Estimated replacement cost $4.5 million
  - Distribution Mains for the town of McCloud. Estimated Cost of Replacement $18.5 million
  - Fire Hall Structure—Houses Fire fighters and equipment for emergency response Estimated Replacement Cost. $400,000.
  - 1.2 Million gallon welded steel water storage tank. Estimated Replacement Cost $1.5 million.
- **Total Value of Critical Facilities—**The total value of critical facilities owned by the jurisdiction is $25.575 million
- **Current and Anticipated Service Trends—**MCSD has seen a decline in permanent residency. This decline may be the age of the community and the poor economy. Should the economic condition change the possibility of development for commercial and light industry would increase along with new residential development.

11.3 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

TABLE 11-1 lists all past occurrences of natural hazards within the jurisdiction.

11.4 HAZARD RISK RANKING

TABLE 11-2 presents the ranking of the hazards of concern.

11.5 APPLICABLE REGULATIONS AND PLANS

The following existing codes, ordinances, policies or plans are applicable to this hazard mitigation plan:

- Emergency Response, Policy No. 3300

11.6 CLASSIFICATION IN HAZARD MITIGATION PROGRAMS

The jurisdiction's classifications under various hazard mitigation programs are presented in **TABLE 11-6**. Due to the insufficient staff and funding we were not able to integrate information from the 2012 plan in the new plan.

11.7 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

TABLE 11- lists the initiatives that make up the jurisdiction's hazard mitigation plan. **TABLE 11-** identifies the priority for each initiative. **TABLE 11-** summarizes the mitigation initiatives by hazard of concern and the six mitigation types.

Part of the revision process is surveying the public about topics that are important to them and how they see the CSD changing in the next 25 years. Similar to the mapping exercise at a workshop, some of the questions are open ended asking about areas and features of concern. Over half of the participants indicated that safety was in the top 3 topic areas of interest. Even more of the participants mentioned flooding, wildfires, or natural disasters as high concerns for the CSD. Other major themes that came out of the survey is the need to preserve the pristine environment surrounding the CSD and the sense of community that is felt in the area.

The information gathered from the survey is integrated into the mitigation strategy of the 2018 update of the LHMP

The CSD General Plan which includes a Safety Element that will continue to collect input from the public. This information will be integrated into the Safety Element which is connected to the LHMP by state statute.

In addition to the General Plan process, the CSD will continually educate and engage the public in natural and man-made disaster planning with annual review of safety by the Planning Commission in a public meeting, publishing disaster related materials for the public, and engaging the public through public forums to address concerns.

11.8 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

A detailed flood plan for Panther, Mud and Squaw Creeks should be re-investigated and a mitigation plan initiated with the necessary funding. This will ease the burden of high premiums for flood insurance, which does nothing for mitigating the situation. A straightforward plan should be realized with the necessary funding to begin flood mitigation to ensure safety for residents of the community of McCloud.

TABLE 11-1.
NATURAL HAZARD EVENTS

Type of Event	Date	Preliminary Damage Assessment
Severe Flood	7/1/2011	$3,500
Severe Weather	3/8/2010	Estimate Unavailable
Severe Flood	1/4/1997	Estimate Unavailable

TABLE 11-2.
HAZARD RISK RANKING

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1	Severe winter Weather	54
2	Flood	54
3	Wild Fire	54
4	Earthquake	36
5	Drought	7
6	Land Slide	30
7	Volcano	18

TABLE 11-3.
LEGAL AND REGULATORY CAPABILITY
ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Stormwater Management	N	N	N	?	NA
Growth Management	N	N	N	N	NA
Planning Documents					
Floodplain or Basin Plan	N	N	N	N	NA
Stormwater Plan	N	N	N	?	Presently being addressed
Capital Improvement Plan	N	N	N	N	NA
Emergency Response Plan	Y	N	N	Y	NA

TABLE 11-4.
ADMINISTRATIVE AND TECHNICAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Staff/Personnel Resources	Available for mitigation activities	Department/Agency/Position
Staff with training in benefit/cost analysis	Y	General Manager
Emergency manager	Y	General Manager

TABLE 11-5.
FISCAL CAPABILITY

ALL OF THESE CAPABILITIES MAY BE USED FOR MITIGATION ACTIVIES IN THE FUTURE

Financial Resources	Accessible or Eligible to Use? To use for mitigation actions.
Authority to Levy Taxes for Specific Purposes	Y
User Fees for Water Service	Y
State Sponsored Grant Programs	Y

TABLE 11-6.
COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Public Protection	No	--	--
Storm Ready	No	--	--
Firewise	No	--	--

TABLE 11-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
MCSD-1 - Inform and educate the public on hazard mitigation and preparedness via a District operated website.							
Existing	All Hazards	1, 2, 5, 8	MCSD	$7000 Low	General Fund	Short-term	Ongoing

TABLE 11-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
MCSD-2—Relocate District owned critical facilities out of identified high hazard risk zones.							
Existing	All Hazards	1, 2, 4, 6	MCSD	High	FEMA Hazard Mitigation Grants	Long-term	Ongoing
MCSD-3—Collect improved data (hydrologic, topographic, geologic, volcanic, historic, etc.) to assess risks and vulnerabilities.							
New and Existing	All Hazards	1, 2, 3, 4, 5, 7	MCSD	$50,000 High	Grants, General Fund	Short-term	Ongoing
MCSD-4—Retrofit, rehabilitate, or replace vulnerable water system, storm water, and sewer facilities and infrastructure throughout the District.							
Existing	All Hazards	1, 2, 4, 6	MCSD	High	FEMA Hazard Mitigation Grants, other grants	Long-term	Ongoing
MCSD-5—Develop District continuity of operations plan and continuity of government plan.							
New	All Hazards	1, 3, 4, 7	MCSD	$50,000 Medium	Grants, General Fund	Short-term	Ongoing
MCSD-6—Design and construct drainage improvements along Panther Creek through the District to address repetitive damage from flooding on the adjacent roads and property.							
Existing	Flood	1, 2, 4	County, MCSD	$25,000 High	FEMA Hazard Mitigation Grants, other grants	Short-term	Ongoing
MCSD-7—Continue to maintain compliance with the National Flood Insurance Program.							
New and existing	Flood	1, 2, 3, 7	MCSD	Low	General Fund	Short-term	Ongoing
MCSD-8—Integrate goals, objectives, and initiatives of the Siskiyou County Hazard Mitigation Plan into existing district regulations and programs where appropriate.							
Existing	All Hazards	1, 2, 3, 5, 7	MCSD	Low	General Fund	Short-term	Ongoing
MCSD-9—Continue to support the implementation, monitoring, maintenance, and updating of this plan.							
New and Existing	All Hazards	All	MCSD	Low	General Fund, FEMA Hazard Mitigation Grant for 5-year update	Short-term	Ongoing
MCSD-10—Support County-wide initiatives identified in Volume 1 of this Plan							
New and Existing	All Hazards	1, 2, 3, 4, 5, 6, 7, 8, 9	City	Low	District	Short Term	Ongoing

TABLE 11-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
MCSD-11—Where appropriate, support retrofitting, purchase, or relocation of structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe loss properties as priority							
New and Existing	All Hazards	1, 2, 3, 4, 5, 6, 7, 8, 9	City	High	District, FEMA Mitigation Grants	Long Term	Ongoing

TABLE 11-8.
MITIGATION STRATEGY PRIORITY SCHEDULE

Initiative	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]
MCSD-1	4	Medium	Low	Yes	No	Yes	High
MCSD-2	4	High	High	Yes	Yes	No	Low
MCSD-3	6	High	High	Yes	No	No	High
MCSD-4	4	High	High	Yes	Yes	No	High
MCSD-5	4	Medium	Medium	Yes	Yes	Yes	High
MCSD-6	3	High	High	Yes	Yes	No	High
MCSD-7	4	High	Low	Yes	No	Yes	High
MCSD-8	4	High	Low	Yes	Yes	Yes	High
MCSD-9	9	High	Low	Yes	Yes	Yes	High
MCSD-10	9	High	Low	Yes	No	Yes	High
MCSD-11	9	High	High	Yes	Yes	No	Medium

a. See Section 1.3 for definitions of high, medium and low priorities.

TABLE 11-9.
ANALYSIS OF MITIGATION INITIATIVES

	Initiative Addressing Hazard, by Mitigation Type[a]					
Hazard Type	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Dam Failure	N/A	N/A	N/A	N/A	N/A	N/A
Drought	MCSD-1	MCSD-2, MCSD-7	MCSD-1, MCSD-8, MCSD-10	MCSD-3	MCSD-1, MCSD-8	MCSD-4
Earthquake	MCSD-8	MCSD-7, MCSD-8, MCSD-11	MCSD-1, MCSD-8, MCSD-10	MCSD-3	MCSD-1, MCSD-8	MCSD-4
Flood	MCSD-5, MCSD-6	MCSD-2, MCSD-7, MCSD-9, MCSD-11	MCSD-1, MCSD-8, MCSD-10	MCSD-3	MCSD-1, MCSD-2, MCSD-3, MCSD-8	MCSD-6, MCSD-7
Landslide	MCSD-6, MCSD-8	MCSD-2, MCSD-7, MCSD-9, MCSD,11	MCSD-1, MCSD-8, MCSD-10	MCSD-3	MCSD-1, MCSD-2, MCSD-3, MCSD-8	MCSD-6, MCSD-7
Severe Weather	MCSD-8	MCSD-3, MCSD-9, MCSD-11	MCSD-1, MCSD-8, MCSD-10	MCSD-3	MCSD-1 MCSD-8, MCSD-9	MCSD-4
Volcano	MCSD-8	MCSD-3, MCSD-9, MCSD-11	MCSD-1, MCSD-8, MCSD-10	MCSD-3	MCSD-1, MCSD-8, MCSD-9	MCSD-4
Wildfire	MCSD-8	MCSD-3, MCSD-9, MCSD-11	MCSD-1, MCSD-8, MCSD-10	MCSD-3	MCSD-1, MCSD-8, MCSD-9	MCSD-4

a. See Section 1.3 for description of mitigation types

TABLE 11-10.
COMMUNITY OUTREACH

WILL BE PERROMING THESE OUTREACH EVENTS AND WILL INCLUDE MITIGATION EDJUCATION TO THE PUBLIC.

Outreach
Community Meetings Go Bag planning Schools
Fire Safe Council Meetings
PSA about Emergency Notification System and Testing
Use of Facebook and Twitter
Joint Community Hmong Preparedness Meetings for evacuations

Siskiyou County
Hazard Mitigation Plan
Volume 2: Planning Partner Annexes

APPENDIX A. PLANNING PARTNER EXPECTATIONS

August 2018

APPENDIX A.
PLANNING PARTNER EXPECTATIONS

Siskiyou County
Hazard Mitigation Plan
Volume 2: Planning Partner Annexes

APPENDIX B. PROCEDURES FOR LINKING TO THE HAZARD MITIGATION PLAN

August 2018

APPENDIX B.
PROCEDURES FOR LINKING TO THE HAZARD MITIGATION PLAN

Not all eligible local governments within Siskiyou County are included in the Siskiyou County Hazard Mitigation Plan. It is assumed that some or all of these non-participating local governments may choose to "link" to the Plan at some point to gain eligibility for programs under the federal Disaster Mitigation Act. In addition, some of the current partnership may not continue to meet eligibility requirements due to a lack of participation as prescribed by the plan. The following "linkage" procedures define the requirements established by the Plan's Steering Committee and all planning partners for dealing with an increase or decrease in the number of planning partners linked to this plan. It should be noted that a currently non-participating jurisdiction within the defined planning area is not obligated to link to this plan. These jurisdictions can chose to do their own "complete" plan that addresses all required elements of section 201.6 of 44CFR.

INCREASING THE PARTNERSHIP THROUGH LINKAGE

The annual time period for the linkage process will be from January to April during any year. Eligible linking jurisdictions are instructed to complete ***all*** of the following procedures during this time frame:

- The eligible jurisdiction requests a "Linkage Package" by contacting the Point of Contact (POC) for the plan:

  Name:
  Title:
  Address:
  City, State ZIP:
  Phone:
  e-mail :

  The POC will provide a linkage packages that includes:

  - Copy of Volume 1 and 2 of the plan
  - Planning partner's expectations package.
  - A sample "letter of intent" to link to the Hazard Mitigation Plan.
  - A Special Purpose District or City template and instructions.
  - Catalog of Hazard Mitigation Alternatives
  - A "request for technical assistance" form.
  - A copy of Section 201.6 of Chapter 44, the Code of Federal Regulations (44CFR), which defines the federal requirements for a local hazard mitigation plan.
- The new jurisdiction will be required to review both volumes of the Hazard Mitigation Plan, which includes the following key components for the planning area:
  - The planning area risk assessment
  - Goals and objectives
  - Plan implementation and maintenance procedures

  - Comprehensive review of alternatives
  - County-wide initiatives.

  Once this review is complete, the jurisdiction will complete its specific annex using the template and instructions provided by the POC. Technical assistance can be provided upon request by completing the request for technical assistance (TA) form provided in the linkage package. This TA may be provided by the POC or any other resource within the planning partnership such as a member of the Steering Committee or a currently participating City or Special Purposes District partner. The POC will determine who will provide the TA and the possible level of TA based on resources available at the time of the request.

- The new jurisdiction will be required to develop a public involvement strategy that ensures the public's ability to participate in the plan development process. At a minimum, the new jurisdiction must make an attempt to solicit public opinion on hazard mitigation at the onset of this linkage process and a minimum of one public meeting to present their draft jurisdiction specific annex for comment, prior to adoption by the governing body. The planning partnership will have resources available to aid in the public involvement strategy such as the Plan website. However, it will be the new jurisdiction's responsibility to implement and document this strategy for incorporation into its annex. It should be noted that the Jurisdictional Annex templates ***do not*** include a section for the description of the public process. This is because the original partnership was covered under a uniform public involvement strategy that covered the planning area described in Volume 1 of the plan. Since new partners were not addressed by that strategy, they will have to initiate a new strategy, and add a description of that strategy to their annex. For consistency, new partners are encouraged to follow the public involvement format utilized by the initial planning effort as described in Volume 1 of the plan.
- Once their public involvement strategy is completed and they have completed their template, the new jurisdiction will submit the completed package to the POC for a pre-adoption review to ensure conformance with the Regional plan format.
- The POC will review for the following:
  - Documentation of Public Involvement strategy
  - Conformance of template entries with guidelines outlined in instructions
  - Chosen initiatives are consistent with goals, objectives and mitigation catalog of the Planning Area Hazard Mitigation Plan
  - A Designated point of contact
  - A ranking of risk specific to the jurisdiction.

  The POC may utilize members of the Steering Committee or other resources to complete this review. All proposed linked annexes will be submitted to the Steering Committee for review and comment prior to submittal to CalEMA.

- Plans approved and accepted by the Steering Committee will be forwarded to CalEMA for review with a cover letter stating the forwarded plan meets local approved plan standards and whether the plan is submitted with local adoption or for criteria met/plan not adopted review.
- CalEMA will review plans for federal compliance. Non-Compliant plans are returned to the Lead agency for correction. Compliant plans are forwarded to FEMA for review with annotation as to the adoption status.

- FEMA reviews the new jurisdiction's plan in association with the approved plan to ensure DMA compliance. FEMA notifies new jurisdiction of results of review with copies to CalEMA and approved planning authority.
- New jurisdiction corrects plan shortfalls (if necessary) and resubmits CalEMA through the approved plan lead agency.
- For plans with no shortfalls from the FEMA review that have not been adopted, the new jurisdiction governing authority adopts the plan (if not already accomplished) and forwards adoption resolution to FEMA with copies to lead agency and CalEMA
- FEMA regional director notifies new jurisdiction governing authority of plan approval.

The new jurisdiction plan is then included with the regional plan with the commitment from the new jurisdiction to participate in the ongoing plan implementation and maintenance.

DECREASING THE PARTNERSHIP

The eligibility afforded under this process to the planning partnership can be rescinded in two ways. First, a participating planning partner can ask to be removed from the partnership. This may be done because the partner has decided to develop its own plan or has identified a different planning process for which it can gain eligibility. A partner that wishes to voluntarily leave the partnership shall inform the POC of this desire in writing. This notification can occur any time during the calendar year. A jurisdiction wishing to pursue this avenue is advised to make sure that it is eligible under the new planning effort, to avoid any period of being out of compliance with the Disaster Mitigation Act.

After receiving this notification, the POC shall immediately notify both CalEMA and FEMA in writing that the partner in question is no longer covered by the Hazard Mitigation Plan, and that the eligibility afforded that partner under this plan should be rescinded based on this notification.

The second way a partner can be removed from the partnership is by failure to meet the participation requirements specified in the "Planning Partner Expectations" package provided to each partner at the beginning of the process, or the plan maintenance and implementation procedures specified under chapter 7 in Volume 1 of the plan. Each partner agreed to these terms by adopting the plan.

Eligibility status of the planning partnership will be monitored by the POC. The determination of whether a partner is meeting its participation requirements will be based on the following parameters:

- Are progress reports being submitted annually by the specified time frames?
- Are partners notifying the POC of changes in designated points of contact?
- Are the partners supporting the Steering Committee by attending designated meetings or responding to needs identified by the body?
- Are the partners continuing to be supportive as specified in the planning partners expectations package provided to them at the beginning of the process?

Participation in the plan does not end with plan approval. This partnership was formed on the premise that a group of planning partners would pool resources and work together to strive to reduce risk within the planning area. Failure to support this premise lessens the effectiveness of this effort. The following procedures will be followed to remove a partner due to the lack of participation:

- The POC will advise the Steering Committee of this pending action and provide evidence or justification for the action. Justification may include: multiple failures to submit annual progress reports, failure to attend meetings determined to be mandatory by the Steering Committee, failure to act on the partner's action plan, or inability to reach designated point of contact after a minimum of five attempts.

- The Steering Committee will review information provided by POC, and determine action by a vote. The Steering Committee will invoke the voting process established in the ground rules established during the formation of this body.
- Once the Steering Committee has approved an action, the POC will notify the planning partner of the pending action in writing via certified mail. This notification will outline the grounds for the action, and ask the partner if it is their desire to remain as a partner. This notification shall also clearly identify the ramifications of removal from the partnership. The partner will be given 30 days to respond to the notification.
- Confirmation by the partner that they no longer wish to participate or failure to respond to the notification shall trigger the procedures for voluntary removal discussed above.
- Should the partner respond that they would like to continue participation in the partnership, they must clearly articulate an action plan to address the deficiencies identified by the POC. This action plan shall be reviewed by the Steering Committee to determine whether the actions are appropriate to rescind the action. Those partners that satisfy the Steering Committee's review will remain in the partnership, and no further action is required.
- Automatic removal from the partnership will be implemented for partners where these actions have to be initiated more than once in a 5 year planning cycle.

APPENDIX C. JURISDICTIONAL ANNEX INSTRUCTIONS AND TEMPLATE FOR MUNICIPALITIES

August 2018

INSTRUCTIONS FOR COMPLETING MUNICIPALITY ANNEX TEMPLATE

This document provides instructions for completing the annex template for city and county governments participating in multi-partner hazard mitigation planning. Assistance in completing the template will be available in the form of a workshop for all planning partners or one-on-one visits with each partner, depending on funding availability. Any questions on completing the template should be directed to:

Jasen Vela
Siskiyou County OES.
806 S. Main St
Yreka Ca. 96097
530-841-2155
e-mail: jvela@co.siskiyou.ca.us

Please provide both a hard copy and digital copy of the completed template to Tetra Tech upon completion.

Associated Materials:

Along with the annex template and these instructions, you have been provided with other materials with information that is needed for completing the template. Be sure to review these materials ***before*** you begin the process of filling in the template:

- Summary-of-loss matrix for the hazard mitigation plan
- Results from the hazard mitigation plan questionnaire
- Catalog of mitigation alternatives
- Fact sheet on Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Grant Program (PDM)

A Note About Software:

The template for the municipal jurisdiction annex is a Microsoft Word document in a format that will be used in the final plan. Partners are asked to use this template so that a uniform product will be completed for each partner. Partners who do not have Microsoft Word capability may prepare the document in other formats, and the planning team will convert it to the Word format.

CHAPTER NUMBER AND TITLE

In the chapter title at the top of Page 1, type in the complete official name of your jurisdiction (The City of Metropolis, Jefferson County, etc.). At this time, also change the name in the "header" box on Page 3, using the same wording.

Note that the template is set up as Chapter "X." Please leave all references to "X" in the template as they are. Once all templates are received, chapter numbering will be assigned for incorporation into the final plan.

HAZARD MITIGATION PLAN POINT OF CONTACT

Please provide the name, title, mailing address, telephone number, and e-mail address for the primary point of contact for your jurisdiction. This should be the person responsible for monitoring, evaluating and updating the annex for your jurisdiction. This person should also be the principle liaison between your jurisdiction and the Steering Committee overseeing development of this plan.

In addition, designate an alternate point of contact. This would be a person to contact should the primary point of contact be unavailable or no longer employed by the jurisdiction.

JURISDICTION PROFILE

Provide information specific to your jurisdiction as indicated, in a style similar to the example provided in the box at right. This should be information that was not provided in the overall mitigation plan document. For population data, use the most current population figure for your jurisdiction based on an official means of tracking (e.g., the U.S. Census or state office of financial management).

JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Chronological List of Hazard Events

In Table X-1, list in chronological order (most recent first) any natural hazard event that has caused damage to your jurisdiction since 1975. Include the date of the event and the estimated dollar amount of damage it caused. Please refer to the summary of natural hazard events within risk assessment of the overall hazard mitigation plan. Potential sources of damage information include:

- Preliminary damage estimates your jurisdiction filed with the county or state
- Insurance claims data
- Newspaper archives
- Other plans/documents that deal with emergency management (safety element of a comprehensive plan, emergency response plan, etc.)
- Citizen input.

Repetitive Loss Properties

A repetitive loss property is any property for which FEMA has paid two or more flood insurance claims in excess of $1,000 in any rolling 10-year period since 1978. In the space provided in the text for Section X.3, indicate the number of any FEMA-identified Repetitive Flood Loss properties in your

Example Jurisdiction Profile:

- **Date of Incorporation**—1858
- **Current Population**—17,289 as of July 2006
- **Population Growth—**Based on the data tracked by the California Department of Finance, Arcata has experienced a relatively flat rate of growth. The overall population has increased only 3.4% since 2000 and has averaged 0.74% per year from 1990 to 2007
- **Location and Description**—The City of Arcata is located on California’s redwood coast, approximately 760 miles north of Los Angeles and 275 miles north of San Francisco. The nearest seaport is Eureka, five miles south on Humboldt Bay. Arcata is the home of Humboldt State University and is situated between the communities of McKinleyville to the north and Blue Lake to the east. It sits at the intersection of US Highway 101 and State Route 299.
- **Brief History**—The Arcata area was settled during the California gold rush in the 1850s as a supply center for miners. As the gold rush died down, timber and fishing became the area’s major economic resource. Arcata was incorporated in 1858 and by 1913 the Humboldt Teachers College, a predecessor to today’s Humboldt State University was founded in Arcata. Recently, the presence of the college has come to shape Arcata’s population into a young, liberal, and educated crowd. In 1981 Arcata developed the Arcata Marsh and Wildlife sanctuary, an innovative environmentally friendly, sewage treatment enhancement system.
- **Climate**—Arcata’s weather is typical of the Northern California coast, with mild summers and cool, wet winters. It rarely freezes in the winter and it is rarely hot in the summer. Annual average rainfall is over 40 inches, with 80% of that falling in the six-month period of November through April. The average year-round temperature is 59ºF. Humidity averages between 72 and 87 percent. Prevailing winds are from the north, and average 5 mph.
- **Governing Body Format**—The City of Arcata is governed by a five-member City Council. The City consists of six departments: Finance, Environmental Services, Community Development, Public Works, Police and the City Manager’s Office. The City has 13 Committees, Commissions and Task Forces, which report to the City Council.
- **Development Trends**—Anticipated development levels for Arcata are low to moderate, consisting primarily of residential development. The majority of recent development has been infill. Residentially, there has been a focus on affordable housing and a push for more secondary mother-in-law units on properties.

  The City of Arcata adopted its general plan in July 2000. The plan focuses on issues of the greatest concern to the community. City actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with such a plan. Future growth and development in the City will be managed as identified in the general plan.

jurisdiction (your technical assistance provider will be able to help you confirm this information). If you have none, indicate "none" in the space provided.

Next, indicate the number (if any) of repetitive loss structures in your jurisdiction that have been mitigated. Mitigated for this exercise means that flood protection has been provided to the structure. If you do not know the answer to this question, the planning team will provide it for you.

HAZARD RISK RANKING

The risk ranking performed for the overall planning area is presented in the risk assessment section of the overall hazard mitigation plan. However, each jurisdiction has differing degrees of risk exposure and vulnerability and therefore needs to rank risk for its own area, using the same methodology as used for the overall planning area. The risk-ranking exercise assesses two variables for each hazard: its probability of occurrence; and its potential impact on people, property and the economy. A detailed discussion of the concepts associated with risk ranking is provided in the overall hazard mitigation plan. The instructions below outline steps for assessing risk in your jurisdiction to develop results that are to be included in the template.

Determine Probability of Occurrence for Each Hazard

A probability factor is assigned based on how often a hazard is likely to occur. In Table 1, list the probability of occurrence for each hazard as it pertains to your jurisdiction, along with its probability factor, as follows:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor = 2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor = 1)
- None—If there is no exposure to a hazard, there is no probability of occurrence (Probability Factor = 0)

TABLE 1.
HAZARD PROBABILITY OF OCCURRENCE

Hazard Type	Probability	Probability Factor

The probability of occurrence of a hazard event is generally based on past hazard events in an area. For example, if your jurisdiction has experienced two damaging floods in the last 25 years, the probability of occurrence is high for flooding and scores a 3 under this category. If your jurisdiction has experienced no damage from landslides in the last 100 years, your probability of occurrence for landslide is low, and scores a 1 under this category.

Determine Potential Impacts of Each Hazard

The impact of each hazard was divided into three categories: impacts on people, impacts on property, and impacts on the economy. These categories were also assigned weighted values. Impact on people was assigned a weighting factor of 3, impact on property was assigned a weighting factor of 2 and impact on the economy was assigned a weighting factor of 1. Steps to assess each type of impact are described below.

Impacts on People

To assess impacts on people, values are assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. In Table 2, list the potential impact of each hazard on people in your jurisdiction, along with its impact factor, as follows:

- High Impact—50% or more of the population is exposed to a hazard (Impact Factor = 3)
- Medium Impact—25% to 49% of the population is exposed to a hazard (Impact Factor = 2)
- Low Impact—25% or less of the population is exposed to the hazard (Impact Factor = 1)
- No impact—None of the population is exposed to a hazard (Impact Factor = 0)

TABLE 2.
HAZARD IMPACT ON PEOPLE

Hazard Type	Impact	Impact Factor	Weighted Impact Factor (Unweighted Factor x 3)

Impacts on Property

To assess impacts on property, values are assigned based on the percentage of the total ***property value exposed*** to the hazard event. In Table 3, enter the cost estimates for potential damage to exposed structures, taken from the “Summary of Loss” matrix provided with these instructions.

TABLE 3. COST ESTIMATES FOR POTENTIAL DAMAGE TO STRUCTURES	
Hazard type	Estimate of Potential Dollar Losses to Exposed Structures

In Table 4, list the potential impact of each hazard on property in your jurisdiction, along with its impact factor. Determine impact based on damage estimates from Table 3, as follows:

- High Impact—30% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)
- Medium Impact—15% to 29% of the total assessed property value is exposed to a hazard (Impact Factor = 2)
- Low Impact—14% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)
- No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)

TABLE 4. HAZARD IMPACT ON PROPERTY			
Hazard Type	Impact	Impact Factor	Weighted Impact Factor (Unweighted Factor x 2)

Impacts on the Economy

To assess impacts on the economy, values are assigned based on the percentage of the total ***property value vulnerable*** to the hazard event. Values represent estimates of the loss from a major event of each hazard in comparison to the total assessed value of property in the county. For some hazards, such as wildfire, landslide and severe weather, vulnerability is the same as exposure due to the lack of loss estimation tools specific to those hazards. In Table 5, list the potential impact of each hazard on the economy in your jurisdiction, along with its impact factor, as follows:

- High Impact—Estimated loss from the hazard is 20% or more of the total assessed property value (Impact Factor = 3)
- Medium Impact—Estimated loss from the hazard is 10% to 19% of the total assessed property value (Impact Factor = 2)
- Low Impact—Estimated loss from the hazard is 8% or less of the total assessed property value (Impact Factor = 1)
- No impact—No loss is estimated from the hazard (Impact Factor = 0)

TABLE 5.
HAZARD IMPACT ON THE ECONOMY

Hazard Type	Impact	Impact Factor	Weighted Impact Factor (Unweighted Factor x 1)

Determine Risk Rating for Each Hazard

A risk rating for each hazard is determined by multiplying the assigned probability factor by the sum of the weighted impact factors for people, property and the economy:

- Risk Rating = Probability Factor x Weighted Impact Factor {people + property + economy}

Using the results developed in Tables 1, 2, 4 and 5, complete Table 6 to calculate a risk rating for each hazard of concern.

TABLE 6. HAZARD RISK RATING			
Hazard Type	Probability Factor (P)	Sum of Weighted Impact Factors on People, Property & Economy (I)	Risk Rating (P x I)

Complete Risk Ranking in Template

Once Table 6 has been completed above, complete Table X-2 in your template. The hazard with the highest risk rating in Table 6 should be listed at the top of Table X-2 and given a rank of 1; the hazard with the second highest rating should be listed second with a rank of 2; and so on. Two hazards with equal risk ratings should be given the same rank.

It is important to note that this exercise should not override your subjective assessment of relative risk based on your knowledge of the history of natural hazard events in your jurisdiction. If this risk ranking exercise generates results other that what you know based on substantiated data and documentation, you may alter the ranking based on this knowledge. If this is the case, please note this fact in the comments at the end of the template. Remember, one of the purposes of this exercise is to support the selection and prioritization of initiatives in your plan. If you identify an initiative with a high priority that mitigates the risk of a hazard you have ranked low, that project will not be competitive in the grant arena.

CAPABILITY ASSESSMENT

Legal and Regulatory Capability

Describe the legal authorities available to your jurisdiction and/or enabling legislation at the state level affecting planning and land management tools that can support hazard mitigation initiatives. In Table X-3, indicate "Yes" or "No" for each listed code, ordinance, requirement or planning document in each of the following columns:

- Local Authority—Enter "Yes" if your jurisdiction has prepared or adopted the identified item; otherwise, enter "No." If yes, then enter the code or ordinance number and its date of adoption in the comments column.
- State or Federal Prohibitions—Enter "Yes" if there are any state or federal regulations or laws that would prohibit local implementation of the identified item; otherwise, enter "No."
- Other Regulatory Authority—Enter "Yes" if there are any regulations that may impact your initiative that are enforced or administered by another agency (e.g., a state agency or special purpose district); otherwise, enter "No."

- State Mandated—Enter “Yes” if state laws or other requirements enable or require the listed item to be implemented at the local level; otherwise, enter “No.”

Administrative and Technical Capability

This section requires you to take inventory of the staff/personnel resources available to your jurisdiction to help with hazard mitigation planning and implementation of specific mitigation actions.

Complete Table X-4 by indicating whether your jurisdiction has access to each of the listed personnel resources. Enter “Yes” or “No” in the column labeled “Available?”. If yes, then enter the department and position title in the right-hand column.

Financial Resources

Identify what financial resources (other than the Hazard Mitigation Grant Program and the Pre-Disaster Mitigation Grant Program) are available to your jurisdiction for implementing mitigation initiatives.

Complete Table X-5 by indicating whether each of the listed financial resources is accessible to your jurisdiction. Enter “Yes” if the resource is fully accessible to your jurisdiction. Enter “No” if there are limitations or prerequisites that may hinder your eligibility for this resource.

Community Mitigation Related Classifications

Complete Table X-6 to indicate your jurisdiction’s participation in various national programs related to natural hazard mitigation. For each program enter “Yes” or “No” in the second column to indicate whether your jurisdiction participates. If yes, then enter the classification that your jurisdiction has earned under the program in the third column and the date on which that classification was issued in the fourth column; enter “N/A” in these columns if your jurisdiction is not participating.

HAZARD MITIGATION ACTION PLAN

Action Plan Matrix

Identify the initiatives your jurisdiction would like to pursue with this plan. Refer to the mitigation catalog for mitigation options you might want to consider. Be sure to consider the following factors in your selection of initiatives:

- Select initiatives that are consistent with the overall goals, objectives and guiding principles of the hazard mitigation plan.
- Identify projects where benefits exceed costs.
- Include any project that your jurisdiction has committed to pursuing regardless of grant eligibility.
- Know what is and is not grant-eligible under the HMGP and PDM (see fact sheet provided). Listing HMGP or PDM as a potential funding source for an ineligible project will be a red flag when this plan goes through review. If you have projects that are not HMGP or PDM grant eligible, but do mitigate part or all of the hazard and may be eligible for other grant programs sponsored by other agencies, include them in this section.
- Although you should identify at least one initiative for your highest ranked risk, a hazard-specific project is not required for every hazard. If you have not identified an earthquake related project, and an earthquake occurs that causes damage in your jurisdiction, you are not discounted from HMGP project grant eligibility.

Complete Table X-7 for all the initiatives you have identified:

- Enter the initiative number and description.
- Indicate whether the initiative mitigates hazards for new or existing assets.
- Identify the specific hazards the initiative will mitigate.
- Identify by number the mitigation plan objectives that the initiative addresses. These have been provided in the Steering Committee meeting minutes that were forwarded to you in the past.
- Indicate who will be the lead in administering the project. This will most likely be your governing body.
- Identify funding sources for the project. If it is a grant, include the funding sources for the cost share. Refer to your fiscal capability assessment (Table X-5) to identify possible sources of funding.
- Indicate the time line as "short term" (1 to 5 years) or "long term" (5 years or greater).

Wording Your Initiative Descriptions:

Descriptions of your initiatives need not provide great detail. That will come when you apply for a project grant. Provide enough information to identify the project's scope and impact. The following are typical descriptions for an action plan initiative:

- **Initiative 1—**Address Repetitive Loss properties. Through targeted mitigation, acquire, relocate or retrofit the five repetitive loss structures in the County as funding opportunities become available.
- **Initiative 2—**Perform a non-structural, seismic retrofit of City Hall.
- **Initiative 3—**Acquire floodplain property in the Smith subdivision.
- **Initiative 4—**Enhance the County flood warning capability by joining the NOAA "Storm Ready" program.

Technical assistance will be available to your jurisdiction in completing this section during the technical assistance visit.

Prioritization of Mitigation Initiatives

Complete the information in Table X-8 as follows:

- Initiative—Indicate the initiative number from Table X-7.
- of Objectives Met—Enter the number of objectives the initiative will meet.
- Benefits—Enter "High," "Medium" or "Low" as follows:
  - High: Project will have an immediate impact on the reduction of risk exposure to life and property.
  - Medium: Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
  - Low: Long-term benefits of the project are difficult to quantify in the short term.
- Costs—Enter "High," "Medium" or "Low" as follows:
  - High: Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.
  - Medium: Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
  - Low: Possible to fund under existing budget. Project is part of, or can be part of an existing ongoing program.

If you know the estimated cost of a project because it is part of an existing, ongoing program, indicate the amount.

- Do Benefits Exceed the Cost?—Enter "Yes" or "No." This is a qualitative assessment. Enter "Yes" if the benefit rating (high, medium or low) is the same as or higher than the cost rating (high benefit/high cost; high benefit/medium cost; medium benefit/low cost; etc.). Enter "No" if the benefit rating is lower than the cost rating (medium benefit/high cost, low benefit/medium cost; etc.)
- Is the Project Grant-Eligible?—Enter "Yes" or "No." Refer to the fact sheet on HMGP and PDM.
- Can Project Be Funded Under Existing Program Budgets?—Enter "Yes" or "No." In other words, is this initiative currently budgeted for, or would it require a new budget authorization or funding from another source such as grants?
- Priority—Enter "High," "Medium" or "Low" as follows:
    - High: Project meets multiple plan objectives, benefits exceed cost, funding is secured under existing programs, or is grant eligible, and project can be completed in 1 to 5 years (i.e., short term project) once funded.
    - Medium: Project meets at least 1 plan objective, benefits exceed costs, requires special funding authorization under existing programs, grant eligibility is questionable, and project can be completed in 1 to 5 years once funded.
    - Low: Project will mitigate the risk of a hazard, benefits exceed costs, funding has not been secured, project is not grant eligible, and time line for completion is long term (5 to 10 years).

This prioritization is a simple review to determine that the initiatives you have identified meet one of the primary objectives of the Disaster Mitigation Act. It is not the detailed benefit/cost analysis required for HMGP/PDM project grants. The prioritization will identify any projects whose probable benefits will not exceed the probable costs.

Analysis of Mitigation Actions

Complete Table X-9 summarizing the mitigation actions by hazard of concern and the following six mitigation types:

- Prevention—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- Property Protection—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- Public Education and Awareness—Actions to inform citizens and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- Natural Resource Protection—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

- Emergency Services—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- Structural Projects—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.

This exercise demonstrates that the jurisdiction has selected a comprehensive range of actions.

FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

In this section, identify any future studies, analyses, reports, or surveys your jurisdiction needs to better understand its vulnerability to identified or currently unidentified risks. These could be needs based on federal or state agency mandates such as EPA's Bio-terrorism assessment requirement for water districts.

ADDITIONAL COMMENTS

Use this section to add any additional information pertinent to hazard mitigation and your jurisdiction not covered in this template.

CHAPTER X.
[INSERT JURISDICTION NAME] ANNEX

X.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

[Name, Title]
[Street Address]
[City, State ZIP]
Telephone: [Phone]
e-mail Address: [email address]

Alternate Point of Contact

[Name, Title]
[Street Address]
[City, State ZIP]
Telephone: [Phone]
e-mail Address: [email address]

X.2 JURISDICTION PROFILE

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation—**[Insert Date of Incorporation]
- **Current Population—**[Insert Population] as of [Insert Date of Population Count]
- **Population Growth—**[Insert Discussion of Population Growth]
- **Location and Description—**[Insert Description of Location, Surroundings, Key Geographic Features]
- **Brief History—**[Insert Summary Discussion of Jurisdiction's History]
- **Climate—**[Insert Summary Discussion of Climate]
- **Governing Body Format—**[Insert Summary Description of Governing Body]
- **Development Trends—**[Insert Summary Description of Development]

X.3 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table X-1 lists all past occurrences of natural hazards within the jurisdiction. Repetitive loss records are as follows:

- Number of FEMA Identified Repetitive Flood Loss Properties: [Insert]
- Number of Repetitive Flood Loss Properties that have been mitigated: [Insert]

X.4 HAZARD RISK RANKING

Table X-2 presents the ranking of the hazards of concern.

X.5 CAPABILITY ASSESSMENT

The assessment of the jurisdiction's legal and regulatory capabilities is presented in Table X-3. The assessment of the jurisdiction's administrative and technical capabilities is presented in Table X-4. The assessment of the jurisdiction's fiscal capabilities is presented in Table X-5. Classifications under various community mitigation programs are presented in Table X-6.

X.6 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

Table X-7 lists the initiatives that make up the jurisdiction's hazard mitigation plan. Table X-8 identifies the priority for each initiative. Table X-9 summarizes the mitigation initiatives by hazard of concern and the six mitigation types.

X.7 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

[Insert text, if any]

X.8 ADDITIONAL COMMENTS

[Insert text, if any]

TABLE X-1.
NATURAL HAZARD EVENTS

Type of Event	FEMA Disaster (if applicable)	Date	Preliminary Damage Assessment

TABLE X-2.
HAZARD RISK RANKING

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1		
2		
3		
4		
5		
6		
7		
8		
9		

TABLE X-3.
LEGAL AND REGULATORY CAPABILITY

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Building Code					
Zonings					
Subdivisions					
Stormwater Management					
Post Disaster Recovery					
Real Estate Disclosure					
Growth Management					
Site Plan Review					
Special Purpose (flood management, critical areas)					
Planning Documents					
General Plan					
Capital Improvement Plan					
Economic Development Plan					
Floodplain or Basin Plan					
Stormwater Plan					
Habitat Conservation Plan					
Shoreline Management Plan					
Emergency Response Plan					
Continuity of Operations Plan					
Post Disaster Recovery Plan					
Terrorism Plan					
Other					
Other					

TABLE X-4. ADMINISTRATIVE AND TECHNICAL CAPABILITY		
Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices		
Engineers or professionals trained in building or infrastructure construction practices		
Planners or engineers with an understanding of natural hazards		
Staff with training in benefit/cost analysis		
Floodplain manager		
Surveyors		
Personnel skilled or trained in GIS applications		
Scientist familiar with natural hazards in local area		
Emergency manager		
Grant writers		

TABLE X-5. FISCAL CAPABILITY	
Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	
Capital Improvements Project Funding	
Authority to Levy Taxes for Specific Purposes	
User Fees for Water, Sewer, Gas or Electric Service	
Incur Debt through General Obligation Bonds	
Incur Debt through Special Tax Bonds	
Incur Debt through Private Activity Bonds	
Withhold Public Expenditures in Hazard-Prone Areas	
State Sponsored Grant Programs	
Development Impact Fees for Homebuyers or Developers	
Other	

TABLE X-6.
COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Community Rating System			
Building Code Effectiveness Grading Schedule			
Public Protection			
Storm Ready			
Firewise			

TABLE X-7.
HAZARD MITIGATION ACTION PLAN MATRIX

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							

TABLE X-8.
MITIGATION STRATEGY PRIORITY SCHEDULE

Initiative	of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]

a. See Section ___ for definitions of high, medium and low priorities.

TABLE X-9.
ANALYSIS OF MITIGATION INITIATIVES

	Initiative Addressing Hazard, by Mitigation Type[a]					
Hazard Type	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects

a. See Section ___ for description of mitigation types

Siskiyou County

Hazard Mitigation Plan

Volume 2: Planning Partner Annexes

APPENDIX D. JURISDICTIONAL ANNEX INSTRUCTIONS AND TEMPLATE FOR SPECIAL-PURPOSE DISTRICTS

August 2018

INSTRUCTIONS FOR COMPLETING SPECIAL-PURPOSE DISTRICT ANNEX TEMPLATE

This document provides instructions for completing the annex template for special-purpose districts participating in multi-partner hazard mitigation planning. Assistance in completing the template will be available in the form of a workshop for all planning partners or one-on-one visits with each partner, depending on funding availability. Any questions on completing the template should be directed to:

Jasen Vela
Siskiyou County OES.
806 S. Main St
Yreka Ca. 96097
530-841-2155
e-mail: jvela@co.siskiyou.ca.us

Please provide both a hard copy and digital copy of the completed template to Tetra Tech upon completion.

Associated Materials:

Along with the annex template and these instructions, you have been provided with other materials with information that is needed for completing the template. Be sure to review these materials ***before*** you begin the process of filling in the template:

- Summary-of-loss matrix for the hazard mitigation plan
- Results from the hazard mitigation plan questionnaire
- Catalog of mitigation alternatives
- Fact sheet on Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Grant Program (PDM)

A Note About Software:

The template for the municipal jurisdiction annex is a Microsoft Word document in a format that will be used in the final plan. Partners are asked to use this template so that a uniform product will be completed for each partner. Partners who do not have Microsoft Word capability may prepare the document in other formats, and the planning team will convert it to the Word format.

CHAPTER NUMBER AND TITLE

In the chapter title at the top of Page 1, type in the complete official name of your jurisdiction (West County Fire Protection District 1, Burgville Flood Protection District, etc.). At this time, also change the name in the “header” box on Page 3, using the same wording.

Note that the template is set up as Chapter “X.” Please leave all references to “X” in the template as they are. Once all templates are received, chapter numbering will be assigned for incorporation into the final plan.

HAZARD MITIGATION PLAN POINT OF CONTACT

Please provide the name, title, mailing address, telephone number, and e-mail address for the primary point of contact for your jurisdiction. This should be the person responsible for monitoring, evaluating and updating the annex for your jurisdiction. This person should also be the principle liaison between your jurisdiction and the Steering Committee overseeing development of this plan.

In addition, designate an alternate point of contact. This would be a person to contact should the primary point of contact be unavailable or no longer employed by the jurisdiction.

JURISDICTION PROFILE

Narrative Profile

Please provide a brief summary to profile your jurisdiction. Include the purpose of the jurisdiction, the date of inception, the type of organization, the number of employees, the mode of operation (i.e., how operations are funded), the type of governing body, and who has adoptive authority. Describe who the jurisdiction's customers are (if applicable, include number of users or subscribers). Include a geographical description of the service area.

Provide information in a style similar to the example provided in the box at right. This should be information that was not provided in the overall mitigation plan document.

Example Jurisdiction Narrative Profile:

Humboldt Community Services District is a special-purpose district created in 1952 to provide water, sewer, and street lighting to the unincorporated area surrounding the City of Eureka known as Pine Hill & Cutten. The District's designated service areas expanded throughout the years to include other unincorporated areas of Humboldt County known as Myrtletown, Humboldt Hill, Fields Landing, King Salmon, and Freshwater. A five-member elected Board of Directors governs the District. The Board assumes responsibility for the adoption of this plan; the General Manager will oversee its implementation. As of April 30, 2007, the District serves 7,305 water connections and 6,108 sewer connections, with a current staff of 21. Funding comes primarily through rates and revenue bonds..

Summary Information

Complete the bulleted list of summary information as follows:

- **Population Served—**List the estimated population that your jurisdiction provides services to. If you do not know this number directly, create an estimate (e.g., the number of service connections times the average household size for the service area based on Census data).
- **Land Area Served—**Enter the service area of your jurisdiction in acres or square miles.
- **Value of Area Served—**Enter the approximate assessed value of your service area. If you do not have this information, the County should be able to provide a number using the County Assessor's database.
- **Land Area Owned—**Enter the area of property owned by the jurisdiction in acres or square miles.
- **List of Critical Infrastructure/Equipment Owned by the Jurisdiction—**List all infrastructure and equipment that is critical to your jurisdiction's operations and is located in a natural hazard risk zone. Briefly describe the item and give its estimated replacement-cost value. Examples are as follows:
  - Fire Districts—Apparatus and equipment housed in a facility that is located in a natural hazard risk zone. This is the equipment that is essential for you to deliver services to this area should a natural hazard occur. It is not necessary to provide a detailed inventory of each engine and truck and its contents. A summary will suffice, such as "5 Engines, 2 ladders, and their contents". Do not list reserve equipment.
  - Dike/Flood Control Districts—Miles of levees, pump stations, retention/detention ponds, tide gates, miles of ditches, etc., within natural hazard risk zones.
  - Water Districts—Total length of pipe (it is not necessary to specify size and type), pump stations, treatment facilities, dams and reservoirs, within natural hazard risk zones.

    - Public Utility Districts—Miles of power line (above ground and underground), generators, power generating sub-stations, miles of pipeline, etc., within natural hazard risk zones.
    - School Districts—Anything within natural hazard risk zones, besides school buildings, that is critical for you to operate (e.g., school buses if you own a fleet of school buses).
- **Total Value of Critical Infrastructure/Equipment—**Enter total replacement-cost value of the critical infrastructure and equipment listed above.
- **List of Critical Facilities Owned by the Jurisdiction—**List all buildings and other facilities that are critical to your jurisdiction's operations and are located in a natural hazard risk zone. Briefly describe the facility and give its estimated replacement-cost value.
- **Total Value of Critical Facilities—**Enter total replacement-cost value of the critical facilities listed above.
- **Current and Anticipated Service Trends—**Enter a brief description on how your jurisdiction's services are projected to expand in the foreseeable future and why. Note any identified capital improvements needed to meet the projected expansion. Examples are as follows:
    - For a Fire District: Portions of the jurisdiction have experienced a 13 percent growth over the last five years. Land use designations allow for an increase in light commercial and residential land uses within the service area. This increase in density of land uses will represent an increase in population and thus a projected increase in call volume. Our District is experiencing an average annual increase in call volume of 13 percent.
    - For Dike/Drainage/Flood Control District: Portions of the jurisdiction have experienced a 13 percent growth over the last five years. Land use designations allow for an increase in light commercial and residential land uses within the service area. This increase in density of land use will result in an increase in impermeable surface within our service area and thus increase the demand on control facilities.
    - For a Water District: Portions of the jurisdiction have experienced a 13 percent growth over the last five years. Land use designations allow for an increase in light commercial and residential land uses within the service area. This increase in density of land use will represent an increase in the number of housing units within the service area and thus represent an expansion of the district's delivery network.

Boundary Map

Maps that illustrate the service area boundary for all special-purpose district partners will be provided at the workshop. Please confirm that the boundaries reflected on the maps are current and accurate for your jurisdiction. In the box for this section, include a reference to the map that includes your jurisdiction's boundaries.

JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

In Table X-1, list in chronological order (most recent first) any natural hazard event that has caused damage to your jurisdiction since 1975. Include the date of the event and the estimated dollar amount of damage it caused. Please refer to the summary of natural hazard events within risk assessment of the overall hazard mitigation plan. Potential sources of damage information include:

- Preliminary damage estimates your jurisdiction filed with the county or state
- Insurance claims data

- Newspaper archives
- Other plans/documents that deal with emergency management (safety element of a comprehensive plan, emergency response plan, etc.)
- Citizen input.

HAZARD RISK RANKING

The risk ranking performed for the overall planning area is presented in the risk assessment section of the overall hazard mitigation plan. However, each jurisdiction has differing degrees of risk exposure and vulnerability and therefore needs to rank risk for its own area, using the same methodology as used for the overall planning area. The risk-ranking exercise assesses two variables for each hazard: its probability of occurrence; and its potential impact on people, property and operations. A detailed discussion of the concepts associated with risk ranking is provided in the overall hazard mitigation plan. The instructions below outline steps for assessing risk in your jurisdiction to develop results that are to be included in the template.

Determine Probability of Occurrence for Each Hazard

A probability factor is assigned based on how often a hazard is likely to occur. In Table 1, list the probability of occurrence for each hazard as it pertains to your jurisdiction, along with its probability factor, as follows:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor = 2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor = 1)
- None—If there is no exposure to a hazard, there is no probability of occurrence (Probability Factor = 0)

TABLE 1.
HAZARD PROBABILITY OF OCCURRENCE

Hazard Type	Probability	Probability Factor

The probability of occurrence of a hazard event is generally based on past hazard events in an area. For example, if your jurisdiction has experienced two damaging floods in the last 25 years, the probability of occurrence is high for flooding and scores a 3 under this category. If your jurisdiction has experienced no damage from landslides in the last 100 years, your probability of occurrence for landslide is low, and scores a 1 under this category.

Determine Potential Impacts of Each Hazard

The impact of each hazard was divided into three categories: impacts on people, impacts on property, and impacts on your jurisdiction's operations. These categories were also assigned weighted values. Impact on people was assigned a weighting factor of 3, impact on property was assigned a weighting factor of 2 and impact on operations was assigned a weighting factor of 1. Steps to assess each type of impact are described below.

Impacts on People

To assess impacts on people, values are assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. In Table 2, list the potential impact of each hazard on people in your jurisdiction, along with its impact factor, as follows:

- High Impact—50% or more of the population is exposed to a hazard (Impact Factor = 3)
- Medium Impact—25% to 49% of the population is exposed to a hazard (Impact Factor = 2)
- Low Impact—25% or less of the population is exposed to the hazard (Impact Factor = 1)
- No impact—None of the population is exposed to a hazard (Impact Factor = 0)

TABLE 2.
HAZARD IMPACT ON PEOPLE

Hazard Type	Impact	Impact Factor	Weighted Impact Factor (Unweighted Factor x 3)

Impacts on Property

To assess impacts on property, values are assigned based on the percentage of the total ***value of buildings, equipment and infrastructure that is exposed*** to the hazard event. In Table 3, enter the cost estimates for potential damage to the jurisdiction's exposed buildings, equipment and infrastructure , taken from the "Summary of Loss" matrix provided with these instructions.

TABLE 3.
COST ESTIMATES FOR POTENTIAL DAMAGE TO STRUCTURES

Hazard type	Estimate of Potential Dollar Losses to Jurisdiction-Owned Facilities Exposed to the Hazard

In Table 4, list the potential impact of each hazard on property in your jurisdiction, along with its impact factor. Determine impact based on damage estimates from Table 3, as follows:

- High Impact—50% or more of the total assessed property value of facilities, equipment and infrastructure is exposed to a hazard (Impact Factor = 3)
- Medium Impact—25% to 49% of the total assessed property value of facilities, equipment and infrastructure is exposed to a hazard (Impact Factor = 2)
- Low Impact—24% or less of the total assessed property value of facilities, equipment and infrastructure is exposed to the hazard (Impact Factor = 1)
- No impact—None of the total assessed property value of facilities, equipment and infrastructure is exposed to a hazard (Impact Factor = 0)

TABLE 4.
HAZARD IMPACT ON PROPERTY

Hazard Type	Impact	Impact Factor	Weighted Impact Factor (Unweighted Factor x 2)

Impacts on the Jurisdiction's Operations

Impact on operations is assessed based on estimates of ***how long it will take your jurisdiction to become 100-percent operable*** after a hazard event. The estimated functional downtime for critical facilities has been estimated for most hazards within the planning area. In Table 5, list the potential impact of each hazard on the operations of your jurisdiction, along with its impact factor, as follows:

- High = functional downtime of 365 days or more (Impact Factor = 3)
- Medium = Functional downtime of 180 to 364 days (Impact Factor = 2)
- Low = Functional downtime of 180 days or less (Impact Factor = 1)
- No Impact = No functional downtime is estimated from the hazard (Impact Factor = 0)

TABLE 5.
HAZARD IMPACT ON OPERATIONS

Hazard Type	Impact	Impact Factor	Weighted Impact Factor (Unweighted Factor x 1)

You will need to consult the risk assessment for this task. The critical facilities exposed to each hazard have been identified, and the impacts on operability have been estimated for most of the hazards within the planning area. If the functional downtime component has not been provided for a hazard in the risk assessment, consider the impact on operability of that hazard to be low.

Determine Risk Rating for Each Hazard

A risk rating for each hazard is determined by multiplying the assigned probability factor by the sum of the weighted impact factors for people, property and operations:

- Risk Rating = Probability Factor x Weighted Impact Factor {people + property + operations}

Using the results developed in Tables 1, 2, 4 and 5, complete Table 6 to calculate a risk rating for each hazard of concern.

TABLE 6.
HAZARD RISK RATING

Hazard Type	Probability Factor (P)	Sum of Weighted Impact Factors on People, Property & Operations (I)	Risk Rating (P x I)

Complete Risk Ranking in Template

Once Table 6 has been completed above, complete Table X-2 in your template. The hazard with the highest risk rating in Table 6 should be listed at the top of Table X-2 and given a rank of 1; the hazard with the second highest rating should be listed second with a rank of 2; and so on. Two hazards with equal risk ratings should be given the same rank.

It is important to note that this exercise should not override your subjective assessment of relative risk based on your knowledge of the history of natural hazard events in your jurisdiction. If this risk ranking exercise generates results other that what you know based on substantiated data and documentation, you may alter the ranking based on this knowledge. If this is the case, please note this fact in the comments at the end of the template. Remember, one of the purposes of this exercise is to support the selection and prioritization of initiatives in your plan. If you identify an initiative with a high priority that mitigates the risk of a hazard you have ranked low, that project will not be competitive in the grant arena.

APPLICABLE REGULATIONS AND PLAN

List any federal, state, local or district laws, ordinances, codes and policies that govern your jurisdiction that include elements addressing hazard mitigation. Describe how these laws may support or conflict with the mitigation strategies of this plan. List any other plans, studies or other documents that address hazard mitigation issues for your jurisdiction. Note whether the documents could have a positive or a negative impact on the mitigation strategies of this plan. “None applicable” is a possible answer for this section.

CLASSIFICATION IN HAZARD MITIGATION PROGRAMS

Complete Table X-3 to indicate your jurisdiction’s participation in various national programs related to natural hazard mitigation. For each program enter “Yes” or “No” in the second column to indicate whether your jurisdiction participates. If yes, then enter the classification that your jurisdiction has earned under the program in the third column and the date on which that classification was issued in the fourth column; enter “N/A” in these columns if your jurisdiction is not participating.

HAZARD MITIGATION ACTION PLAN

Action Plan Matrix

Identify the initiatives your jurisdiction would like to pursue with this plan. Refer to the mitigation catalog for mitigation options you might want to consider. Be sure to consider the following factors in your selection of initiatives:

- Select initiatives that are consistent with the overall goals, objectives and guiding principles of the hazard mitigation plan.
- Identify projects where benefits exceed costs.
- Include any project that your jurisdiction has committed to pursuing regardless of grant eligibility.
- Know what is and is not grant-eligible under the HMGP and PDM (see fact sheet provided). Listing HMGP or PDM as a potential funding source for an ineligible project will be a red flag when this plan goes through review. If you have projects that are not HMGP or PDM grant eligible, but do mitigate part or all of the hazard and may be eligible for other grant programs sponsored by other agencies, include them in this section.
- Although you should identify at least one initiative for your highest ranked risk, a hazard-specific project is not required for every hazard. If you have not identified an earthquake related project, and an earthquake occurs that causes damage in your jurisdiction, you are not discounted from HMGP project grant eligibility.

Complete Table X-4 for all the initiatives you have identified:

- Enter the initiative number and description.
- Indicate whether the initiative mitigates hazards for new or existing assets.
- Identify the specific hazards the initiative will mitigate.
- Identify by number the mitigation plan objectives that the initiative addresses. These have been provided in the Steering Committee meeting minutes that were forwarded to you in the past.
- Indicate who will be the lead in administering the project. This will most likely be your governing body.
- Identify funding sources for the project. If it is a grant, include the funding sources for the cost share.
- Indicate the time line as “short term” (1 to 5 years) or “long term” (5 years or greater).

Technical assistance will be available to your jurisdiction in completing this section during the technical assistance visit.

Wording Your Initiative Descriptions:

Descriptions of your initiatives need not provide great detail. That will come when you apply for a project grant. Provide enough information to identify the project’s scope and impact. The following are typical descriptions for an action plan initiative:

- **Initiative 1—**Address Repetitive Loss properties. Through targeted mitigation, acquire, relocate or retrofit the five repetitive loss structures in the County as funding opportunities become available.
- **Initiative 2—**Perform a non-structural, seismic retrofit of City Hall.
- **Initiative 3—**Acquire floodplain property in the Smith subdivision.
- **Initiative 4—**Enhance the County flood warning capability by joining the NOAA “Storm Ready” program.

Prioritization of Mitigation Initiatives

Complete the information in Table X-5 as follows:

- Initiative—Indicate the initiative number from Table X-4.
- of Objectives Met—Enter the number of objectives the initiative will meet.
- Benefits—Enter "High," "Medium" or "Low" as follows:
  - High: Project will have an immediate impact on the reduction of risk exposure to life and property.
  - Medium: Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
  - Low: Long-term benefits of the project are difficult to quantify in the short term.
- Costs—Enter "High," "Medium" or "Low" as follows:
  - High: Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.
  - Medium: Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
  - Low: Possible to fund under existing budget. Project is part of, or can be part of an existing ongoing program.

  If you know the estimated cost of a project because it is part of an existing, ongoing program, indicate the amount.
- Do Benefits Exceed the Cost?—Enter "Yes" or "No." This is a qualitative assessment. Enter "Yes" if the benefit rating (high, medium or low) is the same as or higher than the cost rating (high benefit/high cost; high benefit/medium cost; medium benefit/low cost; etc.). Enter "No" if the benefit rating is lower than the cost rating (medium benefit/high cost, low benefit/medium cost; etc.)
- Is the Project Grant-Eligible?—Enter "Yes" or "No." Refer to the fact sheet on HMGP and PDM.
- Can Project Be Funded Under Existing Program Budgets?—Enter "Yes" or "No." In other words, is this initiative currently budgeted for, or would it require a new budget authorization or funding from another source such as grants?
- Priority—Enter "High," "Medium" or "Low" as follows:
  - High: Project meets multiple plan objectives, benefits exceed cost, funding is secured under existing programs, or is grant eligible, and project can be completed in 1 to 5 years (i.e., short term project) once funded.
  - Medium: Project meets at least 1 plan objective, benefits exceed costs, requires special funding authorization under existing programs, grant eligibility is questionable, and project can be completed in 1 to 5 years once funded.
  - Low: Project will mitigate the risk of a hazard, benefits exceed costs, funding has not been secured, project is not grant eligible, and time line for completion is long term (5 to 10 years).

This prioritization is a simple review to determine that the initiatives you have identified meet one of the primary objectives of the Disaster Mitigation Act. It is not the detailed benefit/cost analysis required for

HMGP/PDM project grants. The prioritization will identify any projects whose probable benefits will not exceed the probable costs.

Analysis of Mitigation Actions

Complete Table X-6 summarizing the mitigation actions by hazard of concern and the following six mitigation types:

- Prevention—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- Property Protection—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- Public Education and Awareness—Actions to inform citizens and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- Natural Resource Protection—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- Emergency Services—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- Structural Projects—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.

This exercise demonstrates that the jurisdiction has selected a comprehensive range of actions.

FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

In this section, identify any future studies, analyses, reports, or surveys your jurisdiction needs to better understand its vulnerability to identified or currently unidentified risks. These could be needs based on federal or state agency mandates such as EPA’s Bio-terrorism assessment requirement for water districts.

ADDITIONAL COMMENTS

Use this section to add any additional information pertinent to hazard mitigation and your jurisdiction not covered in this template.

CHAPTER X.
[INSERT JURISDICTION NAME] ANNEX

X.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

[Name, Title]
[Street Address]
[City, State ZIP]
Telephone: [Phone]
e-mail Address: [email address]

Alternate Point of Contact

[Name, Title]
[Street Address]
[City, State ZIP]
Telephone: [Phone]
e-mail Address: [email address]

X.2 JURISDICTION PROFILE

[Insert Narrative Profile Information, per Instructions]

The following is a summary of key information about the jurisdiction:

- **Population Served—**[Insert Population] as of [Insert Date of Population Count]
- **Land Area Served—**[Insert Area]
- **Value of Area Served—**The estimated value of the area served by the jurisdiction is [Insert Total Value]
- **Land Area Owned—**[Insert Area]
- **List of Critical Infrastructure/Equipment Owned by the Jurisdiction:**
  - [Insert Description of Item] [Insert Value of Item]
  - [Insert Description of Item] [Insert Value of Item]
  - [Insert Description of Item] [Insert Value of Item]
  - [Insert Description of Item] [Insert Value of Item]
- **Total Value of Critical Infrastructure/Equipment—**The total value of critical infrastructure and equipment owned by the jurisdiction is [Insert Total Value]
- **List of Critical Facilities Owned by the Jurisdiction:**
  - [Insert Description of Item] [Insert Value of Item]
  - [Insert Description of Item] [Insert Value of Item]
  - [Insert Description of Item] [Insert Value of Item]
  - [Insert Description of Item] [Insert Value of Item]
- **Total Value of Critical Facilities—**The total value of critical facilities owned by the jurisdiction is [Insert Total Value]
- **Current and Anticipated Service Trends—**[Insert Summary Description of Service Trends]

The jurisdiction’s boundaries are shown on Figure [Insert of Figure Showing Jurisdiction Boundaries]

X.3 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table X-1 lists all past occurrences of natural hazards within the jurisdiction.

X.4 HAZARD RISK RANKING

Table X-2 presents the ranking of the hazards of concern.

X.5 APPLICABLE REGULATIONS AND PLANS

The following existing codes, ordinances, policies or plans are applicable to this hazard mitigation plan:

- [Insert Name of Code, Ordinance, Policy or Plan]
- [Insert Name of Code, Ordinance, Policy or Plan]
- [Insert Name of Code, Ordinance, Policy or Plan]
- [Insert Name of Code, Ordinance, Policy or Plan]
- [Insert Name of Code, Ordinance, Policy or Plan]
- [Insert Name of Code, Ordinance, Policy or Plan]

X.6 CLASSIFICATION IN HAZARD MITIGATION PROGRAMS

The jurisdiction's classifications under various hazard mitigation programs are presented in Table X-3.

X.7 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED INITIATIVES

Table X-4 lists the initiatives that make up the jurisdiction's hazard mitigation plan. Table X-5 identifies the priority for each initiative. Table X-6 summarizes the mitigation initiatives by hazard of concern and the six mitigation types.

X.8 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

[Insert text, if any]

X.9 ADDITIONAL COMMENTS

[Insert text, if any]

TABLE X-1.
NATURAL HAZARD EVENTS

Type of Event	FEMA Disaster (if applicable)	Date	Preliminary Damage Assessment

TABLE X-2.
HAZARD RISK RANKING

Rank	Hazard Type	Risk Rating Score (Probability x Impact)
1		
2		
3		
4		
5		
6		
7		
8		
9		

**TABLE X-3.
COMMUNITY CLASSIFICATIONS**

	Participating?	Classification	Date Classified
Public Protection			
Storm Ready			
Firewise			

**TABLE X-4.
HAZARD MITIGATION ACTION PLAN MATRIX**

Applies to new or existing assets	Hazards Mitigated	Objectives Met	Lead Agency	Estimated Cost	Sources of Funding	Timeline	Status Update
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							
Initiative—Description							

TABLE X-5.
MITIGATION STRATEGY PRIORITY SCHEDULE

Initiative	of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority[a]

a. See Section ___ for definitions of high, medium and low priorities.

TABLE X-6.
ANALYSIS OF MITIGATION INITIATIVES

	Initiative Addressing Hazard, by Mitigation Type[a]					
Hazard Type	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects

a. See Section ___ for description of mitigation types