



COUNTY of
DEL NORTE
★ CALIFORNIA ★

2026 Hazard Mitigation Plan

Volume 1—Basic Plan



September 2026



TETRA TECH

2026 Del Norte County Hazard Mitigation Plan

September 2026

Tetra Tech Project Number 105S045034

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EXECUTIVE SUMMARY

Hazard mitigation is the use of long-term and short-term policies, programs, projects, and other activities to minimize the loss of life, injury, and property damage that can result from a disaster. Communities, residents, and businesses across the United States have been faced with continually increasing costs associated with natural and human-caused hazards. Hazard mitigation is the first step in reducing risk and is the most effective way to reduce costs associated with hazards.

The Del Norte County Hazard Mitigation Plan (HMP), updated for 2026, is the County's plan for reducing the risks that disasters pose to people, property, the economy, and the environment in the County. It includes countywide assessment of hazards, risk, and capabilities. The plan complies with federal and state hazard mitigation planning requirements to establish the Planning Partners' eligibility for funding under Federal Emergency Management Agency (FEMA) grant programs.

The following are the jurisdictions in Del Norte County that participated as Planning Partners in the 2026 update of the HMP:

- Del Norte County
- City of Crescent City
- Big Rock Community Services District
- Crescent Fire Protection District
- Elk Valley Rancheria
- Gasquet Community Services District
- HRC Community Services District (*formerly Hussey Ranch Corporation*)
- Klamath Community Services District
- Smith River Community Services District
- Smith River Fire Protection District

The Planning Process

Overall Approach

To support the planning process for this HMP, the Planning Partners accomplished the following:

- Developed a Steering Committee to provide guidance, leadership, and oversight of the planning process
- Reviewed the 2019 HMP
- Identified hazards of concern to the County to be included in the update
- Profiled the hazards of concern
- Estimated the inventory at risk and potential losses associated with these hazards
- Reviewed and updated the mitigation goals and objectives
- Reviewed mitigation strategy and actions outlined in the 2019 HMP to indicate progress
- Developed new mitigation actions to reduce the vulnerability of assets from hazards of concern
- Involved a wide range of stakeholders and the public in the plan update process



- Developed mitigation plan maintenance procedures to be executed after obtaining approval of the plan from the California Governor's Office of Emergency Services (Cal OES) and FEMA

Multiple Agency Support for Hazard Mitigation

Primary responsibility for hazard mitigation lies with local governments. Partners at the regional, state, and federal levels are available to assist local communities with their mitigation strategies. FEMA provides grants, tools, guidance, and training to support mitigation planning. In California, Cal OES is the lead agency providing hazard mitigation planning assistance to local jurisdictions.

The participating jurisdictions provided significant input into the preparation of this HMP, in particular the preparation of jurisdiction-specific annexes included in Volume 2. They fully coordinated with and solicited participation from county, local, and tribal governments, relevant organizations and groups, state and federal agencies, and the general public. This coordination ensured that stakeholders had established communication channels and relationships to support mitigation planning and mitigation actions included in the plan.

Risk Assessment for Local Hazards of Concern

The Planning Partners evaluated each jurisdiction's risk and vulnerability due to each of the hazards of concern, based on past events, past and predicted future losses, and the expected probability of future occurrence. From these evaluations, hazards were ranked as high, medium, or low risk to each jurisdiction. The hazard rankings were used to focus and prioritize individual jurisdictional mitigation strategies. The hazard rankings for each jurisdiction is shown in Figure ES-1.

Capability Assessment and Plan Integration into Other Local Mechanisms

Effective mitigation is achieved when hazard awareness and risk management become integral parts of public activities and decision-making. Del Norte County has many plans and programs that support hazard risk management. This HMP integrates, complements, and references those plans and programs to the extent practical in order for it to be a comprehensive resource for hazard mitigation.

The HMP includes a capability assessment to review relevant local mechanisms for each participating jurisdiction. This assessment identifies where each jurisdiction is currently able to implement hazard mitigation measures and where each would benefit from improved capabilities for such measures. The capability assessment provides a summary of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county and local) that support hazard mitigation in the County. In the jurisdictional annexes, each participating jurisdiction identifies how it has integrated hazard risk management into its existing planning, regulatory and operational/administrative framework, and how it intends to continue to promote this integration.



Figure ES-1. Jurisdiction Hazard Rankings

Jurisdiction	Drought	Earthquake	Excessive Rainfall	Extreme Heat	Extreme Wind	Flood	Landslide	Tsunami	Wildfire
Crescent City	Low	Medium	Medium	Low	Medium	Low	Medium	High	Medium
Unincorporated County	Low	Medium	Medium	Low	Medium	Medium	Medium	High	High
Big Rock CSD	Low	Medium	High	Medium	High	Low	High	Low	Low
Crescent FPD	Low	Medium	Medium	Low	Medium	Medium	Medium	High	High
Elk Valley Rancheria	Medium	Medium	Low	Medium	Low	Low	Low	Medium	High
Gasquet CSD	Medium	Medium	Low	Medium	Low	Low	Low	Low	High
HRC CSD	Low	Medium	Low	Low	Low	Low	Low	Low	High
Klamath CSD	Medium	Medium	Medium	Medium	Medium	Medium	Medium	High	High
Smith River FPD	Low	Medium	Medium	Low	High	Low	Medium	Medium	High
Smith River CSD	Low	Medium	Medium	Low	High	Medium	Medium	Low	High

Note: Low (yellow) = Values less than 3.9; Medium (orange) = Values between 3.9 and 4.9; High (red) = Values greater than 4.9

Mitigation Strategy

Hazard Mitigation Plan Goals and Objectives

The HMP includes mitigation goals for reducing or avoiding long-term vulnerabilities to the identified hazards of concern. The planning process included a review and update of previous mitigation goals and objectives developed to guide the selection of mitigation actions. The goals and objectives were updated based on the updated risk assessment, discussions, research, and input from plan participants and stakeholders. The goal development process considered the goals expressed in the California State Hazard Mitigation Plan, as well as other relevant county and local planning documents.

2026 Del Norte County HMP Goals

- Reduce the risk of natural hazard impacts to human life and safety
- Protect the continuity of community lifelines
- Safeguard Del Norte County's economy
- Foster an educated community
- Conserve Del Norte County's unique environmental and cultural resources

Implementation of the 2019 Plan

The status of the mitigation projects identified in Del Norte County's previous HMP, approved in 2019, was reviewed for this HMP. Numerous projects and programs have been implemented that have reduced hazard vulnerability to assets in the planning area. Uncompleted projects have been reevaluated, modified as necessary, and incorporated into this plan. The Planning Partners' annexes describe these mitigation activities in more detail, and plan maintenance procedures have been developed to encourage thorough integration with local decisions and processes and regular review of implementation progress.



2026 Mitigation Strategy

Del Norte County and the participating jurisdictions each designed a mitigation strategy to be implemented over the next five years. Many participating jurisdictions are very small organizations that do not have the funding or the capacity to implement all-hazards mitigation programs. Most jurisdictions chose targeted projects that address their hazards of high concern. A total of 102 mitigation actions are included in this update. Figure ES-2 shows the number of mitigation actions selected by each jurisdiction.

Figure ES-2. Total Mitigation Actions by Jurisdiction

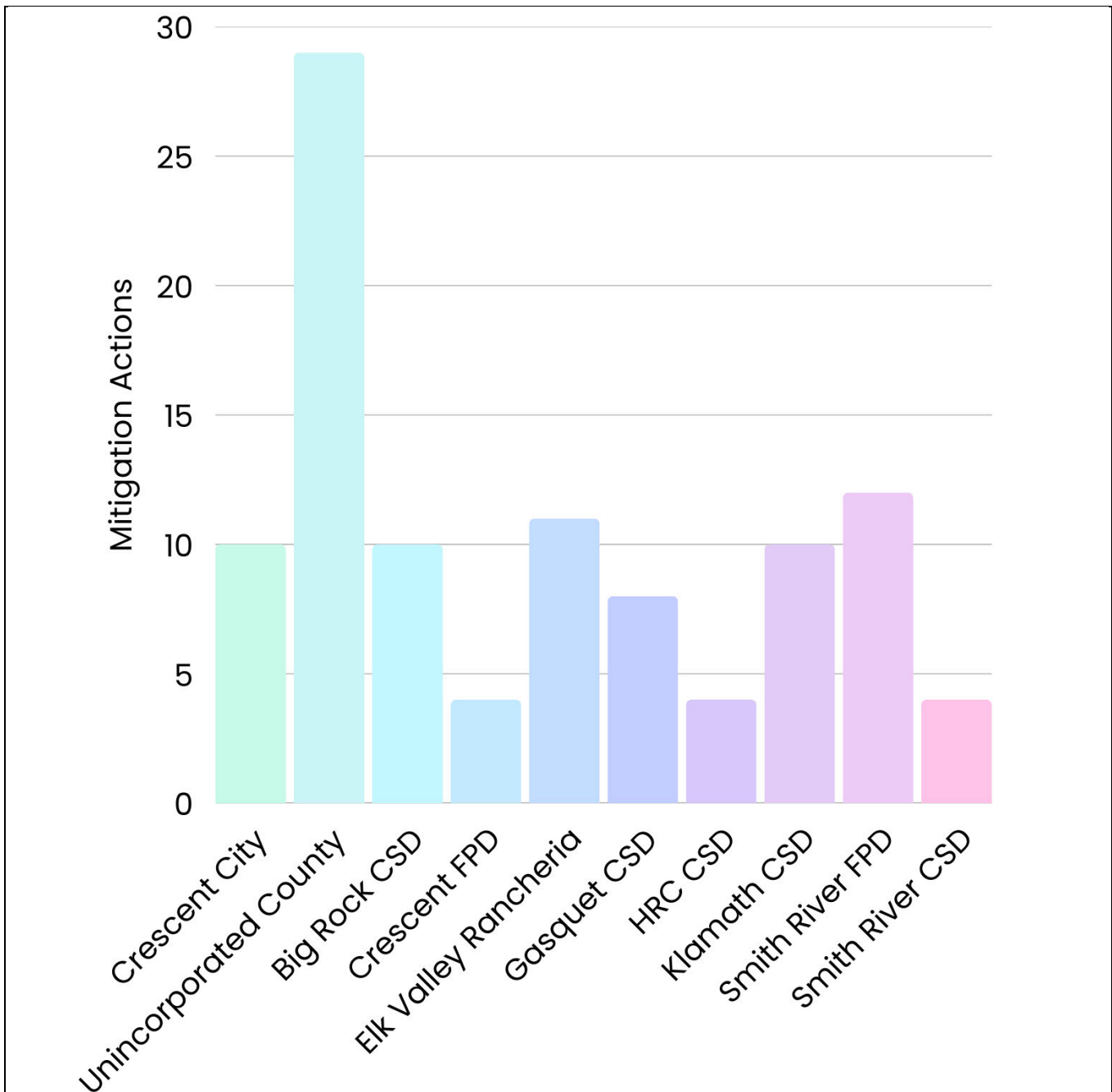




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PART 1:

THE PLANNING

PROCESS AND

PLANNING AREA





1. INTRODUCTION

Del Norte County's 2026 Hazard Mitigation Plan (HMP) was developed to reduce risks from disasters to the people, property, economy, and environment within the County. Developed by the County and nine additional participating local jurisdictions (the Planning Partners), this HMP updates the 2019 Del Norte County HMP. The updated 2026 HMP includes countywide analysis and assessment of hazards, risk, and capabilities.

1.1 OVERVIEW TO HAZARD MITIGATION PLANNING

1.1.1 What Is Hazard Mitigation?

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk and effects that can result from hazards. The Federal Emergency Management Agency (FEMA) defines a HMP as the documentation of a state or local government's evaluation of natural hazards and strategies to mitigate them.

Effective mitigation planning helps people, organizations, and government agencies to better prepare for and respond when disasters occur. It also allows local governments to remain eligible for FEMA grant funding for mitigation projects that will reduce the impact of future disaster events. The long-term benefits of mitigation planning and implementation include the following:

- An increased understanding of hazards faced by local communities
- A more sustainable and disaster-resistant community
- Financial savings through partnerships that support planning and mitigation efforts
- Focused use of limited resources on hazards that have the biggest impact on the community
- Reduced long-term impacts and damage to human health and structures
- Reduced costs associated with response and recovery efforts, including repairs

The Federal Emergency Management Agency (FEMA) estimates that for every dollar spent on damage prevention (mitigation), at least twice that amount is saved by not having to perform post-disaster repairs.

1.1.2 Regulatory Framework

Federal policy regarding disasters encourages communities to assess their vulnerability to hazards before disaster strikes and then take actions to reduce potential risks. A disaster-resistant community can rebound more quickly and cost-effectively from a natural disaster, with less human injury or loss of property. This minimizes other losses associated with disasters, such as the time lost from productive activity by businesses and industries.



The federal Disaster Mitigation Act of 2000 (DMA) encourages hazard mitigation planning by states, tribes, and local governments. Under the DMA, communities seeking certain hazard-related federal funding must identify potential natural hazards to the community's health, safety, and well-being, and identify and prioritize actions that can be taken by the community to mitigate those hazards before disaster strikes.

Regulations implementing the DMA are included in Title 44 of the Code of Federal Regulations, Section 201 (44 CFR 201). To be eligible for hazard mitigation assistance from the federal government, communities must have an HMP to prepare for and reduce the potential impacts of natural hazards. The federal regulations require that states and local governments update HMPs on a 5-year basis.

One goal of the federal regulations is to facilitate cooperation between state and local authorities, prompting them to work together. This enhanced planning process enables local and state governments to better articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects. In California, responsibility for fulfilling the requirements of the DMA and 44 CFR 201 has been delegated to the California Governor's Office of Emergency Services (Cal OES). Table 1-1 summarizes the 44 CFR 201 requirements and where each is addressed in this HMP.

Table 1-1. FEMA Local Mitigation Plan Review Crosswalk

Plan Criteria	Primary Location in Plan
Prerequisites	
Adoption by the Local Governing Body: §201.6(c)(5)	Section 2.7; Appendix A
Planning Process	
Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)	Chapter 2
Risk Assessment	
Identifying Hazards: §201.6(c)(2)(i)	Chapter 5
Profiling Hazards: §201.6(c)(2)(i)	Chapters 6-14
Assessing Vulnerability: Overview: §201.6(c)(2)(ii)	Chapters 6-14
Assessing Vulnerability: Identifying Structures: §201.6(c)(2)(ii)(A)	Chapters 6-14
Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)	Chapters 6-14
Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)	Chapters 6-14
Mitigation Strategy	
Local Hazard Mitigation Goals: §201.6(c)(3)(i)	Section 17.2
Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)	Volume 2
Implementation of Mitigation Actions: §201.6(c)(3)(iii)	Chapter 17; Volume 2
Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)	Volume 2
Plan Maintenance Process	
Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(i)	Chapter 18
Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)	Section 2.4; Volume 2
Continued Public Involvement: §201.6(c)(4)(iii)	Section 2.7; Section 18.2



1.1.3 Specialized Terms and Concepts

Like any technical field, hazard mitigation has developed over the years its own set of terms and concepts with particular meanings within the hazard mitigation practice. A full glossary and list of acronyms is provided in Appendix B. The list below provides a quick reference for specialized terms whose use is especially prominent in this hazard mitigation plan:

- **Adaptive capacity**—The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities or to respond to consequences (IPCC 2022)
- **Asset**—anything that is important to the character and function of a community (e.g., people, structures, community lifelines, the economy, and natural, historic, and cultural resources) (FEMA 2023)
- **Capability assessment**—an evaluation of which authorities, policies, programs, funding and resources a participant has to accomplish hazard mitigation (FEMA 2023)
- **Cascading hazards**—a primary event, such as heavy rainfall, seismic activity, or rapid snowmelt, followed by a chain of consequences that may range from modest (lesser than the original event) to substantial (National Academies of Sciences, Engineering, and Medicine 2022)
- **Community lifelines**—the most fundamental services in a community that, when stabilized, enable all other aspects of society to function (FEMA 2023)
- **Extent**—the range of anticipated intensities of the identified hazards within a community, most commonly expressed using various scientific scales (FEMA 2022)
- **Hazard profile**—a description of a hazard’s location, extent, previous occurrences and probability of future events within a community (FEMA 2023)
- **Hazard ranking**—the process of identifying the hazards that pose the greatest risk to a community, based on how likely the hazard is to occur, the potential consequences if the hazard does occur, and other relevant local factors
- **Impact**—the consequences or effects of a hazard on a community’s assets identified in the vulnerability assessment. (FEMA 2023)
- **Integration**—the inclusion of hazard mitigation principles, vulnerability information and mitigation actions into other existing community planning to leverage activities that have co-benefits, reduce risk and increase resilience (FEMA 2022)
- **Mitigation action**—measures, projects, plans or activities proposed to reduce the current and future vulnerabilities identified in the risk assessment (FEMA 2023)
- **Mitigation strategy**—the long-term blueprint for reducing the potential hazard-related losses identified in the risk assessment; the strategy consists of mitigation goals, mitigation actions, and a plan for implementing the actions (FEMA 2023)
- **Natural hazard**—a source of harm or difficulty created by a meteorological, environmental or geological event (FEMA 2023)



- **Plan maintenance**—monitoring and updating a hazard mitigation plan as warranted by changing conditions, availability of new information, and progress on the proposed mitigation actions (FEMA 2023)
- **Planning process**—the procedures used to develop a hazard mitigation plan with broad acceptance across the community
- **Risk**—the potential for damage or loss when natural hazards interact with people or assets (FEMA 2023)
- **Risk assessment**—a data-driven analysis to find where a local jurisdiction is vulnerable to hazards (FEMA 2023)
- **Social vulnerability**—the potential for loss within an individual or social group, as affected by traits that influence an individual's or group's resilience, which is their ability to prepare, respond, cope or recover from an event (FEMA 2023)
- **Stakeholder**—individuals or groups that a mitigation action or policy affects, including businesses, private organizations and residents (FEMA 2023)
- **Vulnerability**—a description of which assets within locations identified to be hazard prone are at risk from the effects of the hazard (FEMA 2023)

1.2 HISTORY OF HAZARD MITIGATION PLANNING IN DEL NORTE COUNTY

1.2.1 Previous Del Norte County HMPs

Del Norte County has been included in 36 federal disaster declarations (major disaster, fire management, and emergency) since 1954. The County adopted its first hazard mitigation plan in 2010. The plan was most recently updated in 2019. The 2019 update identified the following as the greatest hazards of concern in Del Norte County:

- | | | |
|------------------|-----------------------|------------------|
| • Climate change | • Flooding | • Severe weather |
| • Dam failure | • Hazardous materials | • Tsunami |
| • Drought | • Landslide | • Wildland fire |
| • Earthquake | | |

1.2.2 Key Changes in the Current Update

The following are the most significant differences between the 2019 County HMP and the 2026 update:

- The 2019 Del Norte County HMP did not identify extreme heat as a hazard of concern. California Assembly Bill 2684 (2024) added a requirement for General Plan safety elements to address the hazard of extreme heat. Therefore, extreme heat was added as a hazard for the current update.
- With the updated FEMA 2023 guidance the Planning Team, and affirmed by The Steering Committee, re-evaluated the inclusion of climate change as a stand-alone hazard, as was done



in the 2019 plan. Subsequently, the impacts of climate change are included in each hazard chapter.

- The Steering Committee re-evaluated the inclusion of dam failure as a hazard. Since 2019, several dams along the Klamath River have been decommissioned and their removal no longer presents a threat of dam failure inundation in Del Norte County.
- The Steering Committee also re-evaluated hazardous materials as a stand-alone hazard of interest. Response actions to hazardous materials incidents will be included in County response plans.
- For the 2026 HMP update, the capability assessment was expanded and is presented as a stand-alone chapter. The discussion of capabilities in each participating jurisdiction's annex to the HMP has been expanded as well (Volume 2).
- The consideration of hazard impacts on critical facilities was revised to align with FEMA's definition of community lifelines.
- The structure of the HMP was reorganized to meet current state and federal planning requirements and improve readability.

1.3 PLAN ORGANIZATION

The Del Norte County HMP provides a detailed review and analysis of each hazard of concern, resources, and relevant statistical information for the Planning Partners. The plan is organized into two volumes: Volume 1 includes all information that applies to the entire planning area (Del Norte County); and Volume 2 consists of annexes that provide specific information for each participating jurisdiction.

Volume 1 is a resource for ongoing mitigation analysis. It includes a description of the County and its jurisdictions as well as information on mitigation planning and how the risk assessment and capability assessment were performed. Volume 1 of the plan includes the following chapters:

- Part 1—The Planning Process and Planning Area
 - Chapter 1, Introduction
 - Chapter 2, Planning Process—A description of the plan methodology and development process, committee and stakeholder roles and activities, and how the plan will be incorporated into existing programs. Information regarding the adoption of the plan by each participating jurisdiction
 - Chapter 3, County Profile—An overview of Del Norte County, including: general information and physical conditions, land use patterns and trends, population and demographics, economy, general building stock inventory, community lifelines, and natural, historic, and cultural resources
- Part 2—Risk Assessment
 - Chapter 4, Methodology—Description of the methodology used to assess hazard risk and the status of local data
 - Chapter 5, Hazards of Concern Identification—Documentation of the process of identifying the natural hazards of concern for further profiling and evaluation



- Chapters 6 – 14, Hazard profiles and findings of the risk assessment—Estimates of the impact of hazard events on life, safety, and health; general building stock; critical facilities; the economy, and natural, historic, and cultural resources
- Chapter 15, Hazard Ranking—Description and summary of the hazard ranking process.
- Part 3—Capability Assessment
 - Chapter 16, Capability Assessment—A summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county, local) that support hazard mitigation within the County
- Part 4—Mitigation Strategy
 - Chapter 17, Mitigation Strategy—Information regarding the mitigation goals and objectives identified by the Steering Committee in response to priority hazards of concern, and the process by which County and local mitigation strategies have been developed or updated
- Part 5—Plan Maintenance
 - Chapter 18, Plan Maintenance Procedures—A system to continue to monitor, evaluate, maintain, and update the plan

Volume 2 consists of annexes for each participating jurisdiction. Each annex summarizes the jurisdiction's planning, regulatory, and fiscal capabilities; evaluates vulnerabilities to hazards; describes the status of past mitigation actions; and provides a specific mitigation strategy. The annexes provide each jurisdiction with an expedient resource for implementing mitigation projects and maximizing future grant opportunities.

Appendices provide additional detail about general information discussed in the HMP.



2. PLANNING PROCESS

This chapter describes the planning process used to update the Del Norte County HMP, including how it was prepared, who was involved in the process, and how the public was involved. The planning approach aimed to achieve the following results:

- The plan is multi-jurisdictional, including the sole municipality in the County, a federally recognized tribe, and special districts in the County. Del Norte County invited all jurisdictions in the County to join in the planning process. Ten local governments in the County (the Planning Partnership) participated in the 2026 plan update process:
 - Del Norte County
 - City of Crescent City
 - Crescent City Fire Protection District (FPD)
 - Big Rock Community Service District (CSD)
 - HRC CSD (*formerly Hussey Ranch Corporation*)
 - Gasquet CSD
 - Klamath CSD
 - Smith River CSD
 - Smith River FPD
 - Elk Valley Rancheria
- The format of this plan is such that other entities can easily join at a later date as part of the regulatory 5-year plan update process
- The plan considers all natural hazards that pose a risk to the area, as required by 44 CFR 201. Non-natural hazards that pose significant risk were considered as well
- The plan was developed following FEMA regulations and prevailing FEMA and state guidance. This ensures that all the requirements are met and supports plan review

Del Norte County applied for and was awarded a multi-jurisdictional planning grant under the Hazard Mitigation Grant Program (HMGP) (DR-4683-0005-P), which supported the development of this HMP. Grant administration was the responsibility of the Del Norte County Office of Emergency Services.

2.1 GENERAL MITIGATION PLANNING APPROACH

FEMA provides hazard mitigation planning support to local communities through guidance, resources, and plan reviews. This hazard mitigation plan was prepared in accordance with the following regulations and guidance:

- DMA (Public Law 106-390, October 30, 2000)
- 44 CFR 201 and 206 (including: February. 26, 2002, October. 1, 2002, October. 28, 2003, and Sept. 13, 2004, Interim Final Rules)
- FEMA Local Mitigation Plan Review Guide, October 1, 2011
- FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013
- FEMA Integrating Hazard Mitigation into Local Planning, March 1, 2013
- FEMA Plan Integration: Linking Local Planning Efforts, July 2015
- FEMA Local Mitigation Planning Policy Guide, April 19, 2022



- FEMA Local Mitigation Planning Handbook, May 2023
- Cal OES Local Hazard Mitigation Planning Fact Sheet, 2023
- Cal OES California State Hazard Mitigation Plan, 2023

2.2 ORGANIZATION OF PLANNING PROCESS

2.2.1 Planning Process Participants

Project Management and Planning Consultant

Project management was the responsibility of the Del Norte County Office of Emergency Services. A contract planning consultant (Tetra Tech, Inc.) was tasked with the following:

- Assistance with the organization of a Steering Committee and the Planning Partnership
- Assistance with the development and implementation of a public and stakeholder outreach program
- Data collection
- Facilitation and attendance at meetings (Steering Committee, stakeholder, public, and other)
- Review and update of the hazards of concern, and hazard profiling and risk assessment
- Assistance with the review and update of mitigation planning goals and objectives
- Assistance with the review of past mitigation strategy progress
- Assistance with the screening of mitigation actions and the identification of appropriate actions
- Assistance with the prioritization of mitigation actions
- Authoring of the draft and final plan documents

Planning Partnership

In June 2023, the County notified all municipalities in the County of the pending planning process and invited them to formally participate. Jurisdictions were asked to formally notify the County of their intent to participate via a letter of intent and to identify planning points of contact to facilitate their participation and represent the interests of their communities.

All participating jurisdictions, including the County, are recognized as Planning Partners and belong to the Planning Partnership for this HMP. Each jurisdiction designated representatives to be actively involved in the Planning Partnership. Representatives were charged with the following:

- Representing their jurisdiction, and guiding the Steering Committee throughout the planning process
- Overseeing the planning process from start to finish
- Reporting on progress of mitigation actions identified in prior or existing HMPs, as applicable
- Identifying, developing, and prioritizing appropriate mitigation actions



- Formalizing the natural hazards of concern
- Updating and developing mitigation goals and objectives
- Developing a public and stakeholder outreach strategy
- Assisting with the development of the county-level mitigation strategy
- Reviewing, amending, and approving all sections of the plan update
- Adopting, implementing, and maintaining the plan update

Table 2-1 shows the current members of the Planning Partnership as of the time of publication of this plan update.

Table 2-1. Del Norte County Hazard Mitigation Planning Partnership Members

Jurisdiction	Primary Point of Contact	Primary Point of Contact Title	Alternate Point of Contact	Alternate Point of Contact Title
Del Norte County	Deborah Otenburg	Emergency Services Manager	Christina Smith	Fiscal Manager
City of Crescent City	David Yeager	Public Works Director	Andrew Leighton	Engineering Project Manager
Big Rock Community Service District	Joe "Hank" Akin	Commissioner	Andy Allen	Manager
Crescent City Fire and Rescue	Kevin Carey	Fire Chief	James Weiland	Battalion Chief
Elk Valley Rancheria	Dale A. Miller	Tribal Council Chairman	Richard Warner	Tribal Council Vice-Chairman
Gasquet Community Service District	Steve Kasmar	Chair	John Andst	Supervisor
HRC Community Service District	Wes White	Board President	Alan Gwiazdon	Board Member
Klamath Community Service District	Margaret Caldwell	Board of Directors Chairman	Sandy Moreno	Contract Treasurer
Smith River Community Service District	Jeff Beard	General Manager	LeeAnn Burcham	Office Manager
Smith River Fire Protection District	Geoff Antill	Project Manager	Elaine Fallgren	Chairperson

The various jurisdictions in Del Norte County have differing levels of capabilities and resources available to apply to the plan update process, as well as differing levels of vulnerability to and impacts from the natural hazards being considered in this plan. It was Del Norte County's intent to encourage participation by all jurisdictions, and to accommodate their specific needs and limitations while still meeting the intent and purpose of plan update participation. Such accommodations have included establishing a Steering Committee, engaging a contract consultant to assume certain elements of the plan update process on behalf of the jurisdictions, and providing alternative mechanisms for planning participation.



Ultimately, jurisdictional participation is evidenced by a completed annex of the HMP, wherein jurisdictions individually identify their planning points of contact, evaluate their risk from the hazards of concern, identify their capabilities to effect mitigation in their community, identify and prioritize a suite of actions to mitigate their hazard risk, and adopt the updated plan via resolution. Annexes are included in Volume 2 of this HMP.

The County and the City of Crescent City actively participate in the National Flood Insurance Program, and each has a designated NFIP floodplain administrator. These floodplain administrators were informed of the planning process, reviewed the plan documents, and provided direct input to the HMP update. The floodplain administrators are identified in the County's and City's jurisdictional annexes in Volume 2.

After completion of the plan, implementation and ongoing maintenance will become a function of the Planning Partnership as described in Chapter 18. The Planning Partnership will be responsible for reviewing the draft HMP and soliciting public comment as part of an annual review and as part of the five-year mitigation plan updates.

Steering Committee

Del Norte County developed a Steering Committee to provide guidance and direction to the HMP update effort and to ensure that the resulting document will be embraced by local government leaders as well as all who live and work within the planning area. Steering Committee members were charged with the following:

- Providing guidance and oversight of the planning process on behalf of the general planning partnership
- Attending and participating in Steering Committee meetings
- Assisting with the development and completion of certain planning elements, including:
 - Reviewing and updating the hazards of concern
 - Developing a public and stakeholder outreach program
 - Ensuring that the data and information used in the plan update process is the best available
 - Reviewing and updating the hazard mitigation goals
 - Identifying and screening appropriate mitigation strategies and activities
- Reviewing and commenting on plan documents prior to submission to Cal OES and FEMA

The Steering Committee provided guidance, leadership, and oversight of the planning process and acted as the point of contact for all participating jurisdictions and various interest groups in the planning area. Table 2-2 lists the members of the Steering Committee.



Table 2-2. Del Norte County Hazard Mitigation Steering Committee Members

Affiliation	Name	Title
Del Norte County, Office of Emergency Services	Deborah Otenburg	Emergency Services Manager
Del Norte County, Office of Emergency Services	Christina Smith	Fiscal Manager
Del Norte County, Community Development Department	Heidi Kunstal	Director
Del Norte County, Border Coast Regional Airport Authority	Ryan Cooley	Airport Director
Del Norte County, Office of Emergency Services	Jessica Seaman	Emergency Services Coordinator
Del Norte County, Community Development Department	Houawa Moua	Environmental Health
Del Norte County, Community Development Department	Jonathan Olson, DN CDD	County Engineer
Del Norte County, Community Development Department	Rosanna Bower, DN CDD	Assistant County Engineer
Del Norte County Regional Transportation Commission	Tamara Leighton	Director
Del Norte Unified School District	Jeff Harris	Superintendent
Del Norte County, Department of Information Technology	Rachel Sarina	IT Operations Officer
Del Norte County Healthcare District	Kevin Caldwell	-
American Red Cross	Mary Dorman	Volunteer
Big Rock Community Service District	Joe "Hank" Akin	Commissioner
City of Crescent City	Andrew Leighton	Engineering Project Manager
City of Crescent City	Eric Weir	City Manager
Crescent City Fire and Rescue	Kevin Carey	Fire Chief
Crescent City Harbor District	Mike Rademaker	CEO/Harbormaster
Elk Valley Rancheria	Jennifer Meyer	Emergency Manager
Gasquet Community Service District	Steve Kasmar	Chair
Gasquet Neighbors Helping Neighbors (Non-Governmental Organization)	Janet Kasbohm	
HRC Community Service District	Wes White	President
Klamath Community Service District	Margaret Caldwell	Board President
Member of the Public	Charles Tweed	Public
Mission Possible (Non-Governmental Organization)	Daphne Cortese-Lambert	-
Open Door (Spanish Community) (Non-Governmental Organization)	Hilda Contreras	-
Pulikla Tribe of Yurok People (formerly Resighini Rancheria) Emergency Management	Gail Tarbell	Emergency Manager
Senior Center (Non-Governmental Organization)	Charlaine Mazzei	-
Smith River Community Service District	Jeff Beard	Manager
Smith River Fire Protection District	Geoff Antil	Project Manager
Summit Accounting Services	Sandra Moreno	Treasurer
Tolowa Dee-ni' Nation Planning	Tim Hoone	Director



Affiliation	Name	Title
Yurok Tribe Emergency Management	Amos Pole	Emergency Manager
Redwood Coast Regional Center	Ronald Lee	Emergency Manager
Redwood Coast Transit	Joe Rye	Executive Director

2.2.2 Planning Activities

Members of the Planning Partnership (individually and as a whole), as well as key stakeholders, met and communicated, as needed, to share information. This included workshops to identify hazards, assess risks, update inventories of critical facilities, and assist in updating mitigation goals and strategies. All members of the Planning Partnership had the opportunity to review the draft HMP, supported interaction with other stakeholders, and assisted with public involvement efforts. These activities provided continuity through the process to ensure that natural hazard vulnerability information and appropriate mitigation strategies were incorporated.

Table 2-3 summarizes meetings and other planning activities conducted during the development of the plan. It also identifies which 44 CFR 201 requirements each activity satisfies. Documentation of meetings (agendas, sign-in sheets, minutes, etc.) may be found in Appendix C. In addition to the activities listed in the table, there was a great deal of communication between Planning Partnership members and the consultant through individual meetings, phone, and email.

Table 2-3. Summary of Mitigation Planning Activities

Date	44 CFR 201 Requirement ^a	Description of Activity	Participants
May 2023	2	All municipalities and special districts invited to participate in the planning process.	Del Norte County
July 30, 2024	—	Introduce the Planning Partnership and contract consultant, provided an overview of the hazard mitigation planning process, and to begin the information gathering processes and update the hazards of concern.	Del Norte County, Planning Partnership
September 6, 2024	2	Introduce the Steering Committee and contract consultant, provided an overview of the hazard mitigation planning process, and to begin the information gathering processes and update the hazards of concern.	Del Norte County, Steering Committee, Stakeholders
July 15, 2022	2, 3c	GIS data collection meeting	Del Norte County Office of Emergency Services, Del Norte County GIS Operations, Contract Consultant
Bi-Weekly	—	Project status meeting to discuss action items in support of the expedited planning process	Del Norte County, Contract Consultant
December 2024	2	Online Public Hazard Preparedness and Mitigation survey developed and deployed	Planning Team, Contract Planner



Date	44 CFR 201 Requirement ^a	Description of Activity	Participants
January 2025	2	Online Stakeholder Hazard Mitigation surveys developed and deployed	Stakeholders, Steering Committee, Planning Team, Contract Planner
April 30, 2025	—	Public meeting about the hazard mitigation planning process and opportunities for public participation	Public, Stakeholders, Del Norte County, Contract Consultant
December 15, 2025	2	Draft HMP posted to public project website	Public and Stakeholders
December 17, 2025	1b, 2, 3, 4, 5	Steering Committee Meeting- Plan Maintenance, Draft HMP Review	Steering Committee Contract Consultant
December 17, 2025	1b	Public meeting about the HMP planning process was made available to attendees. Attendees were encouraged to review the draft HMP.	Public, Stakeholders, Del Norte County, Contract Consultant
January 2026	1b, 2	Public and stakeholder comments to draft HMP received and incorporated into final HMP.	Public and Stakeholders
July 27, 2026	All requirements	Final plan submitted to Cal OES and FEMA Region 9	Cal OES, FEMA Region 9
Upon plan approval by FEMA	1a	Plan adoption by resolution by the governing bodies of all participating municipalities	All plan participants

Note: TBD = to be determined.

a. Numbers in column 2 identify specific requirements of 44 CFR 201.6, as follows:

- 1a – Prerequisite – Adoption by the Local Governing Body (201.6.a.1)
- 1b – Public Participation (201.6.b)
- 2 – Planning Process – Documentation of the Planning Process (201.6.c.1)
- 3a – Risk Assessment – Identifying Hazards (201.6.c.2.i)
- 3b – Risk Assessment – Profiling Hazard Events (201.6.c.2.i)
- 3c – Risk Assessment – Assessing Vulnerability: Identifying Assets (201.6.c.2.ii.A)
- 3d – Risk Assessment – Assessing Vulnerability: Estimating Potential Losses (201.6.c.2.ii.B)
- 3e – Risk Assessment – Assessing Vulnerability: Analyzing Development Trends (201.6.c.2.ii.C)
- 4a – Mitigation Strategy – Local Hazard Mitigation Goals (201.6.c.3.i)
- 4b – Mitigation Strategy – Identification and Analysis of Mitigation Measures (201.6.c.3.ii)
- 4c – Mitigation Strategy – Implementation of Mitigation Measures (201.6.c.3.iii)
- 5a – Plan Maintenance Procedures – Monitoring, Evaluating, and Updating the Plan (201.6.c.4.i)
- 5b – Plan Maintenance Procedures – Implementation through Existing Programs (201.6.c.4.ii)
- 5c – Plan Maintenance Procedures – Continued Public Involvement (201.6.c.4.iii)

2.3 STAKEHOLDER OUTREACH AND INVOLVEMENT

The Del Norte County HMP update was written using the best available information obtained from a wide variety of sources. Throughout the HMP update process, a concerted effort was made to gather information from municipal and regional agencies and staff as well as stakeholders, federal and state agencies, and the residents of the County. A Steering Committee solicited information from local agencies and individuals with specific knowledge of certain natural hazards and past historical events.



In addition, the Steering Committee and Planning Partnership took into consideration planning and zoning codes, ordinances, and recent land use planning decisions.

The stakeholders are the agencies, departments, non-profits, districts, authorities, and other entities that have a stake in managing hazard risk and mitigation. Information and input provided by these stakeholders have been included throughout this plan.

To ensure broad regional, county, and local representation in this planning process, a comprehensive list of county-wide and regional stakeholders was developed with the support of the Steering Committee. Participating jurisdictions identified local stakeholders, as described in Volume 2. Stakeholder outreach was performed early and throughout the planning process. Identified stakeholders were invited to attend meetings, complete surveys, and comment on the draft HMP.

The following sections list the stakeholders who were invited to participate in the development of this plan and describe how they contributed to the plan. This summary information demonstrates the scope and breadth of the stakeholder outreach efforts during the planning process. Beyond those described here, many stakeholders were aware of and/or contributed to this plan through formal and informal outreach efforts by the Planning Partners involved in the plan update. Communication with the groups listed in this section included emails, surveys, telephone calls, and, at times, in-person meetings.

2.3.1 Federal and State Agencies

The federal and state agencies listed in Table 2-4 were contacted during the planning process. The table describes how each participated.

Table 2-4. Participation of Federal and State Agencies

Agency	Participation
FEMA Region 9	Provided updated planning guidance; provided information on previous federal disasters, conducted plan review.
National Centers for Environmental Information (NCEI) National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) Storm Prediction Center (SPC) U.S. Army Corps of Engineers (USACE) U.S. Census Bureau U.S. Geological Survey (USGS)	Information regarding hazard identification and the risk assessment for this HMP update was requested and received or incorporated by reference.
California Governor's Office of Emergency Services	Provided information on state emergency proclamations; administered planning grant and facilitated FEMA review; provided updated planning guidance; provided review of draft and final plan.
California Department of Forestry and Fire Protection (CAL FIRE) California Department of Conservation California Department of Water Resources California Natural Resources Agency	Information regarding hazard identification and the risk assessment for this HMP update was requested and received or incorporated by reference.



2.3.2 County and Regional Agencies

The county and regional agencies listed in Table 2-5 were invited to participate during the planning process. The table describes how each participated.

Table 2-5. County and Regional Agencies

Agency	Participation
• Del Norte County, Office of Emergency Services • Del Norte County, Community Development Department • Tolowa Dee-ni' Nation • Redwood Coast Transit	Served on steering committee, attended meetings, provided input and reviewed draft HMP.
• Border Coast Regional Airport Authority • Crescent City Harbor District • Del Norte Local Transportation Commission • Redwood Coast Regional Center	Served on the steering committee, provided input, and reviewed draft HMP.
• Del Norte County Administration • National Weather Service	Provided input and reviewed draft HMP.
• Pulikla Tribe of Yurok People (formerly Resighini Rancheria) • Yurok Tribe	Invited to take the stakeholder survey and review the draft HMP.

2.3.3 Business, Academia, and Other Private Organizations

Representatives from the business sector, educational institutions, and other private organizations were invited to attend a Steering Committee meeting, complete the stakeholder survey, and comment on the draft HMP. These organizations are listed below:

- Del Norte Unified School District
- Del Norte Ambulance
- Pacific Power
- Cal Ore Life Flight
- Sutter Coast Hospital

2.3.4 Nonprofit Organizations and Community-Based Organizations

The following groups and agencies that provide support to and work with socially vulnerable populations and underserved communities were invited to complete a stakeholder survey and review the draft HMP:

- Mission Possible
- Open Door Community Clinic
- Del Norte Senior Center
- Gasquet Neighbors Helping Neighbors
- Gasquet American Legion



- Family Resource Center of the Redwoods
- Hmong Community Center
- Del Norte & Tribal Lands Community Food Council
- Smith River Baptist Church
- Smith River United Methodist Church

2.3.5 Adjacent Jurisdictions

The County kept surrounding jurisdictions informed of the project, invited them to complete a neighboring community survey, and requested their review of the draft HMP. The following adjoining county and jurisdictional representatives were contacted in January 2025 to inform them about the HMP update, stakeholder survey and to invite them to provide input to the planning process:

- Siskiyou County
- Humboldt County
- Curry County, Oregon

2.3.6 Stakeholder Survey

A stakeholder survey was designed to identify general needs for hazard mitigation and resiliency within Del Norte County from the perspective of stakeholders, as well as to identify specific projects that may be included in the mitigation plan. It was distributed to identified stakeholders, including county and municipal departments and agencies. Feedback was reviewed by the Steering Committee and integrated where appropriate in the plan. The full results of the survey are available in D.

Survey Respondents

As of May 14, 2025, 10 stakeholders completed the survey, with responses from local government, tribal partners, utilities, and the private sector. The majority of respondents represented emergency management positions within their organization.

When asked if the organization maintains or manages facilities or infrastructure within their designated service area, 90 percent reported that they manage buildings, roads, or water infrastructure.

Eighty percent of respondents noted that they work with socially vulnerable populations. Examples of this work included the following:

- Personal services
- Funding or financial support
- Human rights advocacy
- Shelter or housing needs
- Mental health services
- Job training



- Emergency supplies
- Discount programs

Hazard and Damage Identification

All respondents indicated that buildings, facilities, or structures their organization is involved with have been impacted by a natural hazard. The most common hazard was wildfire, with 80 percent of respondents reporting closures or power outages from the 2023 wildfires; however, impacts from all hazards of concern were reported. Responses included the following statements:

- Multiple past floods have destroyed buildings and homes dating back into the 1800s, 1955, 1964, and more recently damages at the west entrance, campground and barn area
- Our office location in Crescent City lost power for several days during the Smith River complex fire. We rotated back up battery packs in the office to power staff mobile devices. Having access to the internet and servers was crucial for us to coordinate our response and support to those in Del Norte County with developmental disabilities.
- Even with the tsunami not being generated in December 2024, the tsunami warning still had a huge impact on the whole community and showed us that in a near shore event we need to be better prepared
- Wildfires have had a lasting impact on our landscape, and on residents. We are losing our timber resources, roadways, recreational opportunities, ecological balance, water quality, and suffering economic hardships at a scale not seen here in Del Norte in recent history.

Stakeholders were asked about their primary concerns regarding hazard mitigation and the challenges to implementing mitigation actions. Responses included the following statements:

- Wildfire education. Fire does not have to be the enemy, but that idea is engrained in most people's minds due to outdated government policies, ineffective land management, and a high percentage of low-income residents who cannot afford to protect their homes and businesses properly.
- We need to be more self-reliant due to Del Norte being so rural. We need to be prepared that if a large event happens we might not receive state or federal assistance for weeks or months. We need to be able to fill the resource needs of the community.
- Established MOUs/MOAs [memorandums of understanding and memorandums of agreement] and collaborative partnerships and turnover of local government and lead agencies
- Challenges are the remote location; we are easily cut off from outside services. Last Chance Grade on Hwy 101 has isolated this population in the past. If a catastrophic event occurred, this community would be left vulnerable.
- Ensuring that those with electricity dependent medical devices has access to power during a disaster/emergency



Community Preparedness

Seventy percent of respondents noted they are aware of the location and number of populations in their community or service area that may need additional support during a hazard event. Populations reported include:

- Seniors and older adults
- Unhoused and homeless
- People with disabilities
- Tribal members
- Low income and poverty
- Access and functional needs populations
- Veterans
- Rural communities
- Trailer parks

Ninety percent of the respondents reported having an emergency operations plan, and 60 percent reported having either a continuity of operations plan or a business continuity plan. The respondents also reported being involved in the following concurrent planning efforts (where relevant, these plans are referenced in this HMP):

- Del Norte Wildfire Resilience Project
- Rock Creek Community Wildfire Resilience Project
- Trails to Firelines Project
- Del Norte County Community Wildfire Protection Plan
- Tribal Multi-Hazard Mitigation Plan
- Integrated Resiliency Management Plan containing individual emergency response plans (i.e., evacuation, communication, continuity of operations (business) and operations)
- Hazardous Vulnerability Analysis
- Land Use Plan
- Flood Study
- Master Planning
- Wildfire Mitigation Plan

Finally, the survey asked about community characteristics that create additional vulnerabilities to hazards. Responses included the following statements:

- Access to transportation, broadband access, economic disadvantages, physical health, limited physical mobility, age, and rural communities are all common characteristics in Del Norte County. More so in the interior of the County. Gasquet, Low Divide, Rock Creek, Big Flat, Washington Flat are all at-risk communities both for wildfire danger but also with access issues



in case of disaster. Big Flat, Rock Creek, and Boulder Creek are only accessed by one paved road which frequently gets closed due to landslides. Wildfires could also trap residents in place.

- We are like an island here in Del Norte and it's possible that in a big event we would not be able to get resources here. This is because only U.S. Highways 101 and 199 are the only ways in or out of the major center of county, and both of the potential to have landslides which seems to happen more and more. We have only one power company that services Del Norte and we only have 1 small hospital. Also we only have 2 main grocery stores for about 27,000 people. We only have one transportation service in Del Norte.
- Broadband connectivity, geographical locations and rural communities. Severe economic disadvantages, transportation limitations, physical and mental health, and substance abuse.
- Transportation for those outside Crescent City has been a barrier to accessing services. Limited physical mobility and cognitive delay also presents obstacles for people to access services available to the wider community. Access to back up power sources (back up battery, generator) is crucial for those with electricity dependent medical devices but there are financial barriers to accessing these backup systems for those with limited resources.

2.4 PUBLIC OUTREACH

Public information activities were conducted throughout the planning process, as summarized below. Copies of all public information activities are available in Volume 2. Two in-person public meetings were held to allow the public an opportunity to learn about the HMP, participate in the planning process, and review the draft HMP. Sign-in sheets and meeting materials are available in Appendix C. A public survey was developed to capture public sentiment about natural hazards and gauge personal preparedness. The full survey results are available in Appendix DD. Finally, a 19-day public comment period was held to obtain feedback from the public on the draft HMP.

2.4.1 Public Information Activities

The public was informed of the hazard mitigation planning effort commencement at the kickoff meeting and through press releases, news articles, and public service announcements released throughout the planning process. Information about the HMP, the public survey link, and the draft HMP were posted to the Prepare Del Norte website (<https://www.preparedelnorte.com/>; see Figure 2-1).

All participating jurisdictions were encouraged to distribute press releases, [preparedelnorte.com](https://www.preparedelnorte.com/), and citizen and stakeholder surveys to relevant partners and stakeholders. Del Norte County posted planning process milestones and meetings on the County Facebook page, as shown in Figure 2-2.

Del Norte County residents maintain the strongest relationships with their government and neighbors through in-person communication. Therefore, extensive outreach was conducted using physical flyers that were posted in community gathering places. The flyer is presented in Figure 2-3 and documentation of the posted flyer appears in Volume 2.



Figure 2-1. Prepare Del Norte Website

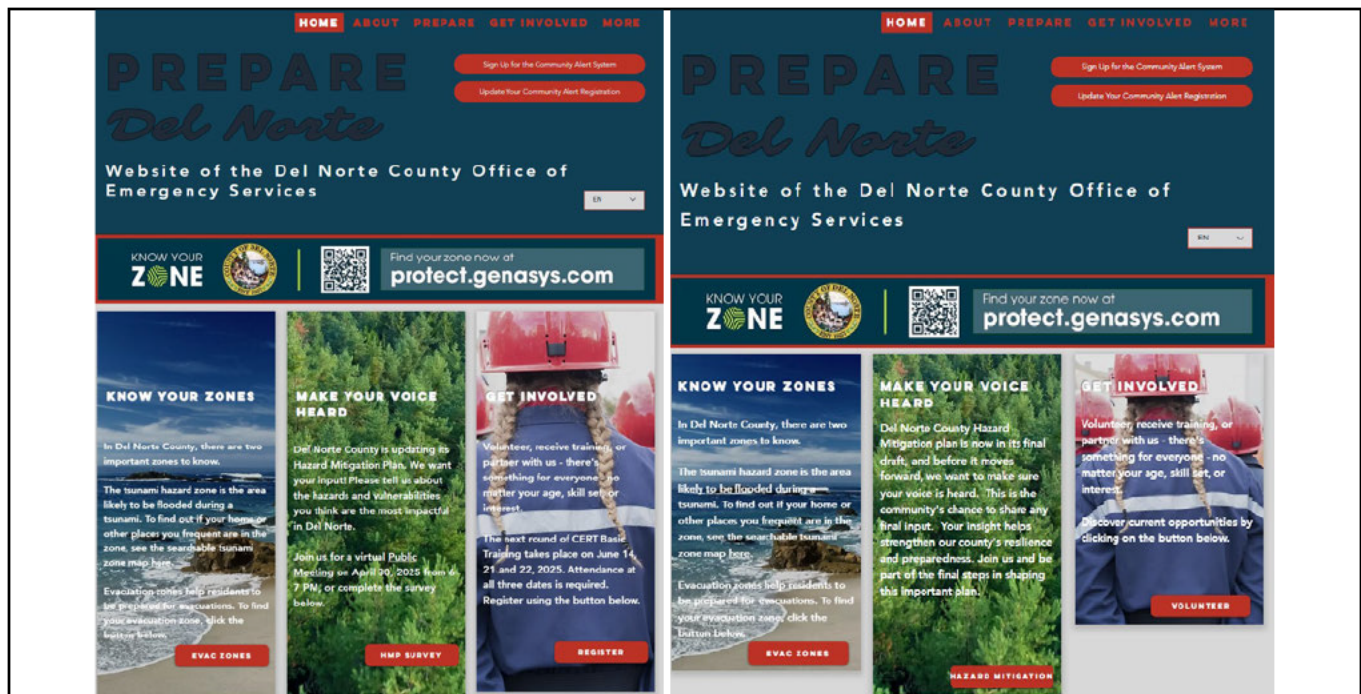


Figure 2-2. Social Media Outreach

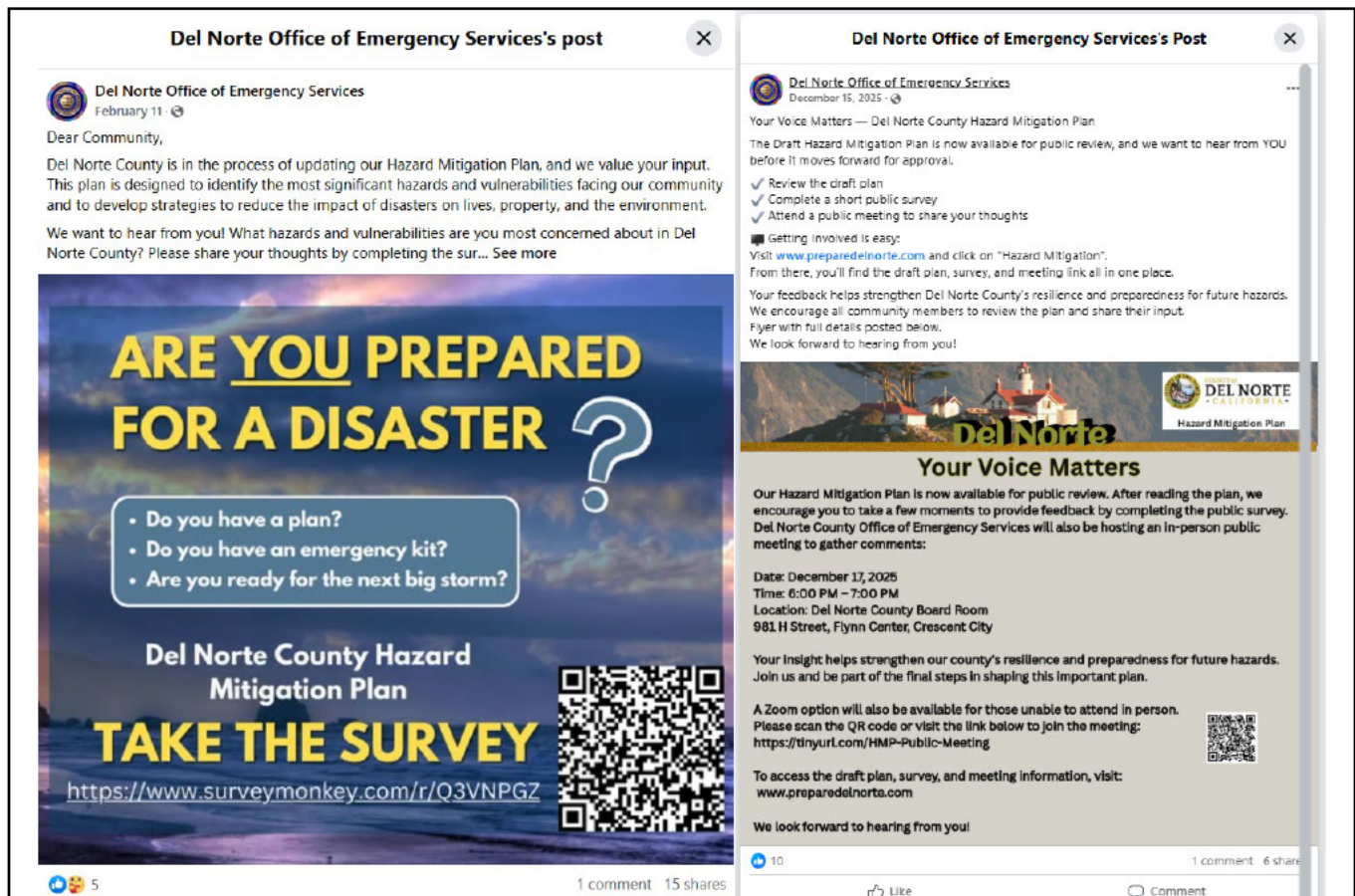




Figure 2-3. Hazard Mitigation Plan Update Flyer

County of DEL NORTE CALIFORNIA

Hazard Mitigation Plan Update

A **Hazard Mitigation Plan (HMP)** is "the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards" (44 CFR 201.6).

The **Hazard Mitigation Plan (HMP)** aims to identify and reduce hazard vulnerability to protect the health, safety, quality of life, environment, and economy of the communities within Del Norte County. HMPs must be reviewed and updated every five years and formally adopted by participating jurisdictions. During the course of this planning project, County and local leaders will work in tandem with the community to identify risks, assess capabilities, and formulate a strategy to reduce disaster vulnerability.

Del Norte County and its jurisdictions are **required to have a FEMA-approved HMP** to remain eligible to apply for and receive grant funding through certain pre- and post-disaster programs.

Over the next year, Del Norte County and its jurisdictions will be updating the current HMP. **The objectives of this planning process are:**

- Provide the public with opportunities to provide input and feedback throughout the planning process.
- Conduct a thorough risk assessment using the most recent and best available data.
- Formulate hazard mitigation goals, objectives, and actions as they relate to reducing loss of life and property from natural hazards.
- Reduce long-term impacts and damages to human health and structures, as well as future repair costs.
- Obtain state and federal approval of the HMP.
- Maintain eligibility for federal funds for pre-disaster mitigation planning before disaster strikes.

We want to hear from you! Complete this survey and tell us what hazards you think impact Del Norte County.

<https://www.surveymonkey.com/r/Q3VNPQZ>

Check out the County's website to learn more about the HMP - <https://www.co.del-norte.ca.us/>

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

Updates to the 2019 Del Norte County Hazard Mitigation Plan:

- Involvement -- actively engaging community members in plan development.
- Increased public and stakeholder outreach.
- Inclusion of hazard impacts on socially vulnerable and underserved communities.
- Addition of current climate change data and research.
- Mitigation action development for every hazard of concern for the County.

Critical facilities and community lifelines will also be assessed in the Hazard Mitigation Plan.

- The County's **critical facilities** provide essential services to the communities, especially before, during, and after a disaster.
- The County's **community lifelines** provide services that allow for the continuity of operations of critical business and government functions, and are crucial to the health and safety of Del Norte residents.

Contact Us:

Deborah Otenburg, Del Norte Office of Emergency Services Manager,
deborah.otenburg@co.del-norte.ca.us

Check out the County's website to learn more about the HMP - <https://www.co.del-norte.ca.us/>

The draft HMP was posted to the public website on December 15, 2025, for public review and comment. All public comments were directed to the Del Norte County Office of Emergency Services for collection and review by the Steering Committee. All public comments received were forwarded to the appropriate jurisdiction and/or agency and incorporated into the final plan as appropriate.

2.4.2 Public Meetings

Two public information meetings were held in Crescent City to give the public an opportunity to ask questions about the HMP.

- The first meeting was held on April 30, 2025. The meeting was announced on the County website (Figure 2-4), promoted on the County Facebook (Figure 2-5), posted on the public meeting bulletin board outside the County administrative offices, and distributed by the Planning Partners for message amplification.
- The second public meeting was held on December 17, 2025. The meeting was announced on the County website (Figure 2-4), promoted on the County Facebook (Figure 2-5), posted at several local businesses and public bulletin boards, and distributed by the Planning Partners for message amplification.



Figure 2-4. Public Meeting Notice on County Website

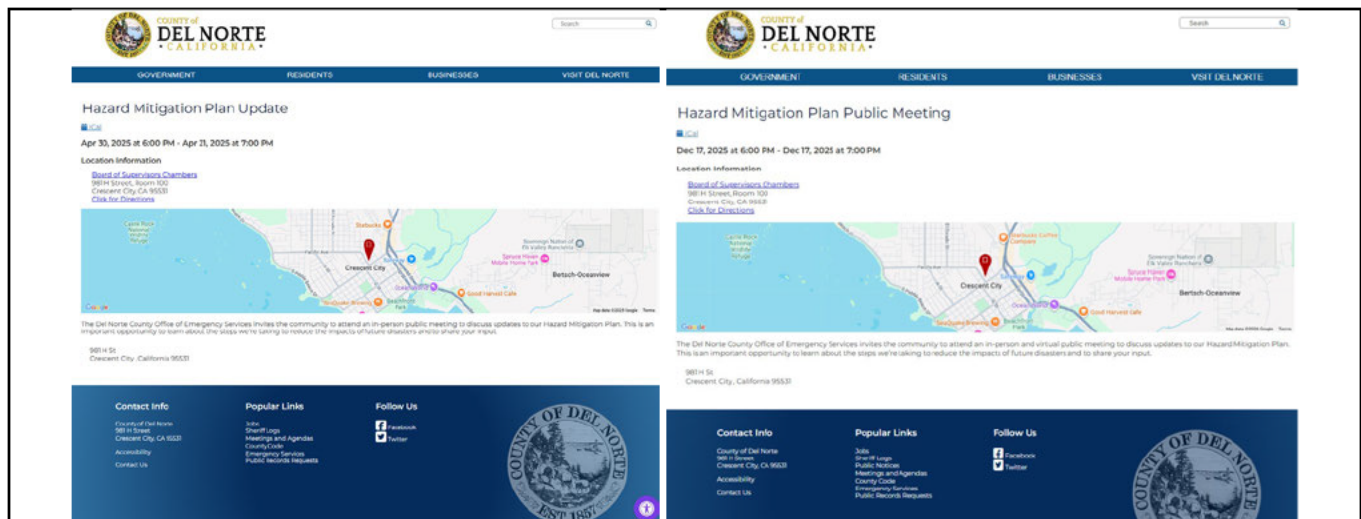
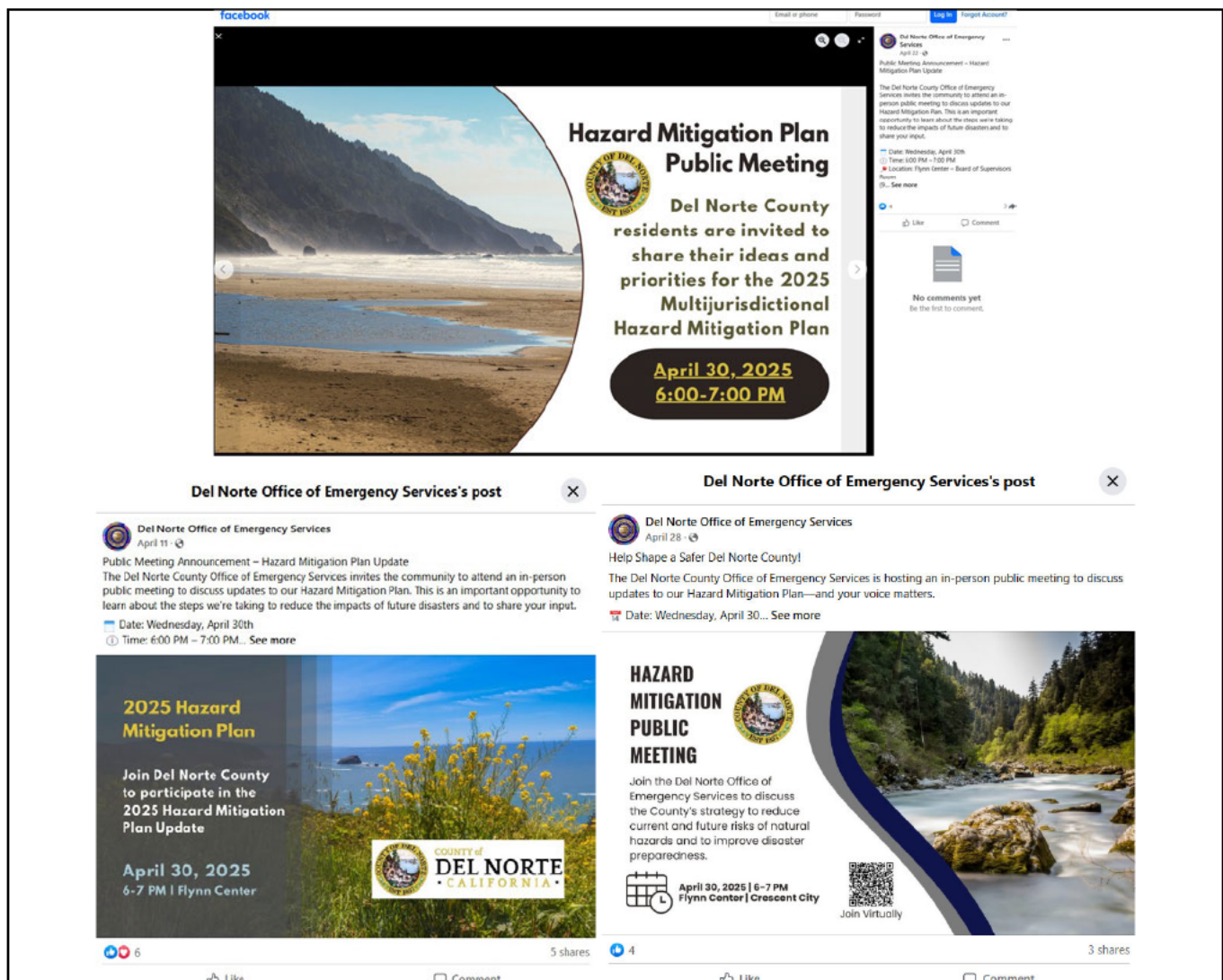


Figure 2-5. Public Meeting Facebook Posts





2.4.3 Public Survey

Distribution

An on-line natural hazards preparedness citizen survey was developed to gauge household hazard preparedness in Del Norte County and to assess the level of knowledge about tools and techniques to assist in reducing risk and loss from hazards. The survey asked quantifiable questions about citizen perception of risk, knowledge of mitigation, and support of community programs. It also asked demographic questions to help analyze trends.

The survey was posted on the County website in January 2025 and was available for public input through May 14. All participating jurisdictions were requested to advertise the availability of the survey via local homepage links and other available public announcement methods.

Response

The survey received 196 responses. The majority of the respondents lived in the unincorporated area of Del Norte County and 36.7 percent live in Crescent City. The most common age of respondents was over the age of 61 (45.5 percent) and most respondents (74.6 percent) reported living in Del Norte County for 10 years or more. The majority of residents reported that they own their home (68.8 percent) and most live in a single-family detached home (77.3 percent).

Most residents receive information concerning natural hazards through mass notifications (84.5%), Facebook (69.5%) or TV and Radio (61.9%).

When asked which natural hazards they had witnessed over the past five years, the top five responses were:

- Wildfire (90.8 percent)
- Excessive Rain (72.8 percent)
- Extreme Wind (67.7 percent)
- Landslide (66.2 percent)
- Flooding (56.9 percent)

The highest hazards of concern (respondents reporting somewhat concerned, very concerned, or extremely concerned) include wildfire, landslide, and tsunami.

Respondents were asked about personal preparedness actions that they or someone in their household had completed or planned to complete. The most popular answer was talking with members of their home about what to do in case of a natural disaster or emergency (79.4 percent), followed by attending meetings or receiving information about natural disasters (68.04 percent).

Respondents were asked which mitigation strategies they feel are most effective. The top three responses were enforcing the disclosure of natural hazard risks during real estate transactions, making homes more disaster-resilient, and improving disaster preparedness of local schools.

When asked about specific actions the County could take to reduce hazard risk, respondents said that the most important action was protecting critical facilities and community lifelines (86.4 percent), followed by protecting and reducing damage to utilities (74.5 percent), strengthening emergency



services (73.9 percent) and promoting cooperations among public agencies, special districts, residents, nonprofit organizations, and local businesses (73.8 percent).

Jurisdiction-specific responses can be found in Volume 2. Refer to Appendix D for the full list of survey questions and responses.

2.4.4 Public Comment Period

On December 15, 2025, Del Norte County announced that the public was invited to review the draft HMP posted on the County website and that public comments would be accepted from December 15 through December 29, 2025. The County received five public comments. The Planning Partnership reviewed the comments and made updates to the draft HMP as appropriate. Common themes expressed in the comments included the importance of the following:

- The hazard ranking results for earthquake and tsunami reflected risk based on historic occurrences but did not consider the extreme impact such events could have on coastal areas of the county. Based on this feedback from multiple reviewers and subject-matter experts, the hazards rankings for earthquake and tsunami were adjusted.
- While extreme heat has the potential to impact inland areas of the county, there is less concern for heat impacts closer to the coast. Additional discussion of potential average temperature increases and extremely hot periods was added to the Extreme Heat hazard profile.

2.5 INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The Del Norte County HMP incorporates the best available information to support hazard profiling, risk assessment, review and evaluation of mitigation capabilities, and the development and prioritization of County and local mitigation strategies. Plans, reports, and other technical information were identified and accessed online through independent research by the planning consultant or provided directly by the County, participating jurisdictions, and stakeholders involved in the planning effort. Detailed sources of technical data and information referenced in this HMP are listed in the References section.

The asset inventory data used for the risk assessment is presented in the County Profile (Chapter 3). Details of the source of this data, along with technical information on how the data was used to develop the risk assessment, are presented in Chapter 4, as well as throughout the hazard profiles in this HMP. The County and participating jurisdictions provided relevant jurisdiction-specific planning and regulatory documents, which were reviewed to identify:

- Existing jurisdictional capabilities
- Needs and opportunities to develop or enhance capabilities, which may be identified in the County or local mitigation strategies
- Mitigation-related goals or objectives, considered in the review and update of the overall Goals and Objectives (see Section 17.1)



- Proposed, in-progress, or potential mitigation actions to be incorporated into the updated County and local mitigation strategies

The following regulations, codes, ordinances, and plans were reviewed to develop mitigation planning goals and objectives and mitigation strategies that are consistent across local and regional planning and regulatory mechanisms:

- General plans
- Building codes
- Zoning and subdivision ordinances
- Flood insurance rate maps
- NFIP flood damage prevention ordinances
- Site plan requirements
- Stormwater management plans
- Emergency management and response plans
- Land use and open space plans
- Capital plans
- California State Hazard Mitigation Plan, 2023

The County and participating jurisdictions were tasked with assessing their planning and regulatory capabilities (see capability assessment section of each jurisdictional annex in Volume 2). They reviewed relevant plans contributing to the capability of the County and each jurisdiction to integrate effective mitigation efforts into their daily activities. This review is reflected in the capability assessment table in each of the municipal annexes. These tables list plan types, names, and dates, as well as a summary of how each plan supports mitigation and resilience.

2.6 INTEGRATION WITH EXISTING PLANNING MECHANISMS AND PROGRAMS

Effective mitigation is achieved when hazard awareness and risk management approaches and strategies become an integral part of public activities and decision-making. Many existing plans and programs support hazard mitigation in the County. It is critical that this HMP integrate, coordinate with, and complement, those existing plans and programs.

The capability assessment presented in Chapter 16 provides a summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, and county) that support hazard mitigation in Del Norte County. In the jurisdictional annexes in Volume 2, each participating jurisdiction identifies how it has already integrated hazard mitigation into its planning, regulatory and administrative framework (“integration capabilities”) and how it intends to promote this integration (“integration actions”).



2.7 PLAN ADOPTION

Adoption by the local governing bodies of each participating jurisdiction demonstrates the commitment of the Planning Partners to fulfill the mitigation goals and strategies outlined in this HMP. Adoption via a resolution from the governing body legitimizes the HMP and authorizes responsible agencies to execute their responsibilities.

All participating jurisdictions will proceed with formal adoption proceedings. Each jurisdiction must submit a copy of its formal adoption resolution or other legal instrument to the Del Norte County HMP Coordinator in the Del Norte County Office of Emergency Services. Del Norte County will forward the executed resolutions to Cal OES, after which they will be forwarded to FEMA for the record. FEMA allows two options for submitting adoption resolutions:

In addition to being required by the DMA, adoption of the HMP is necessary because:

- It lends authority to the plan to serve as a guiding document for all local and state government officials.
- It gives legal status to the plan in the event it is challenged in court.
- It certifies to program and grant administrators that the plan's recommendations have been properly considered and approved by the jurisdictions' governing authority and citizens.
- It helps to ensure the continuity of mitigation programs and policies over time because elected officials, staff, and other community decision-makers can refer to the official document when making decisions about the community's future.

Source: FEMA. 2003. How to Series: Bringing the Plan to Life (FEMA 386-4).

- **Submittal of adoption resolutions with plan**—All participating jurisdictions provide documentation of plan adoption when the plan is initially submitted to the state for review. After receiving the draft HMP from the state, FEMA conducts its review and will approve the plan if it meets all requirements.
- **Approvable pending adoption**—A draft HMP is submitted to the state and FEMA for approval prior to adoption by the jurisdictions. When FEMA determines that the plan as a whole and each participating jurisdiction have met all the requirements except adoption, FEMA will inform the state that the plan is “approvable pending adoption” (APA). After that, once FEMA receives documentation of adoption resolutions from at least one jurisdiction, the status is changed from APA to approved for the entire plan and for that jurisdiction. Other jurisdictions that participated in the planning process then receive approval once they pass their own adoption resolutions. A jurisdiction with a plan in APA status does not meet the requirement for an approved mitigation plan to apply for and receive funding assistance.

FEMA will transmit acknowledgement of verification of formal plan adoption and the official approval of the plan to the Del Norte County HMP Coordinator. The plan approval date begins the five-year approval period and sets the expiration date for the plan. All participating jurisdictions will have the same expiration date regardless of their own jurisdiction's adoption date. The date indicated on FEMA's approval letter is the official approval date.

Plan maintenance and monitoring is detailed in Part 5, Chapter 18. The resolutions issued by each jurisdiction to support adoption of this HMP are included in Appendix A.



3. COUNTY PROFILE

The planning area for this HMP is all of Del Norte County. This chapter presents general information about the County's land, people, and assets. This information provides a baseline for understanding the economic, structural, and population assets at risk from the hazards addressed in this HMP.

3.1 LOCATION

Del Norte County is located in the far northwest corner of the State of California on the Pacific coast, adjacent to Oregon (see Figure 3-1). The county is bounded on the north by Curry County, Oregon; on the north east by Josephine County, Oregon; on the east by Siskiyou County; on the south by Humboldt County and on the west by the Pacific Ocean. The county encompasses 1,070 square miles, 80 percent of which is forestlands, protected redwoods and recreation areas. Most of the county is located in Six Rivers National Forest. Elevations in the county range from sea level to 6,424 feet at Bear Mountain along the county's eastern boundary. Geographically, the county is defined by its coastal plain, mountainous region and rivers.

The county's name (pronounced "del nort") is from the Spanish "la tierra del norte" (the land of the north). Because of its rugged terrain and sparse population, it is one of the least-known areas in California. The county is known for its recreational fishing and hunting areas and for its natural wonders, in particular the coastal redwoods, unique plants and flowers, coastal birds, rocky, primitive beaches and sea stacks, pristine rivers, and historic lighthouses.

3.2 JURISDICTIONS WITHIN THE COUNTY

The following sections provide brief descriptions of the jurisdictions in Del Norte County that participated in this HMP. The county seat is Crescent City, the County's only incorporated city.

3.2.1 City of Crescent City

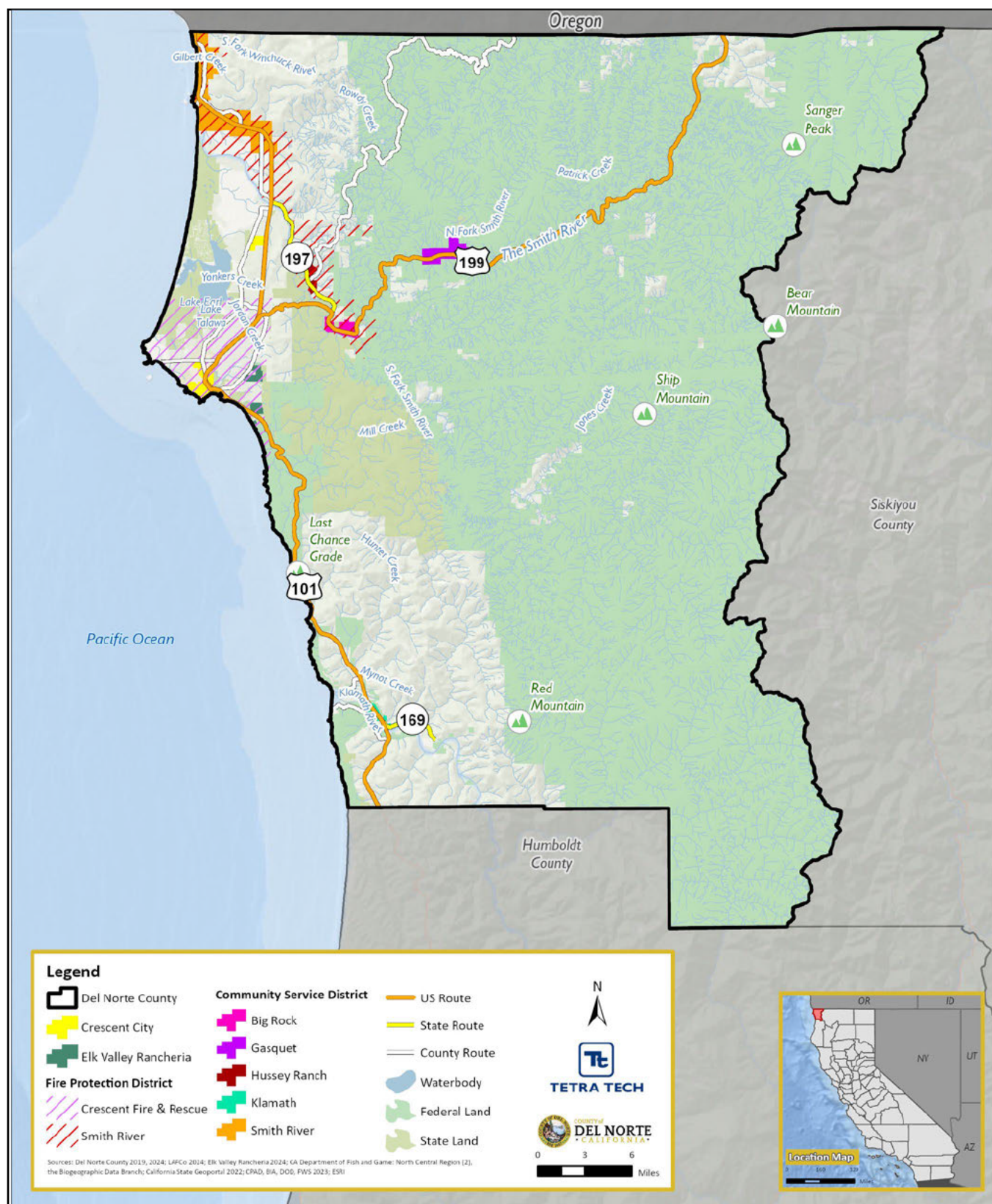
Crescent City and its urban growth area (UGA) lie on the coastal plain along the Pacific Ocean south of Point Saint George, about 20 miles south of the Oregon border. Its UGA extends to the southern portion of the Lake Earl area. Highway 101 bisects this region. The Pelican Bay State Prison is legally a part of Crescent City, though it is outside the UGA in otherwise unincorporated county areas.

3.2.2 Elk Valley Rancheria

The Elk Valley Rancheria is a tribal reservation of about 100 acres in unincorporated Del Norte County. The reservation is accessible from Howland Hill Road to the south and Norris Avenue to the north and is bisected by Mathews Street and Wyentae Street. Of the reservation's 41 parcels, 12 are held in trust (about 40 acres). The remainder are fee lands owned by tribal and non-tribal individuals or by the tribe.



Figure 3-1. Del Norte County Hazard Mitigation Planning Area





3.2.3 Unincorporated Del Norte County

Unincorporated Del Norte County includes all areas outside Crescent City and is made up of agricultural valleys, small rural communities, and extensive public forest and coastal lands.

In the north, the community of Smith River lies along U.S. Highway 101 and serves as a local service and commercial center. The Smith River flows from the northeast to the Pacific Ocean near the town and is one of California's last major free-flowing rivers, supporting trout and salmon, riparian habitats, and recreational opportunities such as fishing and rafting.

Just south of Smith River is Fort Dick, an area largely devoted to dairy and cattle ranching. Nearby coastal wetlands and dunes add ecological diversity. The Lake Earl Wildlife Area and Tolowa Dunes State Park protect tidal marshes, freshwater lagoons, and dune habitats.

Northeast of Crescent City, Hiouchi is located near Jedediah Smith Redwoods State Park, providing access to old-growth redwoods and river recreation along the Smith River. Further east along U.S. Highway 199, Gasquet lies along the North and Middle Forks of the Smith River and includes the Gasquet Ranger Station, rural homesites, and a small public airfield. Continuing east, Washington Flat and Stateline 101 consist of small clusters of rural homes.

Other smaller valleys, including Big Flat and Rock Creek, are accessed via South Fork Road and French Hill Road and are developed with rural homes and small farms.

At the southern end of the county, Klamath sits where the Klamath River meets the Pacific Ocean and borders Redwood National and State Parks. The community has connections to commercial and subsistence fishing, tourism, and tribal activities. Nearby, Requa and Klamath Glen are small riverfront communities.

Timber production occurs throughout the county on private lands. Much of the remainder of unincorporated Del Norte County consists of public lands, including national forests, wilderness areas, and state parks. The result is a sparsely populated landscape that combines working lands with protected ecosystems.

3.2.4 Special Districts

Table 3-1 provides summary information on the special districts participating in this HMP. Further details are given in the jurisdictional annexes in Volume 2.



Table 3-1. Special Districts Participating in the HMP

Big Rock Community Service District

The Big Rock CSD is a local government entity established in 1966 in the unincorporated community of Hiouchi. The district's primary function is to supply water for domestic use, irrigation, sanitation, industrial purposes, fire protection, and recreation. The district has undertaken significant infrastructure projects to enhance its water supply system. The CSD is authorized to provide other services, including sewage collection and treatment, garbage disposal, fire protection, public recreation facilities, street lighting, mosquito abatement, and police protection. However, the extent to which these additional services are currently provided may vary. The district encompasses 520 acres, bordered on three sides by the Smith River and surrounded by the Smith River National Recreation Area within the Six Rivers U.S. National Forest. It includes the Jedediah Smith Redwoods State Park Campground and the Redwood National Park Hiouchi Visitor Center. During winter, the district serves approximately 320 customers. The population significantly increases during tourism season due to the proximity of state and national parks.



Gasquet Community Service District

Gasquet is a small community of approximately 500 year-round residents (over 600 summer residents) along the banks of the Middle Fork Smith River and Highway 199, surrounded by the Smith River National Recreation Area. This district is 18 miles inland from Highway 101 and the coast. Gasquet was designated as a community at risk by the Department of Interior in 2001.





HRC Community Service District

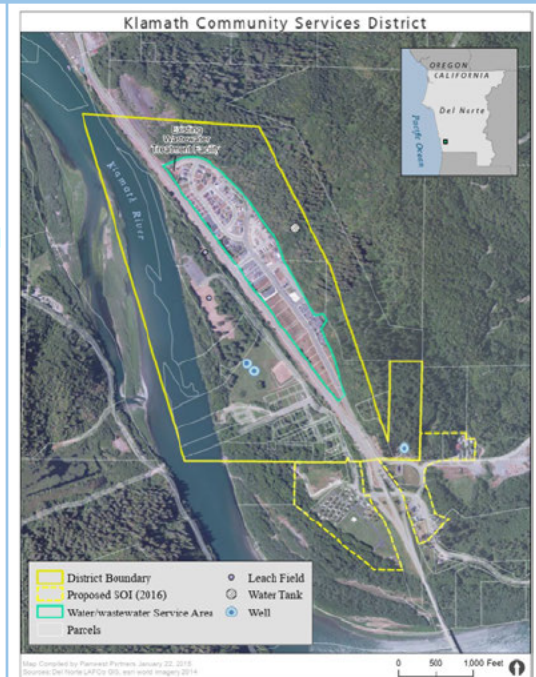
The HRC Community Services District is a special district 10 miles northeast of Crescent City along North Bank Road (Highway 197). Encompassing about 353 acres of land within the Smith River National Recreation Area, the district was established in 1965 to provide water services for domestic use and to support the Del Norte Golf Course. The district's sphere of influence extends over approximately 584 acres, including areas designated for potential development.

The primary service offered by the CSD is the provision of water to approximately 75 connections, serving an estimated population of 160 residents. The water system includes a well located adjacent to the Smith River, a 132,000-gallon storage tank, and distribution piping. Water is disinfected before distribution to ensure safety. The system has a maximum capacity of about 230 connections, indicating the potential for future growth.



Klamath Community Service District

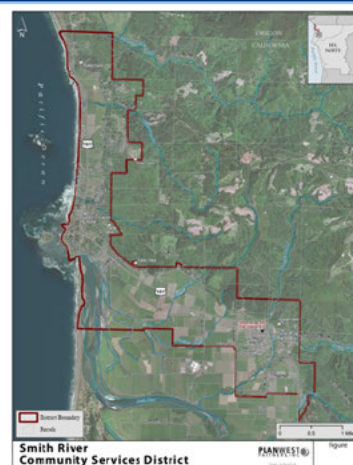
The Klamath CSD is located in southern Del Norte County, approximately 20 miles south of Crescent City and 55 miles north of Arcata. The Klamath CSD was formed June 14, 1965 for the purpose of providing water and wastewater services to the unincorporated community of Klamath. Klamath is located within the northern part of the Yurok Reservation and Klamath CSD serves Yurok Tribal, facilities, and housing at the relocated Klamath Townsite. This includes Tribal Headquarters, a Casino and Hotel. The District is approximately 0.44 square miles (285 acres), with a boundary that extends along both sides of Highway 101 for approximately one mile north of the Klamath Glen Road exit. The District extends west to the Klamath River and east to approximately 400 feet beyond existing development. According to the District, there are approximately 41 residential customers and 20 commercial customers within the District boundaries. This includes the Village Mobile & RV Park which has 33 lots, two hotels, and one seasonal RV park. The District estimates a year-around population of 240. Due to seasonal tourism and recreational uses, the District estimates that the summer population exceeds 360.





Smith River Community Service District

The Smith River CSD covers 4,736.3 acres around the community of Smith River, the northernmost community in coastal Del Norte County. The District is 13 miles north of Crescent City. It encompasses the mouth of the Smith River and extends along Highway 101 north to the Oregon border. The CSD provides domestic water, community center management, and street lighting services. The town center is near Rowdy Creek. It is bounded by the Green Diamond Resource Company lands on the east and the Smith River on the south. The western edge of Smith River is covered in agricultural land. This district includes the tribal lands of the Tolowa Dee-ni Nation.



Crescent Fire Protection District

The Crescent FPD was formed in 1949 to provide fire protection and emergency response services to the unincorporated areas surrounding Crescent City. The District covers 26 square miles, serving around 13,000 residents, and it operates from three fire stations in Crescent City and adjacent areas.

The FPD maintains a roster of about 50 volunteer firefighters who respond to emergencies 24/7. Emergencies to which they respond include structure fires, wildland fires, vehicle fires, traffic collisions, medical incidents, and hazardous materials situations.



Smith River Fire Protection District

The Smith River FPD is a dedicated volunteer-based emergency response agency serving the community of Smith River, the Tolowa Dee-ni' Nation, and the community of Hiouchi. The FPD was organized in 1934 following a devastating fire in Smith River the year prior that nearly destroyed the entire town. By 1956, the department was formally incorporated as the Smith River FPD. The FPD provides fire safety, rescue, and emergency medical services to residents and visitors of its communities and mutual aid areas. It operates two fire stations and maintains a fleet of engines, attack vehicles, and utility vehicles that allow the district to effectively respond to various emergencies.



Source: (Del Norte LAFCo 2015, Del Norte LAFCo 2016, Del Norte LAFCo 2018, Del Norte LAFCo 2022a, Del Norte LAFCo 2022b, Del Norte LAFCo 2024, SRVFD 2024)



3.3 EARLY HISTORY

Prior to the arrival of European settlers, the Tolowa and the Yurok occupied what is now Del Norte County. Tolowa territory covered the northern part of the county, and Yurok the southern part. The first Europeans to explore the Del Norte County area were most likely the Spanish who arrived by ship in the 17th and 18th centuries. The first American to explore the region was Jedediah Strong Smith, for whom the Smith River is named. In 1848, gold was discovered along the Trinity River. By 1850, northwestern California, including the Del Norte County area, was teeming with miners. Klamath City, at the mouth of the Klamath River, was founded in 1851 and was intended to be a port city and provide access to the gold-rich back country. However, shifting sand bars at the mouth of the river made navigation uncertain and the town was deserted soon after.

The City of Crescent City was established in 1853 by J.F. Wendell, who was issued a land warrant for 230 acres. Crescent City became a bustling shipping and trade center, catering to and supplying the miners. In 1855 Congress authorized the building of a lighthouse at “the battery point” (a high tide island on the coast of Crescent City) to facilitate the use of Crescent Bay as a harbor. This lighthouse is still functioning today as a historic landmark.

Gold discoveries in the immediate vicinity of Crescent City and along the south fork of the Smith River fueled a major growth boom in the Del Norte County area. However, within a few years, a decline in the production from local mines and the opening of more promising fields elsewhere in the state drew all but a handful of miners from the area. By the late 1850s, the population boom for Del Norte County was over. Del Norte County was officially established in 1857, from part of the territory of Klamath County.

The timber industry has historically played a critical role in Del Norte County’s economy. Locally produced lumber was shipped from Crescent City to San Francisco. The northern California timber industry peaked in the post-World War II years as a result of strong housing and construction demand. Shortly after 1950, the number of mills began to drop as the industry transitioned from one based on harvesting old growth timber to one that relies on younger, smaller, less valuable second growth.

3.4 PHYSICAL SETTING

3.4.1 Water Resources

Del Norte County features abundant rivers, lakes, and coastal landscapes. At the heart of the county flows the Smith River, one of the purest rivers in the United States. Meandering through canyons and ancient redwoods, the Smith River is a haven for salmon and steelhead trout, attracting anglers and nature enthusiasts alike. It is protected under the Wild and Scenic Rivers Act, ensuring its essential role to the local ecosystem.

Further south lies the Klamath River, whose waters carry cultural significance for Native American tribes. This river, lined with forests and teeming with wildlife, offers opportunities for fishing, rafting, and quiet reflection amid the wild landscapes.



Where the Smith River plain meets tidal salt water, Lake Earl and Lake Tolowa form the largest coastal lagoon in California. These tranquil waters are a refuge for thousands of migratory birds, popular with birdwatchers and kayakers. The wetlands, creeks, and tributaries that crisscross the county—including Mill Creek, a key salmon-spawning stream—support a diverse range of species and ecosystems.

The Pacific Ocean's impact on the County's western shoreline carves dramatic cliffs and hidden coves. Beaches like Crescent Beach and tide pools brimming with marine life offer a connection to the sea.

3.4.2 Geology

Topography

Del Norte County consists of two topographic regions: the eastern mountainous belt in the Northern Coast Range and the Klamath Mountains; and the coastal lowlands, extending from Crescent City to the Oregon border. The wide part of the coastal lowlands, referred to as the Smith River Plain, encompasses approximately 75 square miles.

The mountainous portion of the county, which extends to the coastline 5 miles south of Crescent City, covers 92 percent of the county. The presence of numerous shear zones within this region, combined with the abundant shales that characterize the western coast of Northern California, often creates serious slope stability problems in the moist climate of Del Norte County. To the east of the coastal volcanic rocks lie older and more variable rocks of the Klamath Mountains province. The geology of the Klamath Mountains and Northern Coast Range has been only partially mapped to date.

Rock and Soils

The soils of Del Norte County reflect the geology of the Klamath Mountain province and coastal plain, the vegetation of extensive forests and coastal plain, high annual rainfall and resulting hydrology, and a mild climate. The coastal plain includes most of the prime agricultural lands in the county. The following classifications of soil in the area were mapped by the University of California, Davis in 1966:

- **Arcata Soils**—The Arcata series consists of well-drained alluvial soils situated on old marine terraces. With a medium texture profile and good internal drainage characteristics, this soil type is considered good to excellent for agricultural uses. Fertilizer applications and irrigation are necessary for the production of pasture or bulbs. Arcata soils are found southeast of Crescent City, east of Lake Earl, and north of the mouth of the Smith River.
- **Carlotta Soils**—The Carlotta series consists of moderately well-drained, medium-texture soils developed in alluvial materials. Only the Carlotta loam (Ca 2) is considered very good to excellent for agriculture. The major limiting factor with Carlotta soils is their generally low nutrient levels. Fertilized and irrigated pastures, however, can be productive.
- **Ferndale Soils**—Ferndale soils are some of the county's best, extensive agricultural soils. They are medium-texture soils of recent alluvial origin and little profile development. The Ferndale silt loam (Fe 2) and Ferndale sandy loam (Fe 3) are rated for high agricultural production. Irrigation and annual applications of nitrogen and phosphate fertilizers are known to increase yields. Permanent pasture and some field crops are the predominant uses for this soil type.



- **Rowdy Soils**—The Rowdy series consists of young soils developed on alluvial fans. Rowdy loam (Ry 2, Ry 3) and Rowdy gravelly clay loam (Ry 4) are designated as very good to excellent agricultural soils. Because of generally low nutrient levels in these soils, annual fertilizer applications are required to maintain productivity. The principal uses of Rowdy soils are as permanent pasture and lily bulb production. Rowdy soils are located on gently sloping lands near Rowdy Creek above the Smith River and Klamath River basins.
- **Russ Soils**—Russ soils, which occur primarily along small streams, develop from sedimentary rock alluvium. The overriding factor in the utilization of Russ soils is drainage. Russ silt loam (Ru 2) and Russ fine sandy loam (Ru 3) are, however, moderately well-to-well-drained and, therefore, rated as productive soils. Pasture and supplementary feed crops are the major uses. Russ soils are located adjacent to Rowdy and Wilson Creeks.

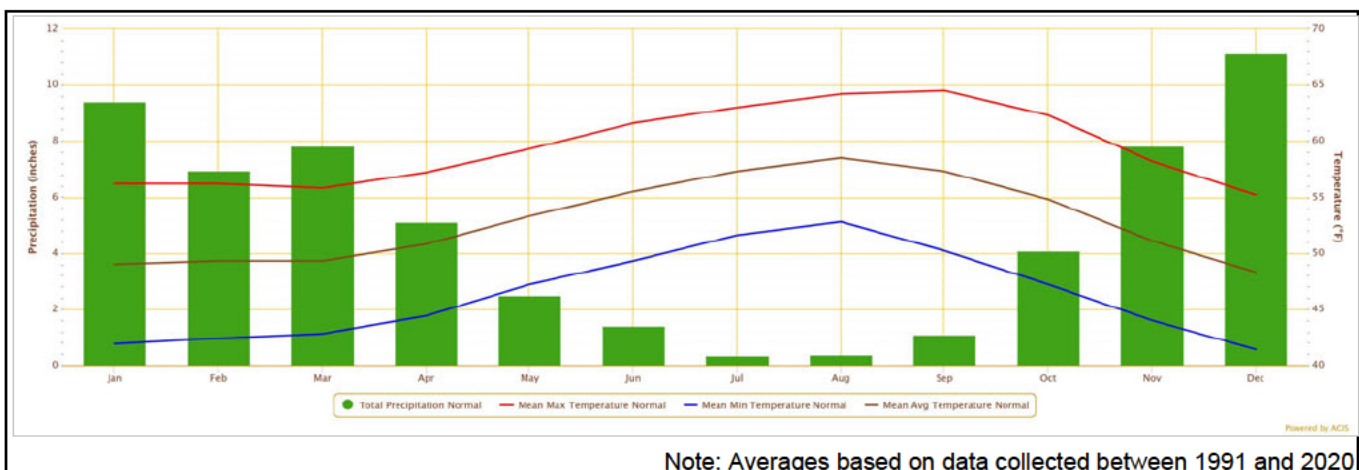
The rocks of the western portion of County’s mountainous terrain consist predominantly of sandstone (greywacke variety) and shale of the Franciscan Complex, an intensely sheared and dismembered assemblage of mainly marine rocks deposited 90 million to 145 million years ago. Other rocks present in lesser quantities in this assemblage are metamorphosed igneous rocks (green stones), cherts, and conglomerates. These rocks were deformed during and following their deposition.

3.4.3 Climate

Present-Day Normal Climate Conditions

Del Norte County is an area of moderate temperatures and considerable precipitation. Annual precipitation is commonly 96 to 150 inches, with 90 percent falling between October and April. While some precipitation is in the form of snow, primarily above 4,000 feet, most is rain that soaks into forest soils, seeps into stream channels, or recharges aquifers. Temperatures along the coast vary only 10 °F from summer to winter, although a greater range is found over inland areas. The average monthly temperature at the Crescent City airport reaches a peak of 58.5 °F in August and a low of 48.3 °F in December, as shown on Figure 3-2. Daily averages for temperature are shown in Figure 3-3.

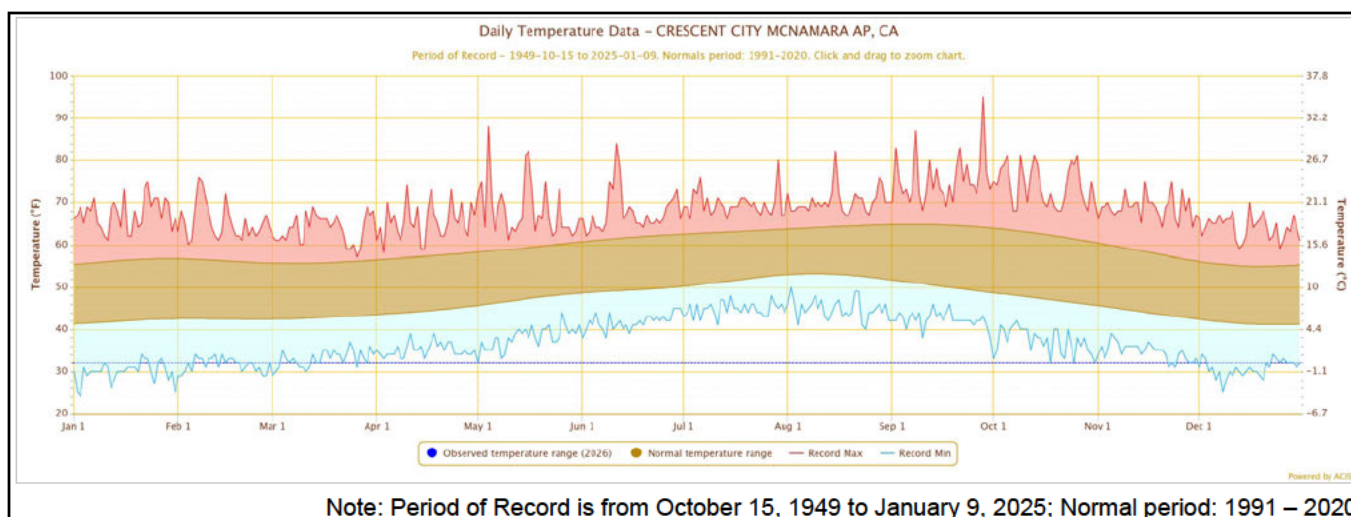
Figure 3-2. Monthly Temperature and Precipitation Averages for Crescent City



Source: (SC-ACIS 2024)



Figure 3-3. Daily Temperature Data for Crescent City



Source: (SC-ACIS 2024)

Projected Climate Change

Table 3-2 shows the historic and projected average daily temperatures in Del Norte County. From 1950 to 2005, the County's average temperature was 57.4 °F; from 2070 to 2099, the daily average is expected to rise to 64.8 °F, which is an increase of 7.4 °F (California's Fourth Climate Change Assessment 2018). Annual precipitation in the County is not expected to change significantly but will likely be delivered in more intense storms over a shorter wet season. The North Coast Region (which comprises counties in the northwest corner of the state, including Del Norte County) is expected to experience prolonged dry seasons and reduced soil moisture, even if annual precipitation stays the same or moderately increases. There will be a higher likelihood of extreme wet years and extreme dry years through 2100 (California's Fourth Climate Change Assessment 2018).

Table 3-2. Del Norte County Historical and Future Average Daily Temperature

	Historical (1950-2005)	Early Century (2020-2039)	Mid-Century (2040-2069)	End Century (2070-2099)
Del Norte County	57.4	60.0	61.8	64.8

Source: (California's Fourth Climate Change Assessment 2018)

3.4.4 Land Cover

The majority of Del Norte County remains undeveloped, with vast stretches of protected wilderness. The combination of old-growth forests, dynamic coastlines, and unspoiled mountainous terrain makes the county one of California's most pristine regions. Spanning a landscape of dense forests, rugged mountains, fertile valleys, and coastal terrain, Del Norte County's land cover reflects untouched wilderness as well as carefully managed spaces. The varied topography and the region's temperate climate have given rise to complex ecosystems. Figure 3-4 shows the current land cover in Del Norte County. Table 3-3. lists land cover types by area.



Figure 3-4. Land Cover Across Del Norte County

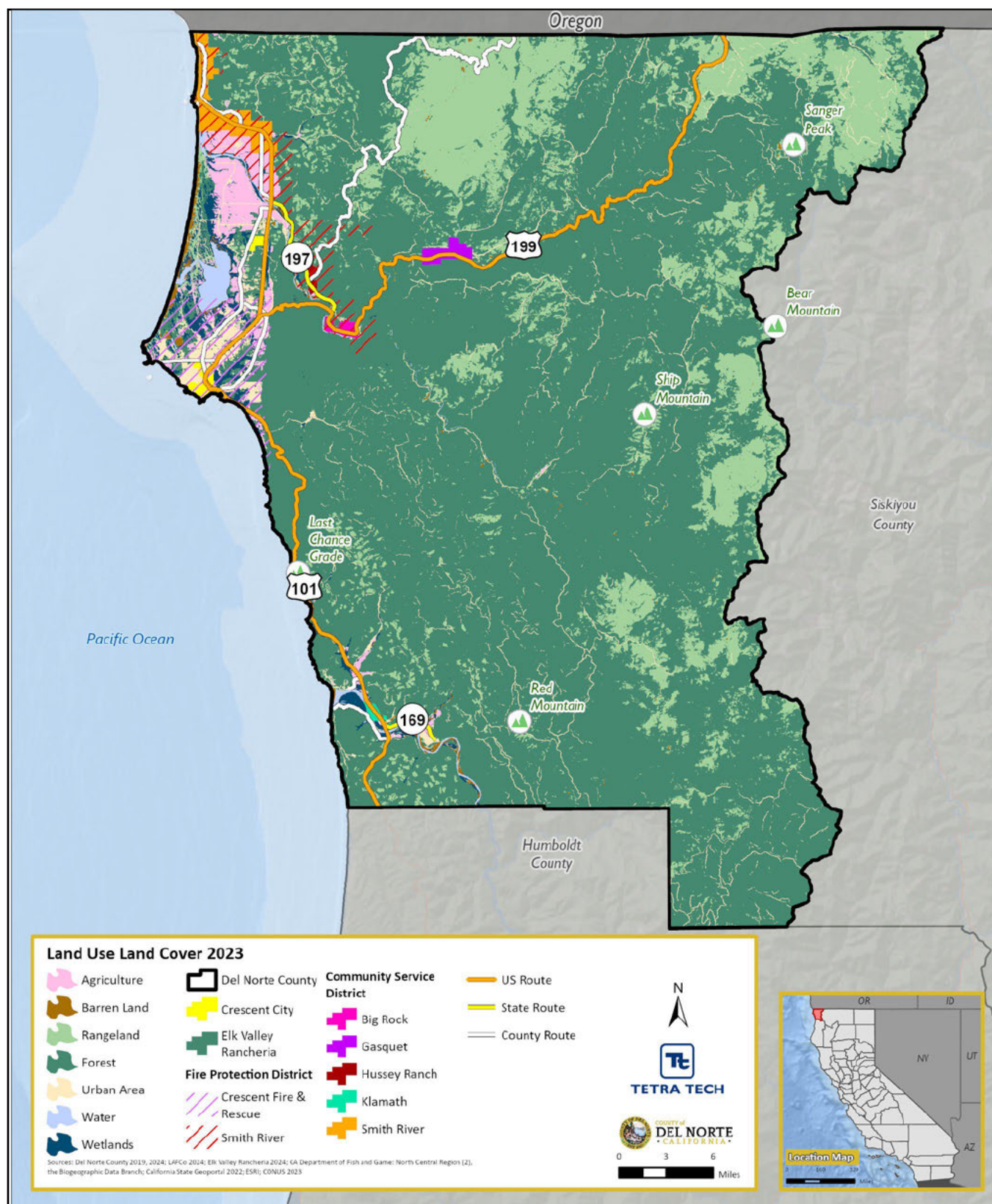




Table 3-3. Del Norte County Land Cover

Land Use Category	2023 Data	
	Acreage	% of County
Agriculture	12,306	1.9%
Barren Land	3,339	0.5%
Forest	490,795	75.6%
Rangeland	107,312	16.5%
Urban Area	22,914	3.5%
Water	4,367	0.7%
Wetland	8,272	1.3%
Del Norte County Total	649,304	100.0%

Source: CONUS 2023

Forests dominate much of the landscape. Coast redwoods found within the Redwood National and State Parks are among the tallest trees on earth. Their dense canopies create a shaded understory where ferns, mosses, and wildflowers flourish. These forests play a critical ecological role, providing habitat for countless species and serving as a significant carbon sink. Outside the redwoods, coniferous forests of Douglas fir, Sitka spruce, and western hemlock stretch across the county, particularly in the rugged foothills and mountainous areas.

The Siskiyou and Klamath Mountains in the eastern portion of the county are covered in a mix of conifers and hardwoods, interspersed with grasslands and shrub-dominated areas. Oak woodlands and meadows flourish in lower elevations, creating pockets of open land where wildflowers bloom seasonally, and wildlife roams freely. These transitional ecosystems are essential for species that require both forested and open habitats.

Moving westward, the landscape shifts dramatically as the Pacific Ocean defines Del Norte County's western boundary. The coastline is a mix of sandy beaches, rugged cliffs, and tidepools, with coastal scrublands and salt marshes thriving in the harsh, windswept environment. Coastal wetlands, particularly around Lake Earl and Lake Tolowa, form the largest estuarine system in California. These wetlands, with their rich vegetation of reeds, sedges, and grasses, are critical habitats for migratory birds, fish, and other wildlife.

The Smith River and the Klamath River create lush riparian corridors, where willows, alders, and other water-loving plants flourish. These areas are not only ecologically vital but also culturally and economically significant, supporting fish populations and recreational activities.

Agricultural lands are a small but important part of Del Norte County's land cover. The county's rugged terrain and protected natural areas leave little room for large-scale farming. Tucked into valleys and flatlands, agricultural areas are primarily used for cattle grazing and small-scale crop cultivation.



3.5 LAND USE

3.5.1 Current Land Use

Land use in the planning area is dictated by the Del Norte County General Plan, dated January 28, 2003 and amended in May of 2021. Most of the land use is forest; 16.5 percent is rangeland; 3.5 percent is developed (urban area); and 1.9 percent is classified as agriculture.

The total land area of Del Norte County is 1,010 square miles, and 77.6 percent of the land is in public ownership; most of it is held by the federal government in the Smith River National Recreation Area and Redwood National Park. With extensive federal and state land ownership, the planning partners exercise land use regulatory jurisdiction over only 23 percent of the land in the county. This means that decisions concerning development on more than three-quarters of the land in the county are out of the control of the jurisdictional entities under this plan. This makes strategic land use planning difficult to accomplish without extensive cooperation among the jurisdictions with regulatory control over land use for the balance of the county (federal, state and Native American governments).

3.5.2 Land Use Trends

The Del Norte County planning area has experienced sporadic growth over the past 30 years with a change from a timber-based economy to a tourism-based economy. It is anticipated that the growth rate will stabilize, with growth being low to moderate over the next 10 years. Caltrans expects housing production to average 50 units per year from 2023 to 2028, despite a declining population (Caltrans 2022). Considering these historical trends and future population projections, anticipated development trends for the planning area are considered low, consisting primarily of residential development with the exception of the Crescent City UGA (see Volume 2 for jurisdiction-specific growth trends).

Del Norte County is subject to state general planning law and the California Coastal Act. These processes govern land use policy-making. The County and Crescent City have adopted general plans with their associated safety elements pursuant to these laws. This HMP will work together with these programs to support wise land use in the future. Maintaining or enhancing the rich abundance of natural resources of Del Norte County is a high priority for its land use programs and managers.

3.6 POPULATION AND DEMOGRAPHICS

3.6.1 Current Population

Figure 3-5 displays the population density in Del Norte County. Table 3-4 summarizes 2022 American Community Survey (ACS) 5-year population estimates for Del Norte County and Crescent City. Del Norte County's estimated population of 27,462 makes it 49th in population out of 58 California counties. The majority of the population is concentrated around Crescent City, with most of the County having a population density of fewer than 100 people per square mile. As of 2024, 23.2 percent of county residents live in Crescent City.



Figure 3-5. Total Population Per Square Mile by Census Tract in Del Norte County

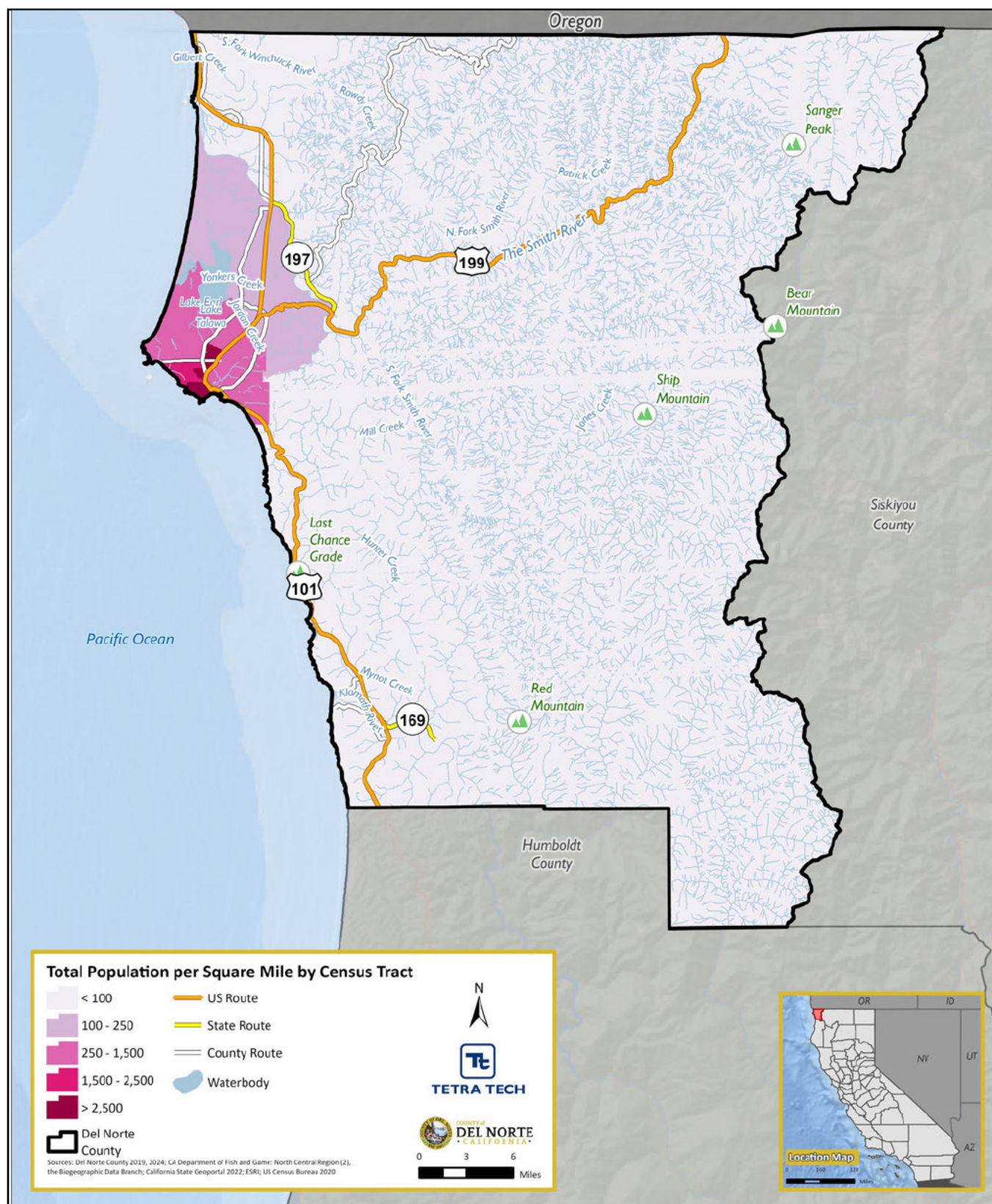




Table 3-4. Del Norte Population, 2022 ACS 5-Year Estimates

Jurisdiction	Total Population	% of County Total
Crescent City	6,379	23.2%
Unincorporated County	21,083	76.8%
Del Norte County Total	27,462	100.0%

Source: U.S. Census Bureau 2022 ACS Vulnerable Population Totals

3.6.2 Socially Vulnerable Populations

Socially vulnerable populations are those that are more susceptible to hazard events based on factors such as their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. This HMP considers several socially vulnerable population groups: persons over the age of 65, persons under the age of 5, non-English speaking households, persons with disabilities, and persons living below the poverty level (as defined by the U.S. Census Bureau).

Table 3-5 summarizes population statistics for these socially vulnerable populations, based on 2022 ACS data. The distributions of the general population density (persons per square mile) for the five metrics of social vulnerability are shown in Figure 3-6.

In Del Norte County, 19.2 percent of the population is over the age of 65 and 5.5 percent of the population is under the age of 5. A total of 13.1 percent of all persons living in households fall below the poverty level, 17.7 percent of residents have a disability, and 1.3 percent of the County's residents live in non-English speaking households.

3.6.3 Population Trends

Population trends over time provide a basis for making decisions on the type of mitigation approaches to consider and the locations in which these approaches should be applied. This information can also be used to support planning decisions regarding future development in vulnerable areas.

Table 3-6 shows California Department of Finance estimates for the population of Del Norte County and the State of California from 2020 through 2070. The county population is expected to decrease by 17 percent from 2020 to 2070.



Table 3-5. Del Norte County Population and Demographic Statistics

	Total Population	65 and Older		5 and Younger		Non-English Speaking		Disability		Below Poverty Level	
		Population	% of Total	Population	% of Total	Households	% of Total	Population	% of Total	Population	% of Total
Crescent City	6,379	864	13.5%	183	2.9%	145	2.3%	945	14.8%	965	15.1%
Unincorporated Del Norte County	21,083	4,397	20.9%	1,324	6.3%	224	1.1%	3,915	18.6%	2,620	12.4%
Del Norte County	27,462	5,261	19.2%	1,507	5.5%	370	1.3%	4,860	17.7%	3,585	13.1%

Source: U.S. Census Bureau 2022 ACS Vulnerable Population Totals



Figure 3-6. Socially Vulnerable Populations

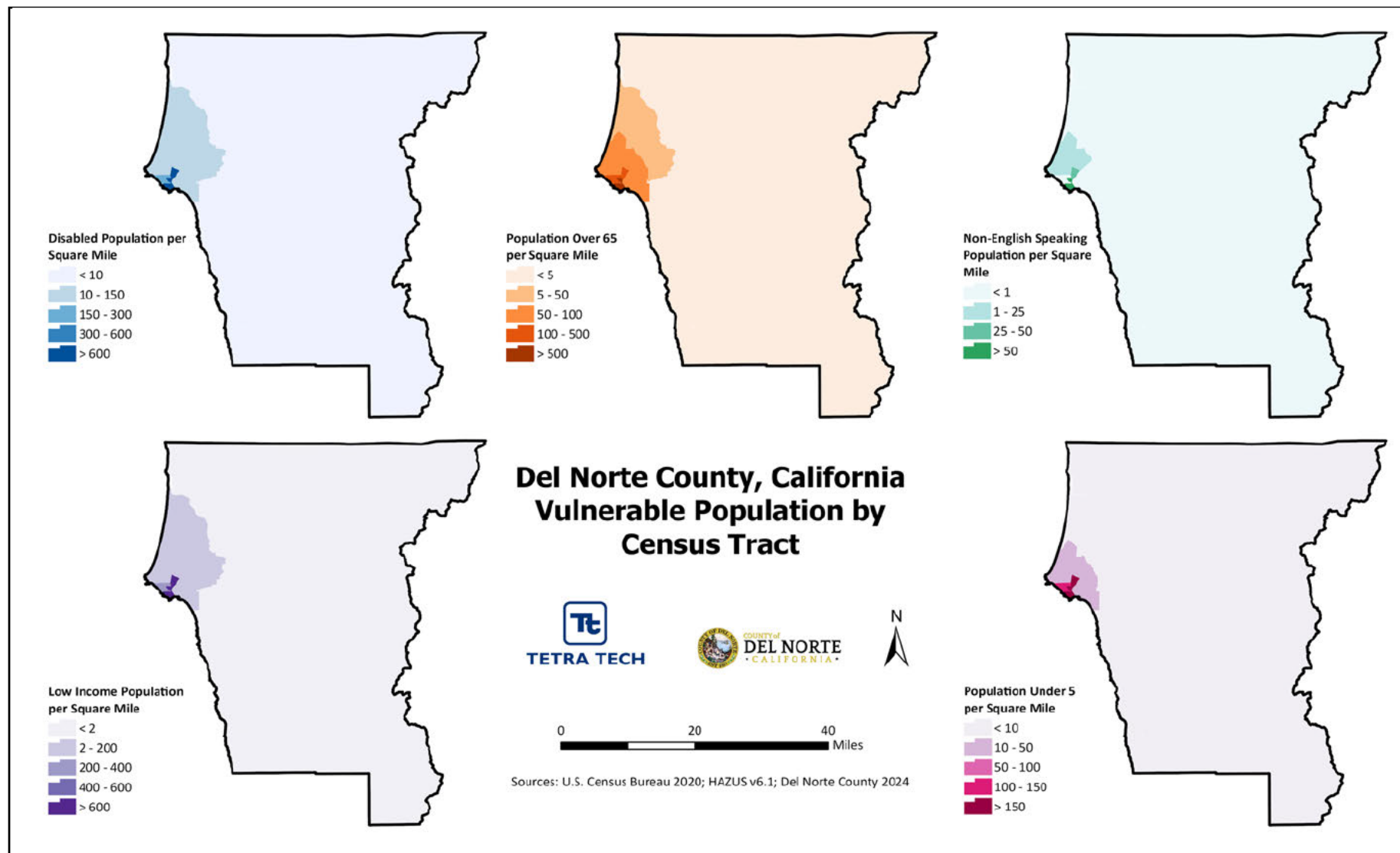




Table 3-6. Projected Population Change in Del Norte County

Geography	2020	2030	2040	2050	2060	2070
Del Norte County	27,648	26,074	25,574	24,848	23,873	25,317
California	39,535,726	39,771,423	40,968,090	41,726,601	41,720,611	41,237,997

Source: (CA Department of Finance 2025)

3.7 ECONOMY

3.7.1 Major Institutions and Economic Sectors

Del Norte is one of the most isolated counties in California. The County's gross domestic product (GDP), shown in Table 3-7, is ranked 53 out of the state's 58 counties (BEA 2024).

Table 3-7. Del Norte County GDP, 2020 to 2023

County	2020	2021	2022	2023
Del Norte	\$783,182	\$811,327	\$815,379	\$844,062

Source: (BEA 2024)

Note: Dollar amounts shown in thousands of chained 2017 dollars.

Currently, there are an estimated 966 businesses and 8,063 employees in the county (GO-BIZ 2025). The most common businesses are service-based, although public administration employs the largest number of people. Wholesalers, retail, and healthcare contribute the most sales dollars to the economy. Table 3-8 lists the number of businesses per industry in the county, the sales per industry, and the number of employees per industry.

Figure 3-7 shows Del Norte County's unemployment rate from 2008 to 2024. During this time, Del Norte experienced a three-year period of unemployment over 13 percent from 2010 to 2012. More recently, the county experienced a surge in unemployment in 2020 due to the COVID-19 pandemic.

3.7.2 Income

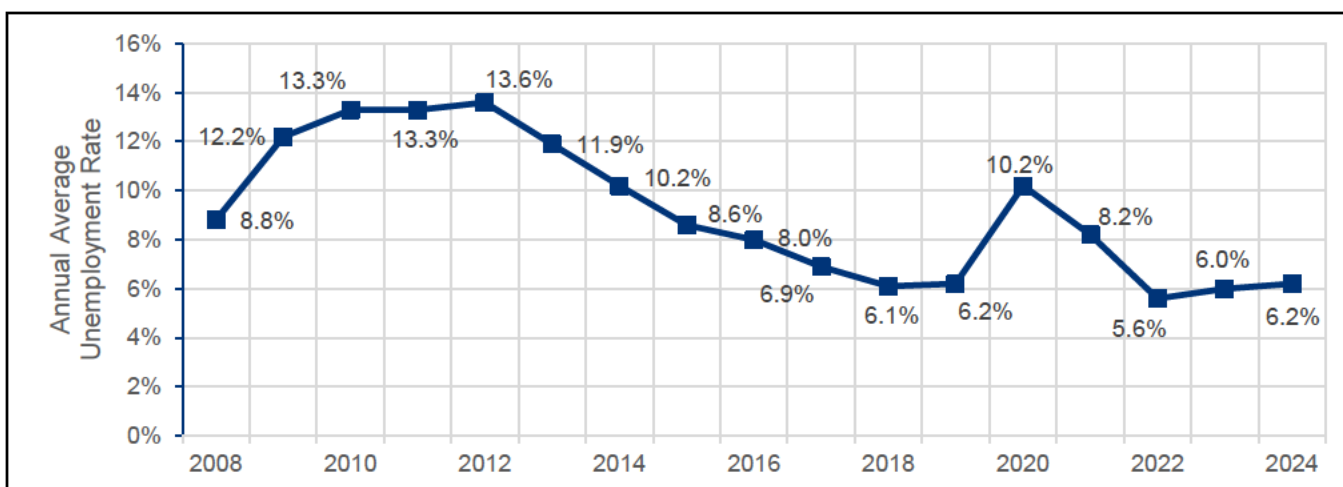
Residents below the poverty level have a great deal to lose during a hazard event and are the least prepared to deal with potential losses. They often occupy more poorly built and maintained housing (SAMHSA 2017). Mobile or modular homes, for example, are more susceptible to damage in earthquakes and 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. Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters. Personal household economics significantly impact people's decisions on evacuation. Individuals who cannot afford gas for their cars may decide not to evacuate. Table 3-9 shows the median household income and per capita income in Del Norte compared to the California and United States averages.



Table 3-8. Industry in Del Norte County

Industry	Businesses	Sales	Employees
Other Services (Repair, Personal Care, Laundry, Religious, etc.)	153	\$10,084,000.00	566
Accommodation and Food Services	102	\$67,271,000.00	978
Public Administration	93	\$731,000.00	1,327
Health Care and Social Services	88	\$107,595,000.00	1,093
Retail: Hobby, Media, General Merchandise	79	\$94,805,000.00	445
Professional, Scientific, and Technical Services	69	\$31,866,000.00	286
Retail: Home, Food, Automobiles, Personal Care	53	\$125,059,000.00	635
Real Estate and Rentals	51	\$14,221,000.00	141
Construction	46	\$24,834,000.00	167
Transportation and Warehousing (Private and Public Transportation, Oil and Gas Pipelines, Sightseeing)	29	\$34,648,000.00	246
Wholesalers	28	\$167,884,000.00	172
Arts, Sports, Entertainment, and Recreation	27	\$75,711,000.00	625
Education	26	\$19,989,000.00	730
Banking, Finance and Insurance	26	\$21,977,000.00	99
Information	16	\$21,977,000.00	78
Administrative and Support; Waste Management; Remediation	15	\$8,512,000.00	73
Agriculture, Forestry, Fishing and Hunting	14	\$23,698,000.00	200
Transportation and Warehousing: Couriers and Messengers, Warehousing and Storage	8	\$537,000.00	53
Manufacturing - Processed Food, Textiles, Clothing	7	\$16,349,000.00	62
Utility Services: Power, Gas, Steam, Water, and Sewage	4	\$6,881,000.00	17
Manufacturing - Chemical, Fuel, Paper, Plastic, Wood	3	\$9,848,000.00	10
Total	966	\$868,776,000.00	8,063

Figure 3-7. Del Norte County Unemployment Rate (2008 to 2024)



Source: (EDD 2025)



Table 3-9. Income in Del Norte County

Income	Del Norte County	California	United States
Median household income (2023 dollars)	\$66,780	\$96,334	\$78,538
Per capita income in past 12 months dollars)	\$31,008	\$47,977	\$43,289

Source: ACS 2019-2023 5-Year Estimates

3.7.3 Economic Trends

As Del Norte County's population is expected to contract, job creation in the county is expected to slow. Existing jobs in retail are expected to consolidate. However, the County is expected to add jobs in the education, healthcare, and hospitality industries. Over the 2023-2028 forecast period, total employment in Del Norte County is expected to increase by approximately 200 jobs (Caltrans 2023).

3.8 GENERAL BUILDING STOCK

3.8.1 Existing Development

For the purposes of this plan, 14,279 structures were identified from tax data and spatial data, as summarized in Table 3-10.

Table 3-10. Building Stock Count and Replacement Cost Value by Occupancy Class

	Crescent City		Unincorporated County		Total	
	Count	RCV	Count	RCV	Count	RCV
Residential	1,204	\$1,166,577,144	9,253	\$7,428,536,022	10,457	\$8,595,113,166
Commercial	472	\$1,128,093,309	2,887	\$3,043,750,073	3,359	\$4,171,843,382
Industrial	7	\$23,612,596	82	\$360,008,433	89	\$383,621,029
Other ^a	41	\$666,351,093	333	\$870,690,045	374	\$1,537,041,138
All Occupancies	1,724	\$2,984,634,142	12,555	\$11,702,984,573	14,279	\$14,687,618,715

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; RS Means 2024

a. "Other" occupancy classes include government, religion, agricultural, and education

These structures account for a replacement cost value (RCV) of approximately \$14.7 billion. Content value was estimated as 50 percent of the structure's replacement cost value for residential properties, and 100 percent of the structure's replacement cost value for non-residential properties. Using this methodology, approximately \$6 billion in contents exist within these properties. Figure 3-8 through Figure 3-10 show the distribution of value density in the county for residential, commercial, and industrial buildings.



Figure 3-8. Distribution of Residential Building Value Density in Del Norte County

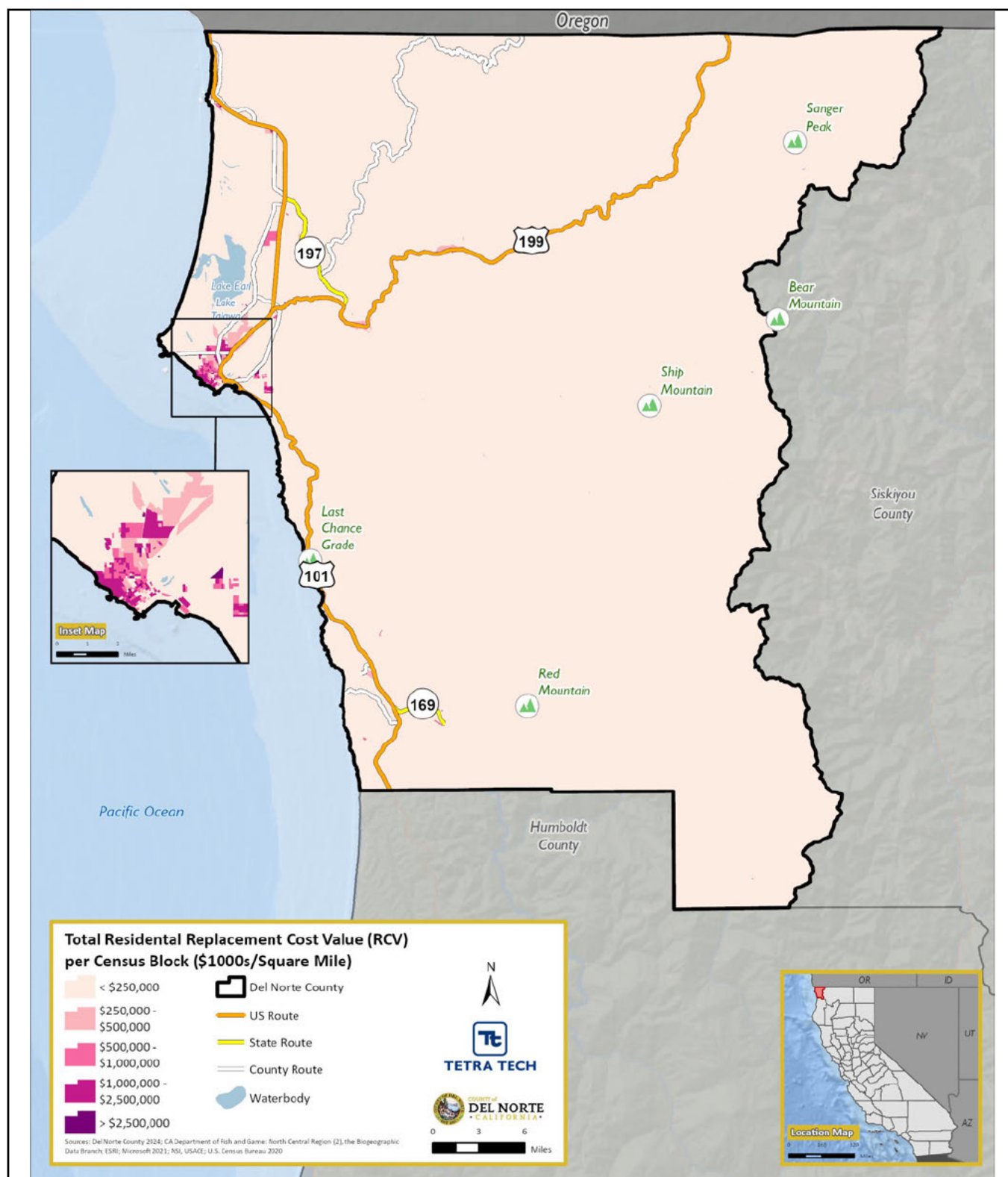




Figure 3-9. Distribution of Commercial Building Value Density in Del Norte County

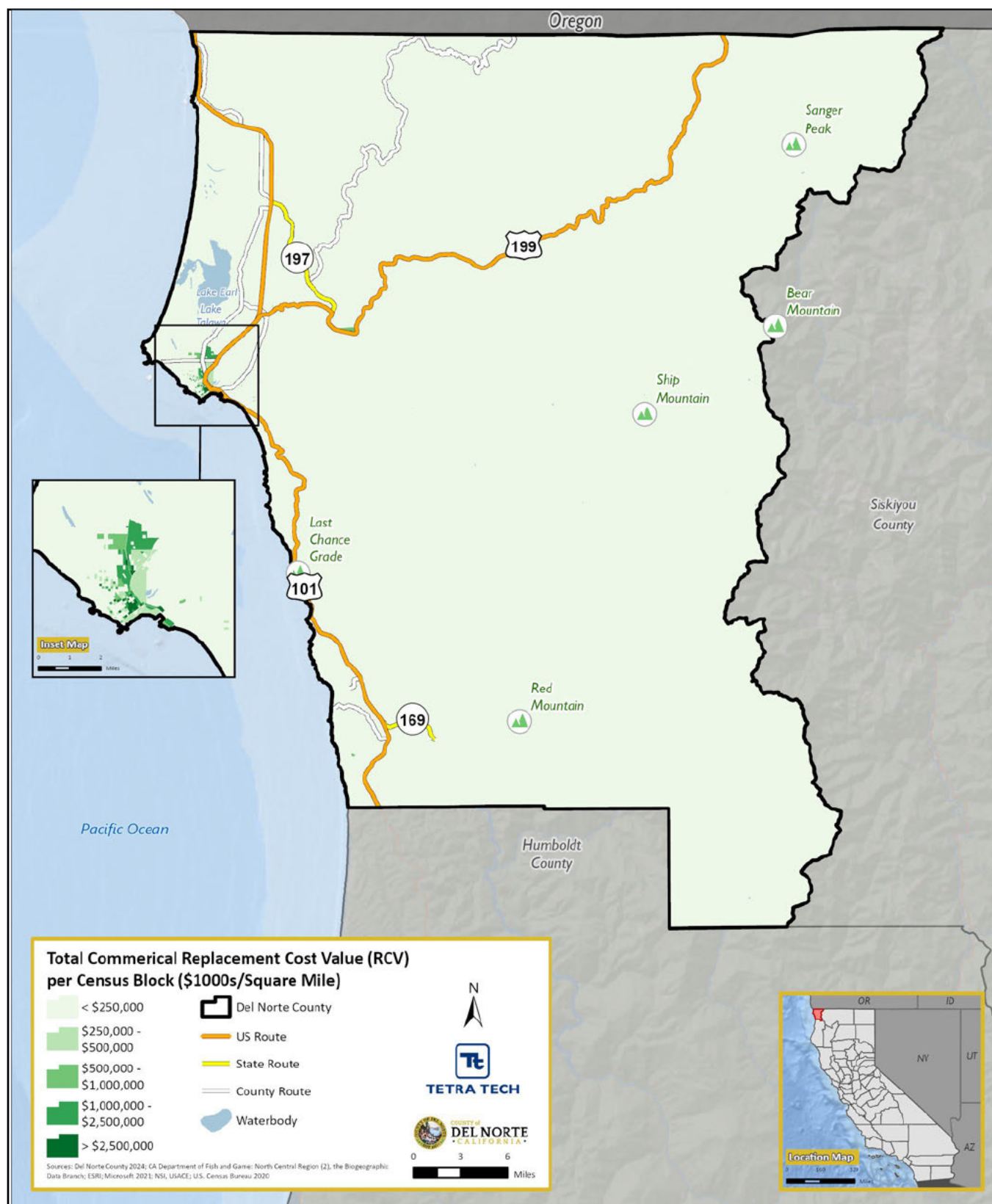
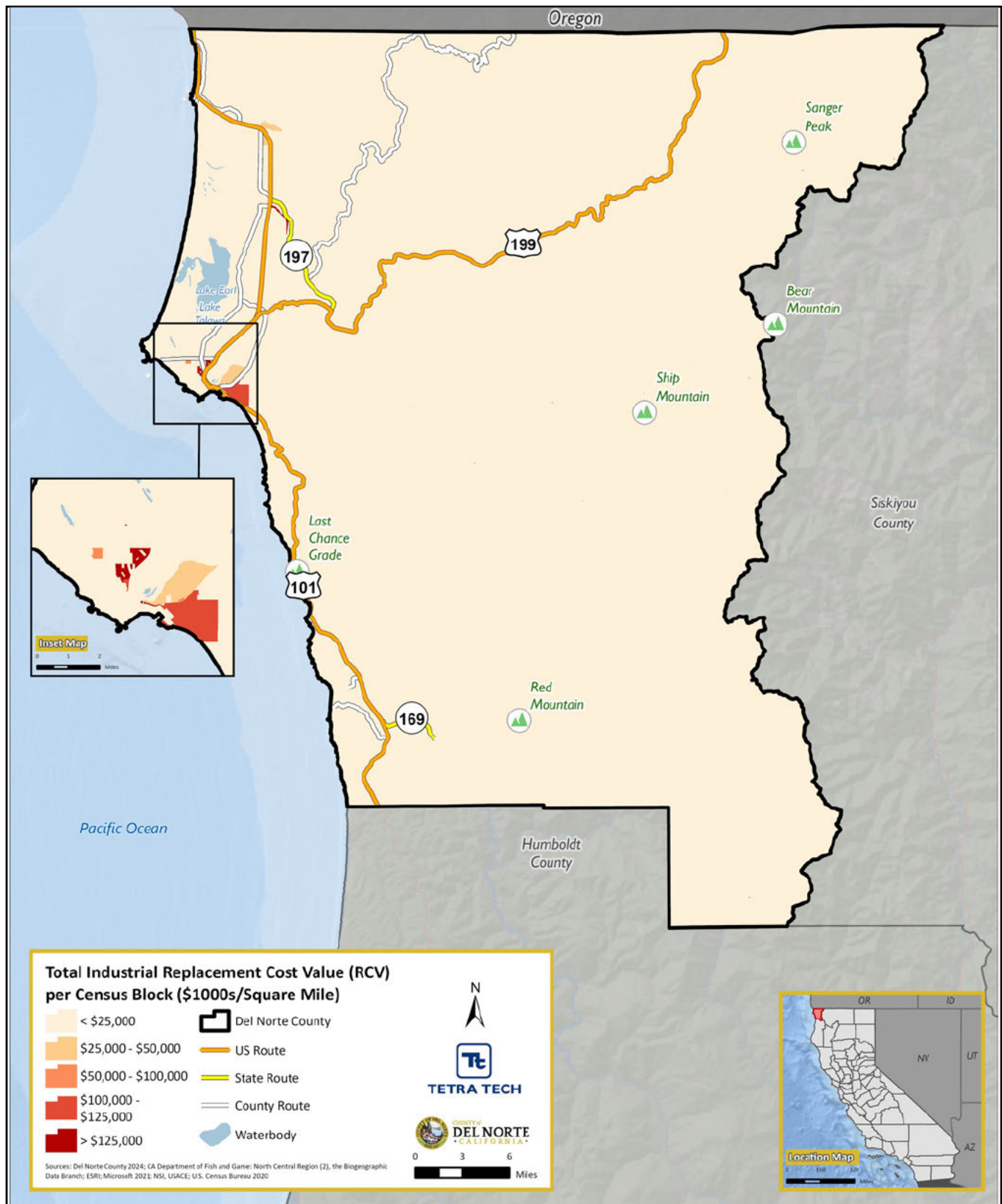




Figure 3-10. Distribution of Industrial Building Value Density in Del Norte County





3.8.2 New Development

Del Norte County examined recent development over the last 5 years and anticipated new development in the next 5 years. Each jurisdiction was asked to provide a list by address of major development that has taken place within these timeframes. The location of new development projects was submitted via ArcGIS Survey123. Table 3-11 shows the identified new development projects.

Table 3-11. New Development in Del Norte County

Planning Partner Area	New Development Count
City and County	
Crescent City	6
Unincorporated County	2
Del Norte County Total	8
Community Service Districts	
Big Rock	0
Gasquet	0
HRC	3
Klamath	0
Smith River	1
Fire Protection Districts	
Crescent Fire Rescue	6
Smith River	1
Tribal Community	
Elk Valley Rancheria	0

Source: Del Norte County Planning Partnership 2025

From 2017 to 2022, an average of 36 new residential units were started per year in Del Norte County. Eighty-four percent were single-family homes. Elk Valley Casino is a new casino that opened in April 2022. The casino is 36,000 square feet and replaced an older casino that was located 2 miles away. Elk Valley Casino contains 300 slot machines, table games, and a separate room for poker tournaments.

According to projections from the county's 6th Cycle Housing Element, Del Norte County will need enough land to accommodate a total of 575 units in order to meet the community's housing demands over the next eight years. Specifically, the county will need to create around 386 units of housing outside Crescent City limits, of which more than 40 percent will need to accommodate low-income individuals and families. This is an increase of about 153 units from earlier projections (Del Norte County 2023). Countywide, housing production is expected to average 50 units per year from 2023 to 2028, despite the expectation that population will decrease. Ninety-one percent are expected to be single-family homes (Caltrans 2023).



The Infill Infrastructure Grant, which is aimed at providing the development of affordable housing across California, has awarded North Coast Counties \$40 million to address affordable housing requirements. The funding includes \$7.5 million for a Crescent City housing project that will provide 160 units for seniors and low-income families. With the receipt of \$5 million in state funding, Danco Communities of Arcata will now construct a 27-unit, low-income senior housing project in Crescent City. Danco must purchase the vacant land for the appraised value and enter into an agreement with the City. Construction will commence within 30 days after the project has been transferred. Housing will be completed within 18 months (Caltrans 2023).

3.9 COMMUNITY LIFELINES

Facilities that are essential to the health and welfare of the population and that maintain essential and emergency functions are designated as critical facilities. These typically include police and fire stations, schools, emergency operations centers, and infrastructure such as roads, bridges and utilities that provide water, electricity, and communications. Facilities that use or store hazardous materials are designated as critical facilities as well. All of these facilities are especially important after any hazard event (FEMA 1997).

FEMA defines some types of critical facilities, as well as public services or activities, as “community lifelines.” Community lifelines provide the fundamental services in a community that, when stabilized, enable all other aspects of society. Following a disaster event, intervention is required to stabilize lifelines. FEMA defines eight categories of community lifelines as summarized in Table 3-12.

A comprehensive inventory of community lifelines in Del Norte County was developed from various sources, including input from the Steering Committee and Planning Partnership. The following sections (data, information, and maps) describe the inventory of FEMA defined community lifelines that was used for the risk assessment in this HMP. Although many lifeline facilities could fall within numerous categories, each lifeline facility identified for this planning effort was categorized according to its primary function.

3.9.1 Safety and Security

Figure 3-11 shows the location of safety and security facilities included in the lifelines inventory. Key facilities and services considered for the inventory under this category include:

- Fire Stations
- Police Stations
- Government Facilities
- Emergency Operations Centers
- Schools
- Post Offices
- Correctional Institutions



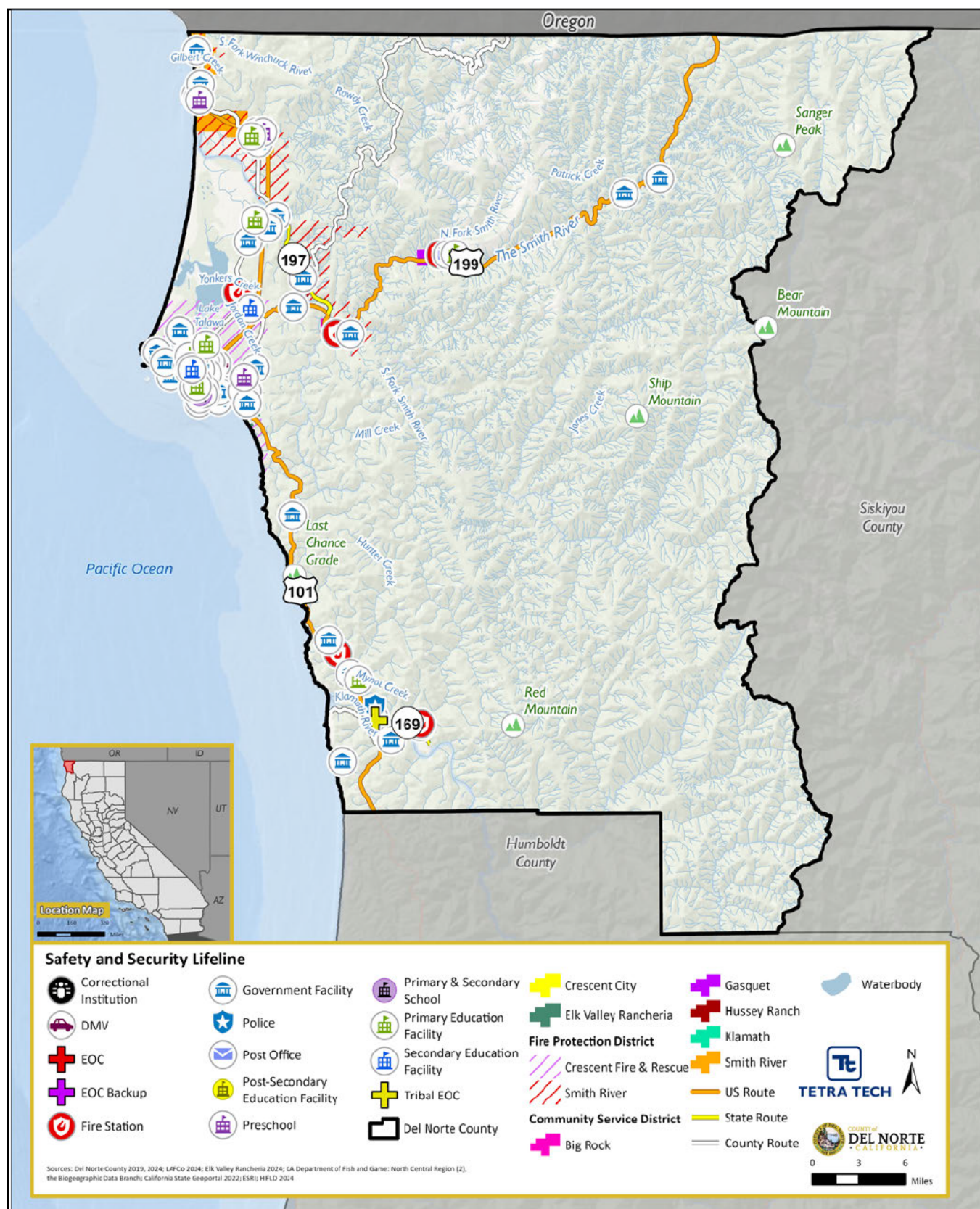
Table 3-12. FEMA-Defined Categories of Community Lifelines

Community Lifeline Category		Types of Facilities and Services Included
	Safety and security	Law enforcement/security, fire service, search and rescue, government service, community safety
	Food, hydration, shelter	Food, hydration, shelter, agriculture
	Health and medical	Medical care, public health, patient movement, medical supply chain, fatality management
	Energy	Power grid, fuel
	Communications	Infrastructure, responder communications, alerts warnings and messages, finance, 911 and dispatch
	Transportation	Highway/roadway/motor vehicle, mass transit, railway, aviation, maritime
	Hazardous materials	Facilities, hazmat, pollutants, contaminants
	Water systems	Potable water infrastructure, wastewater management

Source: FEMA 2023



Figure 3-11. Safety and Security Facilities In Del Norte County





3.9.2 Food, Hydration, Shelter

Figure 3-12 shows the location of food, hydration, and shelter facilities included in the lifelines inventory. Key facilities and services considered for the inventory under this category include:

- Agricultural Inspection Stations
- Food Distribution Programs
- Commercial Food Supply Chain
- Emergency Shelters

3.9.3 Health and Medical

Figure 3-13 shows the location of health and medical facilities included in the lifelines inventory. Key facilities and services considered for the inventory under this category include:

- Emergency Medical Services
- Hospitals
- Medical Centers
- Cemeteries
- Nursing Homes
- Pharmacies
- Veterinarians

3.9.4 Energy

Figure 3-14 shows the location of energy facilities included in the lifelines inventory. Key facilities and services considered for the inventory under this category include:

- Electrical Power Facilities
- Gas Stations
- Fuel Storage

3.9.5 Communications

Figure 3-15 shows the location of communications facilities included in the lifelines inventory. Key facilities and services considered for the inventory under this category include:

- Commercial Communications Infrastructure
- Dispatch
- Financial Services

Figure 3-12. Food, Hydration, and Shelter Facilities in Del Norte County

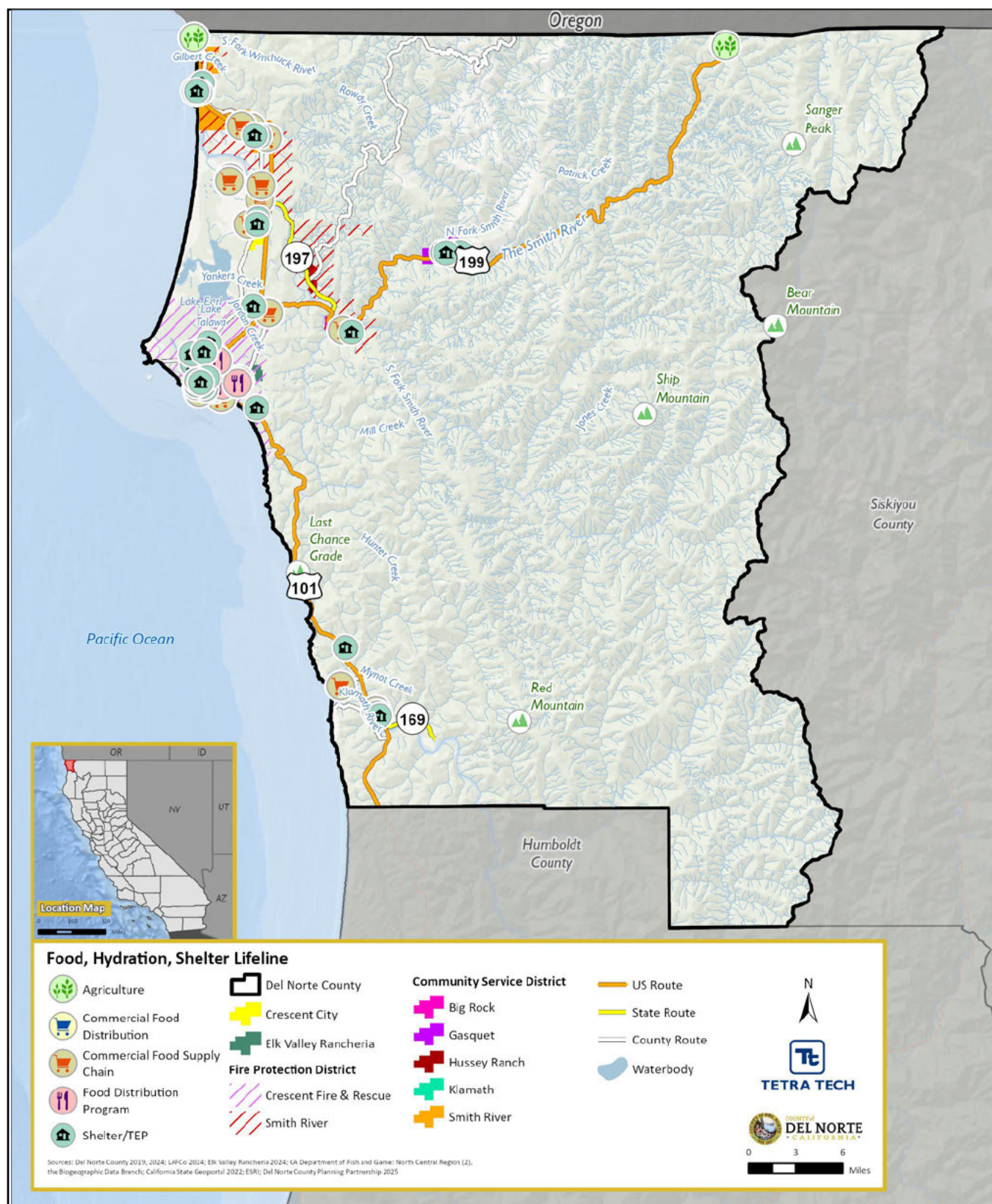




Figure 3-13. Health and Medical Facilities in Del Norte County

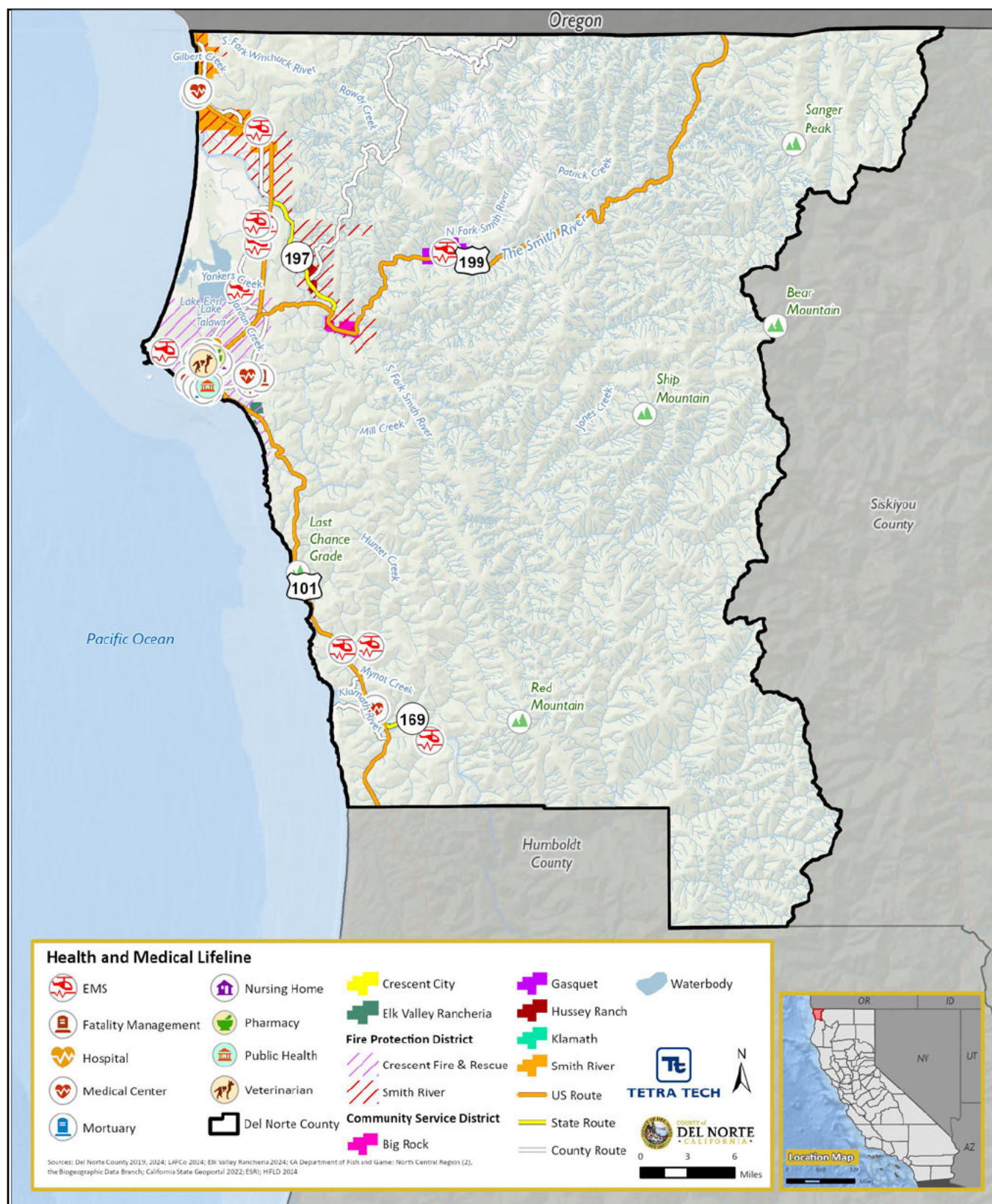




Figure 3-14. Energy Facilities in Del Norte County

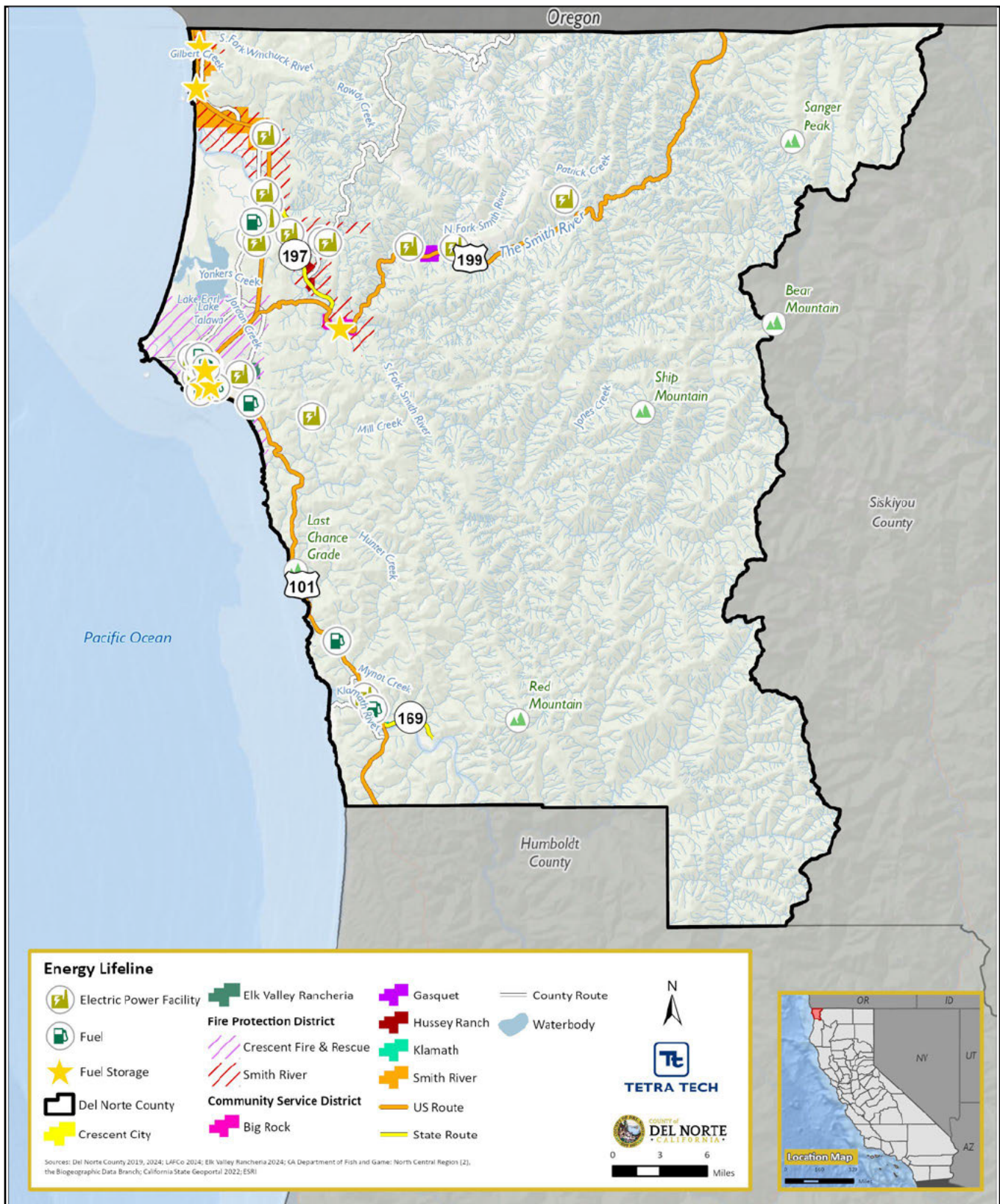
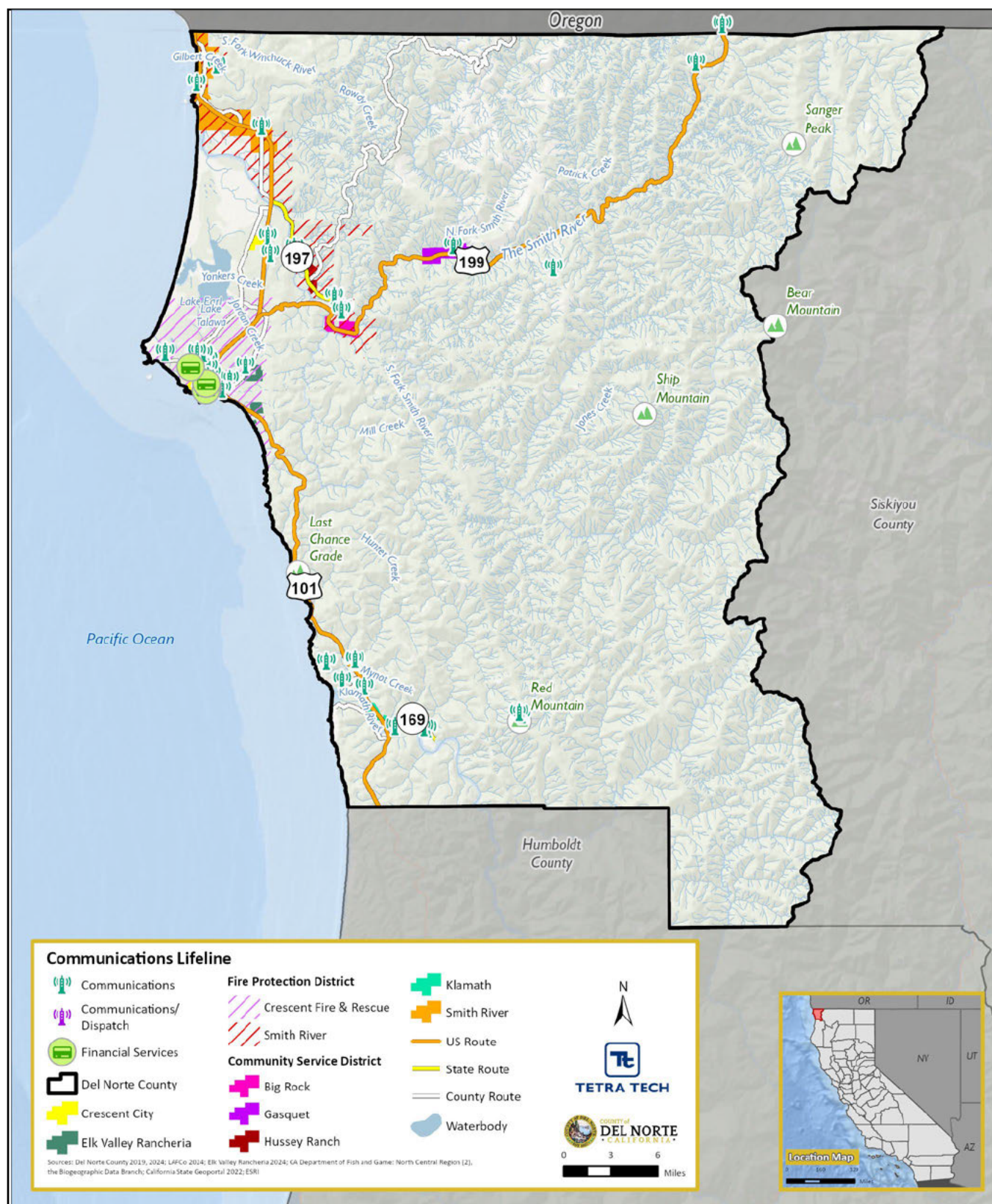




Figure 3-15. Communications Facilities in Del Norte County





3.9.6 Transportation

Figure 3-16 shows the location of transportation facilities included in the lifelines inventory. Key facilities and services considered for the inventory under this category include:

- Airports
- Bridges
- Car Rentals

3.9.7 Hazardous Materials

Figure 3-17 shows the location of hazardous materials facilities included in the lifelines inventory. Key facilities and services considered for the inventory under this category include:

- Fish Hatcheries
- Retail Locations
- Agricultural Storage

3.9.8 Water Systems

Figure 3-18 shows the location of water system facilities included in the lifelines inventory. Key facilities and services considered for the inventory under this category include:

- Wastewater Treatment
- Water Tanks
- Pump Stations

3.9.9 Other Critical Facilities

Figure 3-19 shows the location of other critical facilities included in the lifelines inventory. These facilities do not meet the definition of a community lifeline but were determined by the community to be of importance. Key facilities and services considered for the inventory under this category include:

- Daycare
- Libraries
- Polling Locations
- Societal Functions



Figure 3-16. Transportation Facilities in Del Norte County

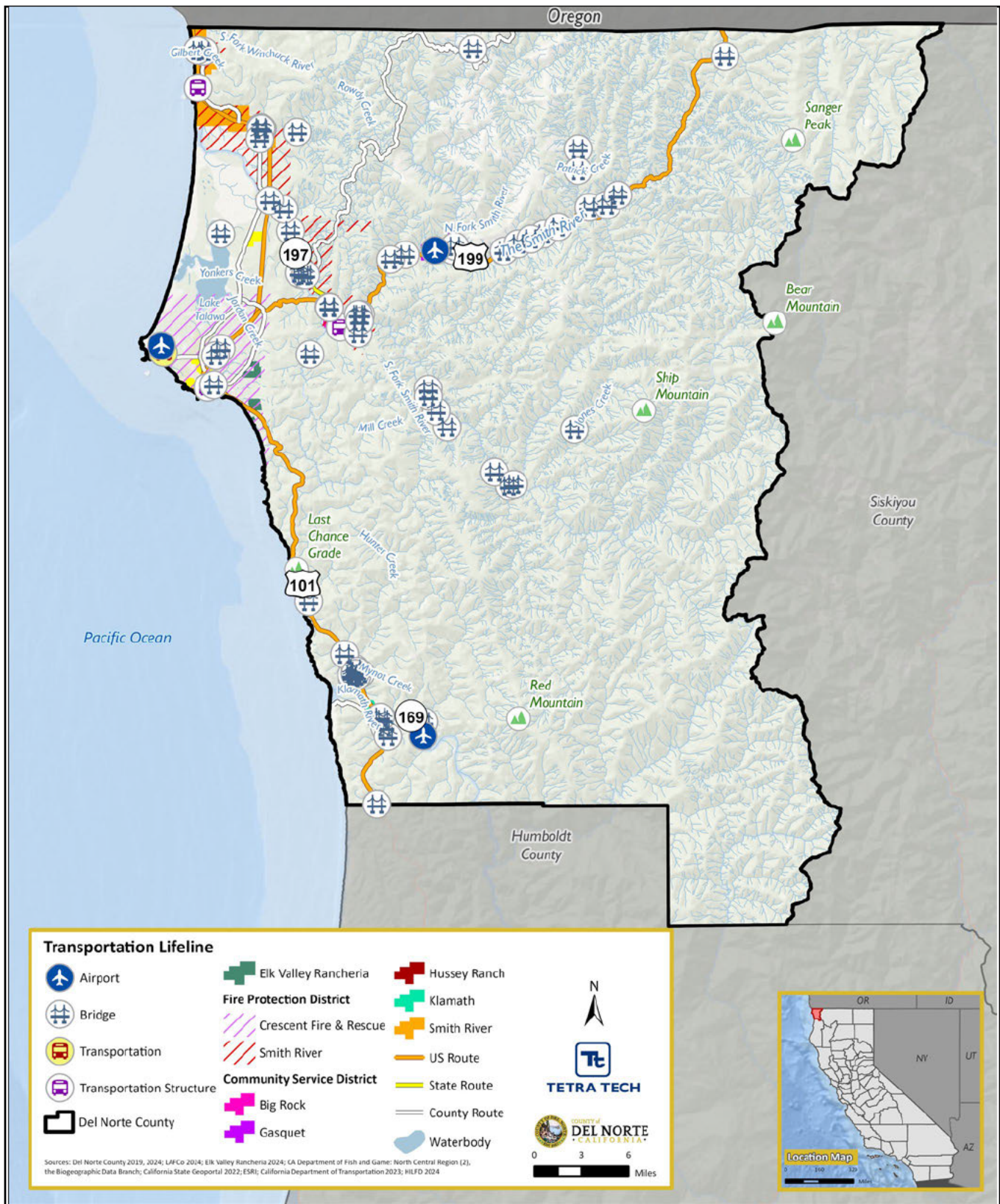




Figure 3-17. Hazardous Material Lifelines in Del Norte County

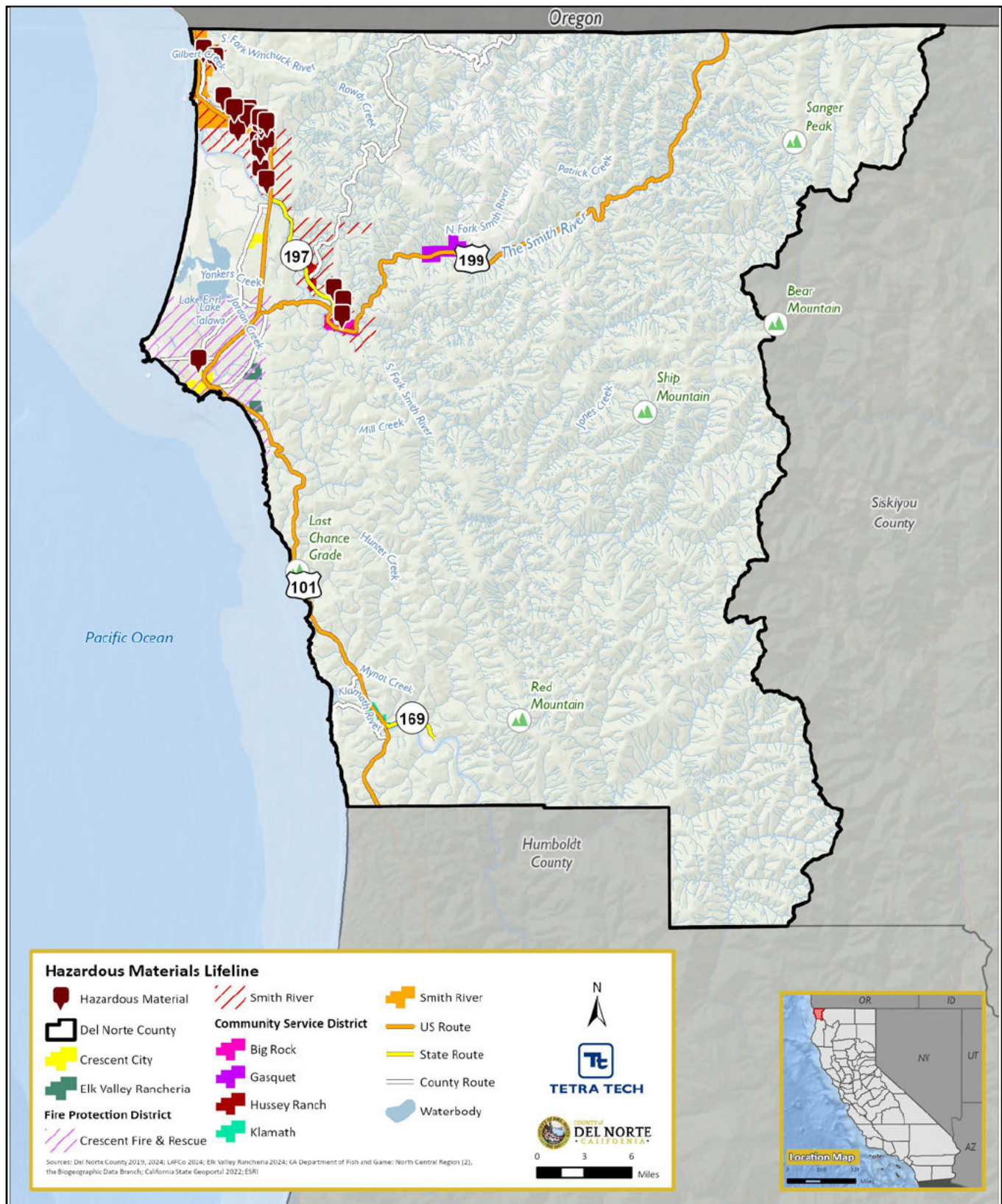
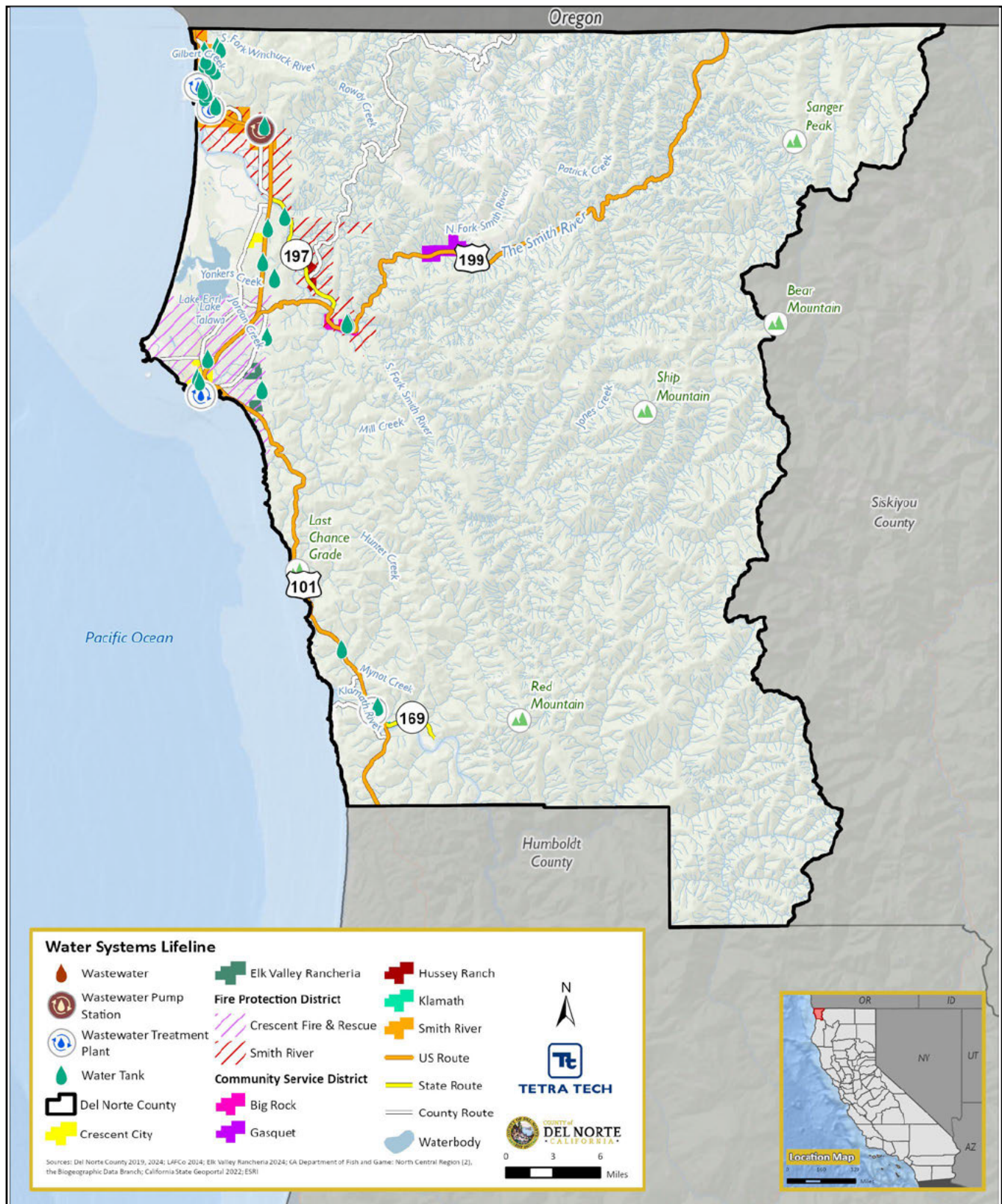




Figure 3-18. Water Systems Lifelines in Del Norte County



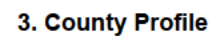


Figure 3-19. Other Critical Facilities in Del Norte County





3.9.10 Community Lifeline Summary

The planning process identified 584 community lifeline facilities in Del Norte County. Table 3-13 summarizes the number of community lifeline facilities in the planning area.

Table 3-13. Number of Community Lifelines in Del Norte County

Lifeline	Crescent City	Unincorporated County	Total
Communications	16	48	64
Energy	12	30	42
Food, Hydration, Shelter	19	51	70
Hazardous Materials	1	25	26
Health & Medical	28	37	65
Safety & Security	42	81	123
Transportation	1	76	77
Water Systems	2	29	31
Other Critical Facilities	27	59	86
Total	148	436	584

3.10 NATURAL, HISTORIC AND CULTURAL RESOURCES

3.10.1 Natural Resources

Del Norte County is renowned for its natural landscapes. The coast redwoods found in the Redwood National and State Parks are among the county's most treasured natural resources. These ancient trees, some over 2,000 years old, form part of a globally significant ecosystem that provides habitat for diverse plant and animal species. The parks are also recognized as a UNESCO World Heritage Site and International Biosphere Reserve.

The Smith River is one of the cleanest rivers in the United States. Its pristine waters support salmon and steelhead trout populations, making it vital for both ecological health and recreational fishing. Other waterways, like the Klamath River, Lake Earl, and numerous creeks, wetlands, and lagoons, provide critical habitats for wildlife and contribute to the county's biodiversity.

The Pacific Ocean shapes Del Norte County's coastline, with rugged cliffs, sandy beaches, and offshore ecosystems supporting a variety of marine life. The county's natural resources also include abundant rainfall, lush forests, and fertile soils, which support limited agriculture and timber industries.

3.10.2 Historic Resources

Del Norte County is steeped in history. The Battery Point Lighthouse, built in 1856, is one of the oldest lighthouses on the West Coast. Located on a rocky islet near Crescent City, it remains a functioning light station and a beloved symbol of the county's maritime heritage.



The Jedediah Smith Redwoods State Park, named after the explorer who traversed the area in the 1820s, highlights the region's role in early westward expansion. Historic trails and sites within the park connect visitors to the early history of exploration and settlement.

Del Norte County's historic resources also include structures and remnants from the logging and fishing industries that shaped the region during the 19th and early 20th centuries. Towns like Crescent City retain elements of this history in their architecture and local museums. Table 3-14 lists the historic places in Del Norte County that are listed on the National Register of Historic Places or the California State Historical Landmark registry.

Table 3-14. Listed Historic Resources in Del Norte County

Name (Landmark Plaque Number)	National Register	California State Historical Landmark	Date Listed
Brother Jonathan (Shipwreck Site) (N2171)	Yes	-	5/21/2002
Brother Jonathan Cemetery (541)	-	Yes	9/14/1955
Camp Lincoln (545)	-	Yes	1/27/1956
Crescent City Plank And Turnpike Road (645)	-	Yes	4/28/1958
Crescent City Lighthouse (Battery Point)(N1234)	Yes	-	9/15/1983
Ender's Beach Archeological Sites (N503)	Yes	-	6/30/1977
Fort Ter-Wer (544)	-	Yes	1/27/1956
Gasquet Ranger Station Historic District (N2019)	Yes	-	3/26/1998
Mus-Yeh-Sait-Neh Village And Cultural Landscape Property (N1851)	Yes	-	10/25/1993
O'men Village Site (N504)	Yes	-	6/30/1977
Old Requa (N315)	Yes	-	12/16/1974
Point St. George Site (N414)	Yes	-	5/17/1976
Radar Station B-71 (N589)	Yes	-	4/19/1978
Redwood Highway (N843)	Yes	-	12/17/1979
S.S. Emidio (497)	-	Yes	12/4/1951
Site Of Old Indian Village At Pebble Beach, Crescent City (649)	-	Yes	7/1/1958
St. George Reef Light Station (N1853)	Yes	-	12/9/1993
Yontocket Historic District (N269)	Yes	-	12/18/1973

Source: (California State Parks n.d.)

3.10.3 Cultural Resources

The cultural heritage of Del Norte County is deeply rooted in its Native American history. The county is home to several Tribes, including Elk Valley Rancheria, Pulikla, Tolowa Dee-ni', and Yurok, whose ancestors have lived in the region for thousands of years. Their cultural resources include traditional



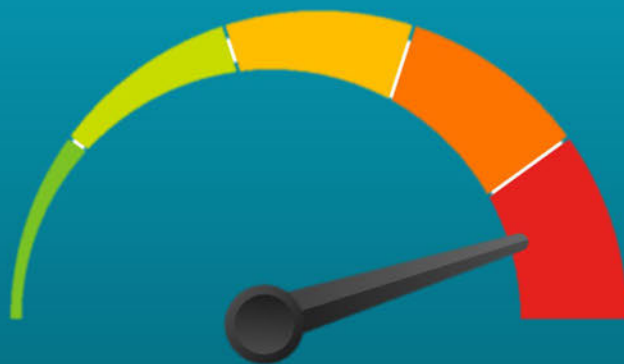
practices, sacred sites, and oral histories passed down through generations. The Smith River and other natural landmarks hold spiritual significance and remain central to the cultural identity of these tribes.

Traditional crafts, ceremonies, and languages are actively preserved by local tribes, contributing to the county's vibrant cultural landscape. The tribes' connection to the land and water continues to shape conservation efforts and the stewardship of natural resources.

Modern cultural resources include the county's festivals, art galleries, and community events. Celebrations such as the Del Norte County Fair highlight the local agricultural heritage, while cultural centers and museums offer insights into both Native American and settler histories.

PART 2:

RISK ASSESSMENT





4. RISK ASSESSMENT METHODOLOGY AND TOOLS

A risk assessment is the process of evaluating the potential loss of life, personal injury, and economic and property damage that could result from identified hazards. Identifying potential hazards and vulnerable assets allows planning personnel to address and reduce hazard impacts and allows emergency management personnel to establish early response priorities. Results of the risk assessment are used in subsequent mitigation planning processes, including determining and prioritizing mitigation actions that reduce each jurisdiction's risk from each hazard. Past, present, and future conditions must be evaluated to assess risk most accurately for the county and participating jurisdictions. The process focuses on the following elements:

- **Identify Hazards of Concern**—Use all available information to determine what types of hazards may affect a jurisdiction.
- **Profile Each Hazard**—Understand each hazard in terms of:
 - Location—Geographic area most likely to be affected by the hazard
 - Extent—The potential severity of each hazard
 - Previous occurrences and losses
 - Impacts of Climate Change
 - Probability of future occurrences
- **Assess Vulnerability and Impacts**—Use all available information to estimate to what extent populations and assets may be adversely affected by a hazard now and in the future:
 - Determine vulnerability—Estimate the total number of assets in the jurisdiction that are likely to experience a hazard event if it occurs by overlaying hazard maps with the asset inventories
 - Estimate potential impacts/losses—Assess the impact of hazard events on the people, property, economy, and lands of the region, including estimates of the losses associated with potential damage or cost that can be avoided by mitigation
 - Evaluate future changes that may affect vulnerability and impacts—Analyze how demographic changes, projected development, and climate change impacts can alter current vulnerability and potential impacts

4.1 PREVIOUS EVENTS AND PROBABILITY OF OCCURRENCE

Based on records of previous hazard events and consideration of potential future changes that could affect the frequency of future events, the risk assessment for each hazard assigns a rating for the probability of occurrence of that hazard in the future. The following were the primary sources for identifying previous occurrences:

- **FEMA disaster declarations**—The President of the United States has the authority to issue disaster declarations for hazard events that cause more damage than state and local governments can manage without assistance from the federal government. The declaration triggers funding for emergency and recovery efforts led by FEMA. The first federal disaster



declaration was issued in 1953. Initially, declarations applied to entire states. Beginning in 1969, the process was refined to specify the individual counties affected by each declaration. Federally disaster declarations are classified as major disaster (DR), emergency declaration (EM), or fire management assistance (FM).

- **California governor's emergency proclamations**—The governor of California is authorized to proclaim an emergency statewide or at local levels. Such proclamations trigger emergency powers and assistance programs. The governor can issue an emergency proclamation when a state of emergency exists, defined in state code as conditions of disaster or extreme peril to people and property that are of a magnitude to be beyond the control of individual local governments. Emergency proclamations are a prerequisite when requesting a federal disaster declaration (Cal OES 2024).
- **U.S. Department of Agriculture disaster declarations**—The U.S. Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties
- **Hazard-specific databases**—Sources that provide records of specific types of hazard events include the National Centers for Environmental Information's Storm Events Database, the National Integrated Drought Information System's U.S. Drought Monitor, and the U.S. Geological Survey's Earthquake Catalog.
- **News reports and previously published planning documents** such as the California State Hazard Mitigation Plan and the previous Del Norte County HMP

Based on records of previous hazard events and consideration of potential future changes that could affect the frequency of future events, the risk assessment for each hazard assigns a rating for the probability of occurrence of that hazard in the future. These ratings were assigned as follows:

- **Unlikely**—Hazard event has less than a 1 percent annual probability of occurring
- **Rare**—Hazard event has between 1 and 10 percent annual probability of occurring
- **Occasional**—Hazard event has between 11 and 90 percent annual probability of occurring
- **Frequent**—Greater than 90 percent annual probability; hazard event is likely to occur multiple times per year

4.2 ASSET INVENTORIES

Del Norte County assets were identified to assess potential vulnerability and impacts associated with the hazards of concern. The HMP update assesses vulnerability and potential hazard impacts for the following types of assets: population, buildings, critical facilities, community lifelines, the environment, and new development. Each asset type is described below. To protect individual privacy and the security of critical facilities, information on properties assessed is presented in aggregate, without details about specific individual properties.

The risk assessment included the collection and use of an expanded and enhanced asset inventory to estimate hazard vulnerability and impacts.



4.2.1 Population

Statistics from the 2020 Decennial Census Population estimate and 2018-2022 American Community Survey (ACS) 5-year estimate were used to estimate the vulnerability of and potential impacts on the County's population. Socially vulnerable populations included in the risk assessment are people under 5 years old or over 65 years old, people living below the poverty level, non-English speaking individuals, and people with a disability.

An area analysis was conducted for the population statistics and were then averaged among the residential structures in the county to estimate the population at the structure level. This methodology was taken to provide a more accurate representation for population counts at the various participating district levels. This estimate provides a more precise distribution of population across the county compared to only using the census block or census tract boundaries.

4.2.2 Buildings

Building Footprints and Attributes

The general building stock was updated countywide with a custom-building inventory using the most current parcel data provided by Del Norte County, building footprint data sourced from Microsoft, building points sourced from the United States Army Corp of Engineers (USACE/NSI), and zoning data sourced from the California State Geoportal. The tax assessment parcels, building points, and zoning data were joined to the spatial layer of structure footprints. Attributes provided in the associated files were used to further define each structure, such as year built, number of stories, basement type, occupancy class, and square footage. The building points were used to estimate the building location.

Occupancy Class

Buildings were assigned occupancy classes for compatibility in Hazus. To facilitate analysis and presentation of results, the Hazus classes were condensed into the categories of residential (including multi-family and single-family), commercial, industrial, and other (agricultural, religious, governmental, and educational).

Building Value

Structural and content replacement cost values (RCV) were calculated for each building using the available assessor data, building points, and RS Means 2024 values. RCV is the current cost of returning a destroyed asset to its pre-damaged condition using present-day cost of labor and materials. Total RCV consists of both the structural cost to replace a building and the estimate value of contents of a building. Content value was estimated as 50 percent of the structure value for residential buildings, and 100 percent of the structure value for non-residential buildings. The analysis used a location factor associated by location zip-code, which produced location factors of 1.19 and 1.13 for residential and non-residential occupancy classes, respectively.



4.2.3 Critical Facilities and Community Lifelines

A critical facility inventory, which includes essential facilities, utilities, transportation features and user-defined facilities, was reviewed for accuracy by Del Norte County. The development involved a review for accuracy, additions, or deletions of new or moved critical assets, identification of backup power for each asset (if known) and whether the critical facility is considered a lifeline in accordance with FEMA's definition.

A lifeline provides indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security (FEMA).

4.2.4 Environment and Land Use

National land cover data created by the U.S. Geological Survey (USGS) in 2023 was converted from a raster to a vector polygon, which informed spatial areas of built and natural land use areas. The built land use areas were defined as urban areas and include developed open space, low, medium, and high intensity locations. Non-urban areas were extracted into agricultural, barren land, forest, rangeland, water, and wetlands land use categories.

4.2.5 New Development

New development in the planning area was defined as development that occurred over the last 5 years or that is expected to occur over the next 5 years. The location of new development projects was submitted via ArcGIS Survey123. A geographic information system (GIS) analysis was conducted to determine hazard exposure of these development sites. If the new development location intersected a spatial hazard layer, the entire location was considered "exposed" to the hazard area of concern.

The new development is listed in Chapter 3, and hazard vulnerability analysis results are presented as a table in relevant annexes in Volume 2.

4.3 VULNERABILITY AND IMPACT ASSESSMENT METHODOLOGY

Del Norte County used standardized tools, combined with local, state, and federal data and expertise to assess potential vulnerability and losses associated with hazards of concern. Three levels of analysis were used, depending upon the data available for each hazard:

- **Qualitative Review**—This analysis includes an examination of historical impacts to understand potential impacts of future events of similar size. Potential impacts and losses are discussed qualitatively using best-available data and professional judgment.
- **Vulnerability Analysis**—This analysis involves overlaying available spatial hazard layers, for hazards with defined locations, on asset mapping in GIS to determine which assets are located in the hazard area.
- **Loss Estimation**—The FEMA Hazus modeling software was used to estimate impact in terms of potential losses for the following hazards: flood, earthquake, and tsunami.



Table 4-1 summarizes the type of analysis conducted by hazard of concern.

Table 4-1. Summary of Risk Assessment Analyses

Hazard	Population	General Building Stock	Critical Facilities	New Development
Drought	Q	Q	Q	Q
Earthquake	V, L	V, L	V, L	V
Excessive Rainfall	Q	Q	Q	Q
Extreme Heat	Q	Q	Q	Q
Extreme Wind	Q	Q	Q	Q
Flood	V, L	V, L	V, L	V
Landslide	V	V	V	V
Tsunami	V, L	V, L	V, L	V
Wildfire	V	V	V	V

Notes: V = vulnerability analysis; L = loss estimation; Q = qualitative review

4.3.1 Hazus

Hazus is a GIS-based software tool developed by FEMA that uses engineering and scientific risk calculations to estimate damage and loss. Its use is accepted by FEMA and provides a consistent framework for assessing risk across a variety of hazards. Hazus' open data architecture can be used to manage community GIS data in a central location. The use of this software also promotes consistency of data output now and in the future and standardization of data collection and storage.

Hazus uses GIS technology to produce detailed maps and analytical reports that estimate direct physical damage to building stock, critical facilities, transportation systems and utility systems. Hazus damage reports can include induced damage (inundation, fire, threats posed by hazardous materials and debris) and direct economic and social losses (casualties, shelter requirements, and economic impact) depending on the hazard and available local data. The Hazus model estimates shelter requirements and potential deaths and injuries. For this HMP, Hazus was used to estimate potential impacts on people and structures from flood, earthquake, and tsunami hazards. Losses were estimated using depth grids for the flood analysis and probabilistic (mean return period) and deterministic analyses for the seismic hazard. The probabilistic model generates estimated damage and losses for specified return periods (e.g., 100- and 500-year).

To generate its results, Hazus uses default data for inventory, vulnerability, and hazards; this default data can be supplemented with local data to provide a more refined analysis. Table 4-2 displays the levels of analysis that can be conducted using the Hazus software depending on the hazard and inventory data provided.



Table 4-2. Summary of Hazus Analysis Levels

Basic Assessment <i>(formerly known as Level 1)</i>	Hazus provides hazard and inventory data with little or no outside data collection or mapping.
Advanced Assessment <i>(formerly known as Levels 2 and 3)</i>	Hazus-provided hazard and inventory data are augmented with more recent or detailed data for the study region, referred to as "local data." Additional option to adjust the built-in Hazus loss estimation models for the hazard loss analyses, usually in conjunction with the use of local data and engineering level support.

4.3.2 Hazard-Specific Methodologies

Drought

All of Del Norte County is at risk from the impacts of drought events. A qualitative analysis was conducted to assess the County's vulnerability to this hazard of concern and potential impacts.

Earthquake

Vulnerability Analysis

Ground shaking is the primary cause of earthquake damage to structures, and soft soils amplify ground shaking. One contributor to the site amplification is the velocity at which the rock or soil transmits shear waves (S-waves). The National Earthquake Hazard Reductions Program (NEHRP) has developed five soil classifications defined by their shear-wave velocity that impact the severity of an earthquake. The soil classification system ranges from A to E, where A represents hard rock that reduces ground motions from an earthquake and E represents soft soils that amplify and magnify ground shaking and increase building damage and losses. Class D and E NEHRP soils are the two classes most susceptible to amplified ground motion during an earthquake.

A vulnerability analysis was conducted for the county's assets (population, building stock, critical facilities, and new development) using NEHRP soil data sourced by the California Geological Survey/California Department of Conservation (2015). The vulnerability analysis defined the hazard area as all areas with Class D and E soil types. Assets with their centroid in the hazard areas were totaled to estimate the numbers and values vulnerable to these soil types.

Loss Estimation

The Hazus analysis for earthquake was an advanced analysis in accordance with the updated FEMA terminology, equivalent to the former Level 3. The default soils and landslide susceptibility hazard datasets in four earthquake Hazus models (two probabilistic and two deterministic) were replaced with supplementary NEHRP D&E soils data specific to Del Norte County, sourced from the California Geological Survey/Department of Conservation (2015). Liquefaction susceptibility hazard boundaries were obtained from the California Geological Survey, but it was confirmed that there are no liquefaction zones spatially represented within the County, so this dataset was not included in the analysis. The California Geological Survey has not evaluated Del Norte County for soil liquefaction. (Source EQ Zapp: California Earthquake Hazards Zone Application, DOC website 11/12/2025)



Probabilistic assessments were conducted for the 500-year and 2,500-year mean return period earthquake events through an advanced analysis (formerly known as Level 3) in Hazus. The probabilistic method uses information from historical earthquakes and inferred faults, locations, and magnitudes to compute probable ground shaking levels, by census tract, for a seismic event of a selected recurrence period. Hazus' potential loss estimates are acceptable for the planning-level purposes of this HMP.

Damage estimates were calculated for losses to buildings (structural and non-structural) and contents. Structural losses include load carrying components of the structure. Non-structural losses include those to architectural, mechanical, and electrical components of the structure, such as nonbearing walls, veneer and finishes, HVAC systems, boilers, etc. Following consultation with the assessment office at the County, it was confirmed that the available tabular assessor data reflects only the primary structure on each parcel, without accounting for multiple structures. As a result, the general building stock could not be enhanced further to modify the default depth-damage functions in Hazus. Accurate modification of the depth-damage functions would require a comprehensive structure inventory without assumptions assigned, where all structures have their attributes accounted for (in particular, occupancy class, number of stories and foundation type). Due to this data limitation, Tetra Tech added two additional Earthquake Models to the analyses: the Cascadia Megathrust (9.3 magnitude) and the N. San Andreas (8.0 magnitude) scenarios.

Deterministic assessments were conducted for the Cascadia Megathrust (9.3 magnitude) scenario and the N. San Andreas (8.0 magnitude) scenario through an advanced Hazus analysis. The deterministic method leveraging ShakeMap data from the USGS National Earthquake Information Center (2017) uses ground motion and shaking intensity to provide a realistic, spatial representation of an earthquake's impact. These parameters are evaluated through Instrumental Intensity (Modified Mercalli Scale), peak ground acceleration (PGA), peak ground velocity (PGV) and response spectral acceleration (SA). This provides a more accurate basis for estimating damage and loss than relying solely on epicenter and magnitude data.

Excessive Rainfall

All of Del Norte County is at risk from the impacts of excessive rainfall. A qualitative analysis was conducted to assess the County's vulnerability to this hazard of concern.

Extreme Heat

All of Del Norte County is at risk from the impacts of extreme heat, particularly the inland community of Gasquet where temperature is not moderated by proximity to the ocean. A qualitative analysis was conducted to assess the County's vulnerability to this hazard of concern.

Extreme Wind

All of Del Norte County is at risk from the impacts of extreme wind. A qualitative analysis was conducted to assess the County's vulnerability to this hazard of concern.



Flood

The 1 and 0.2 percent annual chance flood events were examined to evaluate the county's risk from the flood hazard. These flood events are generally those considered by planners and evaluated under federal programs such as NFIP. The following data were used to evaluate vulnerability and determine potential future losses for this plan update:

- The Del Norte County FEMA Effective Digital Flood Insurance Rate Map (DFIRM) dated August 2, 2017 with a latest LOMR of November 29, 2010.
- A riverine depth grid was created by use of the 2017 effective FEMA Digital Flood Insurance Rate Map (DFIRM) and a 10-meter Digital Elevation Map (DEM) model provided by the U.S. Geological Survey (USGS, 2024). A coastal depth grid used the same methodology as the riverine depth grid; however, the Digital Elevation Model was resampled to a 3-meter DEM for better coverage.

The effective Del Norte County FEMA DFIRM published in 2017 was used to evaluate vulnerability and determine potential future losses. The depth grids generated using the DFIRM and 10- and 3- meter DEM were integrated into the Hazus riverine and coastal flood models and used to estimate potential losses for the 1 percent annual chance flood event.

Vulnerability Analysis

To estimate vulnerability to the 1 percent and 0.2 percent annual chance flood events, the DFIRM flood boundaries were overlaid on the centroids of updated assets (population, building stock, critical facilities, and new development). Centroids that intersected the flood boundaries were totaled to estimate the building RCV and population vulnerable to the flood inundation areas.

Loss Estimation

The Hazus riverine and coastal flood models were run to estimate potential losses in Del Norte County for the 1 percent annual chance flood event. An advanced Hazus analysis equivalent to the former Level 3 was performed for the building stock and critical facilities. Buildings located within the floodplain were imported as user-defined facilities to estimate potential losses at the structural level. Hazus calculated the estimated potential losses to the population (default 2020 U.S. Census data), potential damage to the general building stock, and potential damage to critical facilities based on the depth grids generated and the default Hazus damage functions in the flood model.

Landslide

A vulnerability analysis was conducted using Deep-Seated Landslide hazard data sourced from the California Geological Survey to determine the county's risk to the landslide hazard. The county's assets (population, buildings, critical facilities, and new development) were examined to determine if they are built in areas of the moderate, high, and very high hazard area. Assets with their centroid located in the hazard area were totaled to estimate the totals and values at risk from the impacts of landslides.



Tsunami

Vulnerability Analysis

A vulnerability analysis was conducted using tsunami hazard data provided by Del Norte County to determine the county's risk to the tsunami hazard. The county's assets (population, buildings, critical facilities, and new development) were examined to determine if they are built in areas of the tsunami hazard area. Assets with their centroid located in the hazard area were totaled to estimate the totals and values at risk from the impacts of tsunami.

Loss Estimation

A coastal depth grid was created from California Department of Conservation tsunami maps and a resampled 3-meter digital elevation map model developed by the USGS. The Hazus coastal flood model was run to estimate potential losses in Del Norte County for the 975-year return period probabilistic tsunami. An advanced Hazus analysis (equivalent to the former Level 3) was performed for the building stock. The custom developed tsunami depth grid and buildings were imported as user-defined facilities to estimate potential losses at the structural level. Hazus calculated the estimated potential losses to the population (default 2020 U.S. Census data) and potential damage to the general building stock based on the depth grids generated and the default Hazus damage functions in the flood model.

Wildfire

A vulnerability analysis was conducted using Wildfire hazard data source from CAL FIRE (2024) to determine the county's risk to the wildfire hazard. The county's assets (population, buildings, critical facilities, and new development) were examined to determine if they are built in areas of the moderate, high, and very high wildfire hazard area. Assets with their centroid located in the hazard area were totaled to estimate the totals and values at risk from the impacts of wildfire.

4.4 DATA SOURCE SUMMARY

Table 4-3 summarizes the data sources used for the risk assessment for this plan.

4.5 LIMITATIONS

Loss estimates, vulnerability analyses, and hazard-specific impact 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 such a study
- Incomplete or dated inventory, demographic, or economic parameter data
- The unique nature, geographic extent, and severity of each hazard
- Mitigation measures already employed by the participating jurisdictions



Table 4-3. Risk Assessment Data Documentation

Data	Source	Date	Format
Population data	U.S. Census Bureau; American Community Survey 5-Year Estimates	2020; 2022	Comma-Separated Values (CSV) format
Building Inventory	Del Norte County; Microsoft; USACE/NSI; CA State Geoportal; RS Means	2024; 2021; 2022; 2024	Digital (GIS) format
Critical Facilities and Lifelines	Del Norte County	2024	Digital (GIS) format
Digitized Effective FIRM maps	FEMA	2017	Digital (GIS) format
10- and 3- Meter Digital Elevation Model	USGS	2024	TIFF
Landslide Hazard Data	California Geological Survey	n.d.	Digital (GIS) format
NEHRP Soils	California Department of Geological Survey, California Department of Conservation	2015	Digital (GIS) format
Tsunami	State of California, California Geological Survey, California Governor's Office of Emergency Services 2021	2021	Digital (GIS) format
ShakeMaps	USGS National Earthquake Information Center	2017	Digital (GIS) format
Wildfire	CAL FIRE	2024	Digital (GIS) format
New Development	Del Norte County	2024	Digital (GIS) Format

Note: NSI = National Structure Inventory; USACE = U.S. Army Corp of Engineers; USGS = U.S. Geological Survey

- The amount of advance notice residents have to prepare for a specific hazard event
- Uncertainty of climate change projections

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Therefore, potential vulnerability and loss estimates are approximate. These results do not predict precise results and should be used to understand relative risk. Over the long term, Del Norte County will collect additional data and update and refine existing inventories to assist in estimating potential losses.

Potential economic loss is based on the present value of the general building stock using best-available data. The county acknowledges significant impacts may occur to critical facilities and infrastructure as a result of these hazard events causing great economic loss. However, monetized damage estimates to critical facilities and infrastructure, and economic impacts were not quantified and require more detailed loss analyses. In addition, economic impacts to industry such as tourism and the real-estate market were not analyzed.



4.6 CONSIDERATIONS FOR MITIGATION AND NEXT STEPS

The following items are to be discussed for considerations for the next plan update to enhance the risk assessment:

- All Hazards
 - Create an updated user-defined general building stock dataset using up-to-date parcels, footprints, and RS Means values.
 - Utilize updated and current demographic data.
- Earthquake
 - Identify unreinforced masonry in critical facilities and privately-owned buildings (i.e., residences) by accessing local knowledge, tax assessor information, and/or pictometry/orthophotos. These buildings may not withstand earthquakes of certain magnitudes and plans to provide emergency response or recovery efforts at these properties can be developed.
 - Perform additional Hazus modeling for deterministic ShakeMap scenarios of the county's interest
- Flood
 - The general building stock inventory can be updated to include attributes regarding first floor elevation and foundation type (basement, slab on grade, etc.) to enhance loss estimates.
 - Conduct a Hazus loss analysis for more frequent flood events (e.g., 10- and 50-year flood events).
 - Conduct a repetitive loss area analysis.
 - Continue to expand and update urban flood areas to further inform mitigation.
 - As more current FEMA floodplain data becomes available (i.e., DFIRMs), update the vulnerability analysis and generate a more detailed flood depth grid that can be integrated into the current Hazus version.
- Landslide
 - As more current Landslide data becomes available, update the vulnerability analysis
- Tsunami
 - As more current Tsunami data becomes available, update the vulnerability analysis
 - Perform a Hazus Flood model to analyze estimated loss for the Tsunami hazard
- Wildfire
 - General building stock inventory can be updated to include attributes such as roofing material, fire detection equipment, or distance to fuels as another measure of vulnerability.



5. IDENTIFICATION OF HAZARDS OF CONCERN

Del Norte County considered a full range of hazards that could impact the area and then identified and ranked those that present the greatest concern. These hazards of concern were identified based on the following:

Hazards of Concern are the hazards that are most likely to impact a community. These are identified using available data and local knowledge.

Natural Hazards are hazards created by a meteorological, environmental, or geological event.

- Input from all Planning Partners
- Review of the 2023 California State Hazard Mitigation Plan
- Review of the 2019 Del Norte County HMP
- Research on the frequency, magnitude, and costs associated with hazards that have previously or could feasibly impact the region
- Qualitative information regarding natural (not human-caused) hazards and the perceived vulnerability of the study area's assets to them.

Table 5-1 compares the hazards for Del Norte County's planning area to the hazards listed in the 2023 California State Hazard Mitigation Plan.

Table 5-1. Identification of Hazards of Concern for Del Norte County

2023 California State HMP	2026 Del Norte County HMP	Comment
Air Pollution	Not included	This hazard is considered a cascading impact of extreme heat, and wildfire and is addressed in those hazard profiles.
Civil Disorder	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Cyber Threats	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Dam Failure	Not Included	The Steering Committee did not determine this hazard to be a significant risk to the County. Since the last plan, all dams that have the potential to inundate Del Norte County have been decommissioned.
Drought	Drought	This local hazard aligns with the State Hazard Mitigation Plan.
Earthquake	Earthquake	This local hazard aligns with the State Hazard Mitigation Plan.
Electromagnetic Pulse Attack	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Energy Shortage	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Epidemic, Pandemic, Vector-Borne Disease	Not included	The Steering Committee determined this hazard is a best addressed through public health planning.
Extreme Cold or Freeze	Not included	The Steering Committee did not determine this hazard to be a significant risk to the County.



2023 California State HMP	2026 Del Norte County HMP	Comment
Extreme Heat	Extreme Heat	This local hazard aligns with the State Hazard Mitigation Plan.
Geomagnetic Storm (Space Weather)	Not included	The Steering Committee determined this hazard is not a significant hazard of concern for Del Norte County.
Hazardous Materials Release	Not included	The Steering Committee did not determine this hazard to be a significant risk to the County.
Invasive and Nuisance Species	Not included	The Steering Committee did not determine this hazard to be a significant risk to the County.
Landslide, Debris Flow, and other Mass Movements	Landslide	This local hazard aligns with the State Hazard Mitigation Plan.
Levee Failure	Flood	This hazard was considered under the Flood hazard.
Natural Gas Pipeline Hazards	Not included	The Steering Committee did not determine this hazard to be a significant risk to the County.
Oil Spills	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Other Potential Causes of Long-Term Electrical Outage	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Public Safety Power Shutoff	Not included	This is considered a cascading impact of various other hazards and is addressed in those hazard profiles.
Radiological Accidents	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Riverine, Stream and Alluvial Flood	Flood	The flood chapter addresses riverine/stream, coastal floods and levee failure.
Sea-Level Rise, Coastal Flooding and Erosion	Flood	Coastal flooding hazards are considered under the flood hazard. Erosion is considered a cascading impact of drought, excessive rainfall, extreme wind, flood and landslide and is addressed in those hazard profiles. Sea-level rise is accounted for as appropriate in discussions of climate change.
Severe Wind, Weather, and Storms	Excessive Rainfall, Extreme Wind	These hazards are addressed under two hazard profiles: Excessive Rainfall, and Extreme Wind.
Snow Avalanche	Not included	The Steering Committee did not determine this hazard to be a significant risk to the County.
Subsidence	Not included	The Steering Committee did not determine this hazard to be a significant risk to the County.
Terrorism	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Transportation Accidents Resulting in Explosions or Toxic Releases	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Tree Mortality	Not included	The Steering Committee did not determine this hazard to be a significant risk to the County.
Tsunami and Seiche	Tsunami	This local hazard aligns with the State Hazard Mitigation Plan.



2023 California State HMP	2026 Del Norte County HMP	Comment
Urban Structural Fire	Not included	The Steering Committee determined this hazard is a human-caused hazard best addressed through emergency response planning.
Volcano	Not included	The Steering Committee did not determine this hazard to be a significant risk to the County.
Well Stimulation and Hydraulic Fracturing	Not included	The Steering Committee did not determine this hazard to be a significant risk to the County.
Wildfire	Wildfire	This local hazard aligns with the State Hazard Mitigation Plan.

Based on the review of potential hazards of concern, nine hazards of concern were identified as significant hazards affecting the entire County, to be addressed at the County level in this plan (shown here in alphabetical order):

- Drought
- Earthquake
- Excessive Rainfall
- Extreme Heat
- Extreme Wind
- Flood
- Landslide
- Tsunami
- Wildfire

The Steering Committee approved use of the following hazard event groupings:

- The flood hazard includes riverine flooding, coastal flooding (including high tide flooding and storm surge), and levee failure. Inclusion of the various forms of flooding under a single flood hazard is consistent with FEMA's Multi-Hazard Identification and Risk
- The landslide hazard includes debris flow and other mass movements

Other natural and human-caused hazards that have occurred within Del Norte County are not addressed in this update for one or more of the following reasons:

- The hazard is considered a cascading impact of the identified hazards of concern.
- The hazard has a low potential to occur.
- The hazard is addressed by other planning mechanisms.
- Occurrences of the hazard would not result in significant impacts within the County.

If deemed necessary by the County, these hazards may be considered in future plan updates.

The County's Office of Emergency Services website – www.preparedelnorte.com contains useful information for the following concerns:

- All-hazard preparedness
- Earthquake
- Flooding
- Landslide
- Power outage
- Tsunami
- Wildfire



6. DROUGHT

6.1 HAZARD PROFILE

6.1.1 Hazard Description

Drought is a significant decrease in water supply relative to what is typical in a given location. It is a normal phase in the climate cycle of most regions, originating from a deficiency of precipitation over an extended period of time, usually a season or more. This leads to a water shortage for some activity, group, or environmental sector. Drought can be characterized based on the following (NOAA 2024):

- Meteorological measurements such as rainfall deficit compared to normal or expected rainfall
- Agricultural impacts due to reduced rainfall and water supply (e.g., crop loss, herd culling, etc.)
- Hydrological measurements of stream flows, groundwater, and reservoir levels relative to normal conditions
- Direct and indirect socio-economic impacts on society and the economy (e.g., increased unemployment due to failure of an industry because of drought)

Determination of when drought begins is based on impacts on water users and assessments of available water supply, including water stored in reservoirs or groundwater basins. Different water agencies have different criteria for defining drought. Some issue drought watch or drought warning announcements.

Droughts are climatic patterns that occur over long periods of time as the result of many causes. Global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast result in warm, dry air and reduced precipitation. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depend on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of global weather systems.

6.1.2 Location

Drought is a regional phenomenon that has the potential to impact the entire planning area. A drought affects all aspects of the environment and the community simultaneously and has the potential to impact every person directly or indirectly in the planning area as well as adversely affect the local economy.

Much of Del Norte County is located in the Smith River Watershed and is bounded by the state border to the north, the Pacific Ocean to the west, Redwood Creek and Mad River hydrological units to the south and Sacramento valley to the east. The North Coast region of the state, which includes Del Norte County, constitutes only about 12 percent of the area in California, yet it produces about 41 percent of the annual rainwater runoff that replenishes surface water streams, lakes, reservoirs, and groundwater (State Water Boards 2018). DWR has identified 62 groundwater basins in the North Coast Region,



which they define as the coastal area from Sonoma County to the Oregon border; groundwater is used widely throughout the North Coast Region for municipal, domestic, agricultural, urban, and industrial water supply (State Water Boards 2018). The amount of groundwater varies with precipitation, infiltration and annual withdrawals.

6.1.3 Extent

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. Vulnerability of an activity to drought depends on its water demand and the water supplies available to meet the demand.

Predicting drought depends on the ability to forecast precipitation and temperature. Drought predictions more than a month in advance are unavailable for most locations (University of Nebraska - Lincoln 2025). Only generalized warning can take place due to the numerous variables involved, including air-sea interactions, soil moisture, topography, and the global weather system.

Monitoring and Rating Drought

NOAA Drought Indices

The National Weather Service (NWS) has developed several indices to measure drought impacts and severity and to map their extent and locations (NWS 2024):

- The **Palmer Crop Moisture Index** measures short-term drought weekly to assess impacts on agriculture.
- The **Palmer Z Index** measures short-term drought on a monthly scale.
- The **Palmer Drought Index** is based on long-term weather patterns. The intensity of drought in a given month is dependent on current weather plus the cumulative patterns of previous months. Weather patterns can change quickly, and the Palmer Drought Severity Index can respond fairly rapidly.
- The **Palmer Hydrological Drought Index** quantifies hydrological effects (reservoir levels, groundwater levels, etc.), which take longer to develop and last longer. This index responds more slowly to changing conditions than the Palmer Drought Index.
- The **Standardized Precipitation Index** considers only precipitation. A value of zero indicates the median precipitation amount; the index is negative for drought and positive for wet conditions. The Standardized Precipitation Index is computed for time scales ranging from one month to 24 months.

Maps of these indices show drought conditions nationwide at a given point in time. They are not necessarily indicators of any given area's long-term susceptibility to drought.



U.S. Drought Monitor

The U.S. Drought Monitor (USDM) is a map that has been updated weekly since 2000 to show the location and intensity of drought across the country, including Del Norte County. The USDM measures variables including temperature, soil moisture, water levels in streams and lakes, snow cover, and meltwater runoff. Conditions are then categorized on a scale from abnormally dry to exceptional drought.

- D0—Abnormally Dry
 - Short-term dryness slowing planting, growth of crops
 - Some lingering water deficits
 - Pastures or crops not fully recovered
- D1—Moderate Drought
 - Some damage to crops, pastures
 - Some water shortages developing
 - Voluntary water-use restrictions requested
- D2—Severe Drought
 - Crop or pasture loss likely
 - Water shortages common
 - Water restrictions imposed
- D3—Extreme Drought
 - Major crop/pasture losses
 - Widespread water shortages or restrictions
- D4—Exceptional Drought
 - Exceptional and widespread crop/pasture losses
 - Shortages of water creating water emergencies

The USDA uses the USDM to trigger disaster declarations and eligibility for low-interest loans. The Farm Service Agency uses it to help determine eligibility for their Livestock Forage Disaster Program, and the Internal Revenue Service uses it for tax deferral on forced livestock sales due to drought. State and local decision makers may use it to trigger drought responses or declare drought emergencies, along with other local indicators of drought within a jurisdiction.

Declaring a Drought

In California, a proclamation of emergency conditions pursuant to the California Emergency Services Act may be used to respond to drought impacts (DWR 2021). Recent legislation required state government to maintain urban water use reporting requirements and prohibitions on wasteful practices such as watering during or after rainfall, hosing off sidewalks and irrigating ornamental turf on public street medians. The overall goal of the legislation is to reduce water use and develop drought assessments and contingency plans.



In July 2024, the State Water Resources Control Board adopted the *Making Conservation a California Way of Life* regulation. The regulation implements residential and commercial water budgets and annual reporting requirements for urban retail water suppliers beginning January 1, 2025 (California Water Boards 2024).

6.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Del Norte County has not been included in any major disaster (DR) or emergency (EM) declarations for drought-related events (FEMA 2024).

State Emergency Proclamations

Table 6-1 lists the single drought-related state emergency proclamation that included Del Norte County between January 2019 and December 2024.

Table 6-1. State Emergency Proclamations for Drought Events in Del Norte County (2019 to 2024)

Proclamation Date	Description
May 10, 2021	The governor modified a previous proclamation that declared a state of emergency due to drought to include 41 additional counties, including Del Norte County.

Source: (California State Library 2024)

USDA Declarations

Table 6-2 lists drought-related USDA agricultural disaster declarations that included Del Norte County between January 2019 and December 2024.

Table 6-2. USDA Declarations for Drought Events in Del Norte County (2019 to 2024)

Event Date	USDA Declaration Number	Description
July 17, 2018	S4399	Drought
October 1, 2018	S4467	Drought
April 21, 2020	S4675	Drought
April 21, 2020	S4676	Drought
October 1, 2020	S4916	Drought
January 1, 2021	S4923	Drought
May 4, 2021	S4995	Drought
October 1, 2021	S5146	Drought
February 8, 2022	S5157	Drought
October 1, 2022	S5371	Drought

Source: (USDA 2024)



Previous Events

Table 6-3 lists known and recorded drought-related events that impacted Del Norte County since the previous HMP was developed. For earlier events, refer to the 2019 Plan.

Table 6-3. Drought Events in Del Norte County (2019 to 2024)

Event Date	Declaration or Proclamation Number	Location Impacted	Description
April to September 2020	USDA Declarations S4675 and S4676	Counties of Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Glenn, Humboldt, Imperial, Inyo, Kern, Lake, Lassen, Los Angeles, Marin, Mendocino, Merced, Modoc, Mono, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Yolo, and Yuba.	Precipitation was below average, and temperatures were above average. For maximum temperature, August 2020 came in second to 1967. For September, the maximum temperature ranked sixth warmest. On August 16, Death Valley recorded a temperature of 130 °F. Five of the State's largest six fires in history were ignited in August and September.
October 2020 to May 2021	State Proclamation of Emergency and USDA Declarations S4916, S4923, and S4995.	Counties of Alameda, Alpine, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Imperial, Inyo, Kern, Kern, Kings, Lake, Lassen, Los Angeles, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Napa, Nevada, Orange, Pauma and Yuima, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Ventura, Yolo, and Yuba.	Water Year 2021 was an extreme year in terms of temperature and precipitation, and it followed a Water Year 2020 that was likewise warm and dry. The Colorado River Basin, an important supply for Southern California, continued dry in Water Year 2021, with storage in Lakes Mead and Powell reaching new record lows.
October 2021-April 2022	USDA Declarations S5146 and S5157	Counties of Alameda, Alpine, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Imperial, Inyo, Kern, Kings, Lake, Lassen, Los Angeles, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Ventura, Yolo, and Yuba.	The 2021 water year was the second driest on record, with extreme heat and lack of precipitation. By the end of 2021, all 58 counties in California were placed under a drought emergency proclamation (State of California 2022d). The drought has continued through 2022; as of April 2022, the snowpack of the Sierra Nevada was at 38% of its statewide average (Becker 2022). The State experienced \$1.2 billion in crop damage as a result of this drought period.

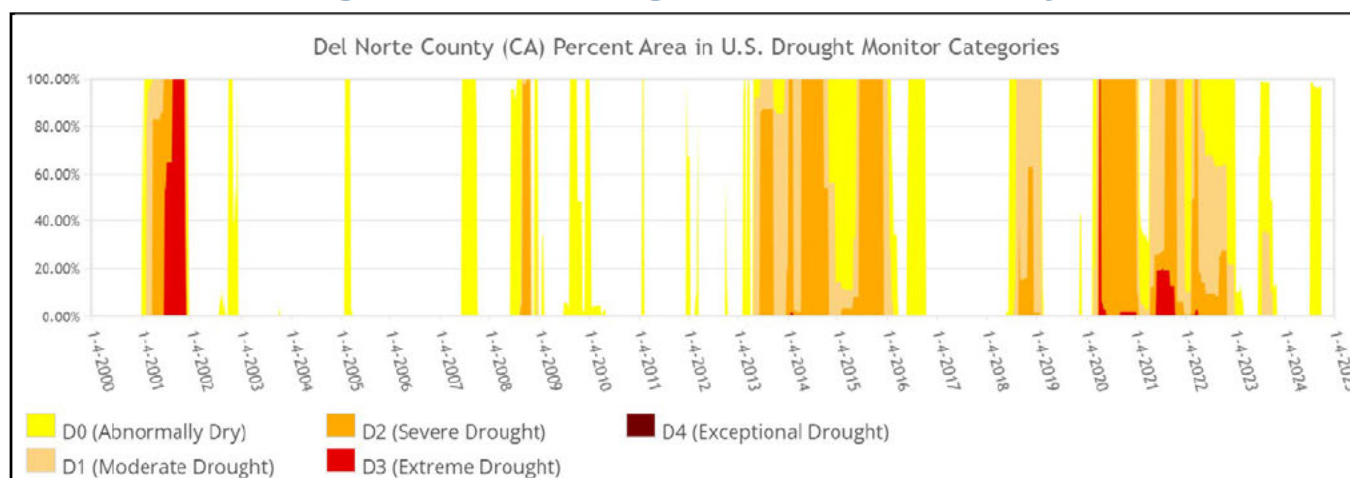


Event Date	Declaration or Proclamation Number	Location Impacted	Description
October 2022 – March 2023	USDA Declaration S5371	Counties of Alameda, Alpine, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Imperial, Inyo, Kern, Kings, Lake, Lassen, Los Angeles, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Ventura, Yolo, and Yuba.	All 58 counties were placed under a drought disaster declaration for severe drought beginning in October 2022. The emergency declaration ended after record-breaking precipitation fell during the atmospheric rivers over the winter of 2022 to 2023.

Source: (Cal OES 2023) (DWR 2021)

As shown in Figure 6-1 Del Norte County experienced extreme droughts in 2001, 2014, 2020, 2021, and 2022.

Figure 6-1. Historical Drought Patterns in Del Norte County



Source: (USDM 2024)

The Drought Impact Reporter—an aggregate news source for drought stories and papers published by the National Drought Mitigation Center—indicates 91 impacts from drought that specifically affected Del Norte County from January 2008 through October 2024 (NDMC 2024). Impacts included bans on recreational and commercial salmon fishing, prohibitions on water rights holders from drawing on watersheds, and state drought emergency declarations.



6.1.5 Probability of Future Occurrences

Probability Based on Previous Occurrences

The cyclical occurrence of drought and documentation of past and current losses point to the strong probability that California will continue to be vulnerable to short- and longer-term drought impacts. Based on the historical and more recent drought events in California, Del Norte County has a high probability of future drought events. According to USDA, Del Norte County has regularly been in a state of drought since 2014. Based on these records and input from the Steering Committee, the probability of occurrence for drought in the County is considered “occasional.”

Potential Impact of Climate Change on Future Probability

Climate change is likely to exacerbate the region’s frequent and severe droughts. Declines in precipitation, and shifts from snow to rain, cause snow drought, which impacts spring runoff, stream flow reliability, and groundwater recharge. The seasonal availability of surface-water supplies will change, with potentially large impacts on local to state-scale water management systems. As described in the County Profile chapter, Del Norte County is expected to experience a rise of more than seven degrees in average temperature by the year 2099. Higher temperatures will lead to increased evaporation, which could exacerbate drought conditions. The vulnerability of groundwater supplies to climate change probably will vary from area to area (State of California 2018).

The North Coast Region is expected to experience prolonged dry seasons and reduced soil moisture conditions, even if the County’s relatively high annual precipitation stays the same or moderately increases. There will be a higher likelihood of extreme wet years and extreme dry years (drought) through 2100 (California’s Fourth Climate Change Assessment 2018).

6.1.6 Cascading Impacts on Other Hazards

The secondary hazard most associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the drought extends. In addition, lack of sufficient water resources can stress trees and other vegetation, making them more vulnerable to infestation from pests, which in turn can make them more vulnerable to ignition.

6.2 VULNERABILITY AND IMPACT ASSESSMENT

6.2.1 Life, Health, and Safety

Overall Population

For this plan, the entire population of the County is considered vulnerable to drought events. Drought has profound impacts on life, health, and safety. It can cause a shortage of water available for human consumption and can reduce local firefighting capabilities. The extent to which activities are affected by drought depends on their water demand and the availability of water supplies. Urban and rural drinking



water systems are particularly vulnerable when drought reduces groundwater recharge from rainfall. Rural areas in Del Norte County, which rely on limited water resources and decentralized water systems, are especially prone to drought-related water shortages and quality issues. The limited access to emergency services and infrastructure in these areas further exacerbates their vulnerability.

Social impacts of drought include mental and physical stress, public safety threats (increased threat from forest/grass fires), and health threats. It can lead to conflicts over limited water resources and force changes in lifestyle. Communities may face tough decisions about water allocation, strict usage restrictions, water quality issues, and insufficient water for firefighting.

Socially Vulnerable Population

Drought significantly impacts socially vulnerable populations. The most affected groups include low-income households, the elderly, and children, who are particularly susceptible to these adverse health impacts due to their limited resources and increased vulnerability (CDPH 2017).

Low-income households often struggle with limited access to alternative water sources, such as bottled water, and lack the financial resources to cope with increased costs for food, utilities, and health care. They may have fewer resources to manage job losses, reduced income, or property damage resulting from drought-related impacts. These populations often lack access to the resources or information needed to mitigate the impacts of drought, such as purchasing water-saving technologies, insuring properties, or relocating to less affected areas.

Elderly individuals and those with disabilities are particularly vulnerable, as they may have difficulty accessing alternative water supplies and medical care during drought conditions. They are also more susceptible to heat-related illnesses and dehydration.

6.2.2 General Building Stock

A drought is not expected to directly affect any structures, and all are expected to be operational during a drought event. All assets are equally vulnerable to impacts associated with the drought hazard.

6.2.3 Community Lifelines and Other Critical Facilities

Drought events generally do not impact buildings directly; however, they can affect agriculture-related facilities and critical facilities associated with water supplies, such as those used for firefighting services. Critical facilities located near wildfire hazard areas are considered vulnerable to wildfires.

While drought affects groundwater sources, it typically does so more slowly than surface water supplies. Groundwater supplies take longer to recover because reduced precipitation during a drought means they are not replenished at a normal rate. This can lead to lower groundwater levels and issues such as reduced pumping capacity or wells going dry, with shallow wells being more susceptible than deep wells. Despite these challenges, critical facilities defined in this plan will remain operational during a drought. Although features like landscaping may not be maintained due to limited water resources, the core functions of critical facilities are at low risk.



6.2.4 Economy

One economic impact of drought is its effect on water supply. When drought conditions persist with little to no relief, local or state governments may impose water restrictions, such as limitations on lawn watering, car washing services, and recreational or commercial outdoor uses of water supplies. In severe drought conditions, watering lawns and crops may not be feasible, leading to dry farmland and crop failures. This can result in crop shortages, which in turn increase food prices (NC State University 2013).

Additionally, the increased demand for water and electricity during droughts can lead to shortages and higher costs for these resources. Industries that rely heavily on water, such as agriculture and tourism, are particularly affected. While most businesses remain operational, they may experience aesthetic impacts, especially within the recreation and tourism industry. Furthermore, droughts in other areas can impact the food supply and prices for residents in the County. The agricultural industry is most at risk economically, as crops may not mature, leading to reduced yields, undernourished livestock, decreased land values, and financial losses for farmers (IPCC 2016).

6.2.5 Natural Resources

Droughts can impact the environment because they can trigger wildfires, increase insect infestations, and exacerbate the spread of disease (IPCC 2016). Additionally, drying streams can diminish habitats for native species, further stressing the environment.

When a drought occurs, the existing pressure on the ecosystem's natural water supplies are amplified, leading to the loss in the critical services it provides such as purifying water and air, preventing erosion, and providing recreation opportunities (NIDIS n.d.). Droughts also have the potential to lead to water pollution due to the lack of rainwater to dilute any chemicals in water sources. Contaminated water supplies may be harmful to plants and animals. If water is not getting into the soil, the ground will dry up and become unstable. Unstable soils increase the risk of erosion and loss of topsoil (NC State University 2013).

6.2.6 Historic and Cultural Resources

Drought can have several detrimental effects on historic and cultural resources. Prolonged, extreme drought can cause soil desiccation, leading to the destabilization of foundations and structures. This can result in cracks and other structural damage to historic buildings. The lack of moisture can also accelerate the deterioration of materials such as wood, stone, and adobe, further compromising the integrity of historic resources (NIDIS n.d.).

Many tribal nations and communities rely on water for rituals and daily practices, and drought disrupts these activities by limiting water availability. Associated environmental changes can damage the sites and undermine their cultural significance, affecting the heritage and identity of the communities.



6.3 FUTURE CHANGES THAT MAY AFFECT RISK

6.3.1 Potential or Planned Development

California's 2020 Water Plan Update projects that water demand in the state will increase through 2045. The California Department of Water Resources (DWR) predicts a modest decrease in single-family water demand from 2020 through 2045, a slight increase in commercial/government water demand, and a moderate increase in multifamily water demand.

New development can impact the risk associated with drought in Del Norte County. As the number of structures in the County continues to rise, including the construction of vacation or second homes, the demand for water resources will rise. This increase in demand can strain existing water supplies, especially during periods of low precipitation.

6.3.2 Projected Changes in Population

Del Norte County's population is projected to decline in upcoming decades, from 27,648 in 2020 to 25,317 in 2070—an 8.4 percent decrease (CA Department of Finance 2025). A decrease in population is likely to result in lower water needs and lower risk from drought.

6.3.3 Climate Change

Climate change is expected to worsen the frequency and severity of droughts in Del Norte County. Declines in precipitation and shifts from snow to rain at higher elevations will lead to snow droughts, impacting spring runoff, stream flow reliability, and groundwater recharge. The seasonal availability of surface water will change, affecting local and state-scale water management systems. Average maximum daily temperatures in Del Norte 2020 to 2099 are projected to rise by 4.8 °F leading to increased evaporation and exacerbating drought conditions. While annual precipitation may not change significantly, it will likely occur in more intense storms within a shorter wet season, resulting in prolonged dry seasons and reduced soil moisture. The region is expected to experience more extreme wet and dry years through 2100. These changes highlight the need for adaptive water management strategies to mitigate the impacts of climate change on water resources in Del Norte County (California's Fourth Climate Change Assessment 2018).

6.3.4 Other Considerations for Future Planning

There is a projected increase in the occurrence of droughts, which could impact the availability of water supplies and place added strain on the population and their access to clean drinking water. Consequently, it may be necessary for critical water-related service sectors to modify their management strategies and proactively allocate resources to adapt to forthcoming shifts.



7. EARTHQUAKE

7.1 HAZARD PROFILE

The Del Norte County website (*Prepare Del Norte - Earthquake n.d.*) outlines the County's efforts to educate residents about earthquakes – what they are, history of occurrences, how to prepare and react during one, and registration for MyShake.

7.1.1 Hazard Description

An earthquake is the vibration of the earth's surface following a release of energy in the earth's crust. 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, east of the San Andreas Fault, and the Pacific Plate to the west, which includes the state's coastal communities. Movement of the tectonic plates against one another creates stresses that build as the rocks are gradually deformed. The rock deformation, or strain, is stored in the rocks as elastic strain energy. When the strength of the rock is exceeded, rupture occurs along a fault.

Geologists have found that earthquakes tend to reoccur along faults, which are zones of weakness in the earth's 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. In fact, relieving stress along one part of a fault may increase it in another part.

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). More than 70 percent of the California's population resides within 30 miles of a fault where high ground shaking could occur in the next 50 years (California Department of Conservation 2024).

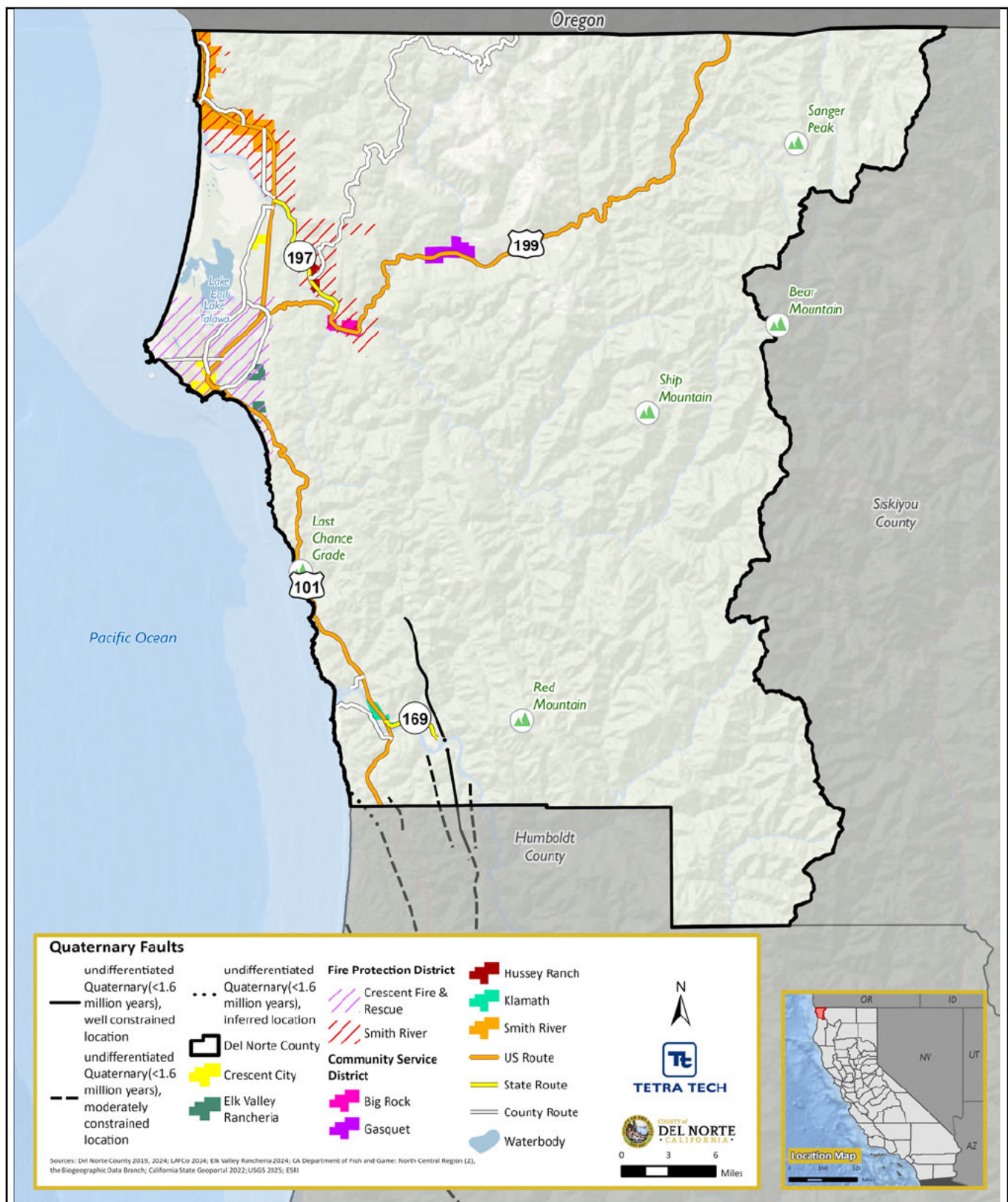
7.1.2 Location

Faults

The USGS maintains a map of information on faults that shows two Class A faults in Del Norte County: Surpur Creek and Lost Man. Class A faults are those where "geologic evidence demonstrates the existence of a Quaternary fault of tectonic origin, whether the fault is exposed for mapping or inferred from liquefaction or other deformational features" (USGS 2024). Figure 7-1 illustrates the quaternary faults in the planning area.



Figure 7-1. U.S. Geological Survey Quaternary Faults in Del Norte County



Source: (USGS 2024)



Del Norte County also could be impacted by earthquakes along faults outside the planning area. A rupture in the Cascadia Subduction Zone (CSZ), for example, would have considerable impacts on the planning area. This is the 600-mile-long offshore zone, from northern Vancouver Island to Cape Mendocino, where the Juan de Fuca plate is being subducted below the North American plate. The California Governor's Office of Emergency Services (Cal OES) estimates that a catastrophic M9.0 earthquake along the CSZ would cause violent ground shaking in Del Norte County and generate a tsunami with estimated wave heights of 16 to 49 feet in Crescent City (Cal OES 2023).

Offshore faults include Bald Mountain-Big Lagoon that are part of the Grogan Fault Zone and the Lost Man Fault.

Positioned at the southern terminus of the CSZ, roughly 100 miles south of Del Norte off the coast of Humboldt County, is the Mendocino Triple Junction, where the Pacific, North American, and Gorda Plates meet. This fault zone is among the most seismically active zones in California. Five Magnitude 7 or larger earthquakes have occurred in the vicinity of the Mendocino Triple Junction since 1900, the most recent in December 2024.

Seismically Sensitive 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.

Ground shaking is the primary cause of earthquake damage to structures, and soft soils amplify ground shaking. One contributor to the site amplification is the velocity at which the rock or soil transmits shear waves. The National Earthquake Hazard Reduction Program (NEHRP) has developed five soil classifications defined by their shear-wave velocity that impact the severity of an earthquake and the likelihood of liquefaction. The soil classification system ranges from A to E, where A represents hard rock that reduces ground motions from an earthquake and E represents soft soils that amplify and magnify ground shaking and increase building damage and losses. Class D and E NEHRP soils are the two classes most susceptible to amplified ground motion during an earthquake. Table 7-1 summarizes NEHRP soil classifications. Figure 7-2 shows NEHRP soil classifications in the planning area. Liquefaction mapping for the planning area is not available.

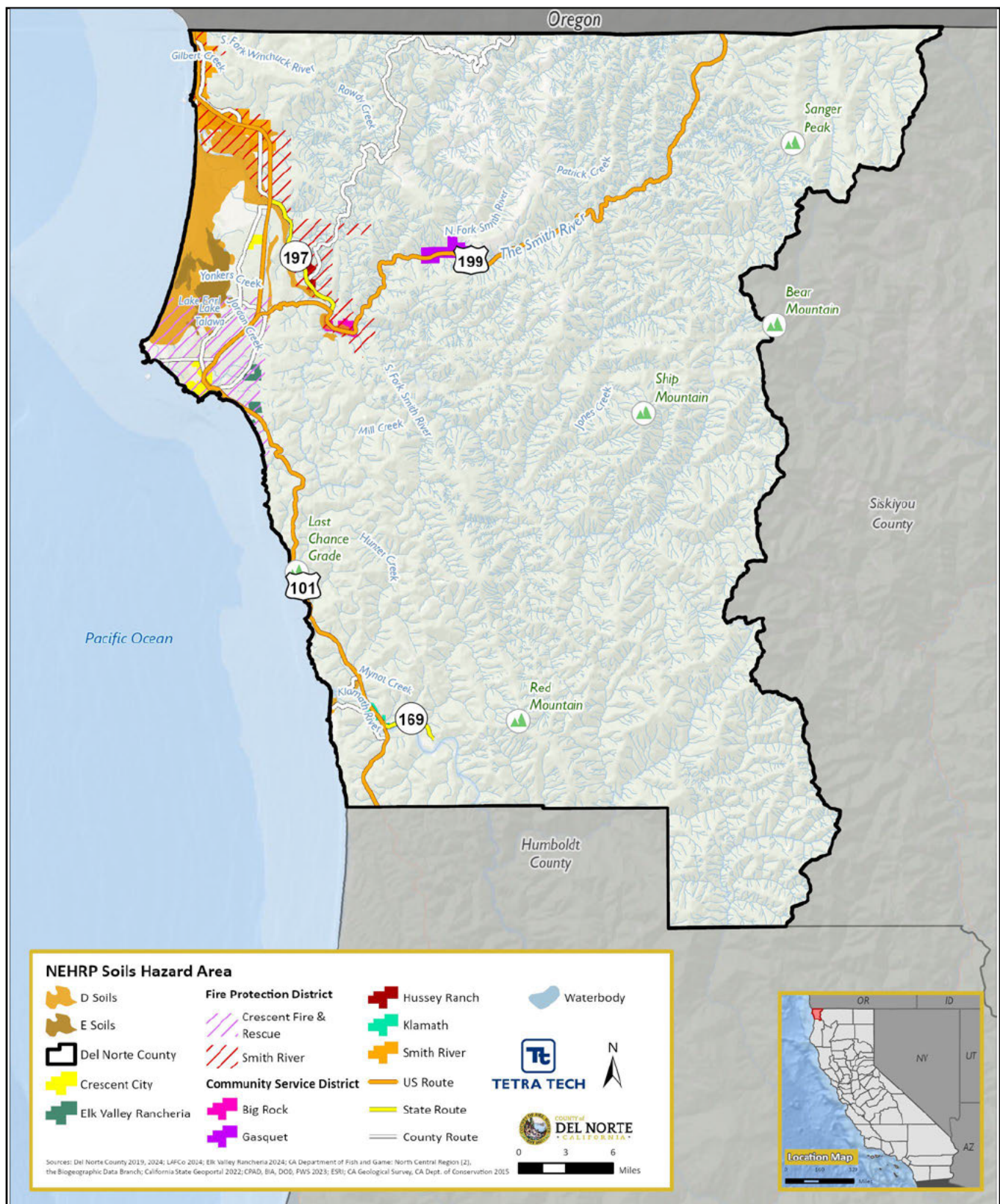
Table 7-1. NEHRP Soil Classification System

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

Source: (FEMA n.d.)



Figure 7-2 NEHRP Soil Hazard Area





7.1.3 Extent

Magnitude

An earthquake's magnitude is a measure of the energy released at the source. It is commonly expressed on the moment magnitude scale (M_w), based on the total moment release of the earthquake (the product of the distance a fault moved and the force required to move it). The scale is as follows:

- Great— $M_w > 8$
- Major— $M_w = 7.0 - 7.9$
- Strong— $M_w = 6.0 - 6.9$
- Moderate— $M_w = 5.0 - 5.9$
- Light— $M_w = 4.0 - 4.9$
- Minor— $M_w = 3.0 - 3.9$
- Micro— $M_w < 3$

Table 7-2 lists the highest-magnitude earthquakes that occurred in Del Norte County as recorded in the USGS Earthquake Catalog.

Table 7-2. USGS Earthquake Catalog, Magnitude 5.5 and Higher

Event Date	Magnitude	Impacts
June 14, 2005	7.2	Offshore – 91 miles - earthquake with no reported impact or damage to the County
November 23, 1873	6.9	All chimneys were knocked down in the Smith River valley. Chimneys also fell at Crescent City, and hardly a brick building in the town escaped damage. Chimneys were damaged in many places as far north as Port Orford, Oregon, and east to Jacksonville, Oregon. Cracks in the ground were observed on the trail from Crescent City to Gasquet in Del Norte County. Felt south to San Francisco and north to Portland, Oregon.
August 23, 1962	5.9	A magnitude 5.9 earthquake occurred 5 kilometers northeast of Hiouchi.

Source: (USGS n.d.)

Intensity

Intensity is the impact that an earthquake has on people and property at any given location. Every earthquake has a single magnitude, but its intensity varies with distance and soil characteristics. The most commonly used intensity scale is the modified Mercalli index (MMI), as described in Table 7-3.

The table lists the peak ground acceleration (PGA) associated with each level of the Mercalli scale. PGA values are directly related to the lateral forces that damage single-family homes and similar “short period” structures. Damage to larger structures (apartment buildings, factories, high-rises, bridges) is associated with longer-period response components of intensity.



Table 7-3. Mercalli Scale and Peak Ground Acceleration Comparison

Modified Mercalli Scale	Perceived Shaking	Potential Structure Damage		Estimated PGA ^a (%g)
		Resistant Buildings	Vulnerable Buildings	
I	Not Felt	None	None	<0.17%
II – III	Weak	None	None	0.17% - 1.4%
IV	Light	None	None	1.4% - 3.9%
V	Moderate	Very Light	Light	3.9% - 9.2%
VI	Strong	Light	Moderate	9.2% - 18%
VII	Very Strong	Moderate	Moderate/Heavy	18% - 34%
VIII	Severe	Moderate/Heavy	Heavy	34% - 65%
IX	Violent	Heavy	Very Heavy	65% - 124%
X – XII	Extreme	Very Heavy	Very Heavy	>124%

PGA = peak ground acceleration. Measured in percent of g, where g is the acceleration of gravity.

Sources: (USGS 2021, USGS 2011)

Figure 7-3 and Figure 7-4 display the MMI rating across Del Norte County for the two probabilistic earthquake events used in the risk assessment for this HMP: the 500-year and 2,500-year mean return period (MRP) events. These figures show that most of the County will experience severe to extreme PGAs for these events.

USGS Hazard Rating

The USGS updated its National Seismic Hazard Maps in 2023. New seismic, geologic, and geodetic information on earthquake rates and associated ground shaking were incorporated into the revised maps. As can be seen in Figure 7-5, Del Norte County falls within the highest hazard classification nationally.

The 1700 Cascadia Earthquake

The Cascadia Earthquake that occurred on January 27, 1700, was one of the largest in the history of North America (USGS 2021). Evidence for this earthquake was gathered by combining First Nations and Native American oral histories with tree-ring dating and other geological evidence in North America and an “orphan tsunami” in Japan. The location has been assigned to the approximate center of the Cascadia Subduction Zone off the coast of Salem, OR, based on the conclusion that an event of this size likely ruptured nearly all this 1,100 km zone. Evidence of the earthquake has been found along the entire Pacific Northwest from British Columbia to Northern California. A similar event could send tsunamis to Northern California within 12-20 minutes of the ground shaking (Penn State University n.d.).



Figure 7-3. Impacts of a 500-Year MRP Earthquake in Del Norte County

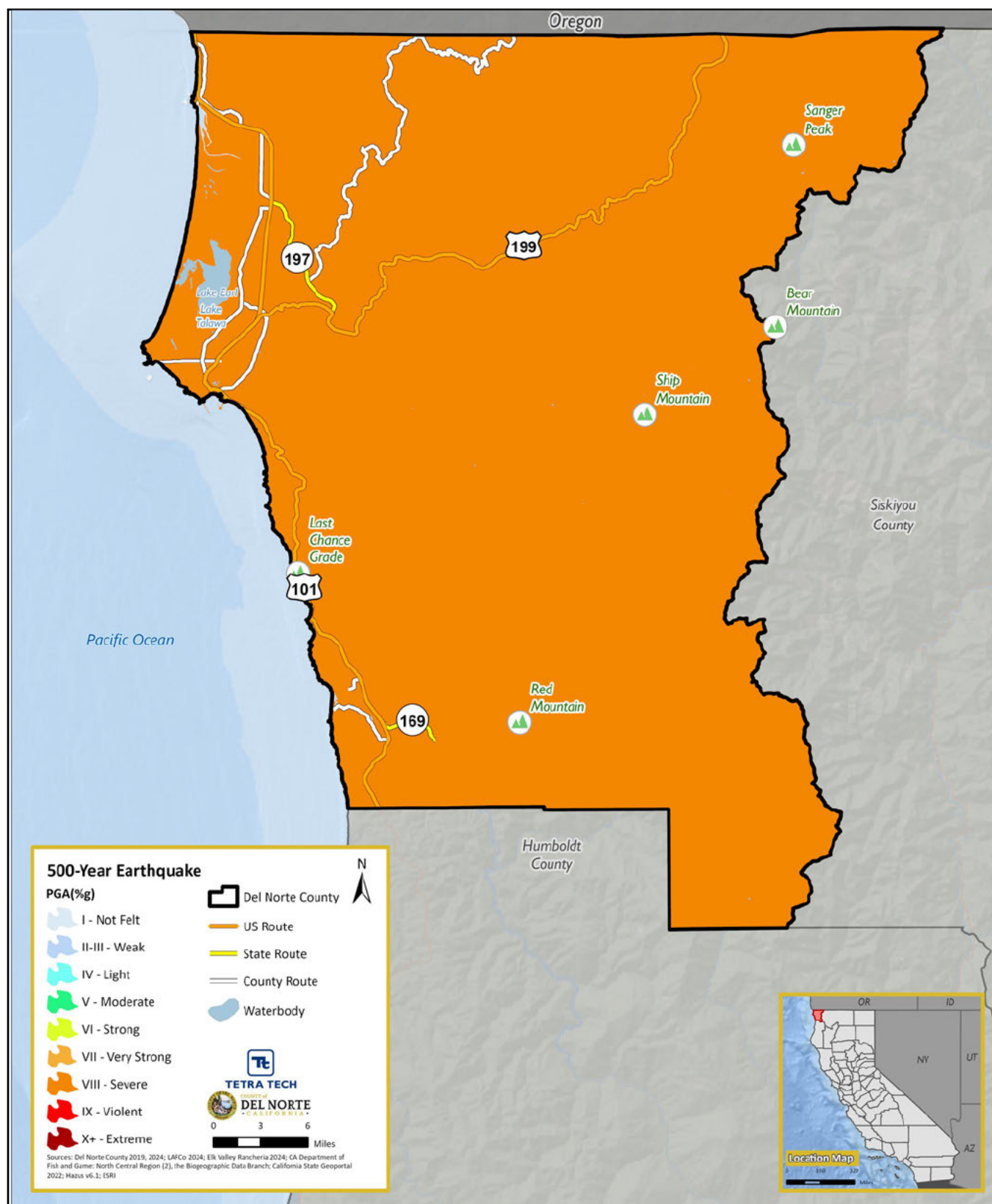




Figure 7-4. Impacts of a 2,500-Year MRP Earthquake in Del Norte County

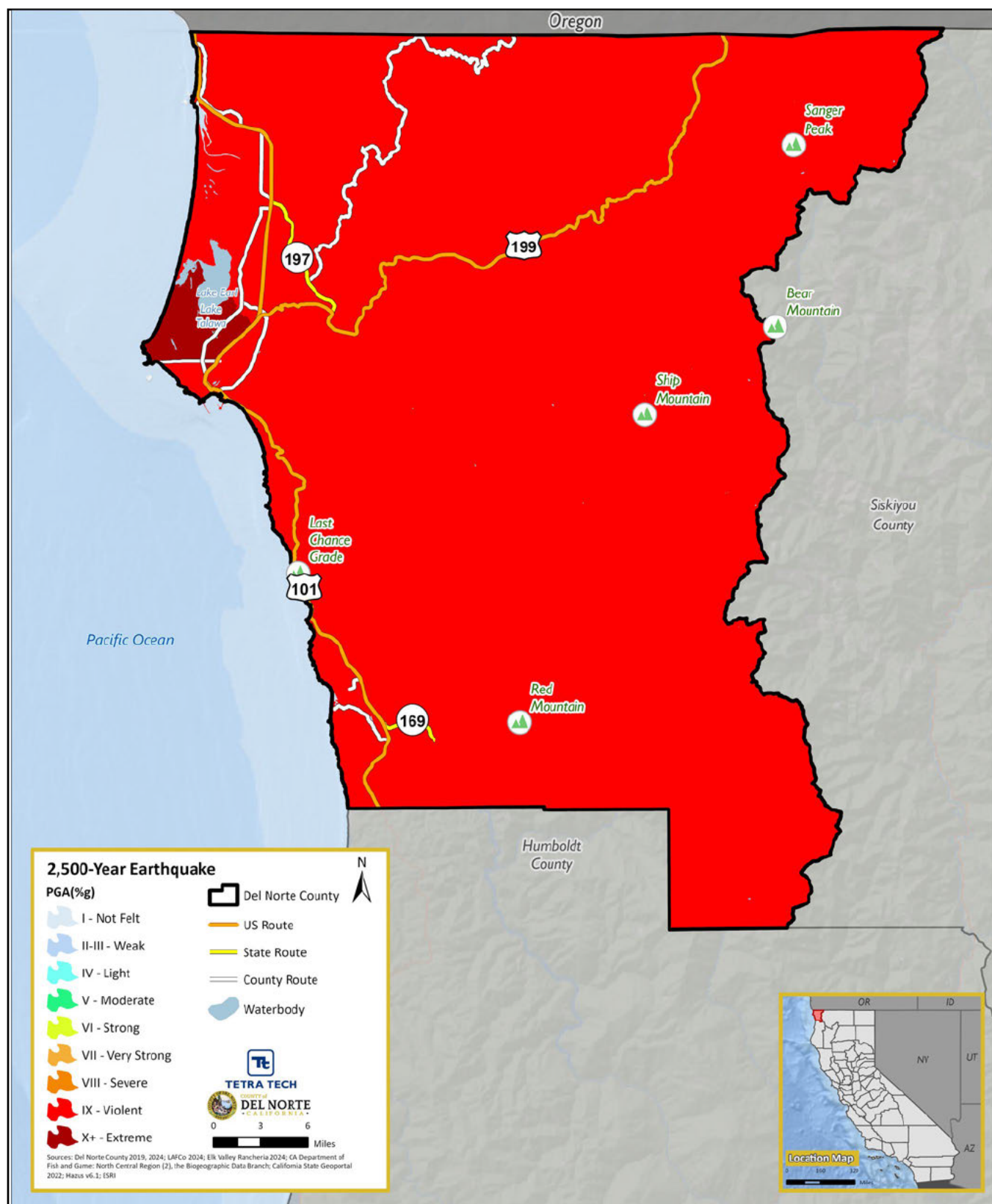
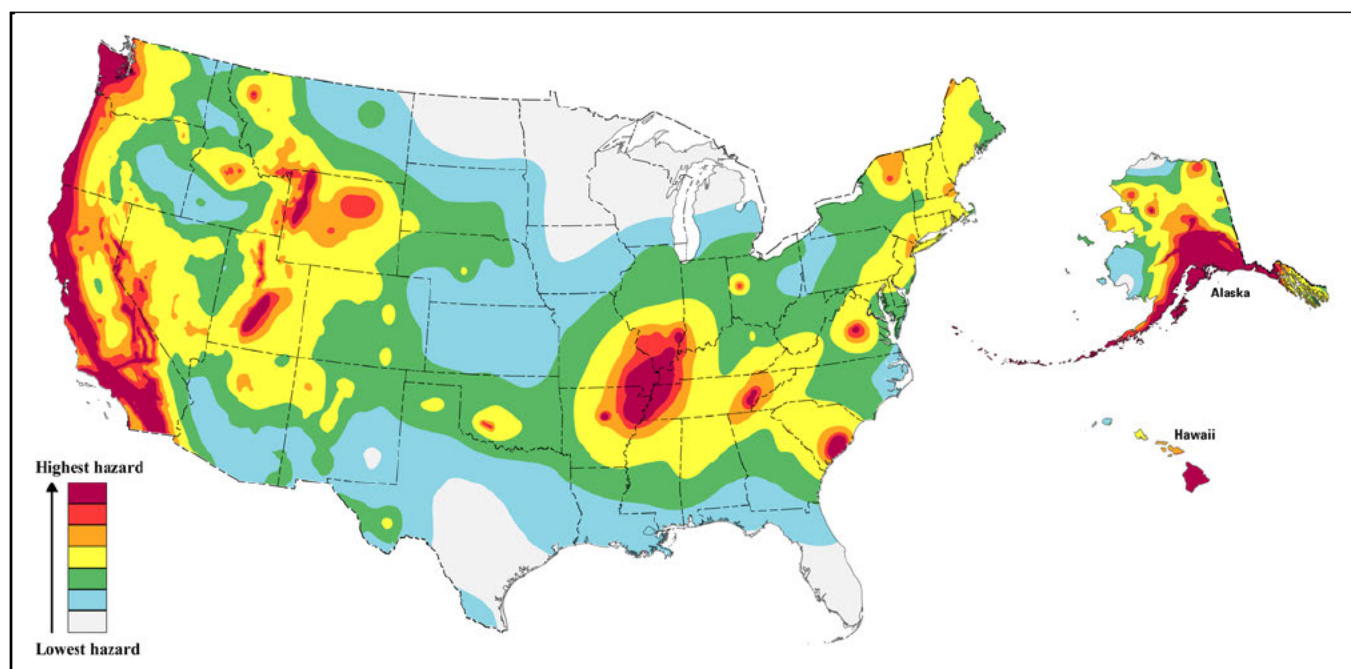


Figure 7-5. Hazard Map from the 2023 50-State Update



7.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Del Norte County has not been included in any major disaster (DR) or emergency (EM) declarations for earthquake-related events (FEMA 2024).

State Emergency Proclamations

Table 7-4 lists the single earthquake-related state emergency proclamation that included Del Norte County between January 2019 and September 2024.

Source: (USGS 2024)

Table 7-4. State Emergency Proclamations for Del Norte County Earthquake Events, 2019 to 2024

Proclamation Date	Description
December 5, 2024	The governor declared a state of emergency in Del Norte, Humboldt, and Mendocino Counties following a magnitude 7.0 earthquake off the Northern California coastline that resulted in strong motion shaking that damaged roads, bridges and buildings, caused widespread power outages affecting thousands of customers, and triggered tsunami evacuations.

Source: (Cal OES 2024)

USDA Declarations

Between 2019 and 2024, Del Norte County was not included in any USDA earthquake-related agricultural disaster declarations (USDA 2024).



Previous Events

Table 7-5 lists recent recorded earthquake-related events that impacted Del Norte County since the previous HMP was developed. For earlier events, refer to the previous HMP.

Table 7-5. Del Norte County Earthquake Events, 2019 to 2024

Event Date	Declaration or Proclamation Number	Description
July 31, 2019	N/A	A magnitude 2.5 earthquake was recorded 12 kilometers east of Bertsch-Oceanview, CA on July 31, 2019. No damages reported.
October 16, 2019	N/A	A magnitude 3.23 earthquake was recorded 6 kilometers west-southwest of Klamath, CA on October 16, 2019. No damages reported.
October 6, 2020	N/A	A magnitude 3.07 earthquake was recorded 14 kilometers southeast of Klamath, CA on October 6, 2020. No damages reported.
January 24, 2023	N/A	A magnitude 2.65 earthquake was recorded near the coast of Oregon on January 24, 2023. No damages reported.
November 23, 2023	N/A	A magnitude 2.82 earthquake was recorded 12 kilometers northwest of Crescent City, CA on November 23, 2023. No damages reported.
November 24, 2023	N/A	A magnitude 2.52 earthquake was recorded 11 kilometers northwest of Crescent City, CA on November 24, 2023. No damages reported.
January 23, 2024	N/A	A magnitude 4.33 earthquake was recorded 16 kilometers west-southwest of Klamath, CA on January 23, 2024. No damages reported.

Source: (USGS n.d.)

7.1.5 Probability of Future Occurrences

Probability Based on Previous Occurrences

California experiences hundreds of earthquakes each year, most with minimal damage and magnitudes below 3.0. Generally, only two or three events large enough to cause moderate damage (magnitude 5.5 or higher) occur each year in the state. Scientists have developed earthquake forecast models that estimate the magnitude, location and likelihood of earthquake fault ruptures throughout California. The most recent model is the Uniform California Earthquake Rupture Forecast. Table 7-6 shows the estimates for the Northern California region. These estimates do not account for an earthquake on the Cascadia Subduction Zone.

Locally, the probability of a magnitude-7.5 or greater event over a 30-year time is 0.11 percent for Subsection 3 of the Trinidad fault zone and 0.69 percent for Subsection 8 of the Big Lagoon-Bald Mountain fault zone. The recurrence interval for a megathrust event on the Cascadia Subduction zone is 400 to 600 years on average, although recurrences appear to be irregular. The probability of a magnitude-9.0 earthquake in the subduction zone over the next 50 years is estimated to be about 10 percent (Cascadia Region Earthquake Workgroup 2013).



Table 7-6. Earthquake Forecast for Northern California

Magnitude (greater than or equal to)	Average Repeat Time (years)	30-Year Likelihood of One or More Events
5	0.24	100%
6	2.4	100%
6.7	12	95%
7	25	76%
7.5	92	28%
8	645	5%

Source: Field et al., 2015

Del Norte County is susceptible to regular earthquake activity, as evidenced by the eight seismic events experienced from 2019 through 2024 (see Table 7-4 and Table 7-5); however, recent earthquakes have not caused significant damage in the county.

Information on previous earthquake occurrences in the County was used to calculate the probability of future occurrence of earthquake events magnitude 5.5 or higher. Table 7-7 lists the number of events from various sources over the 151-year period from 1873 to 2024, which is the most complete period of record for all sources reviewed. Based on these records and input from the Steering Committee, the probability of occurrence for earthquakes in the County is considered “unlikely.”

Table 7-7. Probability of Future Hazard Events in Del Norte County

Hazard Type	Number of Occurrences Between 1873 and 2024	Percent Chance of Occurring in Any Given Year
Earthquake	2	1%

Source: (USGS n.d.)

Potential Impact of Climate Change on Future Probability

The potential direct impacts of climate change on earthquake probability are unknown.

7.1.6 Cascading Impacts on Other Hazards

Earthquakes can cause disastrous landslides. River valleys are vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Earthen dams and levees are susceptible to failure due to seismic events, and the impacts of their eventual failures can be considered secondary risk exposure to earthquakes. Depending on the location, magnitude, depth, type, displacement, fault location (water or land), among other factors, earthquakes can also trigger tsunamis. In the event of a Cascadia rupture, a devastating tsunami could be generated, leaving Del Norte County with minimal warning time. Additionally, power lines can be broken or downed during the earthquake. It may be difficult to control a fire, particularly if the water lines feeding fire hydrants are also broken.



7.2 VULNERABILITY AND IMPACT ASSESSMENT

Vulnerability to the earthquake hazard was evaluated using the methodology described in Section 4.3.2. The assessment considered people and assets on NEHRP Class D and E soils and impacts from four earthquake scenarios:

- Probabilistic assessments were conducted for the 500-year and 2,500-year mean return period (MRP) earthquake events.
- Deterministic assessments were conducted for the Cascadia Megathrust (9.3 magnitude) scenario and the N. San Andreas (8.0 magnitude) scenario.

7.2.1 Life, Health, and Safety

Overall Populations

The entire population of the planning area is exposed to the earthquake hazard. Table 7-8 summarizes the number of people living in areas with seismically sensitive NEHRP Class D and E soils, where intensity may be the greatest.

Table 7-8. Population in the NEHRP D&E Soils Hazard Area

Planning Area	Total Population (2022 ACS 5-Year Estimates)	Population in the NEHRP D&E Soils Hazard Area	
		Number of Persons	% of Planning Partner Total
Crescent City	6,379	0	0.0%
Unincorporated County	21,083	1,863	8.8%
Del Norte County Total	27,462	1,863	6.8%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Geological Survey, CA Dept of Conservation 2015

The potential impacts are dependent on the age and construction type of the structures that people live in and the intensity of the earthquake. Earthquakes that are strong enough to damage infrastructure may have public health impacts, such as contaminated water supply, fires from propane gas leaks, or prolonged power outages (which can especially impact public health when combined with extreme temperatures).

As a result of an earthquake event, residents may be displaced or require temporary long-term shelter. The number of people requiring shelter is generally less than the number displaced as some displaced persons use hotels or stay with family or friends following a disaster event. Table 7-9 summarizes Hazus estimates for three of the four earthquake scenarios evaluated (for the North San Andreas 8.0-magnitude earthquake scenario, projections indicate that there would be zero displaced individuals and no persons seeking short-term shelter).



Table 7-9. Displacements and Shelter Requirements for the Evaluated Earthquake Scenarios

Planning Area	Total Population (2022 ACS 5-Year Estimates)	500-Year MRP Earthquake Event		2,500-Year MRP Earthquake Event		Cascadia Megathrust 9.3- Magnitude Earthquake Scenario	
		Displaced Population	Persons Seeking Short-Term Shelter	Displaced Population	Persons Seeking Short-Term Shelter	Displaced Population	Persons Seeking Short- Term Shelter
Crescent City	6,379	76	51	562	380	63	42
Unincorporated County	21,083	510	311	2,727	1,735	636	376
Del Norte County Total	27,462	586	362	3,289	2,115	699	418

Source: Hazus v6.1; CA Geological Survey, CA Dept of Conservation 2015; U.S. Census Bureau 2020/2022



Hazus estimates casualties for earthquake occurrence at three possible times of day that represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 a.m. estimate represents the maximum residential occupancy load, the 2:00 p.m. estimate represents the maximum educational, commercial and industrial sector loads, and the 5:00 p.m. estimate represents peak commute time.

Table 7-10 shows that the number of casualties increases significantly from the 500-year MRP event to the 2,500-year MRP event. Table 7-11 shows that the severity of impacts from Cascadia Megathrust 9.3-magnitude earthquake scenario are greater than for the 500-year MRP event but less than for the 2,500-year MRP event. Hazus estimates zero casualties for the North San Andreas 8.0-magnitude earthquake scenario. For all modeled events, occurrence at 2:00 p.m. is estimated to result in the highest numbers of casualties.

Table 7-10. Estimated Casualties for the 500-Year and 2,500-Year MRP Earthquake Events

	500-Year MRP			2,500-Year MRP		
	2:00 a.m.	2:00 p.m.	5:00 p.m.	2:00 a.m.	2:00 p.m.	5:00 p.m.
Injuries Without Hospitalization	101	106	75	573	743	499
Hospitalizations	20	26	20	164	263	192
Fatalities	2	5	4	29	68	44

Table 7-11. Estimated Casualties for the Cascadia Megathrust 9.3M Earthquake Scenario

	Cascadia Megathrust 9.3M		
	2:00 AM	2:00 PM	5:00 PM
Injuries Without Hospitalization	116	127	89
Hospitalizations	21	28	21
Fatalities	2	5	3

Socially Vulnerable Population

Populations most vulnerable to earthquakes are those located in/near the built environment, particularly those near unreinforced masonry construction. People over 65 and individuals living below the poverty threshold are particularly susceptible. This is due to factors such as decreased mobility, limited financial resources to respond to hazards, and the quality and location of their housing. Research indicates that while some populations may not face higher hazard exposure, they can experience more severe impacts and longer recovery times if affected.

Table 7-12 presents the estimated socially vulnerable populations living in the NEHRP Soil Class D and E hazard areas. For Del Norte County, there are 388 persons over the age of 65 years, 117 persons under the age of 5 years, 19 non-English speakers, 346 persons with a disability, and 231 living in poverty located in these areas.



Table 7-12. Vulnerable Population in the NEHRP D & E Soils Hazard Area

Planning Area	Vulnerable Populations Living on NEHRP Class D & E Soils									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Unincorporated County	388	8.8%	117	8.8%	19	8.5%	346	8.8%	231	8.8%
Del Norte County Total	388	7.4%	117	7.8%	19	5.1%	346	7.1%	231	6.4%



7.2.2 General Building Stock

Buildings on Seismically Sensitive Soils

Table 7-13 lists the number of buildings on NEHRP Class D & E soils and the replacement cost value (RCV) of those buildings. Table 7-14 categorizes these buildings by occupancy class.

Table 7-13. Building Stock and Replacement Costs on NEHRP Class D & E Soils

Planning Area	Planning Partner Total Buildings		Buildings in the NEHRP D&E Soils Hazard Area			
	Count	Replacement Cost Value	Number of Buildings		Replacement Cost Value	
			Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	0	0.0%	\$0	0.0%
Unincorporated County	12,555	\$11,702,984,573	1,215	9.7%	\$1,450,092,505	12.4%
Del Norte County Total	14,279	\$14,687,618,715	1,215	8.5%	\$1,450,092,505	9.9%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Geological Survey, CA Dept of Conservation 2015; RS Means 2024

Table 7-14. Buildings in the NEHRP D&E Soils Hazard Area by General Occupancy Class

Planning Area	Buildings in the NEHRP D&E Soils Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other ^a
Crescent City	0	0	0	0
Unincorporated County	818	304	6	87
Del Norte County Total	818	304	6	87

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Geological Survey, CA Dept of Conservation 2015

a. Other = Government, Religion, Agricultural, and Education

Building Damage

The total RCV of the general building stock is estimated at \$1.3 billion, all of which is exposed to earthquake events. The estimated damage for the County from a 500-year MRP earthquake is summarized as follows: \$815 million in residential damage, \$416 million in commercial damage, and \$157 million in damage to all other occupancy types. As shown in Table 7-15, the unincorporated county is projected to lose \$1.2 billion (10.5 percent) of its total building and contents value from a 500-year MRP earthquake event. Crescent City is projected to lose \$160 million (5.3 percent) of its total building and contents value from this earthquake event.



Table 7-15. 500-Year MRP Earthquake Event Estimated Losses

Planning Area	Total Replacement Cost (RCV)	500-Year MRP Estimated Losses				
		All Occupancies		Residential Properties	Commercial Properties	Other Occupancies
		Loss	% of RCV			
Crescent City	2,984,634,142	\$159,605,509	5.3%	\$74,455,791	\$68,764,507	\$16,385,212
Unincorporated County	11,702,984,573	\$1,228,671,375	10.5%	\$740,937,739	\$347,117,052	\$140,616,584
Del Norte County Total	14,687,618,715	\$1,388,276,884	9.5%	\$815,393,530	\$415,881,559	\$157,001,796

Source: Hazus v6.1; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; RS Means 2024; CA Geological Survey; CA Dept of Conservation 2015

Table 7-16 summarizes the estimated damage from the 2,500-year MRP earthquake. Overall, the County is projected to lose \$5.4 billion (37.0 percent) for this hazard event. The unincorporated county is projected to lose \$4.7 billion (40.4 percent) of its total building and contents value. Crescent City is projected to lose \$704 million (23.6 percent) of its total building and contents value.

Table 7-16. 2,500-Year MRP Earthquake Event Estimated Losses

Planning Area	Total Replacement Cost (RCV)	2,500-Year MRP Estimated Losses				
		All Occupancies		Residential Properties	Commercial Properties	Other Occupancies
		Loss	% of RCV			
Crescent City	2,984,634,142	\$704,386,805	23.6%	\$324,957,645	\$296,803,277	\$82,625,883
Unincorporated County	11,702,984,573	\$4,724,329,595	40.4%	\$2,740,019,661	\$1,397,155,074	\$587,154,860
Del Norte County Total	14,687,618,715	\$5,428,716,400	37.0%	\$3,064,977,306	\$1,693,958,351	\$669,780,743

Source: Hazus v6.1; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; RS Means 2024; CA Geological Survey; CA Dept of Conservation 2015

Under the Cascadia Megathrust 9.3-magnitude earthquake scenario, Del Norte County is projected to experience substantial financial losses across its built environment. Estimated losses countywide amount to \$1.63 billion, representing 11.1 percent of the total RCV. Crescent City is expected to incur \$155.2 million in damage, or 5.2 percent of its total RCV, while the unincorporated county faces a much higher impact, with losses estimated at \$1.48 billion, 12.6 percent of total RCV. Residential properties are projected to suffer the greatest damage, totaling \$951 million, followed by commercial properties at \$496 million and other occupancies at nearly \$187 million. These results are shown in Table 7-17.



Table 7-17. Cascadia Megathrust 9.3-Magnitude Earthquake Scenario - Estimated Losses

Planning Area	Total Replacement Cost (RCV)	Cascadia Megathrust 9.3-Magnitude Earthquake - Estimated Losses				
		All Occupancies		Residential Properties	Commercial Properties	Other Occupancies
		Loss	% of RCV			
Crescent City	2,984,634,142	\$155,248,941	5.2%	\$71,711,223	\$67,619,154	\$15,918,564
Unincorporated County	11,702,984,573	\$1,478,674,679	12.6%	\$879,351,410	\$428,399,373	\$170,923,896
Del Norte County Total	14,687,618,715	\$1,633,923,620	11.1%	\$951,062,633	\$496,018,527	\$186,842,460

Source: Hazus v6.1; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; RS Means 2024; CA Geological Survey; CA Dept of Conservation 2015

In the North San Andreas 8.0-magnitude earthquake scenario, Del Norte County is projected to experience minimal financial losses relative to its total building value. The estimated losses across all occupancies are less than 0.1 percent of the total RCV. Crescent City is expected to incur around \$6,881 in damage, while the unincorporated county may see losses of \$111,778. Residential properties are projected to bear the largest share of the losses, totaling \$59,307 countywide, followed by commercial properties at \$42,461 and other occupancies at \$16,891. These figures suggest that the anticipated impact of this earthquake scenario on Del Norte County's built environment would be relatively minor. The results are shown in Table 7-18.

Table 7-18. North San Andreas 8.0-Magnitude Earthquake Scenario - Estimated Losses

Planning Area	Total Replacement Cost (RCV)	North San Andreas 8.0-Magnitude Earthquake - Estimated Losses				
		All Occupancies		Residential Properties	Commercial Properties	Other Occupancies
		Loss	% of RCV			
Crescent City	2,984,634,142	\$6,881	<0.1%	\$2,468	\$3,727	\$687
Unincorporated County	11,702,984,573	\$111,778	<0.1%	\$56,840	\$38,734	\$16,204
Del Norte County Total	14,687,618,715	\$118,659	<0.1%	\$59,307	\$42,461	\$16,891

Source: Hazus v6.1; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; RS Means 2024; CA Geological Survey; CA Dept of Conservation 2015

Table 7-19 shows that all building occupancy classes are likely to experience all levels of damage severity as a result of the 500-year and 2,500-year MRP events.

Table 7-20 shows that all building occupancy classes are likely to experience all levels of damage severity as a result of the Cascadia Megathrust 9.3- Magnitude and North San Andreas 8.0-Magnitude earthquake scenarios.



Table 7-19. Predicted Level of Damage from the 500- and 2,500-Year MRP Earthquake

Occupancy Class	Total Number of Buildings in Occupancy	Severity of Expected Damage	Earthquake 500-Year MRP		Earthquake 2,500-Year MRP	
			Building Count	% of All Buildings in Occupancy Class	Building Count	% of All Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)	10,457	NONE	2,625	25.1%	189	1.8%
		MINOR	3,203	30.6%	1,154	11.0%
		MODERATE	2,637	25.2%	3,231	30.9%
		SEVERE	1,481	14.2%	2,436	23.3%
		DESTRUCTION	511	4.9%	3,447	33.0%
Commercial Buildings	3,359	NONE	669	19.9%	15	0.4%
		MINOR	738	22.0%	88	2.6%
		MODERATE	1,115	33.2%	456	13.6%
		SEVERE	664	19.8%	1,001	29.8%
		DESTRUCTION	173	5.1%	1,800	53.6%
Industrial Buildings	89	NONE	17	18.7%	0	0.4%
		MINOR	21	23.8%	3	3.1%
		MODERATE	30	34.0%	14	15.2%
		SEVERE	17	18.7%	26	29.3%
		DESTRUCTION	4	4.8%	46	51.9%
Government, Religion, Agricultural, and Education Buildings	375	NONE	101	27.1%	5	1.4%
		MINOR	98	26.2%	27	7.2%
		MODERATE	104	27.7%	83	22.2%
		SEVERE	59	15.7%	116	31.0%
		DESTRUCTION	13	3.4%	143	38.2%

Source: Hazus v6.1; CA Geological Survey, CA Dept of Conservation 2015; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022



Table 7-20. Predicted Level of Damage from Cascadia Megathrust and North San Andreas

Occupancy Class	Total Number of Buildings in Occupancy	Severity of Expected Damage	Cascadia Megathrust 9.3-Magnitude Earthquake Scenario		North San Andreas 8.0-Magnitude Earthquake Scenario	
			Building Count	% of All Buildings in Occupancy Class	Building Count	% of All Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)	10,457	NONE	826	7.9%	10,456	100.0%
		MINOR	3,862	36.9%	1	<0.1%
		MODERATE	3,065	29.3%	0	0.0%
		SEVERE	2,159	20.6%	0	0.0%
		DESTRUCTION	545	5.2%	0	0.0%
Commercial Buildings	3,359	NONE	74	2.2%	3,359	100.0%
		MINOR	428	12.7%	0	0.0%
		MODERATE	1,468	43.7%	0	0.0%
		SEVERE	1,205	35.9%	0	0.0%
		DESTRUCTION	184	5.5%	0	0.0%
Industrial Buildings	89	NONE	2	2.3%	89	100.0%
		MINOR	14	15.9%	0	0.0%
		MODERATE	40	44.5%	0	0.0%
		SEVERE	29	32.6%	0	0.0%
		DESTRUCTION	4	4.8%	0	0.0%
Government, Religion, Agricultural, and Education Buildings	375	NONE	23	6.1%	374	100.0%
		MINOR	88	23.6%	0	0.0%
		MODERATE	151	40.4%	0	0.0%
		SEVERE	99	26.4%	0	0.0%
		DESTRUCTION	13	3.5%	0	0.0%

Source: Hazus v6.1; CA Geological Survey, CA Dept of Conservation 2015; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022

7.2.3 Community Lifelines and Other Critical Facilities

All infrastructure in Del Norte County is considered at risk to earthquakes, including all pipes, roads, bridges, dams, water and wastewater treatment facilities, and utility poles. During earthquakes, underground infrastructure, such as water and sewer systems, are especially vulnerable. Damaged or impassable roads may cut off certain populations from vital resources.

For earthquake analysis, Hazus provides estimates of the likely level of damage to each community lifeline, as well as an assessment of how quickly damaged facilities can be returned to full functionality after an earthquake event. These results are shown for the evaluated earthquake scenarios in Table 7-21.



Table 7-21. Estimated Time to Return to Functionality Following an Earthquake

Name	Average % Probability of Sustaining Damage					Average % Functionality			
	None	Slight	Moderate	Extensive	Complete	Day 1	Day 7	Day 30	Day 90
500-Year Mean Return									
Communications	32.6%	38.7%	18.3%	7.3%	3.0%	79.3%	90.0%	94.9%	97.7%
Energy	15.6%	22.3%	32.4%	17.5%	12.1%	26.7%	61.6%	76.1%	88.8%
Food, Hydration, Shelter	4.3%	11.3%	28.2%	29.6%	26.5%	4.3%	15.6%	43.8%	73.5%
Hazardous Materials	4.4%	11.8%	28.7%	30.1%	24.9%	4.3%	16.1%	44.8%	75.0%
Health and Medical	32.1%	39.1%	17.9%	6.1%	4.7%	32.1%	70.3%	89.1%	94.7%
Safety and Security	17.0%	19.8%	27.4%	20.1%	15.7%	17.0%	36.4%	64.1%	82.7%
Transportation	71.7%	9.9%	7.3%	6.9%	4.2%	80.3%	86.4%	89.5%	94.4%
Water Systems	24.4%	31.8%	24.4%	15.7%	3.7%	49.9%	83.1%	90.4%	98.1%
2,500-Year Mean Return									
Communications	1.6%	16.7%	39.7%	25.9%	16.0%	44.4%	72.3%	86.8%	92.1%
Energy	0.3%	3.2%	17.6%	26.0%	53.0%	4.8%	32.0%	51.8%	64.5%
Food, Hydration, Shelter	<0.1%	0.2%	2.8%	10.3%	86.6%	<0.1%	0.2%	3.0%	13.4%
Hazardous Materials	<0.1%	0.2%	2.7%	10.1%	87.0%	0.0%	0.2%	2.9%	13.0%
Health and Medical	1.2%	16.4%	41.0%	22.0%	19.3%	1.2%	17.2%	58.6%	70.4%
Safety and Security	0.9%	4.7%	17.4%	19.8%	57.0%	0.9%	5.5%	23.1%	36.0%
Transportation	19.7%	11.3%	11.9%	21.0%	36.1%	33.2%	44.0%	46.9%	59.7%
Water Systems	0.8%	9.9%	30.3%	33.7%	25.3%	18.6%	48.2%	63.0%	88.2%
Cascadia Megathrust 9.3-Magnitude									
Communications	14.1%	50.9%	22.7%	8.9%	3.4%	76.3%	88.9%	93.1%	97.4%
Energy	3.4%	17.9%	36.5%	27.8%	14.4%	15.2%	54.6%	66.8%	86.4%
Food, Hydration, Shelter	<0.1%	0.9%	17.2%	46.7%	35.2%	0.0%	0.8%	18.0%	64.7%
Hazardous Materials	<0.1%	0.4%	11.7%	43.5%	44.4%	0.0%	0.3%	12.1%	55.5%
Health and Medical	16.2%	55.3%	14.8%	8.3%	5.4%	16.1%	70.2%	86.2%	94.4%
Safety and Security	8.0%	18.0%	24.2%	30.0%	19.8%	8.0%	25.5%	50.1%	78.8%
Transportation	66.8%	10.9%	7.6%	9.4%	5.4%	77.5%	83.8%	86.0%	93.0%
Water Systems	8.2%	36.3%	34.4%	17.9%	3.2%	38.7%	81.7%	90.6%	98.3%
North San Andreas 8.0-Magnitude									
Communications	100.0%	<0.1%	0.0%	0.0%	0.0%	99.9%	99.9%	99.9%	99.9%
Energy	100.0%	<0.1%	0.0%	0.0%	0.0%	99.9%	99.9%	99.9%	99.9%
Food, Hydration, Shelter	99.9%	<0.1%	0.0%	0.0%	0.0%	99.9%	99.9%	99.9%	99.9%
Hazardous Materials	99.9%	<0.1%	0.0%	0.0%	0.0%	99.9%	99.9%	99.9%	99.9%
Health and Medical	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	100.0%	100.0%
Safety and Security	100.0%	<0.1%	0.0%	0.0%	0.0%	99.9%	99.9%	99.9%	99.9%
Transportation	100.0%	<0.1%	0.0%	0.0%	0.0%	99.9%	99.9%	99.9%	99.9%
Water Systems	100.0%	<0.1%	0.0%	0.0%	0.0%	99.9%	99.9%	99.9%	99.9%

Source: Hazus v6.1; CA Geological Survey, CA Dept of Conservation 2015; Del Norte County 2019,2024;HIFLD 2024; California Department of Transportation 2023; California Department of Education 2020; California Department of Motor Vehicle 2020



Table 7-22 shows the number of critical facilities located in the NEHRP Class D and E soils hazard area for Del Norte County. There are a total of 76 facilities located in this hazard area with the highest number among the Food, Hydration, Shelter lifeline (14) and Other Critical Facilities (14).

7.2.4 Economy

Earthquake impacts on the economy include loss of business function, damage to inventory, relocation costs, wage loss, and rental costs during the repair or replacement of buildings. Roads would undergo damage due to ground failure, resulting in interruptions of regional transportation and of distribution of materials. Losses to the community that would result from damage to lifelines could exceed costs of repair. Earthquake events can significantly affect bridges, many of which provide the only access to certain neighborhoods. Because softer soils generally follow floodplain boundaries, bridges that cross watercourses are particularly vulnerable. Potential impacts on facilities and infrastructure will depend on their age, which correlates with standards in place at times of construction.

Hazus estimates the volume of debris that may be generated as a result of an earthquake event to enable the study region to manage debris removal and disposal. Debris estimates are divided into two categories: reinforced concrete and steel that require special equipment to break up before being transported, and brick, wood, and other debris that can be loaded directly onto trucks with bulldozers (FEMA 2022).

As shown in Table 7-23, for the 500-year MRP event, 98,178 tons of brick/wood debris and 162,107 tons of concrete/steel debris will be generated countywide. For the 2,500-year MRP event, Hazus estimates that 366,268 tons of brick/wood debris and 763,939 tons of concrete/steel debris will be generated countywide.

Table 7-24 shows the debris generated for the Cascadia Megathrust 9.3-magnitude and North San Andreas 8.0-magnitude earthquake scenarios. There will be 130,677 tons of brick/wood debris and 212,447 tons of concrete/steel debris will be generated countywide for the Cascadia Megathrust scenario. For the North San Andreas scenario, Hazus estimates that 2 tons of brick/wood debris and less than 1 tone of concrete/steel debris will be generated countywide.

7.2.5 Natural Resources

Earthquakes can impact ecosystems and wildlife by triggering landslides, soil liquefaction, and changes in water flow, which can destroy habitats and degrade marine environments. Seismic activity can disrupt natural water sources, causing contamination or loss of freshwater resources and potentially affecting geothermal resources essential for local ecology. Geothermal resources can both positively and negatively affect local ecosystems. Potential benefits include small land footprint and reduced habitat fragmentation compared to other renewable sources. Potential negative effects include release of toxic substances like sulfur, heavy metals, potential for landslides, and disruption of sensitive habitats.



Table 7-22. Number of Facilities in the NEHRP D & E Soils Hazard Area, by Lifeline Category

Planning Area	Number of Facilities in the NEHRP D&E Soils Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communica-tions	Energy	Food, Hydration, Shelter	Hazard-ous Materials	Health & Medical	Safety & Security	Transpor-tation	Water Systems	Other Critical Facilities	Count	% of Planning Partner Total
Crescent City	0	0	0	0	0	0	0	0	0	0	0.0%
Unincorporated County	4	8	14	11	2	9	12	2	14	76	17.4%
Del Norte County Total	4	8	14	11	2	9	12	2	14	76	13.0%

Source: Del Norte County 2019, 2024; HIFLD 2024; California Department of Transportation 2023; California Department of Education 2020; California Department of Motor Vehicles 2020; CA Geological Survey, CA Dept of Conservation 2015



Table 7-23. Debris from 500-Year and 2,500-Year MRP Event

Planning Area	Debris Generated by 500-Year MRP		Debris Generated by 2,500-Year MRP	
	Brick/Wood (tons)	Concrete/Steel (tons)	Brick/Wood (tons)	Concrete/Steel (tons)
Crescent City	7,850.8	19,945.5	38,777.3	104,687.3
Unincorporated County	90,327.3	142,162.1	327,490.6	659,251.8
Del Norte County Total	98,178.1	162,107.6	366,267.9	763,939.1

Source: Hazus v6.1; CA Geological Survey, CA Dept of Conservation 2015; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022

Table 7-24. Debris from Cascadia Megathrust 9.3M and North San Andreas 8.0M Scenarios

Planning Area	Debris Generated by the Cascadia Megathrust 9.3-Magnitude Earthquake Scenario		Debris Generated by the North San Andreas 8.0-Magnitude Earthquake Scenario	
	Brick/Wood (tons)	Concrete/Steel (tons)	Brick/Wood (tons)	Concrete/Steel (tons)
Crescent City	8,725.1	22,037.6	0.0	0.0
Unincorporated County	121,952.3	190,409.3	2.1	0.1
Del Norte County Total	130,677.4	212,446.9	2.1	0.1

Source: Hazus v6.1; CA Geological Survey, CA Dept of Conservation 2015; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022

7.2.6 Historic and Cultural Resources

Earthquakes can cause significant structural damage or destruction to Del Norte County's historic buildings, landmarks, and other historically significant sites, leading to the loss of irreplaceable heritage. Earthquake-induced landslides, ground shaking, and soil liquefaction can damage or destroy archaeological sites and burial grounds, resulting in the loss of invaluable information about Del Norte's past, indigenous history, and heritage.

Earthquakes can disrupt access to natural resources essential for traditional practices, affecting the transmission of cultural knowledge to future generations. Additionally, museums and cultural institutions housing local art, artifacts, and historical documents are at risk, and their loss would mean a significant loss of cultural heritage.

7.3 FUTURE CHANGES THAT MAY AFFECT RISK

7.3.1 Potential or Planned Development

Land use in the planning area will be directed by general plans adopted under California's General Planning Law. The safety elements of these plans establish standards for protecting the community



from hazards, including seismic risks. This plan provides a tool to ensure no increase in exposure in high seismic risk areas. Development will be regulated through building standards and performance measures to reduce risk.

Development in areas with softer NEHRP soil classes, liquefaction, and landslide-susceptible zones may experience foundation shifting or cracking during earthquakes due to loose soil characteristics. However, current building codes require seismic provisions, making new construction less vulnerable to seismic impacts compared to older buildings that may have been built to lower standards. Any increases in development in the County would increase the overall risk from the earthquake hazard, though new development is likely to be better protected than older building stock due to meeting modern building code requirements.

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. The determination of how great a force a structure should be able to withstand is based on probabilistic seismic mapping of the area. Such mapping identifies the probability of a given magnitude of ground shaking occurring over a specified time period. Buildings, bridges, highways and utilities built to meet modern seismic design requirements are typically able to withstand earthquakes better, with less damage and disruption.

7.3.2 Projected Changes in Population

Del Norte County's population is projected to decline in upcoming decades, from 27,648 in 2020 to 25,317 in 2070—an 8.4 percent decrease (CA Department of Finance 2025). A decrease in population is likely to result in a decrease in overall risk from earthquake events.

7.3.3 Climate Change

Climate change can increase the risk of cascading hazards related to earthquakes, including possible tsunamis and landslides (Cal OES 2023). As climate change brings more intense storms to the County, there will be a higher likelihood of extreme wet years which could saturate the soil and make landslides and debris flows more likely to occur following an earthquake.

7.3.4 Other Considerations for Future Planning

In planning for future earthquake resilience, Del Norte County must prioritize infrastructure resilience, technological advancements, and economic factors. Ensuring that future infrastructure projects are designed with earthquake resilience in mind is crucial. This includes retrofitting existing structures to meet modern seismic standards and ensuring that new developments adhere to stringent building codes. By doing so, the County can significantly reduce potential damage and enhance the safety of its residents.



8. EXCESSIVE RAINFALL

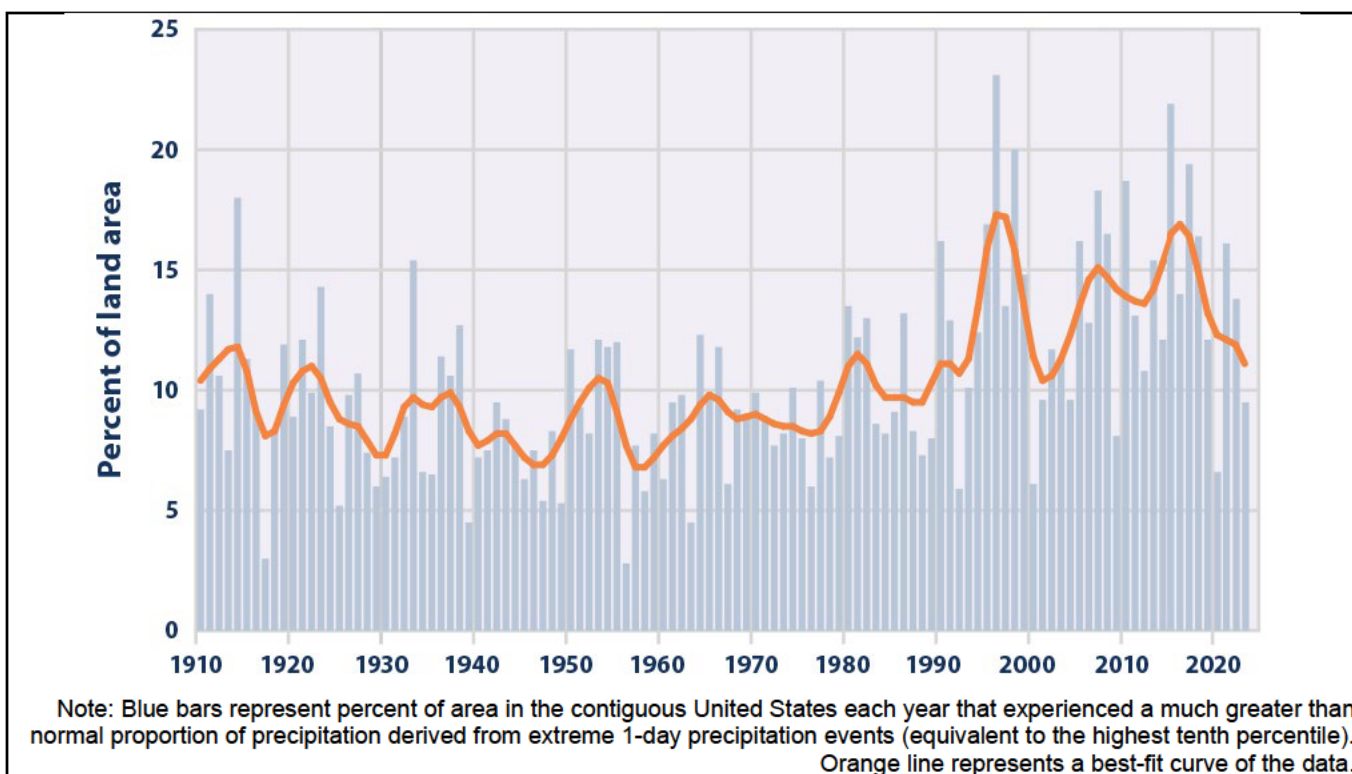
8.1 HAZARD PROFILE

8.1.1 Hazard Description

Excessive rainfall is when precipitation significantly exceeds what is normal; or what the ground can absorb, leading to increased surface runoff and potential flooding. (NOAA). This phenomenon can arise during atmospheric rivers, tropical cyclones, and winter storms. Excessive rainfall can increase the likelihood of flash floods, landslides, and debris flows.

Excessive rainfall events can be measured by tracking their frequency (how often they occur), examining their return period (the chance that the event will be equaled or exceeded in a given year), or directly measuring the amount of precipitation in a certain period (for example, inches of rain falling in a month). One way to track heavy precipitation is by calculating what percentage of a particular location's total precipitation in a given year has come in the form of extreme one-day events. In recent years, a larger percentage of precipitation nationwide has come in the form of intense single-day events. Figure 8-1 illustrates the percentage of the land area of the contiguous 48 states where a much greater than normal portion of total annual precipitation has come from extreme single-day precipitation events. Nine of the top 10 years for extreme one-day precipitation events have occurred since 1995.

Figure 8-1. Extreme One-Day Precipitation Events in the Contiguous 48 States (1910 to 2023)



Source: (NOAA 2024)

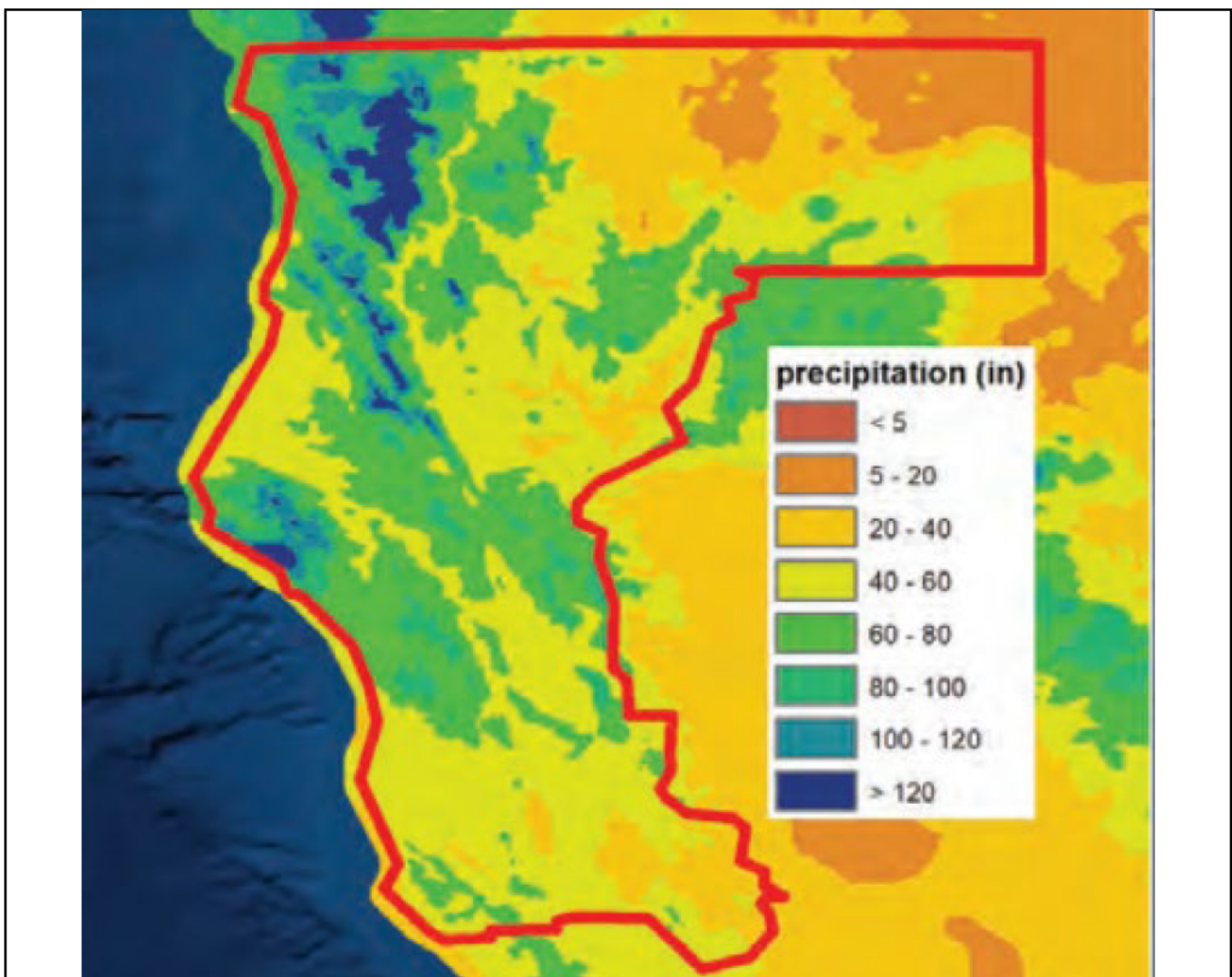


Excessive rainfall events do not necessarily indicate an increase in the overall amount of precipitation for a given location; rather, they suggest that precipitation is occurring more intensely. However, modifications in the intensity of precipitation, along with alterations in the frequency of precipitation events, can result in changes to the total precipitation amounts over time (EPA 2024).

8.1.2 Location

California receives about 75 percent of its annual precipitation from November through March, with about 50 percent occurring from December through February (OEHHA 2024). The North Coast region receives the most precipitation of all regions in the state, with an average of 55 inches per year (Grantham 2018). Figure 8-2 illustrates average annual precipitation in the North Coast region from 1981 to 2010. Del Norte County is located in the upper left corner of the red outlined area and receives the highest amount of precipitation around the Klamath Mountains.

Figure 8-2. North Coast Precipitation, Observed 30-year Average (1981 to 2010)



Source: (Grantham 2018)



8.1.3 Extent

Table 8-1 displays the top ten monthly precipitation totals in Del Norte County from January 1895 to November 2024. The highest recorded month was November 1973, when 37.20 inches of rain fell, and there have been nine months when more than 30 inches of rain fell.

Table 8-1. Top Ten Highest Precipitation Months, 1895 to 2024

Month, Year	Precipitation (Inches)
November 1973	37.20"
December 1996	36.18"
December 1964	36.16"
January 1909	33.46"
February 1902	32.79"
February 1904	31.67"
March 1904	31.59"
January 1953	30.91"
December 2015	30.81"
January 1970	29.50"

Source: (NCEI 2024)

In California, the most severe storms are frequently linked to atmospheric rivers, which are long streams of water vapor transported from the Pacific Ocean. These atmospheric rivers can convey a volume of water equivalent to that of 15 Mississippi Rivers. These storms lead to significant rainfall concentrated over a limited geographic area. They account for approximately 40 percent of California's annual snowpack, and the occurrence or absence of these substantial storms greatly influences water supply levels each year (Grantham 2018). Storms associated with atmospheric rivers provide about half of California's precipitation and help end droughts, but they can also produce devastating floods.

8.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Table 8-2 lists all excessive rainfall-related presidentially declared disasters that have included Del Norte County.

State Emergency Proclamations

Table 8-3 lists all excessive rainfall-related state emergency proclamations that have included Del Norte County.



Table 8-2. FEMA Disaster Declarations for Excessive Rainfall Events in Del Norte County

Event Date	Declaration Date	Declaration Number	Description
April 4, 1958	April 4, 1958	DR-82	Heavy Rainstorms, Flood
October 24, 1962	October 24, 1962	DR-138	Severe Storms, Flooding
February 25, 1963	February 25, 1963	DR-145	Severe Storms, Heavy Rains, Flooding
December 24, 1964	December 24, 1964	DR-183	Heavy Rains & Flooding
February 16, 1970	February 16, 1970	DR-283	Severe Storms, Flooding
April 5, 1972	April 5, 1972	DR-329	Severe Storms, Flooding
January 21, 1983 to March 30, 1983	February 9, 1983	DR-677	Coastal Storms, Floods, Slides, Tornadoes
February 12, 1986 to March 10, 1986	February 21, 1986	DR-758	Severe Storms, Flooding
January 5, 1993 to March 20, 1993	February 3, 1993	DR-979	Severe Storm, Winter Storm, Mud & Landslides, Flooding
January 3, 1995 to February 10, 1995	January 10, 1995	DR-1044	Severe Winter Storms, Flooding, Landslides, Mud Flows
December 28, 1996 to April 1, 1997	January 4, 1997	DR-1155	Severe Storms, Flooding
February 2, 1998 to April 30, 1998	February 9, 1998	DR-1203	Severe Winter Storms and Flooding
December 17, 2005 to January 3, 2006	February 3, 2006	DR-1628	Severe Storms, Flooding, Mudslides, and Landslides
February 1, 2017 to February 23, 2017	April 1, 2017	DR-4308	Severe Winter Storms, Flooding, Mudslides
February 24, 2019 to March 1, 2019	May 18, 2019	DR-4434	Severe Winter Storms, Flooding, Landslides, and Mudslides
December 27, 2022 to January 31, 2023	January 14, 2023	DR-4683	Severe Winter Storms, Flooding, Landslides, and Mudslides
March 9, 2023 to July 10, 2023	March 10, 2023	EM-3592	Severe Winter Storms, Flooding, Landslides, and Mudslides
February 21, 2023 to July 10, 2023	April 3, 2023	DR-4699	Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides

Source: (FEMA 2024)

**Table 8-3. State Emergency Proclamations for Del Norte County Excessive Rainfall (2019 to 2024)**

Proclamation Date	Description
April 12, 2019	The governor declared a state of emergency in Butte, Colusa, Del Norte, Mariposa, Napa, Santa Cruz, Solano, and Tuolumne counties for impacts on roads, highways, and other critical infrastructure from the winter storm system of January 5, 2019 to February 12, 2019
November 17, 2021	The governor declared a state of emergency in Del Norte, Los Angeles, Madera, Mariposa, Mendocino, Napa, Orange, San Benito, San Mateo, Santa Clara, Santa Cruz, Siskiyou, Sonoma, Tehama, and Trinity counties due to the atmospheric river event that occurred beginning January 26, 2021.
January 4, 2023	The governor declared a state of emergency in all counties due to a series of atmospheric river systems that brought high winds, substantial precipitation, and river and urban flooding to the state on December 27, 2022.
March 12, 2023	The governor declared a state of emergency in Calaveras, Del Norte, Glenn, Kings, San Benito, and San Joaquin counties as a result of a series of ongoing winter storms that struck California in February and March 2023.
June 21, 2024	The governor added Del Norte County to a state of emergency proclamation for March 2024 storms that brought heavy rains, mountain snow, thunderstorms, flooding, landslides, and high winds.

Source: (Cal OES 2024) (California State Library 2024)

USDA Declarations

Between 2019 and 2024, Del Norte County was not included in any USDA excessive rainfall-related agricultural disaster declarations (USDA 2024).

All Recent Events

Table 8-4 lists major recorded excessive rainfall-related events that impacted Del Norte County since the previous HMP was developed. For earlier events, refer to the previous HMP.

8.1.5 Probability of Future Occurrences

Probability Based on Previous Occurrences

Information on previous excessive rainfall occurrences in the County was used to calculate the probability of future occurrence of such events. Table 8-5 lists the number of events from various sources over the 27-year period from 1997 to 2024, which is the most complete period of record for all sources reviewed. Based on these records and input from the Steering Committee, the probability of occurrence for excessive rainfall in the County is considered “occasional.”



Table 8-4. Excessive Rainfall Events in Del Norte County (2019 to 2024)

Event Date	Declaration or Proclamation Number	Location Impacted	Description
January 16, 2019	State of Emergency		An atmospheric river spread across northern California and produced heavy rain that led to localized flooding.
February 24, 2019	DR-4434 and State of Emergency	Active slide occurred on Highway 101 blocking all lanes.	Heavy rain occurred as a result of a persistent influx of moisture in Northern California, leading to rapid rises on creeks, streams and rivers. Numerous instances of flooding were observed, which resulted in road closures and one fatality. Estimated 3.5 inches of rain.
September 18, 2019	N/A	Rain showers and storms produced heavy rainfall near Humboldt Bay resulting in localized urban flash flooding in and around the city of Arcata. Sixteen buildings at Humboldt State University suffered minor damage due to heavy rain.	A relatively vigorous upper-level trough impacted the Pacific Northwest during mid-September.
October 21, 2021	N/A	The first round of heavy rainfall yielded rainfall rates sufficient for debris flows occurring across the River Complex burn scar.	Several rounds of heavy rain occurred across northwest California from October 21st to October 25th. The next heavy rainfall event was associated with a classic atmospheric river on October 24th. Impacts were mainly limited to nuisance flooding.
December 26, 2022	DR-4683 and State of Emergency	Heavy rain caused mud, dirt, and rock to slide across Highway 199.	Deep-layer westerly flow occurring along a zonally oriented quasi-stationary frontal boundary yielded a multi-day atmospheric river event across Northwest California during late December. Widespread impacts due to heavy rain and strong winds were observed across the region.
March 1, 2024	DR-4699 and State of Emergency	Rock slide into both lanes of Highway 199, 6 miles east of Gasquet, CA.	A deep trough brought widespread hail showers and snow to Northwest California. Heavy snow of several feet was measured in the mountains while the hail showers resulted in numerous traffic accidents along the coast.
March 6, 2024	DR-4699 and State of Emergency	Slide covered Klamath Beach Road, 1 mile south-southeast of Klamath, CA.	An offshore low pressure system brought cooler drier air while a series of shortwave disturbances enhanced precipitation.
March 24, 2024	DR-4699 and State of Emergency	A slide 7 miles west northwest of Willow Creek, CA.	A warm air advection brought a warm front and associated precipitation and eventually cold air to Northern California.

Source: (FEMA 2024) (Cal OES 2024) (NOAA 2024)



Table 8-5. Probability of Future Excessive Rainfall Events in Del Norte County

Hazard Type	Number of Occurrences Between 1997 and 2024	Percent Chance of Occurring in Any Given Year
Excessive Rainfall	20	74%

Source: (NOAA 2024)

Potential Impact of Climate Change on Future Probability

Climate change can affect the frequency of precipitation as warmer oceans increase the amount of water that evaporates into the air. According to California's Fourth Climate Change Assessment, annual precipitation in the North Coast region is anticipated to remain relatively stable; however, it is expected to occur in more intense storms and within a shorter wet season. There is a higher likelihood of extreme wet years and extreme dry years (drought). An "average" rainfall year will become less common, and the county could face excessive rainfall events during the extreme wet years.

By the end of the 21st century, California is projected to lose 3 to 6 inches of rainfall per year, receive 100 to 200 percent more instances of very high seasonal precipitation, and experience a compressed rainy season (Grantham 2018).

8.1.6 Cascading Impacts on Other Hazards

A rise in excessive rainfall events will increase the frequency and extent of flooding in low-lying areas, particularly along the coast where flood risk will be enhanced with rising sea levels. Localized flooding can occur when heavy rain overwhelms local drainage systems or pools in low-lying areas. Rain falling on saturated soils on slopes or on areas recently burned by wildland fire may lead to landslides.

The potential impacts of heavy precipitation include crop damage and soil erosion. An increase in flooding can lead to injuries, drownings, and respiratory health impacts from exposure to mold. Runoff from precipitation can impair water quality as pollutants deposited on land wash into water bodies.

8.2 VULNERABILITY AND IMPACT ASSESSMENT

8.2.1 Life, Health, and Safety

Overall Population

Excessive rainfall can significantly impact the life, health, and safety of residents. It can cause disruptions to daily life and limit access to essential services. Excessive rainfall in Del Norte County can disrupt daily activities, limit access to essential services, and increase the likelihood of injuries and fatalities. Emergency response efforts may be strained, and residents could face prolonged periods without access to health care, utilities, and transportation.



Socially Vulnerable Population

Vulnerable groups are especially at risk due to limited resources and access to emergency information. Older people, people with disabilities, unsheltered, low-income households, and non-English speakers, are particularly at risk during excessive rainfall events. These groups may have limited resources to prepare for and respond to flooding and landslides resulting from excessive rain. They may face challenges in accessing emergency information and services, increasing their vulnerability to the impacts of severe weather.

8.2.2 General Building Stock

Excessive rainfall can cause significant damage to the general building stock in Del Norte County. Flooding can lead to water intrusion, structural damage, and mold growth in residential, commercial, and public buildings. Landslides can result in the destruction of properties located on or near slopes.

Ensuring that buildings are constructed and maintained to withstand heavy rainfall and flooding is crucial for minimizing damage and protecting residents. Implementing flood-resistant building practices and regular maintenance can enhance the resilience of the county's building stock against excessive rainfall events.

8.2.3 Community Lifelines and Other Critical Facilities

Heavy rainfall can overwhelm drainage systems, leading to urban flooding that damages roads, bridges, and transportation networks, disrupting daily activities and emergency response efforts. Flooding can also damage electrical substations, water treatment plants, and sewage systems, resulting in power outages, water contamination, and sewage overflows, which pose health risks and disrupt essential services (TOPOS Magazine 2025).

Healthcare facilities may suffer from flooding, hindering their ability to provide medical care during emergencies. Communication networks, including phone lines and internet services, can be disrupted, impeding the coordination of emergency response efforts. Additionally, emergency services such as fire and police departments may face challenges in reaching affected areas due to flooded roads and damaged infrastructure, delaying response times and reducing the effectiveness of rescue operations.

Since 1997, Caltrans has invested more than \$100 million to respond to impacts of rain events along the Last Chance Grade; geotechnical studies indicate continued movement of the roadway, signaling that regular investments will be required to keep the roadway safe and open (Caltrans 2023). Excessive rainfall in 2016 and 2017 led to cracks and settling on the roadway, deformation of retaining walls, and a localized landslide that took out a portion of the southbound lane. In June 2024, Caltrans announced that they intended to build a 6,000-foot that will bypass the Last Chance Grade landslide hazard area; this will be the longest tunnel constructed in Caltrans history (Caltrans 2024).



8.2.4 Economy

Excessive rainfall can significantly impact the economy by causing property damage, agricultural losses, and business disruptions. Flooding can lead to costly repairs and reconstruction, damage crops, and force businesses to close temporarily, resulting in lost revenue and job losses (Science Daily 2022).

Increased insurance costs and public expenditure on emergency response and infrastructure repairs can strain budgets. Persistent severe rainfall can also slow long-term economic growth by reducing productivity and increasing disaster recovery costs.

8.2.5 Natural Resources

Heavy rainfall can lead to flooding, soil erosion, and landslides, which can destroy habitats and disrupt ecosystems. It can also cause water contamination, affecting both wildlife and plant life.

8.2.6 Historic and Cultural Resources

Excessive rainfall can damage historic buildings and landmarks through water intrusion, structural weakening, and mold growth. Flooding and landslides can also destroy archaeological sites and artifacts, leading to the loss of irreplaceable heritage.

Museums, libraries, and community centers can be severely affected by water damage caused by excessive rainfall. This can result in the loss of valuable cultural artifacts, documents, and artworks. Additionally, traditional practices and knowledge may be disrupted if natural resources essential for these practices are damaged.

8.3 FUTURE CHANGES THAT MAY AFFECT RISK

8.3.1 Potential or Planned Development

Future development can increase the risk of excessive rainfall by creating more impervious surfaces, altering natural drainage patterns, and straining existing infrastructure. Development can also lead to the loss of vegetation and natural buffers that absorb rainfall, increasing runoff and the likelihood of flooding. Additionally, placing more people and properties in flood-prone areas heightens the community's vulnerability to excessive rainfall events.

8.3.2 Projected Changes in Population

Del Norte County's population is projected to decline in upcoming decades, from 27,648 in 2020 to 25,317 in 2070—an 8.4 percent decrease (CA Department of Finance 2025). A decline in population can reduce the strain on infrastructure, potentially lowering the risk of flooding.

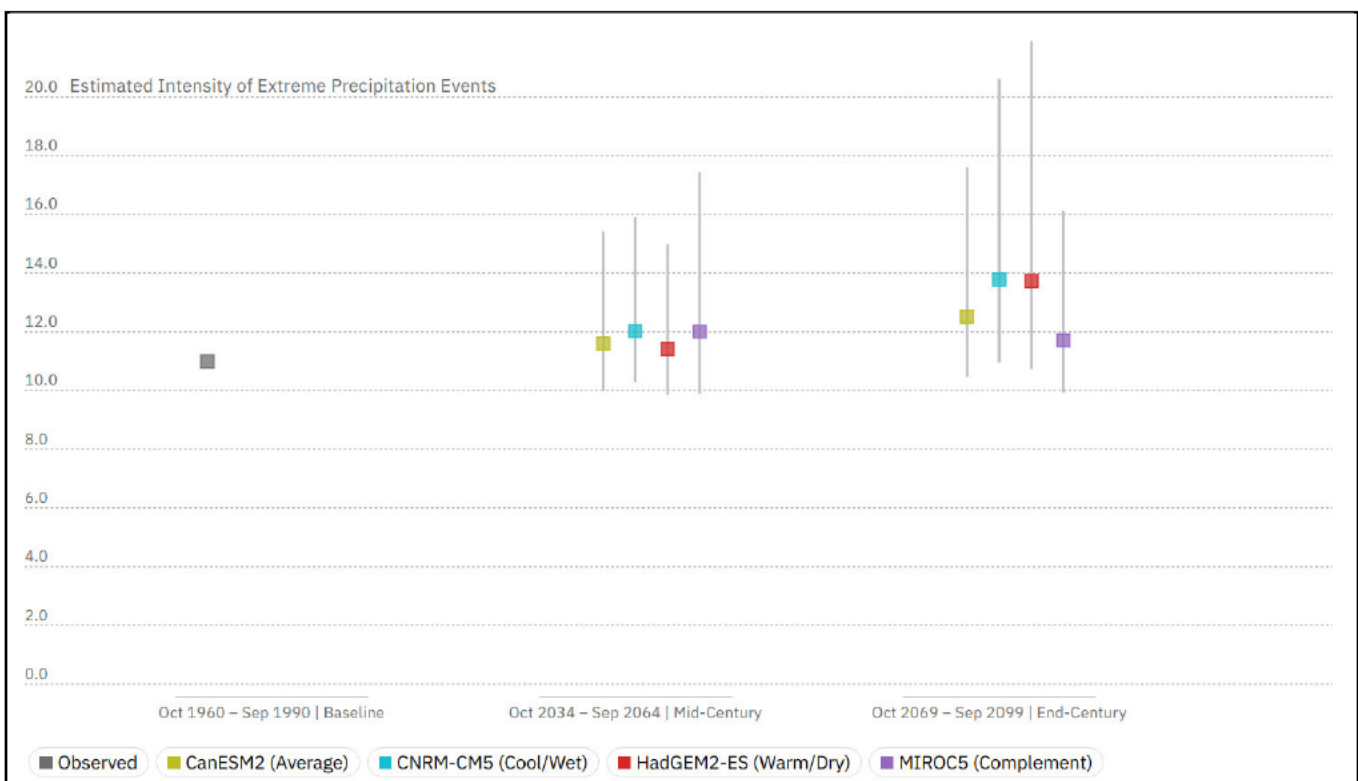


8.3.3 Climate Change

Climate change can affect the intensity of rainfall as warmer oceans increase the amount of water that evaporates into the air. According to California’s Fourth Climate Change Assessment, annual precipitation in the North Coast region is anticipated to remain relatively stable but occur in more intense storms and within a shorter wet season. There is a higher likelihood of extreme wet years and extreme dry years. The county could face more extreme rainfall during the extremely wet years.

The projected increase in rainfall intensity can be seen in Figure 8-3. While state projections point to increased intensity of extreme precipitation events through the end of the century, there have been nine months since 1895 where more than 30 inches of rain fell in one month in Del Norte County.

Figure 8-3. Estimated Intensity of Extreme Precipitation Events Through 2099



Source: (Cal-Adapt 2025)

8.3.4 Other Considerations for Future Planning

Several conditions can significantly affect the risk of excessive rainfall in a region. Topography plays a crucial role, as areas with steep slopes are more prone to landslides and rapid runoff, while valleys and low-lying areas are more susceptible to flooding. Soil saturation is another critical factor; pre-existing moisture levels can limit the soil's ability to absorb additional water, increasing the likelihood of flooding and landslides. Vegetation cover also influences rainfall impact, as dense vegetation can absorb more water and reduce runoff, whereas deforested areas are at higher risk of flooding and soil erosion.



9. EXTREME HEAT

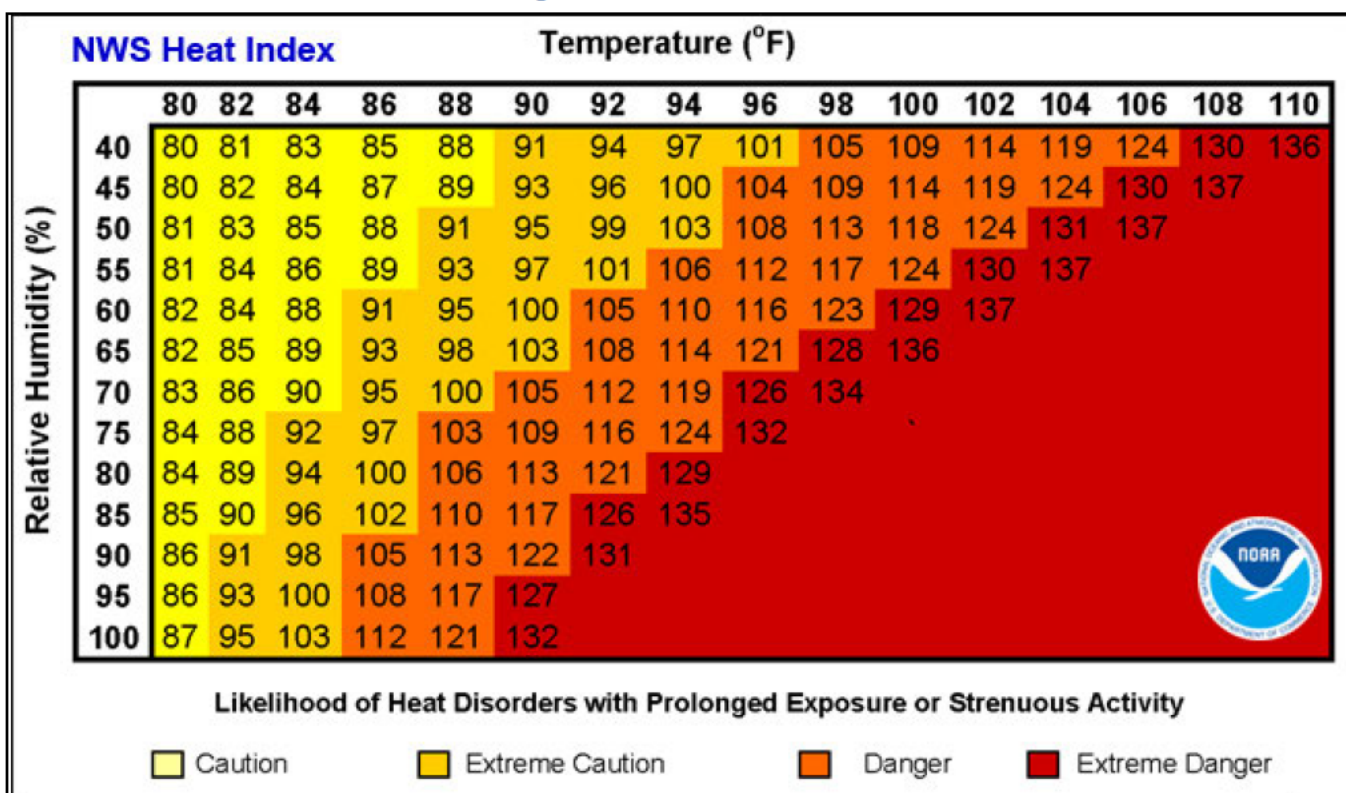
9.1 HAZARD PROFILE

9.1.1 Hazard Description

The CDC defines extreme heat as weather that is much hotter than average for a particular time and place (EPA/CDC 2016). NOAA defines a heat wave as a period of abnormally and uncomfortably hot and unusually humid weather that lasts two or more days (NOAA 2009).

The National Weather Service (NWS) has created a heat index that considers temperature and relative humidity to estimate the likelihood of heat disorders with prolonged exposure. Heat indices utilize temperature measurements that are taken in the shade, so when exposure to direct sunlight is also a factor, the heat index value can be increased by up to 15 °F. Figure 9-1 shows the heat index value for shaded areas.

Figure 9-1. NWS Heat Index



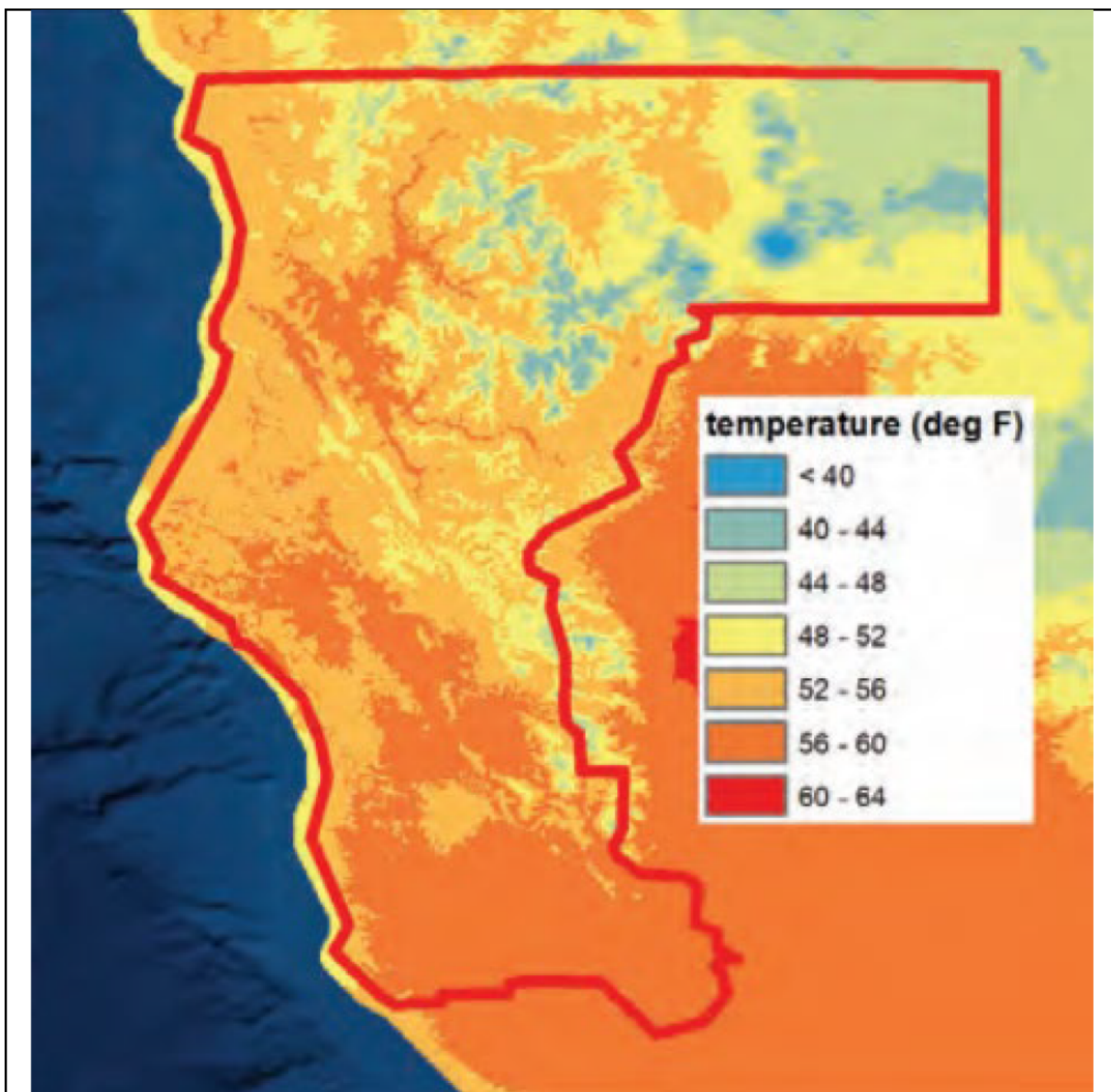
Source: (NWS Amarillo 2023)



9.1.2 Location

Extreme heat events can occur anywhere in Del Norte County and may be exacerbated by geographic location, elevation, or land cover. Figure 9-2 illustrates the average temperature in the North Coast region from 1981 to 2010. Del Norte County is in the upper left corner of the red outlined area.

Figure 9-2. North Coast Temperature, Observed 30-year Average (1981 to 2010)



Source: (Grantham 2018)



9.1.3 Extent

NWS Eureka maintains records of temperatures recorded at observation towers across its weather forecast region. While the climatological warmest month of the year may be September, extreme heat events can occur throughout the year, as Table 9-1 shows.

Table 9-1. Maximum 1-Day Temperature for Del Norte County

Location	Value	Date of Event	Valid Date Range
Crazy Peak, California	110°F	July 30, 2003	January 23, 1985 to January 26, 2025
Crescent City 3 NNW	93°F	October 10, 1991	January 1, 1950 to July 22, 2013
Crescent City McNamara AP	95°F	September 28, 2020	January 1, 1950 to March 16, 2005
Elk Valley	104°F	March 12, 2005	January 1, 1950 to March 16, 2003
Gasquet, CA	114°F	July 9, 2008	November 15, 1993 to May 30, 2014
Gasquet RS	92°F	July 6, 2013	January 27, 2005 to December 18, 2013
Klamath	98°F	September 18, 2000	January 1, 1950 to November 30, 2006
Ship Mountain	96°F	August 1, 2017	June 25, 2001 to January 26, 2025

Source: (SC-ACIS 2025)

Note: Not all reporting stations provided data back to 1950, but those that did are included in this data

Table 9-2 describes the adverse effects the body can experience with prolonged exposure.

Table 9-2. Classification of Heat Index Values and the Human Impact of Extreme Heat

Classification	Heat Index	Effects on the Body
Caution	80°F – 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F – 102°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F – 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Source: (NWS Tampa 2024)

9.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

There have been no extreme heat-related presidentially declared disasters that included Del Norte County (FEMA 2024).

State Emergency Proclamations

No state emergency proclamations have been issued due to extreme heat in Del Norte County (California State Library 2024).



USDA Declarations

Between 2019 and 2024, Del Norte County was not included in any USDA extreme heat-related agricultural disaster declarations (USDA 2024).

Recent Watches & Warnings

Since 2017, NWS (NWS Eureka 2025) has issued a number of heat advisories, watches, and warning for Del Norte County. Table 9-3 lists the watches and warning that included the County.

Table 9-3. Heat Watches & Warnings Issued by NWS for Del Norte Co.

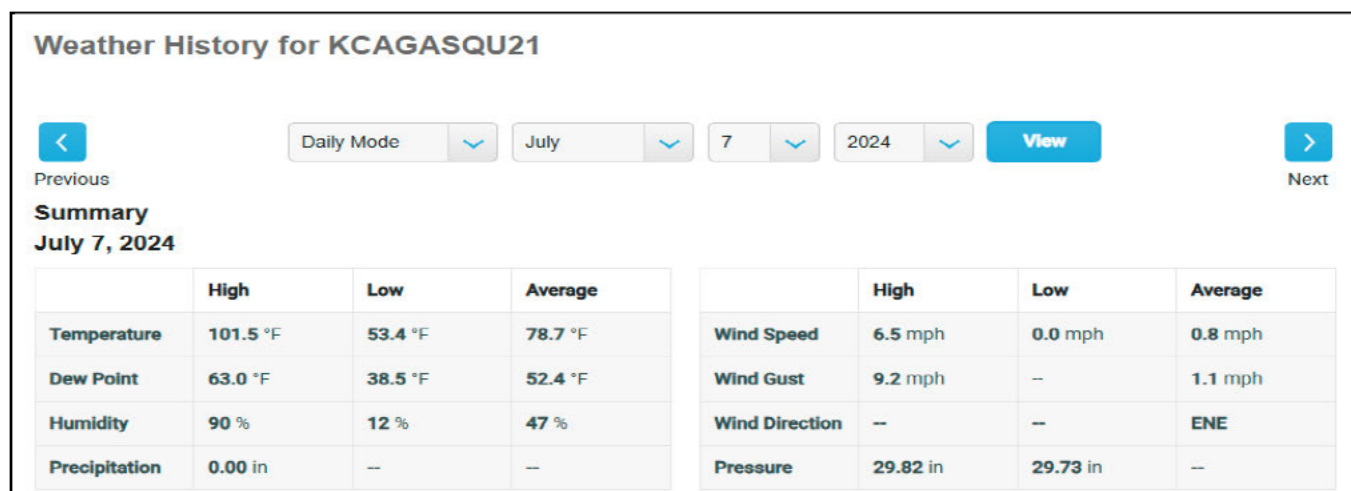
Date Issued	Date Expired	Type of Event
July 17, 2017	July 31, 2017	Excessive Heat Watch
July 31, 2017	August 4, 2017	Excessive Heat Warning
August 31, 2017	September 1, 2017	Excessive Heat Watch
September 1, 2017	September 4, 2014	Excessive Heat Warning
July 16, 2018	July 17, 2018	Excessive Heath Watch
August 13, 2020	August 15, 2020	Excessive Heat Watch
September 3,	September 6, 202	Excessive Heat Watch
September 6, 2020	September 8, 2020	Excessive Heat Warning
September 28, 2020	September 28, 2020	Excessive Heat Watch
July 6, 2024	July 12, 2024	Heat Advisory
July 10, 2025	July 12, 2025	Extreme Heat Watch
July 12, 2025	July 15, 2025	Extreme Heat Warning

Source NWS Eureka

Temperatures in Del Norte County varied significantly during early July 2024. While areas along the coast experienced temperatures in the 70s, inland temperatures, as in Gasquet, exceeded 100 °F (see Figure 9-3). Figure 9-4 shows the forecasted temperatures in northwest California for July 6 – 12, 2024.

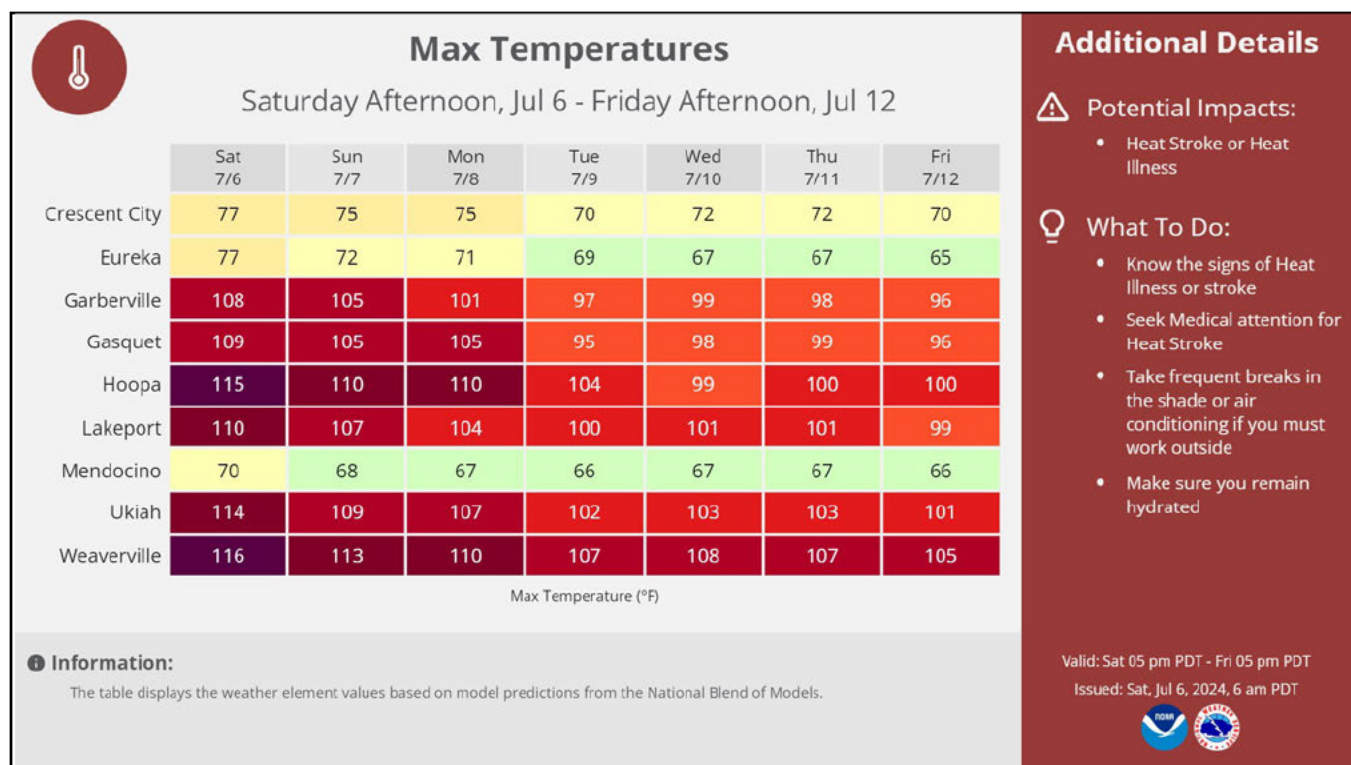


Figure 9-3. Gasquet Weather for July 7, 2024



Source: Weather Underground – Gasquet reporting station

Figure 9-4. Hot Weather Forecast for Northern California, Early July 2024



Source: NWS Eureka



9.1.5 Probability of Future Occurrences

Probability Based on Previous Occurrences

Information on previous extreme heat occurrences in the County was used to calculate the probability of future occurrences of such events. Table 9-4 lists the number of events from various sources over the eight-year period from 2017 to 2024, which is the most complete period of record for all sources reviewed. Based on these records and input from the Steering Committee, the probability of occurrence for extreme heat in the County is considered to be “occasional.”

Table 9-4. Probability of Future Extreme Heat Events in Del Norte County

Hazard Type	Number of Occurrences Between 2017 and 2024	Percent Chance of Occurring in Any Given Year
Extreme Heat	6	75%

Source: (SC-ACIS 2025); (NWS Eureka 2025)

Potential Impact of Climate Change on Future Probability

Heat waves are occurring more often and with more intensity than in the past in major U.S. cities. The impact to rural areas has been less intense. The frequency of heat waves has increased steadily, from an average of two per year during the 1960s to six per year during the 2010s and 2020s (EPA 2022a).

Climate change can affect the frequency of extreme heat events as warmer air temperatures and warmer sea surface temperatures mean higher humidity for areas like Del Norte County. In their article “the Great Heat Wave over California and Nevada” (Gershunov, R and Iacobellis 2009) increasing trend they projected that since there have been increasing numbers of overnight record warm minimum temperatures, and a continued trend is expected moving forward. As overnight temperatures fail to fall to “average” levels, heat waves are perpetuated into the following day.

9.1.6 Cascading Impacts on Other Hazards

A secondary effect of extreme heat is poor air quality, which can occur during summer when stagnant atmospheric conditions trap humid air and pollutants near the ground, closer to residents. In Del Norte County, this is especially true when wildfire and wildfire smoke coincides with periods of prolonged extreme heat.(American Lung Association)



9.2 VULNERABILITY AND IMPACT ASSESSMENT

9.2.1 Life, Health and Safety

Overall Population

The entire population of Del Norte County is exposed to extreme heat events. Extreme heat can significantly impact the life, health, and safety of residents. It can cause disruptions to daily life and limit access to essential services. Potential health impacts include injury and death. Extreme heat is the number one weather-related cause of death in the United States (EPA 2025). Heat has claimed an average of 164 lives per year in the United States over the last 30 years (Donegan 2023). According to the *California Climate Adaptation Strategy*, heat waves have claimed more lives in California than all other declared disaster events combined. Adhering to extreme temperature warnings and conducting appropriate mitigation and preparation measures can significantly reduce the risk of temperature-related deaths.

People who are not acclimated to the level of heat expected—especially those who are new to a much warmer climate—may be more susceptible to the impacts of extreme heat. Susceptibility also may be increased based on activities people do during hot weather:

- Those working outdoors – especially new workers, temporary workers, or those returning to work after a week or more off. Workers who are exposed to extreme heat may be at risk of heat stroke, heat exhaustion, heat cramps, or heat rashes. Heat can also increase the risk of injuries in workers as it may result in sweaty palms, fogged-up safety glasses, and dizziness. Burns may occur as a result of accidental contact with hot surfaces. Working outdoors increases the chances of getting sunburned (CDC 2020, CDC 2018).
- Those exercising or doing strenuous activities during the heat of the day – especially those not used to the level of heat expect those who are not drinking enough fluids, or those new to that type of activity

Socially Vulnerable Population

Vulnerable groups are especially at risk due to limited resources and access to emergency information. According to NOAA's [NWS HeatRisk](#) tool, the following groups are more heat sensitive when it comes to extreme heat events:

- Older and younger people
- Those on medications or with preexisting conditions that make them more sensitive to heat
- Those without a reliable source of cooling and/or hydration

Vulnerable groups often have limited access to air conditioning and cooling centers, increasing their risk (NIHHIS n.d.). Many socially vulnerable individuals work in outdoor or non-climate-controlled environments, such as construction and agriculture, making them more susceptible to heat-related health issues.



Meteorologists can accurately forecast extreme heat events and the severity of the associated conditions with several days of lead time. These forecasts provide an opportunity for public health and other officials to notify vulnerable populations, implement short-term emergency response actions, and focus on surveillance and relief efforts for those at greatest risk.

9.2.2 General Building Stock

All the building stock in the County is exposed to the extreme heat hazard. This hazard generally does not impact buildings; however, elevated summer temperatures increase the energy demand for cooling. Losses can be associated with the overheating of heating, ventilation, and air conditioning (HVAC) systems.

9.2.3 Community Lifelines and Other Critical Facilities

Direct impacts on structures are expected to be minimal. However, extreme heat events can sometimes cause short periods of utility failures, commonly referred to as brownouts, due to increased usage from air conditioners, appliances, and similar equipment. To mitigate this risk, backup power is recommended for critical facilities and infrastructure. Additionally, designating and developing emergency cooling facilities can enhance the resilience and safety of communities.

9.2.4 Economy

Extreme heat events can significantly impact the economy. Businesses may experience loss of function and damage to inventory. Owners often face increased financial burdens due to higher utility bills and business interruptions caused by power failures, including loss of electricity and telecommunications. In agriculture, high temperatures stress crops, leading to reduced yields and heightened irrigation demands, further taxing water resources. These challenges can strain financial resources and disrupt economic stability.

9.2.5 Natural Resources

Extreme heat significantly impacts natural resources, particularly water, forests, and wildlife. Elevated temperatures increase evaporation rates, reducing water availability in lakes, rivers, and reservoirs, which exacerbates drought conditions and strains water supplies for various uses. Forests face increased wildfire risks due to extreme heat, which can devastate ecosystems and wildlife habitats, while also making trees more susceptible to diseases and pests. Wildlife struggles to find adequate water and food during heatwaves, disrupting breeding cycles and migration patterns, thereby impacting biodiversity.

9.2.6 Historic and Cultural Resources

Temperature is a potential threat to historic and cultural heritage sites as it exacerbates the expected rates of decay and contributes to the appearance of new decay. Extreme heat may aggravate physical,



chemical, and biological mechanisms, causing degradation by affecting the structure or composition of building materials. Under extreme heat, stones can face both macro (e.g., cracking of stones, soot accumulation, color change in stone containing iron) and micro degradation (e.g., mineralogical and textural changes), leading to potential structural instability. The long-term impacts include weakened stones and increased susceptibility to deterioration processes such as salt weathering and temperature cycling (Sesana, et al. 2021).

Proper strategies help safeguard buildings and their contents. Sudden and dramatic fluctuations in cooling should be minimized. Slower temperature changes give building materials and stored contents time to acclimate to new temperatures in the building and corresponding new humidity levels (CCAHA 2019).

Extreme heat can increase the risk of ignition of fires and their propagation. Fire causes material loss and deformation of cultural heritage assets and may also increase the probability of cracking or splitting in built structures.

9.3 FUTURE CHANGES THAT MAY AFFECT RISK

9.3.1 Potential or Planned Development

New development will change the landscape where buildings, roads, and other infrastructure replace open land and vegetation. Transformation of pervious surfaces (including vegetation) to impervious surfaces causes an island of higher temperatures. Green space preservation will need to continue to be a priority to mitigate increased heat islands. The ability of new development to withstand extreme temperature impacts can be enhanced through land use practices and consistent enforcement of codes and regulations for new construction.

9.3.2 Projected Changes in Population

Del Norte County's population is projected to decline in upcoming decades, from 27,648 in 2020 to 25,317 in 2070—an 8.4 percent decrease (CA Department of Finance 2025). Population change is not expected to significantly affect the overall vulnerability of Del Norte County's population to extreme heat. However, any substantial growth in less densely populated areas may necessitate utility system upgrades to meet demands for water and electricity during extreme temperature events, preventing additional stress on these systems.

9.3.3 Climate Change

Climate change is expected to increase the intensity of extreme heat events due to warmer air and sea surface temperatures, leading to higher humidity. Communities can anticipate more intense heat waves over the coming decades, not only during the day but also at night. There has been a rise in overnight record warm minimum temperatures, a trend that is likely to continue, perpetuating heat waves into the following day. (EPA 2025)



10. EXTREME WIND

10.1 HAZARD PROFILE

10.1.1 Hazard Description

Wind is air moving from high to low pressure. It is the rough horizontal movement of air (as opposed to an air current) caused by uneven heating of the earth's surface. It occurs at all scales, from local breezes generated by heating of land surfaces and lasting tens of minutes to global winds resulting from solar heating of the earth. Types of damaging winds include the following (NOAA 2024):

- **Straight-line Wind** is any thunderstorm wind not associated with rotation (e.g., tornadic winds). Straight-line winds are movements of air from areas of higher pressure to areas of lower pressure—the greater the difference in pressure, the stronger the winds.
- A **Downdraft** is a small-scale column of air that rapidly sinks toward the ground and usually results in a downburst.
- A **Downburst** is a strong downdraft with horizontal dimensions larger than 2.5 miles, resulting in an outward burst or damaging winds on or near the ground. It is usually associated with thunderstorms but can occur with rainstorms too weak to produce thunder.
- A **Microburst** is a small, concentrated downburst that produces an outward burst of damaging winds near the surface. It is typically short-lived, lasting only five to ten minutes, with maximum wind speeds of up to 168 miles per hour (mph).
- A **Macroburst** is an outward burst of strong winds at or near the surface wider than 2.5 miles across that can occur when a downdraft reaches the surface. While usually associated with thunderstorms, microburst can also occur in storms when no thunder is present.
- A **Gust Front** is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. It is characterized by a wind shift, temperature drop, and gusty winds ahead of a thunderstorm.
- A **Derecho** is a widespread and long-lived windstorm associated with thunderstorms that are often curved. A derecho generally consists of several microbursts, downbursts, and downburst clusters, and these types of wind events are unique in that they travel great distances.
- A **Bow Echo** is a formation of showers or thunderstorms that exhibits a curved or bowed appearance. These phenomena typically develop from a cluster of storms; however, they can also originate from a single supercell thunderstorm. When a bow echo travels more than 250 miles and produces widespread wind gusts of 58 mph or greater, it is classified as a derecho (NOAA 2023).
- A **tornado** is a narrow, violently rotating column of air that extends from a thunderstorm cloud to the ground. Destruction from tornadoes depends on the size, intensity, and duration of the storm. Damage paths can be greater than 1 mile wide and 50 miles long. Tornadoes typically move at speeds between 30 and 125 miles per hour and can generate internal winds exceeding 300 miles per hour. The average lifespan of a tornado is five minutes (NOAA 2024).



10.1.2 Location

Extreme wind events have the potential to happen anywhere in the planning area. Wind events are most damaging to areas that are heavily wooded. Under most conditions, the planning area's highest winds come from the southwest. (NOAA 2024)

The coastal area of the county regularly reports strong wind gusts of about 20 mph (17 knots) or above. The coastal wind is so regular that the California Energy Commission identified Del Norte County as one of six sites in the North Coast region that has the potential to host floating offshore wind energy platforms (CEC 2024).

10.1.3 Extent

Damaging straight-line winds, those that exceed 50 to 60 mph, are much more common than tornados (NOAA 2024). The Beaufort Wind Scale (Table 10-1) describes the potential impacts winds at various speeds.

Table 10-1. Beaufort Wind Scale

Beaufort Number	Speed (mph)	Terminology	Description
0	0	Calm	Calm. Smoke rises vertically.
1	1-3	Light air	Wind motion visible in smoke.
2	4-7	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19-24	Fresh breeze	Smaller trees sway
6	25-31	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use is difficult.
7	32-38	Near gale	Whole trees in motion. Some difficulty when walking into the wind.
8	39-46	Gale	Twigs broken from trees. Cars veer on road.
9	47-54	Severe gale	Light structure damage.
10	55-63	Storm	Trees uprooted. Considerable structural damage.
11	64-73	Violent storm	Widespread structural damage.
12	74-95	Hurricane	Considerable and widespread damage to structures.

Source: (NWS 2024)

The NOAA National Center for Environmental Information reports that the region around Del Norte County experienced 77 days between 1973 to 2024 when wind speeds measured above 40 knots (46 mph).

Tornadoes wind speeds are estimated based on post-tornado damage to 28 indicators, such as motels, strip malls, small barns, single family residences, and schools. Tornado severity is classified according to the Enhanced Fujita Scale and assigned a number from EF0 to EF5, see Table 10-2.



Table 10-2. Enhanced Fujita Scale

Enhanced Fujita Number	3-Second Gust (mph)
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

Source: (NOAA 2007)

10.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Table 10-3 lists all extreme wind-related presidentially declared disasters that have included Del Norte County.

Table 10-3. FEMA Disaster Declarations for Extreme Wind Events in Del Norte County

Event Date	Declaration Date	Declaration Number	Description
January 21, 1983 to March 30, 1983	February 9, 1983	DR-677	Coastal Storms, Floods, Slides, Tornadoes
February 21, 2023 to July 10, 2023	April 3, 2023	DR-4699	Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides

Source: (FEMA 2024)

State Emergency Proclamations

Table 10-4 lists all extreme wind-related state emergency proclamations that have included Del Norte County.

USDA Declarations

Between 2019 and 2024, Del Norte County was not included in any USDA extreme wind-related agricultural disaster declarations (USDA 2024).

Previous Events

Table 10-5 lists major recorded extreme wind-related events that impacted Del Norte County since the previous HMP was developed. For earlier events, refer to the previous HMP. Six tornadoes occurred in the county from 1958 to 1996. Four of the six tornados occurred in Crescent City, one in Klamath, and one on the Smith River (NOAA 2024).



Table 10-4. State Emergency Proclamations for Extreme Wind Events that included Del Norte County

Proclamation Date	Description
October 26, 2019	The governor declared a state of emergency for a historic wind event that caused red flag conditions throughout most of the state and created extremely dangerous fire weather conditions.
November 17, 2021	The governor declared a state of emergency in 15 counties, including Del Norte, for an atmospheric river event on January 26, 2021, that brought damaging winds and substantial precipitation to the state.
January 4, 2023	The governor declared a state of emergency for all California counties due to a series of atmospheric rivers that brought high winds, substantial precipitation, and flooding to the state on December 27, 2022
March 12, 2023	The governor added Calaveras, Del Norte, Glenn, Kings, San Benito, and San Joaquin counties to prior emergency declarations, bringing the total to 40 declared counties, for ongoing atmospheric river impacts of late February 2023, including tornado warnings and heavy precipitation.
June 21, 2024	The governor added Del Norte County to a state of emergency proclamation for March 2024 storms bringing heavy rains, mountain snow, thunderstorms, flooding, landslides, and high winds.

Source: (Cal OES 2024)

Table 10-5. Extreme Wind Events in Del Norte County (2019 to 2024)

Event Date	Declaration or Proclamation Number	Location Impacted	Description
November 26, 2019	N/A	Crescent City measured a 60 mph gust.	An anomalously cold upper low dropped south from British Columbia toward the coast of northwest California during late November. Wide spread wind damage occurred across the region, as well as mountain snow, and small hail near the coast.
December 25, 2020	N/A	High wind gust observed at sea level at the Crescent City observation site.	A storm system moved across northwest California during late December. Locally heavy rain was observed, as well as snow across the interior mountains. Exposed coastal areas and ridges also experienced strong winds.
January 26, 2021	State of Emergency	Measured gust of 62 mph at sea level.	A series of strong upper waves dug east-southeast across northwest California resulting in periods of strong winds and mountain snow.
November 8, 2021	N/A	Measured gusts of 62 mph (54 knots) at the Crescent City Airport.	High winds were observed across the ridges of northwest California, as well as exposed coastal areas in the vicinity of Crescent City. No damage was reported with these winds.
January 3, 2022	N/A		A strong upper-level storm system moving east across the northeast Pacific aided in the development of strong winds across coastal portions of Del Norte County.



Event Date	Declaration or Proclamation Number	Location Impacted	Description
December 9, 2022 to December 10, 2022	N/A	Tree fell on vehicle causing accident. Power lines down across Highway 197 and 199 due to high wind gusts.	An upper disturbance moved east across Northwest California during early to mid-December. Locally heavy low-elevation rainfall was observed, along with areas of heavy mountain snow. Impacts due to falling trees occurring with periods of strong gusty winds were also observed.
December 26, 2022 to December 27, 2022	State of Emergency	Strong winds caused trees to fall on both the northbound and southbound lanes of Highway 101, trees blocked Parkway Drive and Highway 199, and a downed power line caused a tree to catch on fire.	Deep-layer westerly flow occurring along a zonally oriented quasi-stationary frontal boundary yielded a multi-day atmospheric river event across Northwest California during late December. Widespread impacts due to heavy rain and strong winds were observed across the region.
January 4, 2023	N/A	A high wind gust was measured at sea level on the south side of Crescent City, a downed tree blocked Highway 101, and downed powerlines started a fire on Highway 199.	A quasi-stationary westerly upper flow regime yielded multiple atmospheric rivers over Northwest California during the first two weeks of January. Impacts from these events were widespread, both in terms of flooding and wind damage.
January 9, 2023	N/A	Crescent City measured a high wind gust of 68 mph. Over 10,000 customers were without power in and around Crescent City. Strong wind knocked a tree down across Highway 101.	A multiday atmospheric river continued across Northwest California during early to mid-January. Impacts from heavy rain and strong winds were numerous across the region.
February 4, 2023	N/A	Multiple trees were reported down across Highway 101 south of Klamath.	A frontal system brought gusty winds to many locations in Northwest California including coastal areas.
March 13, 2023	DR-4699	Non-thunderstorm related wind damage involving a downed tree about 3 feet diameter, blocked Highway 199.	Flooding and debris flow as well as generally unsettled weather continued.
January 13, 2024	N/A	A tree was reported down on Highway 101 near Smith River.	An atmospheric river sank south and stalled over Humboldt, Del Norte, and western Trinity counties, bringing widespread rains between 3 and 7 inches to the region. Widespread creek flooding occurred in Del Norte and Humboldt counties with multiple homes damages or destroyed.
February 29, 2024	N/A	Tree reported down blocking part of Highway 199.	The continuous impactful storms over the winter brought another round of rain and wind to Northwest California during the last day of the month.



Event Date	Declaration or Proclamation Number	Location Impacted	Description
March 1, 2024	N/A	Tree reported down across two lanes due to wind 2 miles northwest of Crescent City.	A deep trough brought widespread hail showers and snow to Northwest California. Heavy snow of several feet was measured in the mountains while the hail showers resulted in numerous traffic accidents along the coast.
March 23, 2024	N/A	A tree was reported down across Highway 199 due to wind 5 miles southeast of Fort Dick.	An approaching warm air advection brought a warm front and associated precipitation and eventually cold air.

Source: (NOAA 2024) (FEMA 2024) (Cal OES 2024)

10.1.5 Probability of Future Occurrences

Probability Based on Previous Occurrences

Information on previous extreme wind occurrences in the County was used to calculate the probability of future occurrence of such events. Table 10-6 lists the number of events from various sources over the 71-year period from 1953 to 2024, which is the most complete period of record for all sources reviewed. Based on these records and input from the Steering Committee, the probability of occurrence for extreme wind in the County is considered “frequent.”

Table 10-6. Probability of Future Extreme Wind Events in Del Norte County

Hazard Type	Number of Occurrences Between 1953 and 2024	Percent Chance of Occurring in Any Given Year
Extreme Wind	98	100%

Source: (NOAA 2024) (FEMA 2024)

Note: 100% probability indicates that it is statistically likely for an event to occur every year. It does not indicate that the occurrence of an event is a certainty in any given year.

Potential Impact of Climate Change on Future Probability

There have been few studies on the effects of climate change on wind. However, the Intergovernmental Panel on Climate Change forecasts slowing winds for the coming decades; by 2100, annual wind speeds could drop by up to 10 percent (Robbins 2022). The effect of these changes on the frequency of wind events is unclear.

10.1.6 Cascading Impacts on Other Hazards

Higher than normal winds can damage or destroy trees and will increase rates of evaporation. Extreme winds have been linked with worsening wildfire seasons in the western U.S. Following excessive rain or soil saturation, trees can also be uprooted during wind storms.



10.2 VULNERABILITY AND IMPACT ASSESSMENT

10.2.1 Life, Health, and Safety

Overall Population

The entire population of Del Norte County is exposed to extreme wind. High winds pose direct threats to the safety of residents, including the risk of injury from flying debris, falling trees, and structural damage to homes and buildings. These events can also lead to power outages and damage to communication lines, affecting essential services such as electricity, water supply, and telecommunications, thereby disrupting daily activities and hindering emergency response efforts. After extreme wind events, residents may be displaced or require temporary to long-term shelter.

Socially Vulnerable Population

Socially vulnerable populations are particularly susceptible to extreme wind events. These populations include individuals over the age of 65, children under the age of 5, non-English speaking individuals, people with disabilities, and residents living below the poverty line. Those living in areas isolated from major roads are also considered socially vulnerable.

Power outages from extreme winds can be life-threatening to those dependent on electricity for life support and are a significant concern. These populations face isolation and exposure during extreme wind events and could suffer more secondary effects of the hazard. Vulnerability is influenced by several factors, including physical and financial ability to react or respond during a hazard, as well as the location and construction quality of their housing. Because these populations face various forms of isolation, they are more at risk for secondary effects from high wind hazards.

10.2.2 General Building Stock

All current and future buildings in Del Norte County, including critical facilities, are at risk from extreme wind events. Residential structures are generally more susceptible to wind damage than commercial and industrial structures due to differences in construction. Wood and masonry buildings, regardless of occupancy class, tend to experience more damage than concrete or steel buildings.

10.2.3 Community Lifelines and Other Critical Facilities

All community lifelines and critical facilities in Del Norte County are vulnerable to extreme wind events. Loss of utilities, particularly power outages, is a common issue during such events. Extreme winds can severely impact power transmission lines, especially as they are funneled through changes in terrain, leading to widespread power outages. Communication lines, antennas, and towers are vulnerable to damage from strong winds and falling branches, leading to disruptions in telecommunications and broadcasting services. This affects both businesses and residents who rely on these services for daily operations.



10.2.4 Economy

Extreme wind events can impact Del Norte County's economy. Power outages can halt business operations, leading to financial losses. Extended outages can affect essential services, such as water supply, communication networks, and healthcare facilities, further compounding the economic impact. Farmland is also at risk, as strong winds can damage crops and disrupt agricultural productivity.

Damage to buildings, roads, and vehicles can be extensive and costly. Extreme winds can tear off roofs, shatter windows, and cause structural damage. Debris can block roads, making transportation difficult and delaying emergency response efforts (CBO 2019). The cost of repairs and cleanup can strain local resources and budgets.

Extreme winds also impact tourism in Del Norte County. Outdoor activities become hazardous, leading to a decline in tourist numbers. Extreme winds can damage tourist facilities, resulting in closures and reduced capacity. Transportation disruptions, safety concerns, and negative perceptions of the region as a safe travel destination further deter visitors.

10.2.5 Natural Resources

Extreme winds can cause significant damage to trees, which in turn affects local fauna and flora. Additionally, storms and high winds exacerbate erosion and contribute to flooding in coastal areas (Ouranos n.d.). Forests are especially susceptible to the destructive force of extreme winds, which can result in downed trees, snapped trunks and limbs, and stripped leaves. This damage increases the risk of wildfire, insect infestation, and the establishment of invasive species. The decomposition of dead trees further exacerbates climate change by releasing substantial amounts of carbon dioxide into the atmosphere (NWF n.d.).

10.2.6 Historic and Cultural Resources

Extreme winds can cause physical damage to historic buildings and monuments, including roofs, walls, windows, and other structural elements, compromising their integrity. Debris from fallen trees and branches can strike and damage these structures, and obstruct access, making repairs and preservation efforts challenging. Heavy rains accompanying windstorms can lead to water infiltration in historic buildings, causing wood rot, mold growth, and damage to interior finishes and artifacts.

In coastal areas, extreme winds can cause erosion and flooding, undermining the foundations of historic buildings and leading to potential collapse. Shoreline changes can threaten archaeological sites and other cultural landscapes. The surrounding environment of historic resources can also be altered by extreme winds, affecting the context and setting that contribute to their historical significance, such as the loss of historic trees, gardens, and other landscape features.

Damage from extreme winds can make historic sites unsafe for visitors and staff, leading to temporary or prolonged closures. This impacts tourism and the local economy, as well as hindering ongoing preservation efforts.



10.3 FUTURE CHANGES THAT MAY AFFECT RISK

10.3.1 Potential or Planned Development

The ability of future development to withstand impacts from extreme wind lies in sound land use practices and consistent enforcement of codes and regulations for new construction. The planning partners enforce the California Building Standards Code (Title 24, CCR), which incorporates and modifies provisions from the International Building Code, in response to California statutory requirements. This code is equipped to deal with the impacts of severe wind events. With these tools, the planning partners are well equipped to deal with future growth and the associated impacts of extreme wind.

10.3.2 Projected Changes in Population

Del Norte County's population is projected to decline in upcoming decades, from 27,648 in 2020 to 25,317 in 2070—an 8.4 percent decrease (CA Department of Finance 2025). A decline in population can significantly affect the risk from extreme wind events. With fewer people living in an area, the exposure to injury or death from such events is reduced, lowering the overall human impact.

Additionally, a smaller population often leads to less infrastructure development and maintenance. While this might mean fewer buildings and structures are at risk of damage, it also implies that existing infrastructure may not be as well-maintained, potentially increasing vulnerability to wind damage. Also, emergency response capabilities can be compromised with a declining population. Fewer resources and personnel available for disaster management can slow down recovery efforts, prolonging the disruption caused by extreme wind events.

10.3.3 Climate Change

The Intergovernmental Panel on Climate Change predicts that annual wind speeds could decrease by up to 10 percent by 2100. This reduction in surface winds, which drive the Gulf Stream, could disrupt global climate patterns.

10.3.4 Other Considerations for Future Planning

Urbanization and infrastructure vulnerability are key factors that can significantly influence the risk of windstorms. As urban areas expand, the density of buildings increases, creating wind tunnels that can amplify wind speeds and cause more severe damage to structures and infrastructure. This effect can lead to higher economic losses and greater challenges in emergency response and recovery efforts.

The condition and resilience of infrastructure such as power lines, roads, and bridges play a crucial role in determining the impact of windstorms. Aging or poorly maintained infrastructure is more likely to fail during high wind events, leading to widespread disruptions. Ensuring that infrastructure is regularly inspected, maintained, and upgraded can help mitigate these risks and enhance community resilience.



11. FLOOD

11.1 HAZARD PROFILE

The Del Norte County website (*Prepare Del Norte - Flooding n.d.*) outlines the County's efforts to educate residents about flood – what they are, history of occurrences, evacuation zones, how to get notified, flood insurance, preparing finances, and more.

11.1.1 Hazard Description

Flooding is defined as the inundation of water onto areas that are typically dry (NOAA 2024). This phenomenon can occur due to several factors, including intense rainfall, coastal waves, rapid snowmelt, or the failure of dams or levees. Even a slight accumulation of water can lead to significant damage, while more severe flooding may submerge homes up to their rooftops. Flooding can develop within minutes or it may take place over an extended period, lasting days or weeks. Floods are among the most prevalent and widespread natural disasters related to weather (NOAA 2024). The following sections describe the types of flooding included in the flood hazard of concern for this HMP.

Riverine/Stream Flooding

Riverine 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 (Mehan 2024). 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.

Coastal Flooding

Coastal floodplains are adjacent to the ocean and other tidally influenced areas. Like riverine floodplains, coastal floodplains may be broad or narrow, depending on local topography and natural flood defenses such as dune systems or tidal wetlands. Coastal flooding types in the planning area include high tide flooding and storm surge.

High Tide Flooding

High tide flooding occurs when local sea level, independent of storm surge or river flooding, temporarily exceeds a threshold for flooding, (US Climate Resilience Toolkit 2023). During exceptionally high tides, water can encroach upon land, affecting low-lying regions with seawater until the tide recedes. This type of flooding is typically localized, often impacting areas as small as city blocks.



Tides known as spring tides or king tides exceed normal levels several times each year when the moon reaches its closest proximity to earth during a new or full moon. The gravitational forces of the moon and sun on the earth's oceans lead to these elevated tide levels (US Climate Resilience Toolkit 2023).

Storm Surge

Storm surge occurs as a result of coastal storms that, when combined with regular tidal patterns, drive water toward the shore. This can lead to waves reaching further inland, causing damage to structures and developments that are usually not exposed to wave action.

When coastal storms align with high tides, the depth and scope of storm surge can significantly escalate. Even mild winds blowing toward the land during high-tide events can displace large volumes of water inland. Rainfall can contribute a considerable amount of water to already elevated tide-related flooding (NOAA n.d.).

Levee Failure

Levees and flood walls are man-made structures designed to protect specific areas within a community from flooding. They are built parallel to a river or another body of water to protect the population and structures behind them from flood-related human health impacts or property damage (FEMA 2021).

These structures fail when flood waters exceed the height of the protective levee structure or when the maximum pressure exerted by the flood waters against the levee or flood wall exceeds its strength and causes a structural failure. Levee failures have the potential to place large numbers of people and great amounts of property at risk.

Damage to the area beyond a failed levee could be more significant than damage caused by the uninhibited flow of flood water (FEMA 2021). Levees are designed to provide a specific level of protection; therefore, excessive water from a flooding event could overtop a levee if the water volume exceeds the levee specifications. Because levees can fail if they are allowed to decay or deteriorate, regular maintenance is critical.

11.1.2 Location

FEMA prepares maps of areas expected to be inundated by a flood of a given magnitude. These areas are determined via statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. Flood hazard areas are delineated on Digital Flood Insurance Rate Maps (DFIRMs), which provide the following information:

- Locations of specific properties in relation to special flood hazard areas (SFHAs)
- Base flood elevations (1 percent annual chance) at specific sites
- Magnitudes of flood in specific areas
- Undeveloped coastal barriers where flood insurance is not available



- Regulatory floodways and floodplain boundaries (1 percent and 0.2 percent annual chance floodplain boundaries)

Land area covered by floodwaters of the base flood is the SFHA on a DFIRM—an area where NFIP floodplain management regulations must be enforced, and where mandatory purchase of flood insurance applies when you have a federally backed mortgage or private mortgage depending on the lender. This regulatory boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities because many communities have maps showing the extent of the base flood and likely depths that will occur.

Flooding in Del Norte County has been extensively documented by gauge records, high water marks, damage surveys and personal accounts. Figure 11-1 shows current SFHA mapping for Del Norte County.

There are two sources of floodplains in Del Norte County: coastal flooding is associated with tidal action and storm surge, and riverine flooding is associated with river systems. Each is described in the sections below, along with a separate discussion of flooding associated with levee failures.

Riverine/Stream Flooding

The Klamath and Smith Rivers are within the Klamath Mountains province; the other river systems in the county are within the Coast Range province. Drainage in the Klamath Mountains province is dendritic (streams and their tributaries have a branch-like arrangement), differing from the trellis drainage patterns typical of the Coast Range province. Northwest-trending folds and faults control the drainage patterns in the Coast Range province, leading to a fairly uniform orientation of rivers.

Significant flood hazard areas in Del Norte County are limited to the Smith River, Klamath River and Elk Creek systems because these are the river systems where development has occurred in or near the floodplain.

Smith River

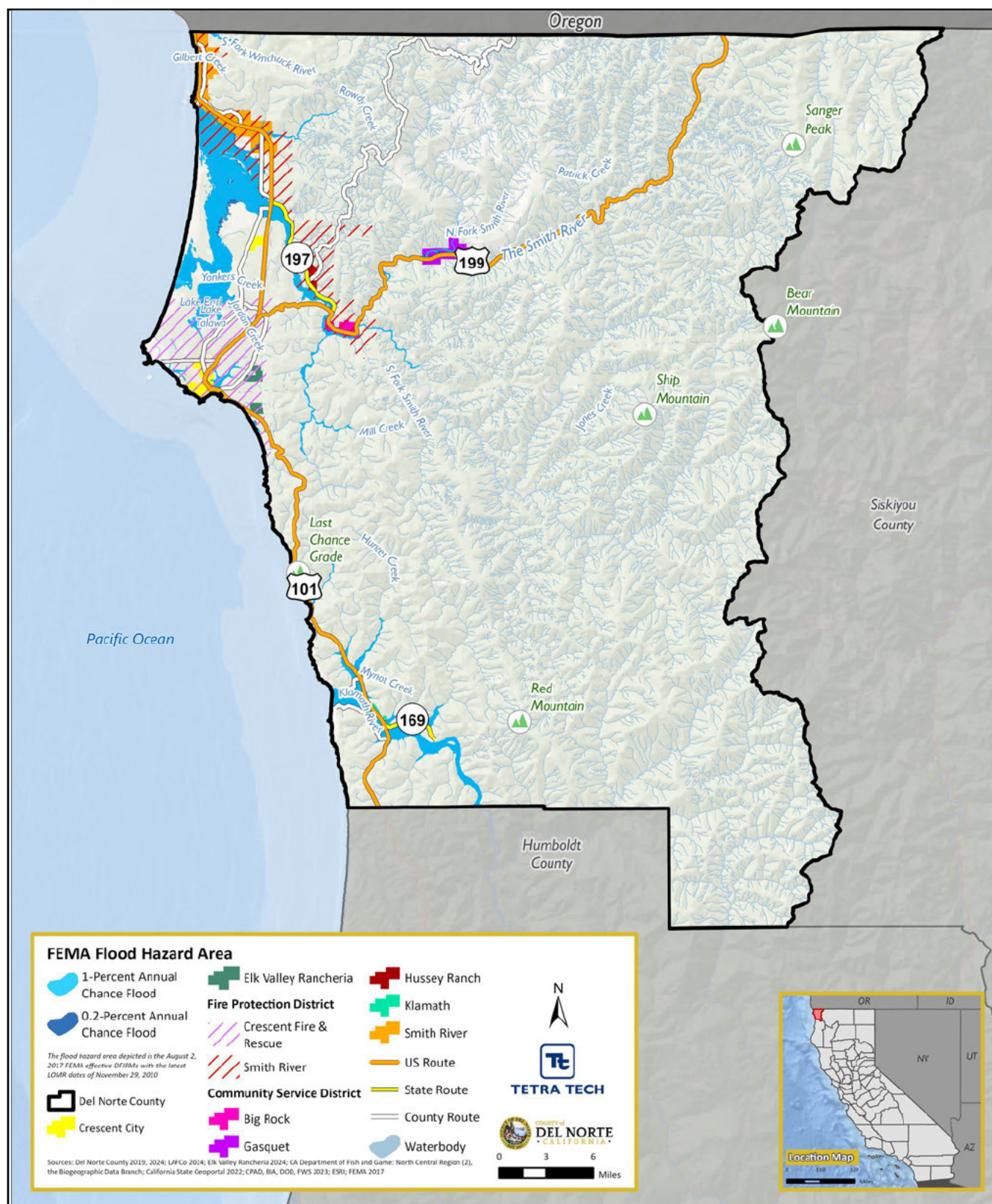
The Smith River drains a basin of 609 square miles. The river flows through the Klamath Mountains, except for the final 15 miles, where it slices through the Coastal range and crosses a broad coastal plain before emptying into the Pacific Ocean. The Smith River is classified as a “Wild and Scenic River” by the National Parks Service and is the only major river in California to flow freely for its entire length without a dam. Its floodplain includes Lake Earl, Lake Tolowa, a portion of U.S. Highway 101, a portion of Lower Lake Road, agricultural land and scattered residential areas

The Lake Earl-Lake Tolowa-Lower Smith River complex covers an area of 12 miles along the Pacific Ocean between Crescent City and the Oregon border.

The California Department of Fish and Wildlife (CDFW) and the County of Del Norte (DNC) periodically breach the sandbar that separates Lakes Earl and Tolowa (lagoon) from the Pacific Ocean between September 1 and February 15 when the lagoon's water surface elevation is between +8' and +10' MSL, and again on or about February 15 if the water height is at or exceeding +5' MSL.



Figure 11-1. Flood Hazard Area





The breaching activity involves creating a channel in the unvegetated sandbar approximately 200 feet long and 20 feet wide. The breach is conducted during an outgoing low tide in daylight hours to minimize environmental and worker safety hazards associated with in-water construction under potentially dangerous high surf conditions. Once the sandbar is breached, the draining water quickly deepens and widens the outlet channel. Within a 24-hour period, the level of the lagoon is quickly lowered to about mean sea level, depending on the tides and winter storms, from a surface area of over 4,800 acres to approximately 2,200 acres. In addition to providing flood control to the lands on the perimeter of the lagoon, the breaching allows salt water from the ocean to mix with the fresh waters of the lagoon for a period of about two to six weeks until the outlet channel is naturally closed again by ocean sediments deposited by longshore currents. This intermixing provides for ingress and egress of aquatic organisms.

The most notable flooding in the area results from intense storms occurring after extended periods of rain, which prime the lake basin and the adjacent Smith River basin for runoff. Smith River discharges of approximately 140,000 cubic feet per second—the 10 percent annual chance flow—cause overbank flow in the Smith River floodplain, which spills over into the Lake Earl-Tolowa Lake complex. The Smith River basin is fan-shaped with a common focal point of the four major tributaries, which gives the basin its very sharp reaction to rainfall and runoff. As a result, floods within the basin are normally of short duration, lasting about 2 to 4 days. Floods develop rapidly, with the peak being reached in 6 to 8 hours after the most intense portion of the storm.

Klamath River

The largest river basin in the region is the Klamath River, which originates in Oregon and drains 12,120 square miles, of which 234 square miles is in Del Norte County. The Klamath River is the second largest river in California, exceeded only by the Sacramento River. Its basin is south and east of the Smith River basin. The major tributaries to the Klamath River include the Salmon, Scott, Shasta and Trinity Rivers, none of which are in Del Norte County. The portion of the Klamath River that lies within Del Norte County is referred to by the U.S. Army Corps of Engineers as Reach I, extending from the mouth of the Klamath to the Humboldt County line. Within Reach I and the Coastal Zone lie the communities of Requa, Klamath Glen, and Klamath. Due to this development, flooding along Reach I is a hazard to life and property.

Dam Updates

In October 2024, the State of California completed the removal of several dams along the Klamath River upstream from Del Norte County. Included in the final agreement is the Del Norte Sediment Management Plan, which requires the Klamath River Renewal Corporation (KRRRC) to monitor the deposition of sediments immediately north and south of the Klamath estuary and at the Crescent City Harbor.

The removal of these structures may reduce the risk of downstream flooding associated with dam failures. However, the environmental review process indicated that the dam removal may alter the 100-year floodplain to a limited degree (CA Water Boards 2020) (DOE 2022). Through this process, the KRRRC, charged with overseeing the dam removal project and habitat restoration, has identified a Downstream Flood Control Project Component to mitigate these potential effects.

Flood flows in the Klamath basin are of two types—rain and snowmelt. The rain flood flows are the more damaging. Practically all damaging flood events have occurred during the period of November through March. Usually these events have occurred from rainstorms of several days in duration. Based



on USGS gage data near Klamath, the maximum record discharge of 557,000 cubic feet per second occurred on December 3, 1964, with a gage height of 55.3 feet.

Snowmelt floods usually begin in March and have not typically caused the damage associated with rain floods. Due to the size of the Klamath River basin, a true “worst-case scenario” would be a rain-on-snow event. While these types of events are not typical for the region, they are possible in light of potential climate change.

Elk Creek

Elk Creek originates in Jedediah Smith Redwood State Park. Several small tributaries flow from the park and combine just west of Elk Valley Road to form the main channel. The creek then flows southwest, draining Elk Valley region and empties into Crescent City Harbor.

Elk Creek is much smaller than the Smith and Klamath Rivers. Its watershed is approximately 6 square miles, and its recognized floodplain covers less than 1 square mile. However, due to its proximity to Crescent City, it is of considerable importance in emergency management planning.

Flooding on Elk Creek is caused by a combination of excess runoff and tidal action. Excess runoff is caused by heavy rainfall and tidal action is caused by wind, waves and tsunamis. Flooding history on Elk Creek indicates that tidal action has been the principal cause of flooding. As a prime example, during the 1964 tsunami that hit Crescent City, the Elk Creek floodplain acted as a natural inlet for water generated by the tsunami, and flooding occurred on a considerable amount of the Elk Creek floodplain, including portions of downtown Crescent City.

Coastal Flooding

Del Norte County has a coast shoreline length of 45.5 miles. From the Oregon border to Point St. George, there are about 14 miles of rocky coast and 11 miles of sandy beach backed by sand dunes. The remainder of the coastline is rocky with pocket beaches and reaches of sand, such as Crescent City and the mouth of the Klamath River. This latter reach includes the Redwood National Park and State Parks and is noted for its rugged headlands and scenic shoreline.

Flooding along the Pacific coast near Crescent City is often associated with the simultaneous occurrence of very high tides, large waves, and storm swells during the winter. Storm centers from the southwest produce the type of storm pattern most commonly responsible for serious coastal flooding. The strong winds and high tides that create storm surges are also accompanied by heavy rains. In some instances, high tides back up river flow, which causes flooding at the river mouths. The 1 percent annual chance flood hazard zone shown on Figure 11-1 includes SFHA areas designated by FEMA as coastal flood zones.

Levee Failure

There are three levees in the planning area. The two levees listed below do not have a sponsor:

- The Del Norte County Levee 1 is located along the Smith River. It is 3.9 miles long and protects an area with 75 people, 57 buildings, and 16 acres of farmland (USACE 2025).



- The Del Norte County Levee 2 is near the Lower Klamath system along the Klamath River. It is approximately 0.1 miles long and protects an area with 17 people, 1 building, and \$390,000 in property value (USACE 2025).

The third levee is the Lower Klamath system. USACE contracted the construction which took place between 1968 and 1973 and later transferred to the County of Del Norte for maintenance responsibility. The system was constructed to prevent major flooding. It is 1.68 miles long and consists of three segments (USACE 2025):

- The Klamath Townsite segment consists of fill placement between Route 101 and the Townsite with interior drainage improvements.
- The Klamath Glen segment has an earthen levee embankment of approximately 8,900 feet in length (1.68 miles). The levee embankment has a maximum height of 39 feet with a 12-foot average crest width. This segment provides for interior drainage of the areas behind the levee during normal operations by a gravity drain and a 9-acre pond with a pump station for flood events.
- The Bank Protection segment, which is outboard of the levee improvements, consists of approximately 7,300 feet of bank stone protection.

Major flood events occurred in 2005, 1986 and 1981. The largest historical flows were estimated at 529,000 cubic feet per second. Historical floods have reached 50 percent of the levee embankment height twice and once less than 25 percent. No significant performance problems have been identified to date. Based on the 2009 risk assessment of the Klamath Glen segment, this flood control system is designed to protect 136 people and 110 structures (roads, buildings, etc.) in the area behind the levee.

Repetitive Loss Properties

The following data provided by FEMA was analyzed for residential properties in the county:

- Repetitive loss properties—A property for which two or more losses for \$1,000 or more were paid. The two losses must be within 10 years of each other and be at least 10 days apart.
- Severe repetitive loss properties—A residential property covered under an NFIP flood insurance policy, and satisfying either of the first two conditions below in addition to the third:
 - At least four NFIP claim payments for the property (including building and contents) over \$5,000 each have occurred, and the cumulative amount of such claims payments exceeded \$20,000
 - At least two separate claims payments for the property (building payments only) have occurred, and the cumulative amount of the building portion of such claims exceeded the market value of the building
 - For either of the above, at least two of the referenced claims must have occurred within any 10-year period and must have occurred more than 10 days apart

FEMA's NFIP Multiple Loss Properties dataset identifies structures in Del Norte County that have had multiple NFIP claims across the history of the program. The dataset lists two repetitive loss properties in the county—one in Smith River and one in Klamath—and no severe repetitive loss properties.



11.1.3 Extent

Riverine/Stream Flooding

Flood severity for riverine flooding is often evaluated by examining peak discharges, which are generally described using the measurement cubic feet per second (cfs). Table 11-1 lists peak flows used by FEMA to map the floodplains of the planning area.

Table 11-1. Summary of Peak Discharges in the Planning Area

Source/Location	Discharge (cubic feet/second)			
	10 Percent Annual Chance	2 Percent Annual Chance	1 Percent Annual Chance	0.2 Percent Annual Chance
Middle Fork Smith River; 10,000 feet upstream of confluence with Smith River-Gasquet reach	21,500	30,500	34,500	44,000
North Fork Smith River; 4,000 feet upstream of confluence of Middle Fork Smith River and north fork Smith River.	39,500	57,000	64,200	80,000
Smith River-Gasquet Reach; Just downstream of confluence of Middle Fork Smith River and North Fork Smith River	65,000	93,100	105,000	132,000
Smith River-Hiouchi Reach-1; Approximately 17,000 feet downstream of U.S. Highway 199 (Hiouchi Bridge)	144,000	198,000	222,000	278,000
Smith River-Hiouchi Reach-2; Just downstream of confluence of South Fork Smith River	134,000	184,000	206,000	258,000
Smith River-Pacific Ocean to U.S. Highway 101, above Peacock Creek	142,000	195,000	218,000	273,000
Rowdy Creek-Approximately 11,500 feet upstream of confluence with Smith River (Gasquet Reach)	8,800	12,400	13,800	16,500

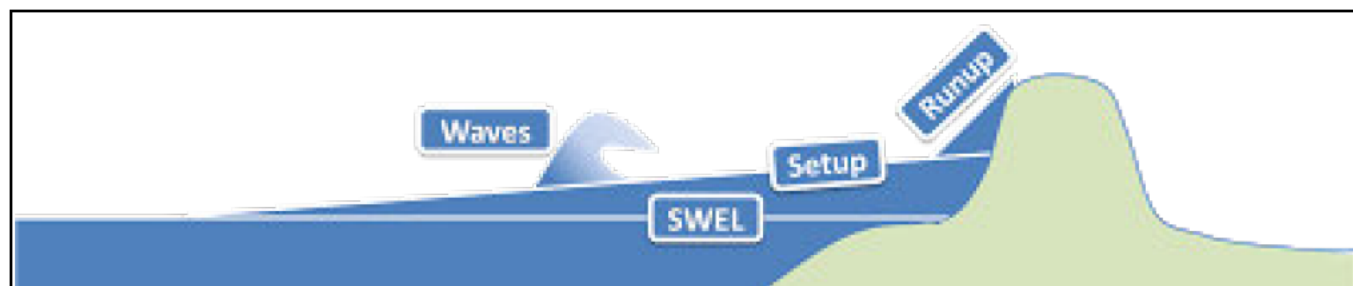
Source: FEMA Flood Insurance Study Number 06015CV000C, Del Norte County, California and Incorporated Areas, August 2, 2017

Coastal Flooding

Flood severity for coastal flooding is determined by wave runup and setup. Storm surge levels are determined by modeling water depth, wind speed, vegetative cover and other factors to determine the “wave runup”—how far inland waves will reach—and “wave setup” the height, speed, and slope of waves and how they differ from the still-water elevation (see Figure 11-2).

Base flood elevations that include wave height range from 18 to 55 feet for a 1 percent annual chance event in the planning area. Flood studies use historical records to determine the probability of occurrence for different storm surge levels. These measurements reflect statistical averages only; it is possible for multiple events with a low probability of occurrence to occur in a short time period.

Figure 11-2. Storm Surge Stillwater Elevation and Added Effects of Wave Setup and Runup



Source: (Del Norte 2019)

Levee Failure

A failure of the Del Norte County levees could impact the communities living near the Smith or Klamath Rivers. USACE estimates that 228 people and 168 structures are protected by the three levees in Del Norte County.

11.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Table 11-2 lists all flood-related presidentially declared disasters that have included Del Norte County.

State Emergency Proclamations

Table 11-3 lists all flood-related state emergency proclamations that have included Del Norte County.

USDA Declarations

Between 2019 and 2024, Del Norte County was not included in any USDA flood-related agricultural disaster declarations (USDA 2024).

Previous Events

Table 11-4 lists major recorded flood-related events that impacted Del Norte County since the previous HMP was developed. For earlier events, refer to the previous HMP.

11.1.5 Probability of Future Occurrences

Probability Based on Previous Occurrences

Information on previous flood occurrences in the County was used to calculate the probability of future occurrence of such events. Table 11-5 lists the number of events from various sources over the 71-year period from 1953 to 2024, which is the most complete period of record for all sources reviewed. Based on these records and input from the Steering Committee, the probability of occurrence for flood in the County is considered “occasional.”



Table 11-2. FEMA Disaster Declarations for Flood Events in Del Norte County

Event Date	Declaration		Description
	Date	Number	
February 5, 1954	February 5, 1954	DR-15	Flood & erosion
December 23, 1955	December 23, 1955	DR-47	Flood
April 4, 1958	April 4, 1958	DR-82	Heavy rainstorms, flood
March 6, 1962	March 6, 1962	DR-122	Floods
October 24, 1962	October 24, 1962	DR-138	Severe storms, flooding
February 25, 1963	February 25, 1963	DR-145	Severe storms, heavy rains, flooding
December 21, 1963	December 21, 1963	DR-161	Flood due to broken dam
December 24, 1964	December 24, 1964	DR-183	Heavy rains & flooding
February 16, 1970	February 16, 1970	DR-283	Severe storms, flooding
April 5, 1972	April 5, 1972	DR-329	Severe storms, flooding
January 21, 1983 to March 30, 1983	February 9, 1983	DR-677	Coastal storms, floods, slides, tornadoes
February 12, 1986 to March 10, 1986	February 21, 1986	DR-758	Severe storms, flooding
January 5, 1993 to March 20, 1993	February 3, 1993	DR-979	Severe storm, winter storm, mud & landslides, flooding
January 3, 1995 to February 10, 1995	January 10, 1995	DR-1044	Severe winter storms, flooding, landslides, mud flows
December 28, 1996 to April 1, 1997	January 4, 1997	DR-1155	Severe storms, flooding
February 2, 1998 to April 30, 1998	February 9, 1998	DR-1203	Severe winter storms and flooding
December 17, 2005 to January 3, 2006	February 3, 2006	DR-1628	Severe storms, flooding, mudslides, and landslides
February 1 – 23, 2017	April 1, 2017	DR-4308	Severe winter storms, flooding, mudslides
February 24, 2019 to March 1, 2019	May 18, 2019	DR-4434	Severe winter storms, flooding, landslides, and mudslides
December 27, 2022 to January 31, 2023	January 14, 2023	DR-4683	Severe winter storms, flooding, landslides, and mudslides
March 9, 2023 to July 10, 2023	March 10, 2023	EM-3592	Severe winter storms, flooding, landslides, and mudslides
February 21, 2023 to July 10, 2023	April 3, 2023	DR-4699	Severe winter storms, straight-line winds, flooding, landslides, and mudslides

Source: (FEMA 2024)

**Table 11-3. State Emergency Proclamations for Flood Events in Del Norte County**

Proclamation Date	Description
April 12, 2019	The governor modified a state of emergency proclamation to include 8 additional counties, including Del Norte, due to atmospheric river storm impacts, which caused widespread damage and flooding from January 5 to February 12, 2019
November 17, 2021	The governor declared a state of emergency in Del Norte, Los Angeles, Madera, Mariposa, Mendocino, Napa, Orange, San Benito, San Mateo, Santa Clara, Santa Cruz, Siskiyou, Sonoma, Tehama, and Trinity counties due to the January 26, 2021 atmospheric river event.
January 4, 2023	The governor declared a state of emergency in all counties due to a series of atmospheric river systems that brought high winds, substantial precipitation, and river and urban flooding to the state on December 27, 2022
March 12, 2023	The governor declared a state of emergency in Calaveras, Del Norte, Glenn, Kings, San Benito, and San Joaquin counties as a result of a series of ongoing winter storms that struck California in late February and March 2023.
June 21, 2024	The governor declared a state of emergency in Del Norte County due to severe damage to roads and highways during the March 2024 storms.
March 2024	The governor added Del Norte County to a state of emergency proclamation for March 2024 storms with mountain snow, thunderstorms, flooding, landslides, and high winds.

Source: (Cal OES 2024) (California State Library 2024)

Table 11-4. Flood Events in Del Norte County (2019 to 2024)

Event Date	Declaration or Proclamation Number	Location Impacted	Description
January 16, 2019	State of Emergency	Law enforcement reported flooding on Highway 199 along the west shoulder and northbound lane.	An atmospheric river spread across northern California and produced heavy rain that led to localized flooding.
January 5, 2023	DR-4683	Coastal flooding across Highway 101 and across jetty and adjacent roadway in southeast portion of Crescent City.	A quasi-stationary westerly upper flow regime yielded multiple atmospheric rivers over Northwest California during the first two weeks of January. Impacts from these events were widespread, both in terms of flooding and wind damage.
January 13, 2024	N/A	Smith River exceeded flood stage at the Jedidiah Smith State Park gauge in Hiouchi and at the Dr. Fine Bridge gauge. Route 197 was flooded and closed.	An atmospheric river sank south and stalled over Humboldt, Del Norte, and western Trinity counties, bringing widespread rains between 3 and 7 inches to the region. Rain fell over a short period of time, 8-10 hours, resulting in the highest flows on the Mad River and Redwood Creek since the 1970s. Widespread creek flooding occurred in Del Norte and Humboldt counties with multiple homes damages or destroyed.

Source: (FEMA 2024) (NOAA 2024)



Table 11-5. Probability of Future Flood Events in Del Norte County

Hazard Type	Number of Occurrences Between 1953 and 2024	% Chance in Any Given Year
Flood	52	73.2%

Source: (NOAA 2024) (FEMA 2024)

Potential Impact of Climate Change on Future Probability

The 100-year flood inundation is projected to increase by nearly 20 percent in Del Norte and neighboring counties by 2100 (Grantham 2018).

11.1.6 Cascading Impacts on Other Hazards

The most problematic secondary hazard for flooding in Del Norte County is bank erosion. In many cases, the threat and effects of bank erosion are worse than actual flooding. This is especially true on the upper courses of the rivers in the county where there are steep gradients, where the floodwaters may pass quickly and without much damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in. Landslides, mudslides, and contaminated water can also be a result of flooding.

11.2 VULNERABILITY AND IMPACT ASSESSMENT

The 1 and 0.2 percent annual chance flood events were examined to evaluate the county's risk from the flood hazard, using the methodology described in Section 4.3.2.

11.2.1 Life, Health, and Safety

Overall Population

Table 11-6 summarizes the population living in the 1 percent and 0.2 percent annual chance riverine flood hazard areas. The unincorporated county has the greatest number of residents living in the flood hazard area: 781 residents in the 1 percent annual chance riverine floodplain and 909 residents in the 0.2 percent annual chance floodplain. There are no people living in the 1 percent annual chance coastal flood hazard area.

Table 11-6. Population in the 1 Percent and 0.2 Percent Annual Chance Riverine Flood Hazard Area

Planning Area	Total Population (2022 ACS Estimates)	1 Percent Annual Chance Riverine Flood Hazard Area		0.2 Percent Annual Chance Flood Hazard Area	
		Number of Persons	% of Planning Partner Total	Number of Persons	% of Planning Partner Total
Crescent City	6,379	37	0.6%	37	0.6%
Unincorporated County	21,083	781	3.7%	909	4.3%
Del Norte County Total	27,462	818	3.0%	946	3.4%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California Geoportal 2022; FEMA 2017



Flood events can lead to the displacement of residents and the need for emergency shelter. Table 11-7 provides an overview of the number of individuals displaced or seeking shelter as a result of flood events in the planning area. In Del Norte County, it is projected that the 1 percent annual chance coastal flood will displace 490 persons, with 325 seeking short-term shelter. The 1 percent annual chance riverine flood is expected to displace 825 persons, with 153 seeking short-term shelter.

Table 11-7. Displacement and Shelter Requirements

Planning Area	Total Population (2022 ACS 5-Year Estimates)	1 Percent Annual Chance Coastal Flood		1 Percent Annual Chance Riverine Flood	
		Displaced Population	Persons Seeking Short- Term Shelter	Displaced Population	Persons Seeking Short- Term Shelter
Crescent City	6,379	61	41	42	10
Unincorporated County	21,083	429	284	783	143
Del Norte County Total	27,462	490	325	825	153

Source: Hazus v6.1; U.S. Census Bureau 2020; Del Norte County 2024; Microsoft 2021; NSI/USACE 2022; California State geoportal 2022; FEMA 2017

Flooding can localize to specific parts of a community, such as certain roads, intersections, or neighborhoods, making buildings inaccessible. Entire communities can become isolated due to floodwaters, posing dangers when motorists and pedestrians attempt to traverse them. Vehicles and individuals can be swept away by flood currents, increasing the risk of drowning. Even shallow, fast-moving waters can carry people or vehicles into deeper areas, where the pressure from flowing water can trap drivers in submerged vehicles. Floodwaters often conceal hazards like electrical wires, debris, nails, and open manholes, and can weaken roads and bridges, making them unsafe for travel.

Socially Vulnerable Population

Research indicates that certain populations may suffer more severe impacts and experience longer recovery times when affected by flooding. This heightened vulnerability is often due to factors such as physical and financial limitations that hinder their ability to respond effectively during a disaster.

Table 11-8 presents the estimated socially vulnerable populations living in the 1 percent annual chance riverine flood hazard areas in the planning area. Overall, in Del Norte County, there are 167 persons over the age of 65 years, 50 persons under the age of 5 years, eight non-English speakers, 150 persons with a disability, and 102 living in poverty located in the 1 percent annual chance riverine flood hazard area. [These numbers are not mutually exclusive to each category]

Table 11-9 presents the estimated socially vulnerable populations living in the 0.2 percent annual chance flood hazard areas in the planning area. Overall, in Del Norte County, there are 194 persons over the age of 65 years, 58 persons under the age of 5 years, nine non-English speakers, 173 persons with a disability, and 117 living in poverty located in the 0.2 percent annual chance flood hazard area.



Table 11-8. Vulnerable Population in the 1 Percent Annual Chance Riverine Flood Hazard Area

Planning Area	Vulnerable Populations Located in the 1 Percent Annual Chance Riverine Flood Hazard Area									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	5	0.6%	1	0.5%	0	0.0%	5	0.5%	5	0.5%
Unincorporated County	162	3.7%	49	3.7%	8	3.6%	145	3.7%	97	3.7%
Del Norte County Total	167	3.2%	50	3.3%	8	2.2%	150	3.1%	102	2.8%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; FEMA 2017

Table 11-9. Vulnerable Population in the 0.2 Percent Annual Chance Flood Hazard Area

Planning Area	Vulnerable Populations Located in the 0.2 Percent Annual Chance Flood Hazard Area									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	5	0.6%	1	0.5%	0	0.0%	5	0.5%	5	0.5%
Unincorporated County	189	4.3%	57	4.3%	9	4.0%	168	4.3%	112	4.3%
Del Norte County Total	194	3.7%	58	3.8%	9	2.4%	173	3.6%	117	3.3%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; FEMA 2017



Among those at risk, the economically disadvantaged and individuals over the age of 65 are particularly vulnerable. Economically disadvantaged populations may base their evacuation decisions on the potential economic impact to their families, making them less likely to evacuate promptly. Meanwhile, older adults are more likely to require medical attention, which may be inaccessible during a flood due to isolation, and they may face greater challenges in evacuating safely.

11.2.2 General Building Stock

Buildings Located in the Mapped Flood Hazard Areas

Table 11-10 through Table 11-12 summarize the number of structures in the 1 percent coastal, 1 percent riverine and 0.2 percent annual chance flood events in the planning area. Table 11-13 through Table 11-15 provides a summary of buildings in the flood hazard areas by occupancy class for Del Norte County.

Table 11-10. Buildings in the 1 Percent Annual Chance Coastal Flood Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the 1 Percent Annual Chance Coastal Flood Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	0	0.0%	\$0	0.0%
Unincorporated County	12,555	\$11,702,984,573	6	<0.1%	\$2,615,141	<0.1%
Del Norte County Total	14,279	\$14,687,618,715	6	<0.1%	\$2,615,141	<0.1%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; FEMA 2017; RS Means 2024

Table 11-11. Buildings in the 1 Percent Annual Chance Riverine Flood Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the 1 Percent Annual Chance Riverine Flood Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	18	1.0%	\$19,628,894	0.7%
Unincorporated County	12,555	\$11,702,984,573	536	4.3%	\$524,108,984	4.5%
Del Norte County Total	14,279	\$14,687,618,715	554	3.9%	\$543,737,878	3.7%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; FEMA 2017; RS Means 2024



Table 11-12. Buildings in the 0.2 Percent Annual Chance Flood Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the 0.2 Percent Annual Chance Flood Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	18	1.0%	\$19,628,894	0.7%
Unincorporated County	12,555	\$11,702,984,573	628	5.0%	\$632,495,861	5.4%
Del Norte County Total	14,279	\$14,687,618,715	646	4.5%	\$652,124,756	4.4%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; FEMA 2017; RS Means 2024

Table 11-13. Buildings in the 1 Percent Annual Chance Coastal Flood Hazard Area by Occupancy Class

Planning Area	Buildings in the 1 Percent Annual Chance Coastal Flood Hazard Area			
	Residential	Commercial	Industrial	Other ^a
Crescent City	0	0	0	0
Unincorporated County	0	6	0	0
Del Norte County Total	0	6	0	0

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; FEMA 2017

a. Other = Government, Religion, Agricultural, and Education

Table 11-14. Buildings in the 1 Percent Annual Chance Riverine Flood Hazard Area by Occupancy Class

Planning Area	Buildings in the 1 Percent Annual Chance Riverine Flood Hazard Area			
	Residential	Commercial	Industrial	Other ^a
Crescent City	7	10	1	0
Unincorporated County	343	107	13	73
Del Norte County Total	350	117	14	73

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; FEMA 2017

a. Other = Government, Religion, Agricultural, and Education

Table 11-15. Buildings in the 0.2 Percent Annual Chance Flood Hazard Area by Occupancy Class

Planning Area	Buildings in the 0.2 Percent Annual Chance Flood Hazard Area			
	Residential	Commercial	Industrial	Other ^a
Crescent City	7	10	1	0
Unincorporated County	399	131	13	85
Del Norte County Total	406	141	14	85

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; FEMA 2017

a. Other = Government, Religion, Agricultural, and Education



Estimated Cost of Damage

Table 11-16 provides an overview of the estimated building losses resulting from the 1 percent annual chance riverine flood event. The total estimated damage is \$121 million, with unincorporated areas expected to incur the majority of this damage. No loss estimates were developed for the 1 percent annual chance coastal flood.

Table 11-16. 1 Percent Annual Chance Riverine Flood Impacts on Buildings

Planning Area	Total Replacement Cost (RCV)	Estimated Loss Due to 1 Percent Annual Chance Riverine Flood				
		All Occupancies		Residential Properties	Commercial Properties	Other Occupancies
		Loss	% of RCV			
Crescent City	\$2,984,634,142	\$300,048	<0.1%	\$284,128	\$15,702	\$217
Unincorporated County	\$11,702,984,573	\$121,063,558	1.0%	\$65,514,103	\$29,336,387	\$26,213,068
Del Norte County Total	\$14,687,618,715	\$121,363,605	0.8%	\$65,798,232	\$29,352,089	\$26,213,285

Source: Hazus v6.1; Del Norte County 2024; Microsoft 2021; NSI/USACE 2022; California State geoportal 2022; RS Means 2024; FEMA 2017

11.2.3 Community Lifelines and Other Critical Facilities

Potential flood impacts on community lifelines and other critical facilities are numerous:

- Oversaturated soils from flooding may cause utility poles to tip over or fall, interrupting the power grid for a potentially large area, especially if a transformer is impacted.
- Excess floodwater can contaminate private drinking water sources, such as wells and springs.
- Excess water makes it more difficult for wastewater treatment plants to treat wastewater efficiently and effectively.
- Floodwater picks up debris, bacteria, sewage, and industrial waste and chemicals that can enter the water source through leaky pipes. Contamination at any step of the water flow process puts consumers at risk of exposure to toxins that could result in serious harm, such as infections, skin rashes, gastrointestinal illnesses, and tetanus; in extreme cases, death may occur.
- Isolation can be caused by bridges being washed out or blocked by floods or debris,

Community lifeline exposure to the 1 percent coastal and riverine annual chance floods and 0.2 percent annual chance flood was examined. Table 11-17 through Table 11-19 summarize the number of community lifelines exposed to these hazard areas in the planning area.

Mitigation planning should consider ways to reduce flood impacts to critical facilities and ensure sufficient emergency and school services remain when a significant event occurs. In cases where short-term functionality is impacted by flooding, facilities of neighboring municipalities may need to increase support response functions.



Table 11-17. Lifeline Facilities in the 1 Percent Annual Chance Coastal Flood Hazard Area

Planning Area	Number of Facilities in the 1 Percent Annual Chance Coastal Flood Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communica-tions	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transpor-tation	Water Systems	Other Critical Facilities	Count	% of Planning Partner Total
Crescent City	0	0	0	0	0	0	0	0	0	0	0.0%
Unincorporated County	0	0	1	0	0	0	0	0	1	2	0.5%
Del Norte County Total	0	0	1	0	0	0	0	0	1	2	0.3%

Source: Del Norte County 2019, 2024; HIFLD 2024; California Department of Transportation 2023; California Department of Education 2020; California Department of Motor Vehicles 2020; FEMA 2017

Table 11-18. Lifeline Facilities in the 1 Percent Annual Chance Riverine Flood Hazard Area

Planning Area	Number of Facilities in the 1 Percent Annual Chance Riverine Flood Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communica-tions	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transpor-tation	Water Systems	Other Critical Facilities	Count	% of Planning Partner Total
Crescent City	0	0	0	0	0	0	0	0	0	0	0.0%
Unincorporated County	5	3	4	2	1	6	32	2	6	61	14.0%
Del Norte County Total	5	3	4	2	1	6	32	2	6	61	10.4%

Source: Del Norte County 2019, 2024; HIFLD 2024; California Department of Transportation 2023; California Department of Education 2020; California Department of Motor Vehicles 2020; FEMA 2017



Table 11-19. Lifeline Facilities in the 0.2 Percent Annual Chance Flood Hazard Area

Planning Area	Number of Facilities in the 0.2 Percent Annual Chance Flood Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communica-tions	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Planning Partner Total
Crescent City	0	0	0	0	0	0	0	0	0	0	0.0%
Unincorporated County	5	3	6	2	1	6	34	2	8	67	15.4%
Del Norte County Total	5	3	6	2	1	6	34	2	8	67	11.5%

Source: Del Norte County 2019, 2024; HIFLD 2024; California Department of Transportation 2023; California Department of Education 2020; California Department of Motor Vehicles 2020; FEMA 2017



11.2.4 Economy

Flood impacts on the local and regional economy include general building stock damage and associated tax loss, impacts on utilities and infrastructure, business interruption, impacts on tourism, and impacts on the local tax base. In areas that are directly flooded, renovations of commercial and industrial buildings may be necessary, disrupting associated services. Loss of facility use, functional downtime, and socio-economic factors are likely. Flood damage to public utilities can disrupt delivery of services. Loss of power and communications may occur, and drinking water and wastewater treatment facilities may be temporarily out of operation.

Debris management may be a large expense after a flood event. Hazus breaks down flood debris into three categories: finishes (dry wall, insulation, etc.); structural (wood, brick, etc.) and foundations (concrete slab and block, rebar, etc.). The distinction is made because of the different types of equipment needed to handle the debris. Table 11-20 and Table 11-21 summarize the countywide debris estimates for the 1 percent coastal and annual chance riverine flood events. The results represent only structural debris generated by flooding, not non-structural debris or debris generated by wind that may be associated with a storm that causes flooding. Hazus estimates that there will be 50 tons of debris generated during the 1 percent annual chance coastal flood event and 2,584 tons of debris generated during a 1 percent annual chance riverine flood event in Del Norte County.

Table 11-20. Estimated Debris from the 1 Percent Annual Chance Coastal Flood Event

Planning Area	Estimated Debris Created During the 1 Percent Annual Chance Coastal Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Crescent City	5	2	2	1
Unincorporated County	45	18	14	13
Del Norte County Total	50	20	15	14

Source: Hazus v6.1; Del Norte County 2024; Microsoft 2021; NSI/USACE 2022; California State geoportal 2022; FEMA 2017

Table 11-21. Estimated Debris from the 1 Percent Annual Chance Riverine Flood Event

Planning Area	Estimated Debris Created During the 1 Percent Annual Chance Riverine Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Crescent City	21	11	3	7
Unincorporated County	2,563	702	939	922
Del Norte County Total	2,584	713	942	929

Source: Hazus v6.1; Del Norte County 2024; Microsoft 2021; NSI/USACE 2022; California State geoportal 2022; FEMA 2017



11.2.5 Natural Resources

Floodwaters can wash pollution from roads—such as oil and hazardous materials—onto normally dry soils, polluting them for agricultural uses. Floodwater can also alter the landscape, for instance, by eroding riverbanks and causing them to collapse. As floodwater carries material from the eroded banks, it suspends sediment in the water, which can degrade water quality and lead to harmful algae blooms. Suspended sediment eventually settles out of the water, which can clog riverbeds and streams, smother aquatic organisms, and destroy habitats.

11.2.6 Historic and Cultural Resources

Historic places in Del Norte County, including museums, historic buildings, and sites listed on the National Register of Historic Places, are vulnerable to flooding. Venues may face structural damage during flood events, with additional risk to important cultural artifacts housed within. Historic structures often lack modern building code requirements, including design flood elevation and construction standards. Many historic resources and structures were built close to waterways, increasing their flood risk.

Cultural institutions, parks, open spaces, community facilities, and religious institutions in Del Norte County are also at risk from flooding. Parks and recreational areas, such as those near the Redwood National and State Parks, may experience closures during flood events, disrupting residents' lives and hindering access to critical community services. Although parks and recreational areas near waterways are exposed to flooding, they are often developed with flooding in mind. Many parks are designated as open spaces to prevent development and mitigate flood risks.

11.3 FUTURE CHANGES THAT MAY AFFECT RISK

11.3.1 Potential or Planned Development

Any development in the floodplain has the potential to negatively impact the natural function of floodplains. It can affect the distribution and timing of drainage or alter or confine drainage channels. Flood potential can be increased in several ways: reducing a stream's capacity to contain flows; increasing flow rates or velocities downstream; and allowing waves to extend further inland.

Expected development trends in identified flood risk areas in Del Norte County are not predicted to cause major concern. Both Crescent City and Del Norte County participate in the National Flood Insurance Program and are considered to be in good standing, based on program compliance. As a participant in the NFIP, both communities have agreed to regulate new development in the mapped floodplain according to standards that equal or exceed those specified under 44 CFR Section 60.3. This will ensure that any development allowed in the floodplain will be constructed such that the flood risk exposure is eliminated or significantly reduced.



11.3.2 Projected Changes in Population

Del Norte County's population is projected to decline in upcoming decades, from 27,648 in 2020 to 25,317 in 2070—an 8.4 percent decrease (CA Department of Finance 2025). With fewer residents, there will be a smaller population exposed to flood hazards, potentially reducing the overall human impact during flood events. However, a declining population might lead to reduced economic resources for flood mitigation and infrastructure maintenance, potentially increasing vulnerability if critical infrastructure is not adequately maintained. Additionally, fewer people could mean a smaller workforce and community support network, which might affect the county's ability to respond to and recover from flood events. Population decline could also lead to changes in land use, such as increased abandonment of properties or shifts in development patterns, which might alter flood risk dynamics. Overall, while a smaller population might reduce direct human exposure to flooding, it could also pose challenges in maintaining and improving flood resilience infrastructure.

11.3.3 Climate Change

Climate change is expected to increase the intensity of rainfall due to warmer oceans. While annual precipitation in the North Coast region of California may remain stable, it will likely occur in more intense storms and shorter wet seasons, leading to extreme wet and dry years (California's Fourth Climate Change Assessment 2018). This could result in extreme riverine flooding and levee failures.

11.3.4 Other Considerations for Future Planning

It is anticipated that Del Norte County will continue to experience flooding events annually that may induce secondary hazards such as infrastructure deterioration or failure, utility failures, power outages, water quality and supply concerns, transportation delays, accidents, and inconveniences.

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. The National Weather Service issues flood watches and alerts for the planning area. The Del Norte County website includes links to the NOAA California Nevada River Forecast Center, which includes flood stage information for the river systems in the planning area.



12. LANDSLIDE

12.1 HAZARD PROFILE

The Del Norte County website (*Prepare Del Norte - Landslide n.d.*) outlines the County's efforts to educate residents about landslides – what they are, history of occurrences, and landslide safety.

12.1.1 Hazard Description

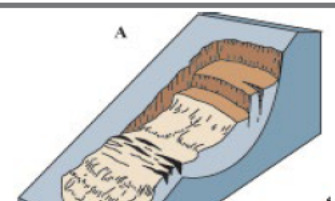
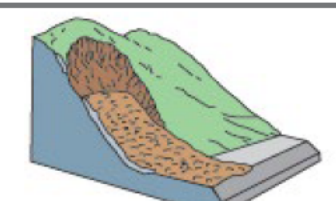
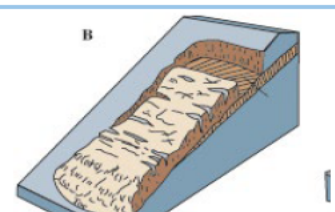
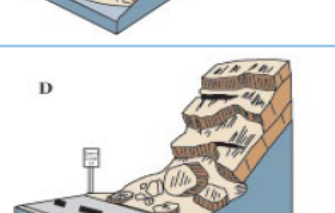
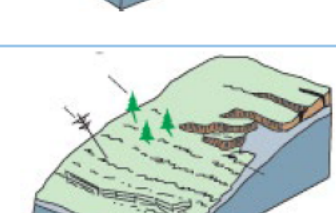
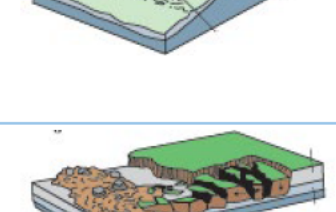
A landslide is a downslope movement of earthen materials. Landslides destroy property and infrastructure and can take the lives of people. When landslides deform and tilt the ground surface, the result can be destruction of foundations, offset of roads, breaking of underground pipes, or overriding of downslope property and structures. Figure 12-1 shows common landslide types as classified by the USGS. All these types of landslides are considered aggregately in USGS landslide mapping.

Landslides are caused by a combination of geological and climate conditions and the influence of urbanization. They can be initiated by storms, earthquakes, fires, volcanic eruptions, or human modification of the land. While small landslides are frequently a result of human activity, the largest landslides are often naturally occurring phenomena with little or no human contribution. Landslides are associated primarily with the following factors (USGS 2004):

- **Water**—Intense rainfall, changes in groundwater level, and water level changes along coastlines, earthen dams, and the banks of lakes, reservoirs, and rivers are the primary triggers of landslides
- **Seismic Activity**—Earthquakes in landslide-prone areas greatly increase the likelihood that landslides will occur, either due to ground shaking alone or shaking-caused dilation of soil materials
- **Mining**—Large vibrations, including blasting, reach yards under the soil surface, which poses a greater threat to areas that are already at risk for sliding
- **Other Human Activity**—Construction activity that undercuts or overloads dangerous slopes or that redirects the flow of surface or groundwater can trigger slope failures

Landslides are typically a function of soil type and slope steepness. Soil type is a key indicator for landslide potential and is used by geologists and geotechnical engineers to determine soil stability for construction standards.

Figure 12-1. Common Landslide Types

Rotational slides—Slides in which the surface of rupture is curved upward, and the slide movement rotates parallel to the ground surface.		Debris avalanches—Debris flows that travel faster than about 10 miles per hour (mph). Speeds in excess of 20 mph are not uncommon, and speeds in excess of 100 mph, although rare, can occur. The slurry can travel miles from its source, growing as it descends, picking up trees, boulders, cars, and anything else in its path.	
Translational slides—Slides in which the mass moves along a roughly flat surface with little rotation.		Earthflows—Landslides with an “hourglass” shape. The slope material liquefies and runs out, forming a bowl or depression at the head.	
Falls—Abrupt movements of geologic materials, such as rocks and boulders, that become detached from steep slopes or cliffs. Falls are strongly influenced by gravity, weathering, and the presence of water in a mineral's pores.		Creep—Slow, steady, downward movements of slope-forming soil or rock. Creep is indicated by curved tree trunks, bent fences, or retaining walls, tilted poles or fences, and small soil ripples or ridges.	
Topples—Slides involving the forward rotation of a unit about some point under the actions of gravity and forces exerted by surrounding objects or by fluids in cracks.		Lateral Spreads—Slides on very gentle slopes or flat terrain caused by liquefaction, the process whereby saturated, loose, sediments are transformed from a solid into a liquefied state. The failure starts suddenly in a small area and spreads rapidly.	
Debris flows—Rapid landslides in which loose soil, rock, organic matter, air, and water mobilize as a slurry that flows downslope. Commonly caused by intense surface water flow due to heavy rain or rapid snowmelt that erodes loose soil or rock on steep slopes.		Post-Wildfire Debris Flows—Debris flows resulting from post-fire conditions, where burned soil surfaces enhance rainfall runoff that concentrates and picks up debris as it moves.	

Source: (U.S. Geological Survey 2006, USGS 2004)



The following also can contribute to landslide formation:

- 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
- Removing or changing the type of vegetation covering slopes
- Wildfire

12.1.2 Location

Features of Landslide-Susceptible Areas

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
- History of landslide activity or movement during the last 10,000 years
- Recent history of wildfire
- Stream or wave activity that has caused erosion, making the surrounding land unstable
- An alluvial fan, indicating historical flows of debris or sediments
- Impermeable soils, such as silt or clay, mixed with granular soils, such as sand or gravel
- Historical hydraulic mine sites

The sites of past movements are likely sites of future landslides. Past landslides can be recognized by their distinctive topographic shapes, which can remain in place for thousands of years and can cover a few acres or square miles. A small proportion of them may become active in any given year. The recognition of ancient dormant landslide sites is important in the identification of areas susceptible to slides because they 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 at risk of construction-triggered sliding.

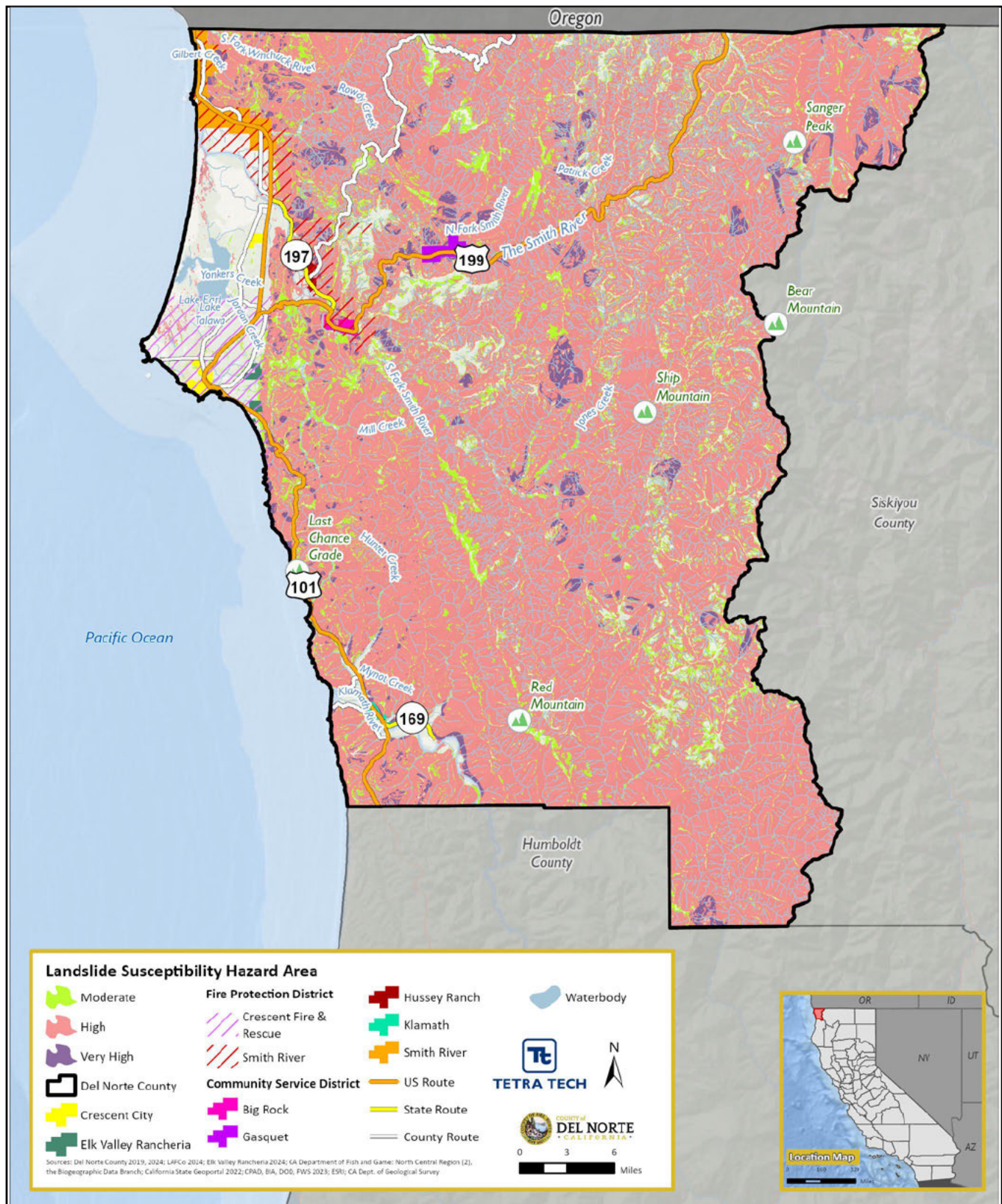
Landslide-Susceptible Areas in Del Norte County

In Del Norte County, a combination of large rain events, easily eroded bedrock, overlying sediments, and fast uplift rates makes the county susceptible to landslides, which can be triggered by rain or seismic events. Conditions are exacerbated by the steady encroachment of development and the infrastructure that supports it.

The California Department of Conservation has mapped susceptibility to deep-seated landslides based on regional estimates of rock strength and steepness of slopes. Generally, weak rocks and steep slopes are most likely to generate landslides. The map uses information on the location of past landslides, the location and relative strength of rock units, and steepness of slope to estimate landslide susceptibility (California Department of Conservation 2020). Figure 12-2 shows this mapping for Del Norte County. As shown in the map, the majority of the county is located in the high susceptibility area.



Figure 12-2. Landslides Hazard Area in Del Norte County





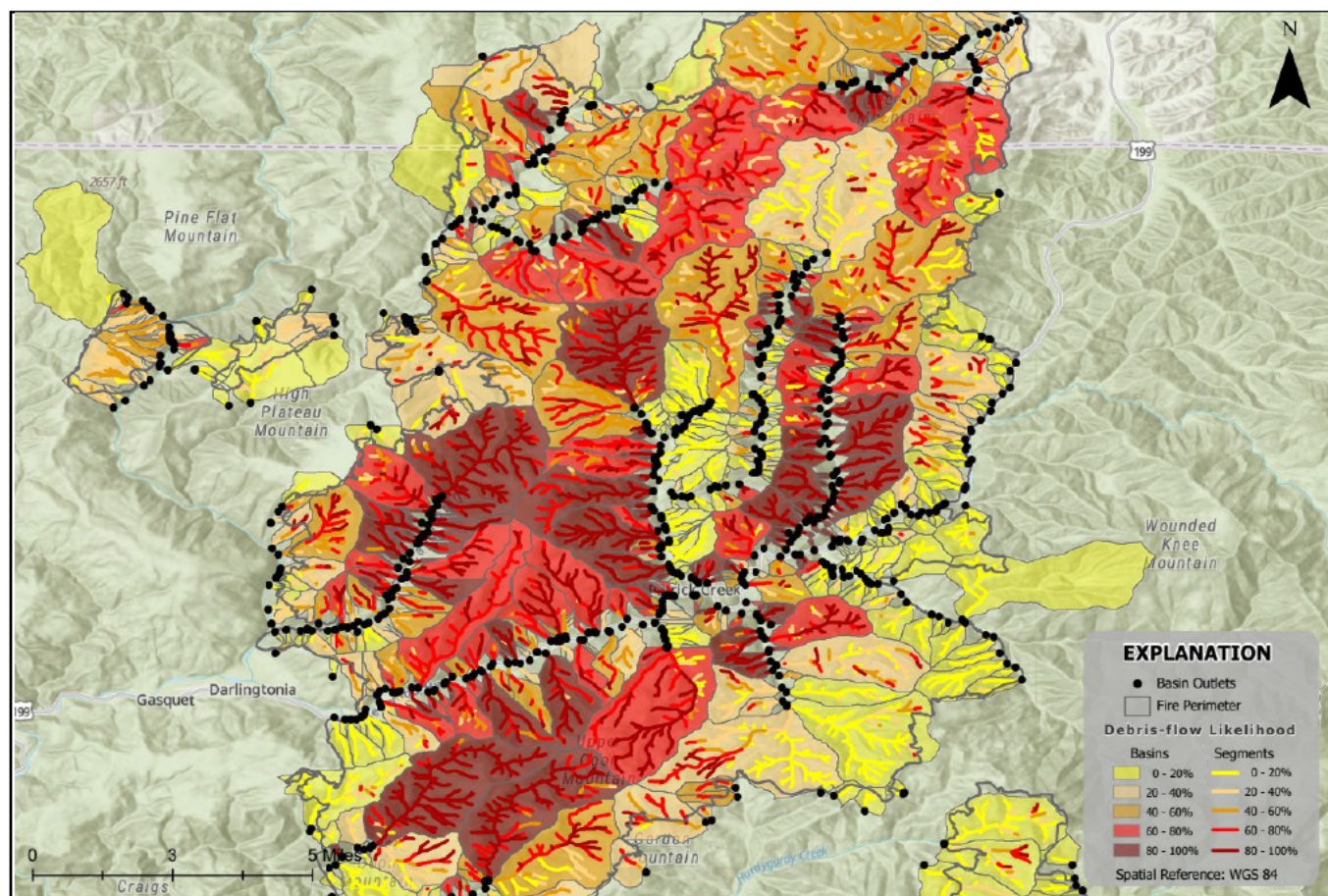
According to Caltrans, 1.97 miles of state highways in Del Norte County are exposed to cliff erosion (Caltrans 2019). Highway 101, the main transportation corridor in northern coastal California, traverses a particularly rugged and landslide-prone area between Crescent City and Wilson Creek. Reoccurring landslides frequently occur on this section of the highway, called Last Chance Grade. In June 2024, Caltrans announced plans to build a 6,000-foot tunnel that will bypass the Last Chance Grade landslide hazard area; this will be the longest tunnel constructed in Caltrans history (Caltrans 2024).

Mapping of Post-Fire Debris Flow Likelihood

The USGS computes thresholds for debris flows in post-burn areas (burn areas less than 2 years old) based on statistical occurrences of debris flows and associated rainfall rates. For post-burn areas assessed by the California Watershed Emergency Response Teams, Cal OES has further refined USGS-generated thresholds using inputs from erosion modeling. Those thresholds are adjusted on a continuous basis with input from local jurisdictions to reflect the revegetation of a post-burn area. Mapping of the post-fire debris flow hazard has been established based on these analyses.

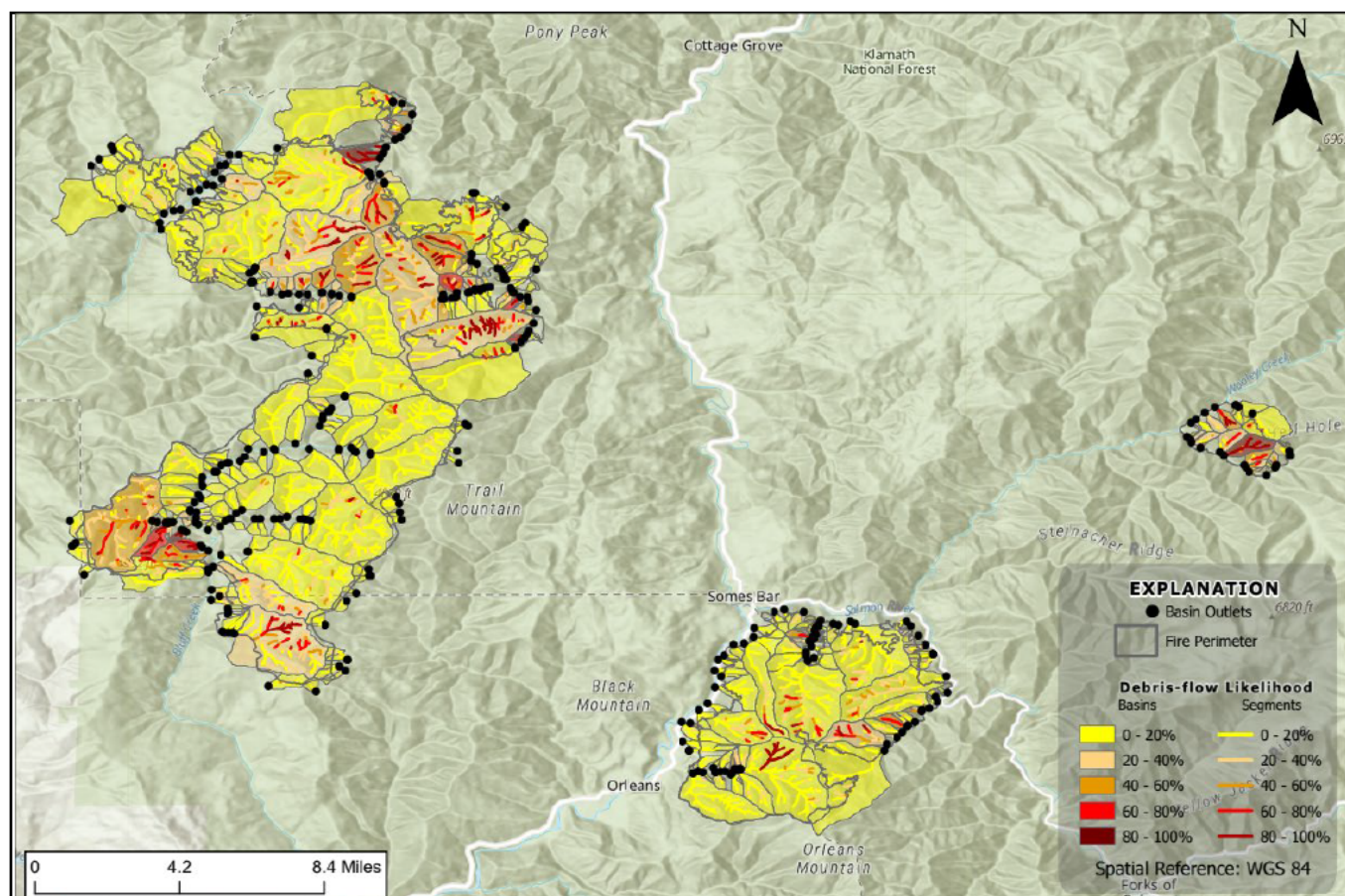
Figure 12-3 and Figure 12-4 show post-fire debris-flow likelihood for two 2023 fires in or near Del Norte County: the Smith River Complex Fire and Lightning Complex Fire, respectively.

Figure 12-3. Smith River Complex Fire Debris Flow Likelihood



Source: (USGS 2024)

Figure 12-4. Lightning Complex Fire Debris Flow Likelihood



Source: (USGS 2024)

12.1.3 Extent

A landslide's severity can be measured using the volume of the material that was moved during the event or by the velocity of the landslide. The rate at which materials move ranges from inches per year to tens of miles per hour (USGS n.d.).

Residents who live on or below hillsides can experience the possibility of debris flow—a fast-moving slurry of water, rock, soil, vegetation, boulders, and trees. Debris flows are triggered by short, intense periods of rainfall or rapid snowmelt, and can cause serious property damage and loss of life (California Department of Conservation 2024). A debris flow typically travels at about 10 mph but can exceed 35 mph in extreme cases (USGS n.d.).

Major landslides in Del Norte County occur as a result of soil conditions that have been affected by severe storms, groundwater or human development. Landslides are most likely during late winter when the water table is high. After heavy rains, 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.



12.1.4 Previous Occurrences

FEMA Disaster Declarations

Table 12-1 lists all landslide-related presidentially declared disasters that have included Del Norte County.

Table 12-1. FEMA Disaster Declarations for Landslide Events in Del Norte County

Event Date	Declaration Date	Declaration Number	Description
January 21, 1983 to March 30, 1983	February 9, 1983	DR-677	Coastal storms, floods, slides, tornadoes
January 5, 1993 to March 20, 1993	February 3, 1993	DR-979	Severe storm, winter storm, mud & landslides, flooding
January 3, 1995 to February 10, 1995	January 10, 1995	DR-1044	Severe winter storms, flooding, landslides, mud flows
December 28, 1996 to April 1, 1997	January 4, 1997	DR-1155	Severe storms, flooding, mud and landslides
December 17, 2005 to January 3, 2006	February 3, 2006	DR-1628	Severe storms, flooding, landslides
February 1, 2017 to February 23, 2017	April 1, 2017	DR-4308	Severe winter storms, flooding, mudslides
February 24, 2019 to March 1, 2019	May 18, 2019	DR-4434	Severe winter storms, flooding, landslides, and mudslides
December 27, 2022 to January 31, 2023	January 14, 2023	DR-4683	Severe winter storms, flooding, landslides, and mudslides
March 9, 2023 to July 10, 2023	March 10, 2023	EM-3592	Severe winter storms, flooding, landslides, and mudslides
February 21, 2023 to July 10, 2023	April 3, 2023	DR-4699	Severe winter storms, straight-line winds, flooding, landslides, and mudslides

Source: (FEMA 2024)

State Emergency Proclamations

Table 12-2 lists all landslide-related state emergency proclamations that have included Del Norte County.

Table 12-2. State Emergency Proclamations for Del Norte County Landslide Events, 2019 to 2024

Proclamation Date	Description
June 21, 2024	The governor added Del Norte County to a state of emergency proclamation for March 2024 storms bringing heavy rains, mountain snow, thunderstorms, flooding, landslides, and high winds.

Source: (Cal OES 2024)



USDA Declarations

Between 2019 and 2024, Del Norte County was not included in any USDA landslide-related agricultural disaster declarations (USDA 2024).

All Recent Events

Table 12-3 lists major recorded landslide-related events that impacted Del Norte County since the previous HMP was developed. For earlier events, refer to the previous HMP.

Table 12-3. Landslide Events in Del Norte County (2019 to 2024)

Event Date	Declaration or Proclamation Number	Location Impacted	Description
April 6, 2018	N/A	Rock and mudslides reported by law enforcement. Estimated storm total rainfall was 4 inches.	A strong storm system resulted in heavy rainfall over Northwest California.
February 25, 2019	DR-4434	14.5 kilometers south of Crescent City, CA on Highway 101.	Rock and debris covered Highway 101 at Last Chance Grade.
April 8, 2019	N/A	25 meters northeast of Postmile R1.1 Del Norte County Highway 197	Mud and trees covered Highway 197 causing a 24 hour closure.
April 10, 2019	N/A	25 meters northeast of Postmile R1.1 Del Norte County Highway 197	Rock slide covered Highway 199 resulting in road closure.
January 12, 2021	N/A	Last Chance Grade	Highway 101 was closed for an extended period due to rock and debris in the roadway.
March 14, 2023	EM-3592	Patrick J. Murphy Memorial Highway and Fizer Lane	Small slide obstructing westbound lane.
June 21, 2024	N/A	A landslide covered Highway 199, six miles east of Gasquet	A deep trough brought widespread hail showers and snow to Northwest California. Heavy snow of several feet was measured in the mountains while the hail showers resulted in numerous traffic accidents along the coast.

Source: (NOAA 2024) (CGS n.d.)

12.1.5 Probability of Future Occurrences

Probability Based on Previous Occurrences

Shallow slides are the most common in Del Norte County, but large catastrophic slides occasionally occur in most parts of the county. Falls, slides, and mud and debris flows caused about half of all damage during the 2005-06 storms in Del Norte County, including tens of millions of dollars of damage to road infrastructure.



Information on previous landslide occurrences in the County was used to calculate the probability of future occurrence of such events. Table 12-4 lists the number of events from various sources over the 41-year period from 1983 to 2024, which is the most complete period of record for all sources reviewed. Based on these records and input from the Steering Committee, the probability of occurrence for landslides in the County is considered “occasional.”

Table 12-4. Probability of Future Landslide Events in Del Norte County

Hazard Type	Number of Occurrences Between 1983 and 2024	Percent Chance of Occurring in Any Given Year
Landslide	19	46%

Source: (NOAA 2024) (FEMA 2024) (Cal OES 2024) (CGS n.d.)

Potential Impact of Climate Change on Future Probability

By 2100, precipitation in the North Coast region is expected to occur in more intense storms. The county could face extreme rainfall, which leads to soil inundation and landslides, especially along steep slopes with little vegetation. Climate change is also expected to increase the occurrence of wildfires, meaning more burn scars that are at higher risk for debris flows after heavy rain. The combination of a generally drier climate in the future, which will increase the chance of drought and wildfires, and the occasional extreme downpour is likely to cause more mudslides and landslides.

12.1.6 Cascading Impacts on Other Hazards

Landslides are not generally known to result in secondary hazards. However, they themselves are often secondary hazards of other event types, such as earthquakes, severe weather, or wildland fires.

12.2 VULNERABILITY AND IMPACT ASSESSMENT

A vulnerability analysis for the landslide hazard was conducted using deep-seated landslide hazard mapping from the California Department of Geological Survey. The County’s assets (population, buildings, critical facilities, and new development) were examined to determine if they are built in the moderate, high, and very high hazard areas. Assets with their centroid located in the hazard area were totaled to estimate the totals and values at risk from the impacts of landslides.

12.2.1 Life, Health, and Safety

Overall Population

Table 12-5 summarizes the estimated population exposed to moderate, high, or very high landslide hazard areas. The exposed population includes 170 residents in the very high hazard area (0.6 percent of the planning partner total), 1,948 residents in the high hazard area (7.1 percent of the total), and 1,853 residents in the moderate hazard area (6.7 percent of the total).



Table 12-5. Population in the Moderate, High, and Very High Landslide Hazard Area

Planning Area	Total Population (2022 ACS 5-Year Estimates)	Moderate Landslide Hazard Area		High Landslide Hazard Area		Very High Landslide Hazard Area	
		Number of Persons	% of Planning Partner Total	Number of Persons	% of Planning Partner Total	Number of Persons	% of Planning Partner Total
Crescent City	6,379	270	4.2%	0	0.0%	0	0.0%
Unincorporated County	21,083	1,583	7.5%	1,948	9.2%	170	0.8%
Del Norte County Total	27,462	1,853	6.7%	1,948	7.1%	170	0.6%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Dept. of Geological Survey

Landslides pose immediate threats to human lives, often resulting in injuries or fatalities. The sudden movement of earth can destroy homes and infrastructure and disrupt essential services, leading to hazardous living conditions. Additionally, landslides can cause long-term health issues due to the displacement of communities and the potential for water contamination. Generally, a landslide event is an isolated incident and impacts the population within the immediate area of the incident. In addition to displacing residents, landslides can block off or damage major roadways and inhibit travel for emergency responders or populations trying to evacuate the area.

Socially Vulnerable Population

Certain populations can experience exacerbated impacts and prolonged recovery from landslides. Individuals over the age of 65 and those below the poverty level are particularly vulnerable to landslides due to potential limited access to medical resources. Populations with access and functional needs, as well as elderly individuals and young children, may struggle to evacuate quickly enough to avoid the impacts of a landslide. Other vulnerable groups include those experiencing homelessness and residents or visitors whose primary language is not English.

Table 12-6 presents the estimated socially vulnerable populations living in the moderate landslide hazard area. Overall, in Del Norte County, there are 366 persons over the age of 65 years, 106 persons under the age of 5 years, 22 non-English speakers, 334 persons with a disability, and 236 living in poverty located in this hazard area.

Table 12-7 presents the estimated socially vulnerable populations living in the high landslide hazard area. There are 406 persons over the age of 65 years, 122 persons under the age of 5 years, 20 non-English speakers, 361 persons with a disability, and 242 living in poverty located in this hazard area.

For the very high landslide hazard area, Table 12-8 shows that there are 35 persons over the age of 65 years, ten persons under the age of 5 years, one non-English speakers, 31 persons with a disability, and 21 living in poverty located in this hazard area.



Table 12-6. Vulnerable Population in the Moderate Landslide Hazard Area

Planning Area	Estimated Number of Vulnerable Persons Located in the Moderate Landslide Hazard Area									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	36	4.2%	7	3.8%	6	4.1%	40	4.2%	40	4.1%
Unincorporated County	330	7.5%	99	7.5%	16	7.1%	294	7.5%	196	7.5%
Del Norte County Total	366	7.0%	106	7.0%	22	6.0%	334	6.9%	236	6.6%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Dept. of Geological Survey

Table 12-7. Vulnerable Population in the High Landslide Hazard Area

Planning Area	Estimated Number of Vulnerable Persons Located in the High Landslide Hazard Area									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Unincorporated County	406	9.2%	122	9.2%	20	8.9%	361	9.2%	242	9.2%
Del Norte County Total	406	7.7%	122	8.1%	20	5.4%	361	7.4%	242	6.8%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Dept. of Geological Survey



Table 12-8. Vulnerable Population in the Very High Landslide Hazard Area

Planning Area	Estimated Number of Vulnerable Persons Located in the Very High Landslide Hazard Area									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Unincorporated County	35	0.8%	10	0.8%	1	0.4%	31	0.8%	21	0.8%
Del Norte County Total	35	0.7%	10	0.7%	1	0.3%	31	0.6%	21	0.6%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Dept. of Geological Survey



12.2.2 General Building Stock

All buildings located in landslide susceptibility areas are at risk. Table 12-9 through Table 12-11 provide a summary of the structures located in the moderate, high, and very high landslide hazard areas in Del Norte County. For an overview of buildings by occupancy class in the moderate, high, and very high landslide hazard areas, refer to Table 12-12 through Table 12-14.

Table 12-9. Buildings in the Moderate Landslide Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the Moderate Landslide Hazard Area			
	Count	Replacement Cost Value	Number of Buildings		Replacement Cost Value	
			Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	64	3.7%	\$100,473,535	3.4%
Unincorporated County	12,555	\$11,702,984,573	946	7.5%	\$1,065,178,849	9.1%
Del Norte County Total	14,279	\$14,687,618,715	1,010	7.1%	\$1,165,652,384	7.9%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California Geoportal 2022; CA Dept. of Geological Survey; RS Means 2024

Table 12-10. Buildings in the High Landslide Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the High Landslide Hazard Area			
	Count	Replacement Cost Value	Number of Buildings		Replacement Cost Value	
			Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	0	0.0%	\$0	0.0%
Unincorporated County	12,555	\$11,702,984,573	1,221	9.7%	\$1,059,753,897	9.1%
Del Norte County Total	14,279	\$14,687,618,715	1,221	8.6%	\$1,059,753,897	7.2%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California Geoportal 2022; CA Dept. of Geological Survey; RS Means 2024

Table 12-11. Buildings in the Very High Landslide Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the Very High Landslide Hazard Area			
	Count	Replacement Cost Value	Number of Buildings		Replacement Cost Value	
			Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	0	0.0%	\$0	0.0%
Unincorporated County	12,555	\$11,702,984,573	99	0.8%	\$80,030,566	0.7%
Del Norte County Total	14,279	\$14,687,618,715	99	0.7%	\$80,030,566	0.5%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California Geoportal 2022; CA Dept. of Geological Survey; RS Means 2024



Table 12-12. Buildings in the Moderate Landslide Hazard Area by Occupancy Class

Planning Area	Buildings in the Moderate Landslide Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other ^a
Crescent City	51	13	0	0
Unincorporated County	695	236	5	10
Del Norte County Total	746	249	5	10

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Dept. of Geological Survey

a. Other = Government, Religion, Agricultural, and Education

Table 12-13. Buildings in the High Landslide Hazard Area by Occupancy Class

Planning Area	Buildings in the High Landslide Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other ^a
Crescent City	0	0	0	0
Unincorporated County	855	333	3	30
Del Norte County Total	855	333	3	30

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Dept. of Geological Survey

a. Other = Government, Religion, Agricultural, and Education

Table 12-14. Buildings in the Very High Landslide Hazard Area by Occupancy Class

Planning Area	Buildings in the Very High Landslide Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other ^a
Crescent City	0	0	0	0
Unincorporated County	75	20	0	4
Del Norte County Total	75	20	0	4

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Dept. of Geological Survey

a. Other = Government, Religion, Agricultural, and Education

As a landslide breaks away from a slope and moves, it creates an uneven surface, causing structural foundations and buildings to experience settlement, cracking, and tilting (USGS 2008). This deformation can occur gradually over years or rapidly within days or hours. A water-saturated, fast-moving debris flow can destroy everything in its path, collapsing walls and shifting structures off their foundations.

12.2.3 Community Lifelines and Other Critical Facilities

Landslides can cause significant damage to facilities that provide community lifeline services. If these lifelines are not functional during or after an emergency, the County may experience cascading impacts, such as injuries, health issues, or prolonged economic impacts.



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 and bridges, causing isolation for neighborhoods, traffic problems, and delays for public and private transportation. Landslides can knock out bridge abutments or significantly weaken the soil supporting them, making them hazardous for use.

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, resulting in power and communication failures. Other types of infrastructure that may also be exposed to landslide hazards include water and sewer infrastructure. Water systems can become dammed or contaminated by landslide materials.

Table 12-15 summarizes the number of community lifelines located in the moderate, high, and very high landslide hazard areas in Del Norte County. Of the 46 community lifelines in moderate landslide hazard areas, the greatest number are categorized as transportation or communications. In the high landslide hazard areas, there are 62 community lifelines, with the greatest number categorized as transportation. For the very high landslide hazard area, there are a total of 13 community lifelines, with the greatest number categorized as communication, transportation, or water systems.

12.2.4 Economy

Direct costs of landslides include the damage sustained by buildings, property, transportation corridors, fuel and energy conduits, and communication lines (USGS 2022). Indirect costs, such as clean-up costs, business interruption, loss of tax revenues, reduced property values, and loss of productivity may also occur. Buildings losses will impact the local tax base and economy. Landslide events that block access to roads can isolate residents and businesses and delay commercial, public, and private transportation. Finally, landslides also have the potential to damage power lines and cause power outages that result in temporary closures to local businesses, which can be devastating for small businesses.

12.2.5 Natural Resources

A landslide alters topography and can damage or destroy vegetation and wildlife habitat. Soil and sediment runoff accumulating downslope can block waterways and roadways and degrade water quality in streams and other water bodies. Mudflows into downstream waterways can threaten the life of freshwater species (USGS 2020). The impacts of eroded landscape can travel for miles downstream into adjacent waterways and create issues for surrounding watersheds. Additional environmental impacts include loss of forest productivity.



Table 12-15. Number of Facilities in the Moderate, High and Very High Landslide Hazard Area

Planning Area	Number of Facilities in the Landslide Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communica-tions	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transpor-tation	Water Systems	Other Critical Facilities	Count	% of Planning Partner Total
Moderate Landslide Hazard Area											
Crescent City	0	0	1	1	0	0	0	0	0	2	1.4%
Unincorporated County	10	3	1	4	1	9	10	3	3	44	10.1%
Del Norte County Total	10	3	2	5	1	9	10	3	3	46	7.9%
High Landslide Hazard Area											
Crescent City	0	0	0	0	0	0	0	0	0	0	0.0%
Unincorporated County	7	3	5	3	0	11	18	13	2	62	14.2%
Del Norte County Total	7	3	5	3	0	11	18	13	2	62	10.6%
Very High Landslide Hazard Area											
Crescent City	0	0	0	0	0	0	0	0	0	0	0.0%
Unincorporated County	3	1	1	0	0	1	3	3	1	13	3.0%
Del Norte County Total	3	1	1	0	0	1	3	3	1	13	2.2%

Source: Del Norte County 2019, 2024; HIFLD 2024; California Department of Transportation 2023; California Department of Education 2020; California Department of Motor Vehicles 2020; CA Dept. of Geological Survey



12.2.6 Historic and Cultural Resources

Landslide impacts on historic resources in Del Norte County are highest in areas near hillsides characterized by unstable soil and erosion. Historical structures, such as the Gasquet Ranger Station Historic District and the Endert's Beach Archeological Sites, are often not built to modern building standards and are more prone to damage. Landslides can disrupt foundations and cause structural damage, threatening the preservation of these important historical sites.

Cultural resources including parks, open spaces, community facilities, and religious institutions are also vulnerable to landslides. Areas near hillsides with unstable soil can experience property and infrastructure damage, affecting cultural landmarks such as the Redwood National and State Parks. Landslides can result in reduced access and potential closures of these assets, disrupting community activities and services.

12.3 FUTURE CHANGES THAT MAY AFFECT RISK

12.3.1 Potential or Planned Development

The California Building Standards Code (Title 24, California Code of Regulations) incorporates the International Building Code (IBC) by reference, with California-specific amendments. The California Building Code (CBC), which forms Part 2 of Title 24, includes provisions requiring geotechnical investigations and slope stability evaluations for projects located in areas with potential landslide or unstable soil conditions. These requirements help ensure that new construction is designed to minimize vulnerability to slope failure and other geologic hazards.

The Del Norte County General Plan (2003) and the City of Crescent City General Plan (2001) contain policies relating to managing risk to development in landslide hazard areas.

12.3.2 Projected Changes in Population

Del Norte County's population is projected to decline in upcoming decades, from 27,648 in 2020 to 25,317 in 2070—an 8.4 percent decrease (CA Department of Finance 2025). A decrease in population is likely to result in a decrease in overall risk from landslide events.

12.3.3 Climate Change

Climate change may impact storm patterns, increasing the probability of more frequent, intense storms. 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 these factors would increase the probability and severity of landslides.



12.3.4 Other Considerations for Future Planning

Del Norte County faces several conditions that can significantly impact the risk of landslides. One of the primary factors is the geological composition of the area. The presence of loose, unconsolidated soils and fractured rock formations makes certain regions more susceptible to landslides. Additionally, hydrological conditions play a crucial role. Heavy rainfall and snowmelt can lead to water saturation, weakening the soil and rock structures and increasing the likelihood of landslides. Poor drainage systems can exacerbate this issue, leading to higher water runoff and further destabilizing the terrain.

Vegetation also significantly influences landslide risk. Areas with sparse or no vegetative cover are more prone to erosion, as plants and trees help stabilize the soil with their root systems. The lack of vegetation can lead to increased soil erosion and a higher probability of landslides, especially during heavy rainfall events.



13. TSUNAMI

13.1 HAZARD PROFILE

The Del Norte County website (*Prepare Del Norte - Tsunami n.d.*) outlines the County's efforts to educate residents about tsunamis – what they are, history of occurrences, evacuation zones, how to get notified, and information about the Redwood Coast Tsunami Work Group.

13.1.1 Hazard Description

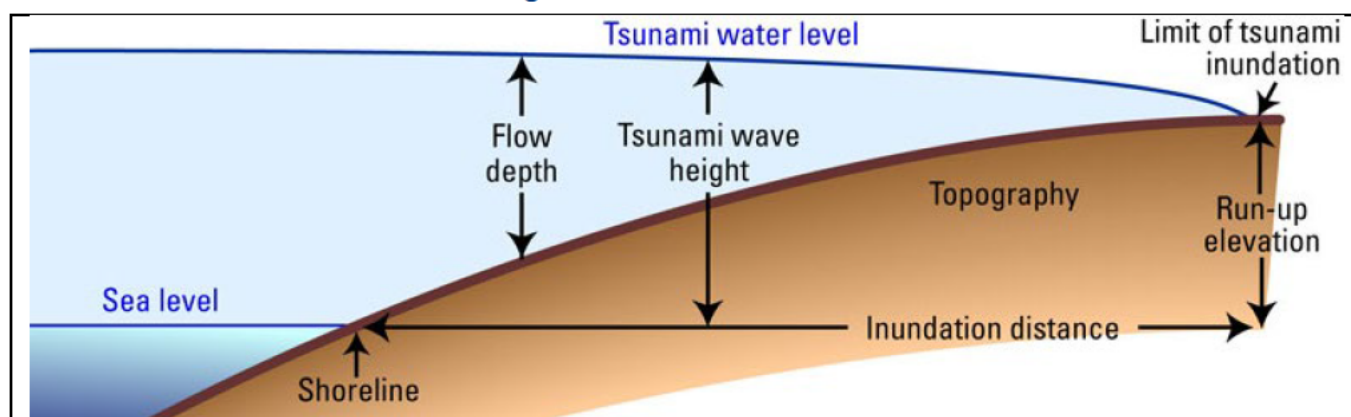
Tsunamis are a series of long waves generated by a large and sudden displacement of the ocean. The most frequent cause of these displacements is large earthquakes occurring beneath or near the ocean floor; however, tsunamis can also be triggered by landslides, volcanic activity, certain weather phenomena, and meteorite impacts. Tsunamis radiate outward in all directions from their source and can move across entire ocean basins. Upon reaching coastal areas, they can result in significant flooding and generate strong currents that may persist for several hours or even days (NOAA 2023). Tsunamis are typically classified as local or distant, depending on the location of their source in comparison to where waves occur:

- The waves nearest to the generating source represent a local tsunami. Such events have minimal warning time, leaving few options except to run to high ground. The damage from the tsunami itself may be accompanied by additional damage from the triggering earthquake due to ground shaking, surface faulting, liquefaction or landslides.
- The waves far from the generating source represent a distant tsunami. Distant tsunamis may travel for hours before striking a coastline, giving a community a chance to implement evacuation plans.

In the open ocean, a tsunami may be only a few inches or feet high, but it can travel with speeds approaching 600 miles per hour. As a tsunami enters the shoaling waters near a coastline, its speed diminishes, its wavelength decreases, and its height increases greatly. At the shoreline, tsunamis may take the form of a fast-rising tide, a cresting wave, or a bore (a large, turbulent wall-like wave). The first wave is usually followed by several larger and more destructive waves (NOAA 2023).

The configuration of the coastline, the shape of the ocean floor, and the characteristics of advancing waves play important roles in the destructiveness of the waves. Bays, sounds, inlets, rivers, streams, offshore canyons, islands, and flood control channels may cause various effects that alter the level of damage. Offshore canyons can focus tsunami wave energy, and islands can filter the energy. It has been estimated that a tsunami wave entering a flood control channel could reach a mile or more inland, especially if it enters at high tide. The orientation of the coastline determines whether the waves strike head-on or are refracted from other parts of the coastline. A wave may be small at one point on a coast and much larger at other points. The inundation area for a tsunami event is often described as runup as illustrated in Figure 13-1.

Figure 13-1. Tsunami Landfall



Source: (USGS 2010)

The Del Norte County website (Prepare Del Norte - Tsunami n.d.) outlines the County's efforts to educate residents about tsunamis – what they are, history of occurrences, evacuation zones, how to get notified, and information about the Redwood Coast Tsunami Work Group.

13.1.2 Location

Del Norte County has a history of being more vulnerable to tsunamis than any other county in California. Figure 13-2 shows the tsunami inundation hazard area for the county. Detailed tsunami maps are shown in Figure 13-3 to Figure 13-6. The inundation areas represent the maximum tsunami runup from a number of extreme, yet realistic, tsunami sources, including the Cascadia Subduction Zone, the Central Aleutians Island Subduction Zone, historical earthquake events, and other sources (Redwood Coast Tsunami Working Group 2022).

13.1.3 Extent

When a tsunami reaches the shore, the water level can rise, in extreme cases, to more than 50 feet for tsunamis of distant origin, and over 100 feet for tsunamis from earthquakes nearby (NOAA 2023). The full extent of a tsunami strike is difficult to estimate because effects depend on the topography of the impact zone. The Boxing Day tsunami in the Indian Ocean in 2004 was the deadliest tsunami in recorded history and claimed the lives of more than 227,000 people across 14 countries (UN 2023). The Del Norte planning area has not experienced any tsunami as devastating as that event.

The Del Norte County planning area possesses some geographical features that may help absorb some of the impacts of tsunami events. However, a major tsunami event in the region would have devastating impacts on the people, property and economy of Del Norte County.

Cal OES estimates that a magnitude 9.0 earthquake along the Cascadia Subduction Zone would generate a tsunami with estimated wave heights of 16 to 49 feet in Crescent City (Cal OES 2023). The Cascadia Subduction Zone is the 600-mile-long offshore zone, from northern Vancouver Island to Cape Mendocino, where the Juan de Fuca plate is being subducted below the North American plate.



Figure 13-2. Tsunami Inundation Hazard Area

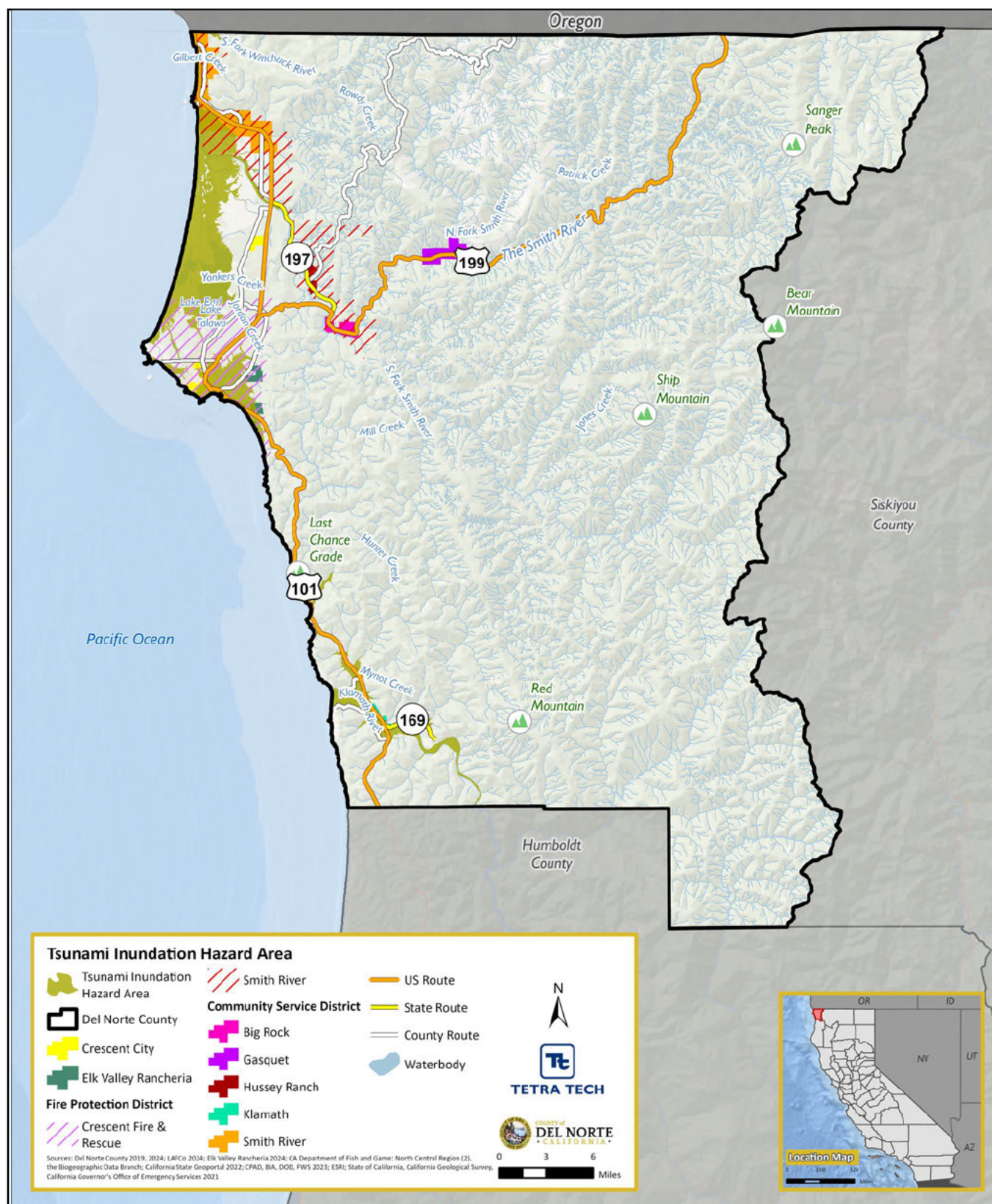


Figure 13-3. Fort Dick Tsunami Hazard Map



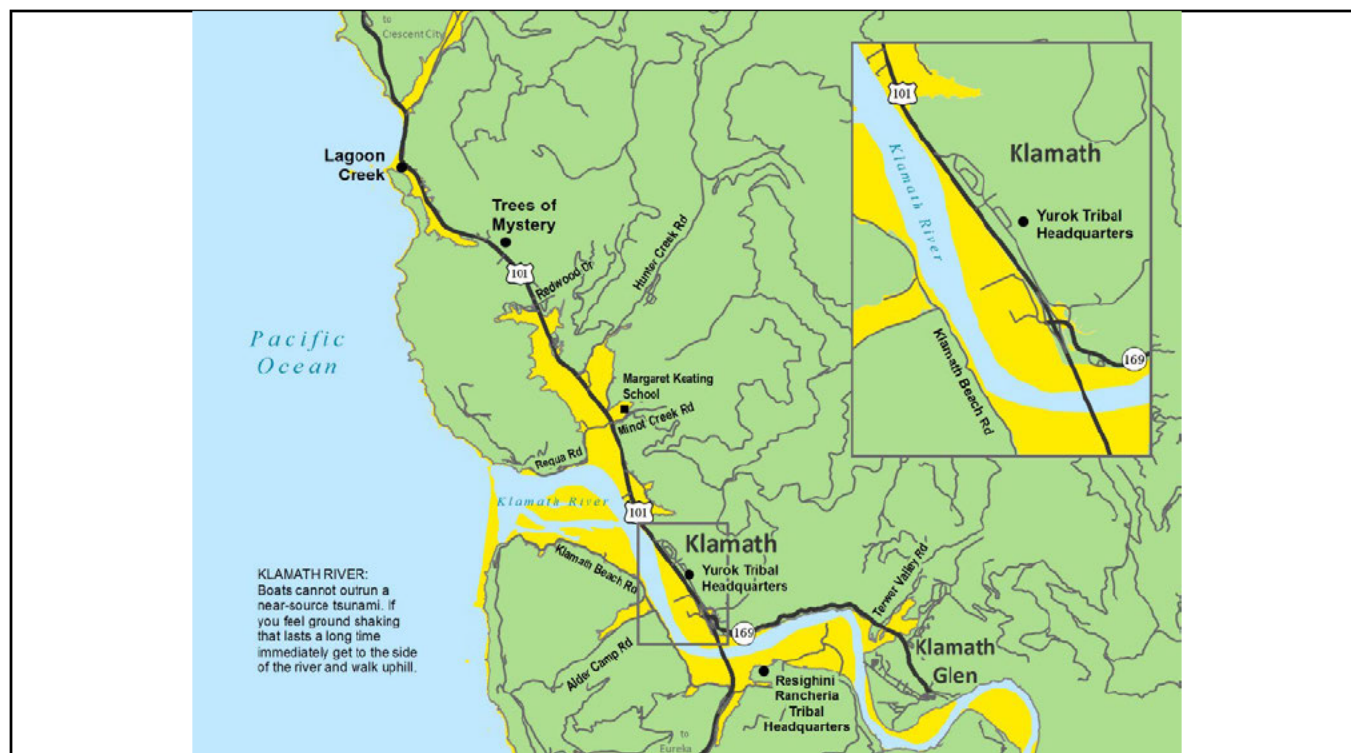
Source: (Redwood Coast Tsunami Working Group 2022)

Figure 13-4. Smith River/Crescent City Tsunami Hazard Map



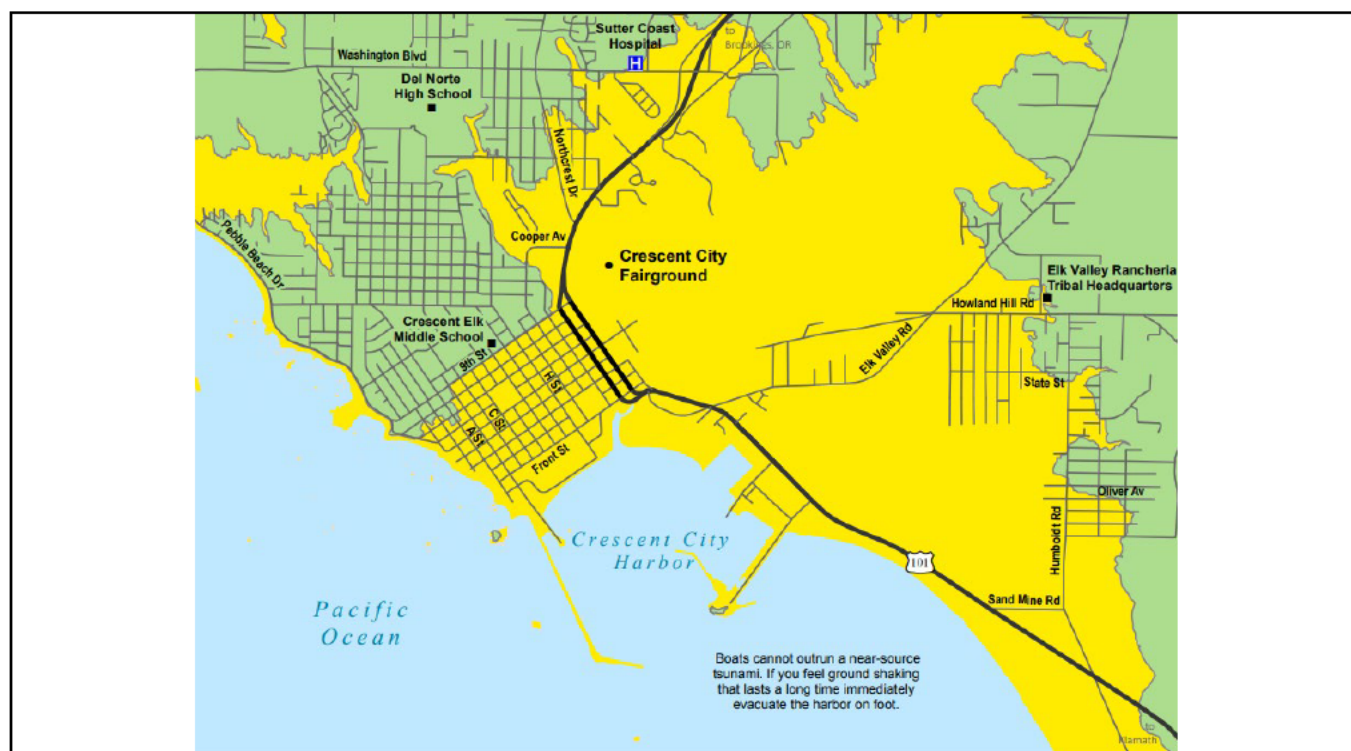
Source: (Redwood Coast Tsunami Working Group 2022)

Figure 13-5. Klamath Tsunami Hazard Map



Source: (Redwood Coast Tsunami Working Group 2022)

Figure 13-6. Crescent City Tsunami Hazard Map



Source: (Redwood Coast Tsunami Working Group 2022)



13.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Table 13-1 lists all tsunami-related presidentially declared disasters that have included Del Norte County.

Table 13-1. FEMA Disaster Declarations for Tsunami Events in Del Norte County

Event Date	Declaration Date	Declaration Number	Description
March 28, 1964	April 1, 1964	DR-169	Seismic Sea Wave
March 11, 2011	April 18, 2011	DR-1968	Tsunami Waves

Source: (FEMA 2024)

State Emergency Proclamations

Table 13-2 lists all tsunami-related state emergency proclamations that have included Del Norte County.

Table 13-2. State Emergency Proclamations for Del Norte County Tsunami Events, 2019 to 2024

Proclamation Date	Description
December 5, 2024	The governor declared a state of emergency in Del Norte, Humboldt, and Mendocino counties following a 7.0 earthquake and tsunami warning. The tsunami warning was canceled and no tsunami occurred.

Source: (Cal OES 2024)

USDA Declarations

Between 2019 and 2024, Del Norte County was not included in any USDA tsunami-related agricultural disaster declarations (USDA 2024).

Previous Events

In 1964, a rupture of an underwater Pacific fault generated the 1964 Great Alaska Earthquake, resulting in a tsunami in Del Norte County. Between midnight and 2 a.m. on March 28, the tidal gauge in the Crescent Harbor recorded elevations of 14.5 feet and 12 feet above sea level before breaking on the third wave; eyewitnesses claimed that the fourth wave was the largest at 22 feet above sea level (Cal Poly Humboldt 2024). 11 people died and nearly 30 square blocks of the City of Crescent City were destroyed.

In 2006, a tsunami damaged the Crescent City Harbor. Between 2019 and 2024, Del Norte County was not included in any tsunami-related disaster events.



13.1.5 Probability of Future Occurrences

Probability Based on Previous Occurrences

The frequency of tsunamis is related to the frequency of the events that cause them, so it is similar to the frequency of seismic or volcanic activities or landslides. The National Tsunami Hazard Mitigation Program rates the tsunami risk to the U.S. west coast as high to very high (Dunbar and Weaver, 2015). The FEMA National Risk Index ranks counties based on risk to natural hazards. Del Norte County is the only county in the contiguous 48 states that is ranked as having a relatively high risk from tsunamis, all other counties on the west coast are ranked as relatively moderate, relatively low, or very low.

Table 13-3 lists the number of major events (defined for these purposes as 3 feet or more of runup) from various sources over the 71-year period from 1953 to 2024, which is the most complete period of record for all sources reviewed. Based on these records and input from the Steering Committee, the probability of occurrence for tsunami in the County is considered “rare.”

Table 13-3. Probability of Future Hazard Events in Del Norte County

Hazard Type	Number of Occurrences Between 1953 and 2024	Percent Chance of Occurring in Any Given Year
Tsunami	3	4.2%

Source: (NOAA 2024) (FEMA 2024)

Potential Impact of Climate Change on Future Probability

The earthquakes and landslides that create tsunamis could be impacted by climate change. Some scientists say that melting glaciers could induce tectonic activity. Heavy rainfall could cause soil instability that may increase the likelihood of landslides into water bodies, which can generate tsunamis.

13.1.6 Cascading Impacts on Other Hazards

Earthquakes can generate tsunamis when the sea floor abruptly deforms and displaces the overlying water from its equilibrium position, especially earthquakes with a magnitude above 7.6 (USGS n.d.). Waves are formed as the displaced water mass, acting under the influence of gravity, attempts to regain its equilibrium.

Aside from the tremendous hydraulic force of the tsunami waves themselves, floating debris carried by a tsunami can endanger human lives and batter inland structures. Tsunami-caused flooding can cause contamination of drinking water and can result in the spread of disease. In addition, tsunami flooding has the potential to spread hazardous materials that contaminate the environment and endanger health. Tsunami inundation often results in electrical issues, such as power outages and even fires above the water level.



13.2 VULNERABILITY AND IMPACT ASSESSMENT

A vulnerability analysis to determine the County's risk to the tsunami hazard was conducted using the tsunami hazard data shown in Figure 13-2 and the methodology described in Section 4.3.2.

13.2.1 Life, Health, and Safety

Overall Population

Table 13-4 presents the overall population located in the tsunami hazard area. Overall 4,019 individuals, representing 14.6 percent of the County total, are located within the hazard area.

Table 13-4. Population in the Tsunami Hazard area

Planning Area	Total Population (2022 ACS 5-Year Estimates)	Population in the Tsunami Hazard Area	
		Number of Persons	% of Planning Partner Total
Crescent City	6,379	2,543	39.9%
Unincorporated County	21,083	1,476	7.0%
Del Norte County Total	27,462	4,019	14.6%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022

The Hazus Flood Model provides estimates of the population that will be displaced due to flooding as well as an estimate of people who will seek publicly provided short-term shelter based on the presence of flooding and characteristics of the population in inundated areas. Estimates of the displaced population and people seeking publicly provided short-term shelter are not based on the modeled damage state of structures. Population is assumed to be displaced in all areas where the depth of flooding is greater than zero.

A Hazus coastal flood model was run to estimate potential losses in Del Norte County for the 975-year return period probabilistic tsunami. In the event of a tsunami, it is estimated that 3,380 people in Del Norte County would be displaced, which represents 12.3 percent of the county population. In addition, 330 people could seek short-term sheltering assistance. Table 13-5 shows the estimated displaced population and persons seeking short-term sheltering for jurisdictions in Del Norte County.

Table 13-5. Population Displaced or Seeking Short-Term Sheltering Due to Tsunami

Planning Partner Area	Total Population (2022 ACS 5-Year Estimates)	Tsunami 975-Year Mean Return Period Impacts on People	
		Displaced Population	Persons Seeking Short-Term Sheltering
Crescent City	6,379	1,414	117
Unincorporated County	21,083	1,966	213
Del Norte County (Total)	27,462	3,380	330

Source: Hazus v6.1; U.S. Census Bureau 2020; Del Norte County 2024; Microsoft 2021; NSI/USACE 2022; California State geoportal 2022; State of California, California Geological Survey, California Governor's Office of Emergency Services 2021



Tsunamis pose significant vulnerabilities to coastal communities, impacting life, health, and safety. These natural disasters not only threaten immediate physical harm but also lead to long-term public health challenges and community well-being issues. Tsunami waves can carry loose objects and people out to sea when they retreat (USGS n.d.).

Public health impacts of tsunamis closely resemble those associated with coastal flooding. Beyond the immediate threats to life and property, tsunamis can lead to the contamination of drinking water through saltwater intrusion, inundation of hazardous materials facilities, or wastewater treatment plants. Floodwaters may carry hazardous substances, rendering them perilous to navigate. Additionally, flooded structures can rapidly develop mold or wood rot, posing significant health risks to inhabitants if not properly addressed.

Socially Vulnerable Population

Table 13-6 presents the estimated socially vulnerable populations within the tsunami hazard area. In Del Norte County, the tsunami hazard area includes 651 persons over the age of 65, 164 children under the age of 72 non-English speakers, 650 individuals with disabilities, and 567 persons living in poverty.

Limited financial resources can prevent economically disadvantaged individuals from adequately preparing for or recovering from a tsunami, and they may live in housing that is more susceptible to damage. Older or disabled individuals often have mobility issues that hinder quick evacuation and may require assistance, which can be scarce during emergencies. These people also may need medical attention during and after a tsunami, but medical facilities may be overwhelmed or inaccessible. Additionally, tsunamis can disrupt transportation and communication networks, isolating communities and making it difficult for emergency services to reach those in need.

13.2.2 General Building Stock

Table 13-7 summarizes the number of structures located in the tsunami hazard area. Overall, in Del Norte County, there are 1,761 buildings (12.3 percent of the total building stock) located in the tsunami hazard area with an estimated \$2.5 billion of replacement cost value (building and content replacement costs).

Table 13-8 shows the estimated building losses from a tsunami. Hazus estimates that a tsunami could cause more than \$364 million in property loss in Crescent City, which represents 12.2 percent of the city's total building value.

Table 13-9 summarizes buildings in the tsunami hazard areas by occupancy class. In this hazard area, there are 1,128 residential properties, 516 commercial properties, 36 industrial properties, and 81 governmental, religious, agricultural, and education properties.



Table 13-6. Vulnerable Populations in the Tsunami Hazard Area

Planning Area	Estimated Number of Vulnerable Persons Located in the Tsunami Hazard Area									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	344	39.8%	72	39.3%	57	39.3%	376	39.8%	384	39.8%
Unincorporated County	307	7.0%	92	6.9%	15	6.7%	274	7.0%	183	7.0%
Del Norte County Total	651	12.4%	164	10.9%	72	19.5%	650	13.4%	567	15.8%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; Del Norte County 2024

Table 13-7. Buildings in the Tsunami Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the Tsunami Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	801	46.5%	\$1,333,479,341	44.7%
Unincorporated County	12,555	\$11,702,984,573	960	7.6%	\$1,196,698,213	10.2%
Del Norte County Total	14,279	\$14,687,618,715	1,761	12.3%	\$2,530,177,554	17.2%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; Del Norte County 2024; RS Means 2024

Table 13-8. Estimated Building Losses from Tsunami Impacts

Planning Partner Area	Total Replacement Cost Value	Tsunami 975-Year Mean Return Period Estimated Losses				
		All Occupancies		Residential	Commercial	All Other Occupancies
		Loss	% of Total			
Crescent City	\$2,984,634,142	\$364,852,511	12.2%	\$111,090,213	\$209,410,807	\$44,351,492
Unincorporated County	\$11,702,984,573	\$427,095,730	3.6%	\$307,136,691	\$88,751,173	\$31,207,866
Del Norte County (Total)	\$14,687,618,715	\$791,948,242	5.4%	\$418,226,904	\$298,161,980	\$75,559,358

Source: Hazus v6.1; Del Norte County 2024; Microsoft 2021; NSI/USACE 2022; California State Geoportal 2022; RS Means 2024; State of California, California Geological Survey, California Governor's Office of Emergency Services 2021



Table 13-9. Buildings in the Tsunami Hazard Area By General Occupancy Class

Planning Area	Buildings in the Tsunami Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other ^a
Crescent City	480	298	4	19
Unincorporated County	648	218	32	62
Del Norte County Total	1,128	516	36	81

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; Del Norte County 2024; RS Means 2024

a. Other = Government, Religion, Agricultural, and Education

Building Damage

Since earthquakes can trigger tsunamis, including a possible Cascadia event, the damage to buildings may be as a result of either the earthquake, tsunami, or a combination of both. During a catastrophic event, such as Cascadia, it may be difficult to determine which hazard caused the subsequent damage. Such an event could cause massive destruction to building stock among other areas. Destruction from just a tsunami is outlined in Table 13-8. As shown in Table 7-15, the unincorporated county is projected to experience \$1.2 billion (10.5 percent) in building and contents loss from a 500-year MRP earthquake event: \$740 million in residential damage, \$347 million in commercial damage, and \$140 million in damage to all other occupancy types. Crescent City is projected to lose \$160 million (5.3 percent) of its total building and contents value from this earthquake event.

13.2.3 Community Lifelines and Other Critical Facilities

Table 13-10 summarizes the critical facilities within the tsunami hazard area in the planning area. Del Norte County has a total of 119 critical facilities located in this hazard area, with the safety and security sector having the highest number of facilities (28).

Tsunamis pose a significant threat to community lifelines and critical facilities, disrupting essential services and hindering emergency response and recovery efforts. Water systems, including treatment plants, pipelines, and distribution networks, can sustain severe damage, leading to contamination and loss of potable water, thereby compromising public health and sanitation. Transportation infrastructure, such as roads, bridges, and airports, is highly susceptible to tsunami damage, impeding evacuation efforts and delaying the arrival of emergency services. This destruction can isolate communities and hinder the delivery of essential supplies.

Energy infrastructure, including power plants, substations, and transmission lines, is also vulnerable, resulting in widespread power outages that affect other critical services like healthcare and telecommunications. Communication networks, including cell towers and fiber optic cables, can be disrupted, making it challenging to coordinate emergency response efforts and communicate with the public, leading to delays in disseminating vital information.



Table 13-10. Number of Facilities in the Tsunami Hazard Area, by Lifeline Category

Planning Area	Number of Facilities in the Tsunami Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communica tions	Energy	Food, Hydration, Shelter	Hazard- ous Materials	Health & Medical	Safety & Security	Transpor- tation	Water Systems	Other Critical Facilities	Count	% of Planning Partner Total
Crescent City	12	5	12	0	14	22	1	1	18	85	57.4%
Unincorporated County	4	1	4	2	0	6	12	2	3	34	7.8%
Del Norte County Total	16	6	16	2	14	28	13	3	21	119	20.4%

Source: Del Norte County 2019, 2024; HIFLD 2024; California Department of Transportation 2023; California Department of Education 2020; California Department of Motor Vehicles 2020



Healthcare facilities, such as hospitals and clinics, may be damaged or flooded, reducing their capacity to provide medical care to those injured during the tsunami, and exacerbating the impact on vulnerable populations. Emergency services, including fire stations and police stations, can be impacted, limiting their ability to respond effectively to the disaster and resulting in delayed rescue operations and increased risk to public safety.

The interdependency between these lifelines means that damage to one sector can have cascading effects on others, compounding the disruption of services and delaying recovery efforts. Addressing these vulnerabilities through proactive hazard mitigation planning is essential to enhance community resilience and ensure a swift and effective response to tsunami events.

13.2.4 Economy

Tsunamis can have wide-reaching economic impacts on Del Norte County. Direct economic consequences may arise from the destruction of buildings and infrastructure, including power utility poles and lines, potable water and wastewater facilities, and roadways. The force of tsunami waves can devastate piers, breakwaters, and seawalls. Ships, marinas, and fishing fleets may be battered, sunk, moored, or stranded, severely affecting the fishing and tourism industries. The impact on fisheries can be profound, as the destruction of breeding grounds and changes in water quality can reduce fish populations. This, in turn, affects the livelihoods of local communities that depend on fishing.

Business interruptions are likely, and damages or alterations to impacted beaches can affect tourism for extended periods after the tsunami. Additionally, the county may experience a decline in tourist numbers due to perceived risks associated with visiting post-tsunami. This reduction in tourism can lead to significant revenue losses for local businesses and the overall economy.

Debris management may also be a large expense after a tsunami event. Hazus estimates the amount of debris generated from a tsunami. The model breaks down debris into three categories: (1) finishes (drywall, insulation, etc.), (2) structural (wood, brick, etc.), and (3) foundations (concrete slab and block, rebar, etc.). The distinction is made because of the different types of equipment needed to handle the debris. The total amount of debris that will require cleanup is estimated to be 36,861 tons for the entire county. Table 13-11 shows the estimated debris created during a tsunami.

Table 13-11. Estimated Debris Created During a Tsunami

Planning Partner Area	Estimated Debris Created by the 975-Year Mean Return Period Tsunami			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Crescent City	20,452	6,606	8,325	5,521
Unincorporated County	16,408	4,952	6,568	4,889
Del Norte County (Total)	36,861	11,558	14,893	10,410

Source: Hazus v6.1; Del Norte County 2024; Microsoft 2021; NSI/USACE 2022; California State geoportal 2022; State of California, California Geological Survey, California Governor's Office of Emergency Services 2021



13.2.5 Natural Resources

Tsunamis can significantly alter the landscape of Del Norte County, both above and below the water. Potential consequences include permanent changes to beaches and other coastal features, loss of or changes to wildlife habitats, and alterations in the quality and availability of fresh water. Tsunami inundation can result in erosion and scouring. Loss of wetlands from erosion and wetland migration due to tsunami inundation can reduce the natural filtration provided by wetland plants, increasing the likelihood of water quality issues. Healthy coastal ecosystems can be transformed, degraded, or lost due in part to tsunamis.

Tolowa Dunes State Park, located within a tsunami hazard zone in Del Norte County, is particularly vulnerable to significant impacts from tsunami events. The park's landscape can undergo dramatic changes, with the potential for fresh water wetlands or Sitka spruce forests to develop following tsunami events. The force of tsunami waves can alter the park's coastal features, affecting both terrestrial and aquatic ecosystems. Associated landslides and sediment shifts can render waterways unnavigable. These changes can disrupt wildlife habitats, impacting the diverse bird, animal, and plant life that thrive in the park. Additionally, the inundation of salt water can harm natural resources, affecting the services they provide, such as biological, ecological, protective, and recreational functions.

The disruption of ecosystems can have cascading effects, leading to long-term ecological imbalances. Overall, the environmental damage caused by tsunamis can have lasting effects on natural resources, requiring extensive restoration efforts and long-term monitoring to mitigate the impacts.

13.2.6 Historic and Cultural Resources

Tsunamis can have devastating effects on the historic resources of Del Norte County, causing both immediate and long-term damage. Historic buildings, monuments, and landmarks located near the coast, such as the Battery Point Lighthouse and the Main Museum managed by the Del Norte County Historical Society, are at high risk of being damaged or destroyed by the powerful force of tsunami waves. This can result in the loss of irreplaceable cultural heritage.

The force of the water can erode foundations and walls, while sediment deposition can bury or obscure historic sites, making restoration efforts challenging and sometimes impossible. The inundation of saltwater can cause significant damage to the materials and structural integrity of historic buildings, as wood, metal, and other materials can deteriorate rapidly when exposed to saltwater, leading to long-term preservation issues.

Tsunamis can also wash away or bury artifacts, making them difficult to recover or permanently destroying valuable historical and archaeological information. Additionally, tsunamis can change the topography of coastal areas, altering the context in which historic sites are situated, which can affect their historical significance and interpretation.

Tsunamis can destroy sacred sites and disrupt traditional fishing practices and other cultural activities, profoundly affecting the community's way of life. The loss of cultural resources can diminish the community's connection to its history and traditions, impacting cultural identity and continuity. The



Tolowa and Yurok tribes, for example, have rich oral histories that document significant tsunami events. These tsunamis have shaped the cultural landscape and heritage of these communities, highlighting the profound impact such natural disasters can have on cultural resources (Fairchild 2012).

13.3 FUTURE CHANGES THAT MAY AFFECT RISK

13.3.1 Potential or Planned Development

Limiting new development in tsunami hazard zones and adopting building codes that address tsunami risks can reduce potential damage, making thoughtful land-use planning essential for protecting vulnerable areas. It is assumed that development and redevelopment trends in Del Norte County are not such that there is major concern about development in identified tsunami risk areas. Future development in the County and the City of Crescent City will be regulated by their respective general plans. Both general plans include policies regarding construction in tsunami hazard areas:

- **Crescent City**—The City requires that construction in low-lying coastal areas—those in the zone of possible runup—be designed in accordance with recommendations stated in the report, *Protection of Crescent City, California From Tsunami Waves*.
- **Del Norte County**—The County requires construction in low-lying coastal areas or in the zone of possible tsunami runup to be designed in accordance with the requirements of the County Flood Hazard Ordinance.

13.3.2 Projected Changes in Population

Del Norte County's population is projected to decline in upcoming decades, from 27,648 in 2020 to 25,317 in 2070—an 8.4 percent decrease (CA Department of Finance 2025). With fewer people living in coastal areas, the overall vulnerability to tsunamis may decrease, leading to fewer lives at risk and potentially less damage to infrastructure. Smaller populations can also result in more efficient evacuation processes during a tsunami warning.

However, a reduced population might limit economic resources for disaster preparedness and recovery efforts, affecting the community's ability to build and maintain protective infrastructure. Additionally, smaller communities may face challenges in maintaining resilience and recovery efforts post-tsunami, as there are fewer people to support rebuilding and recovery.

13.3.3 Climate Change

Climate change may increase tsunami risk by affecting the factors that cause them. Rising seas could result in an increase in wave runup when tsunamis occur. Even modest rises in sea level will dramatically increase the frequency and intensity of flooding when a tsunami occurs, as the tsunami can travel further inland. Future smaller tsunamis could have the same impact as larger tsunamis today.



13.3.4 Other Considerations for Future Planning

The National Tsunami Warning Center (NTWC) analyzes earthquakes, evaluates water-level information, issues tsunami messages, conducts public outreach, and coordinates with government, academic, and international partners to provide timely, relevant information about tsunamis. In this case, strong ground shaking would provide the first warning of a potential tsunami. To detect and measure tsunamis, the NTWC depends on seismic and water-level networks from around the world. The time it takes to detect a tsunami after an earthquake depends on the distance between the source of the earthquake and the nearest measurement station. The amount of time it takes for a warning center to issue initial tsunami messages depends on the number and location of seismic stations near an earthquake's point of origin. In regions of high seismic station density, the warning centers can issue messages within five minutes. In areas of lower seismic station density, response time increases to 10–15 minutes.

In Del Norte County, the sirens and aircraft public address system are critical components to local warning systems. In addition to the civil air patrol conducting flyovers once a year, the County is transitioning from tsunami sirens to a more direct approach, such as the use of Everbridge and other cell-phone-related notifications.

The first visible indication of an approaching tsunami may be a rise or drop in water surface levels (FEMA 2013):

- The advancing tsunami may initially arrive as a strong surge increasing the sea level. This can be similar to the rising tide, but the tsunami surge rises faster and does not stop at the shoreline. Even if the wave height appears to be small, 3 to 6 feet for example, the strength of the accompanying surge can be deadly. Waist-high surges can cause strong currents that float cars, small structures, and other debris. Boats and debris are often carried inland by the surge and left stranded when the water recedes.
- A drop in water level (drawdown) can be caused by the trough preceding the advancing, large inbound wave crest. Rapid drawdown can create strong currents in harbor inlets and channels that can severely damage coastal structures due to erosive scour around piers and pilings. As the water's surface drops, piers can be damaged by boats or ships straining at or breaking their mooring lines. The vessels can overturn or sink due to strong currents, collisions with other objects, or impact with the harbor bottom.

Understanding local bathymetry and topography is crucial for tsunami mitigation and planning, as different areas will experience varying levels of impact based on their specific geographical features.



14. WILDFIRE

14.1 HAZARD PROFILE

The Del Norte County website (*Prepare Del Norte - wildfire n.d.*) outlines County efforts to educate residents about wildfires – what they are, history of occurrences, evacuation zones, how to get notified, creating defensible space, watches and warning, creating evacuation plans, and becoming fire wise.

14.1.1 Hazard Description

A wildfire is an uncontrolled fire that burns vegetation in wildland or rural areas, that can spread into communities or developed areas, and that requires fire suppression. Wildfires can be ignited by natural forces such as lightning, or by human activity such as powerlines, smoking, campfires, equipment use, and arson. Wildfires can generally be classified as follows (WFOA 2024):

- **Ground fires** may arise where there are significant accumulations of dead vegetation such as humus and peat. These fires progress slowly beneath the surface, making them challenging to detect from above. When there is an ample supply of dry fuel, extinguishing ground fires can be particularly difficult. Ground fires can last for months or even years. They can smolder underground through the winter and reignite above ground in spring.
- **Surface fires** generally burn debris, such as litter, twigs, and leaves, that accumulates on the ground's surface. These fires may also affect surface vegetation such as shrubs and grasses. They are generally the easiest to extinguish
- **Crown fires** occur in the tree canopy. They are the most hazardous type of wildfire. Crown fires are characterized by extreme heat, intensity, and destructive capability and often spreading rapidly. They burn at exceptionally high temperatures, resulting in the combustion of a significant portion of biomass and effectively sterilizing the soil.

Wildfires affect grass, forest, and brushlands, as well as any structures located within them or adjacent to them. Where there is human access to wildland areas, the risk of fire increases due to a greater chance for human ignition sources and historical fire management practices.

California is one of the most fire-prone regions in the world due to the combination of complex terrain, climate, fire-adapted ecosystem, history of fire suppression, and community development patterns, all of which have contributed to extensive wildfires. Flammable expanses of brush, diseased timberland, overstocked forests, hot and dry summers, extreme topography, intense wind events, summer lightning storms, and human acts all contribute to California's wildfire threat.

Hundreds of local, state, and federal agencies have responsibility for wildfire protection in California. In many instances, two or more organizations have dual primary responsibility on the same parcel of land—one for wildfire protection, and others for structural fire protection. In some areas, fire agencies have responsibility for both wildfire and structure fires. To address wildfire jurisdictional responsibilities, the California state legislature adopted legislation 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 fire protection responsibility rests with the federal agency. In many instances, FRAs are interspersed with private lands. Fire protection for developed private property is usually not the responsibility of the federal agency; such 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 responsibility for wildfire protection and where CAL FIRE administers fire hazard classifications and building standard regulations. SRAs are defined as lands that meet the following criteria:
 - Are unincorporated county areas
 - Are not federally owned
 - Have wildland vegetation cover rather than agricultural or ornamental plants
 - Have watershed 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 is that of a local government agency.

State law requires local governments to update the safety elements in their general plans to recognize wildfire risks in SRAs. The safety element must include information and policies on unreasonable risk from potential hazards, including fire. The state encourages integration among jurisdictions to enhance mitigation and prevention efforts.

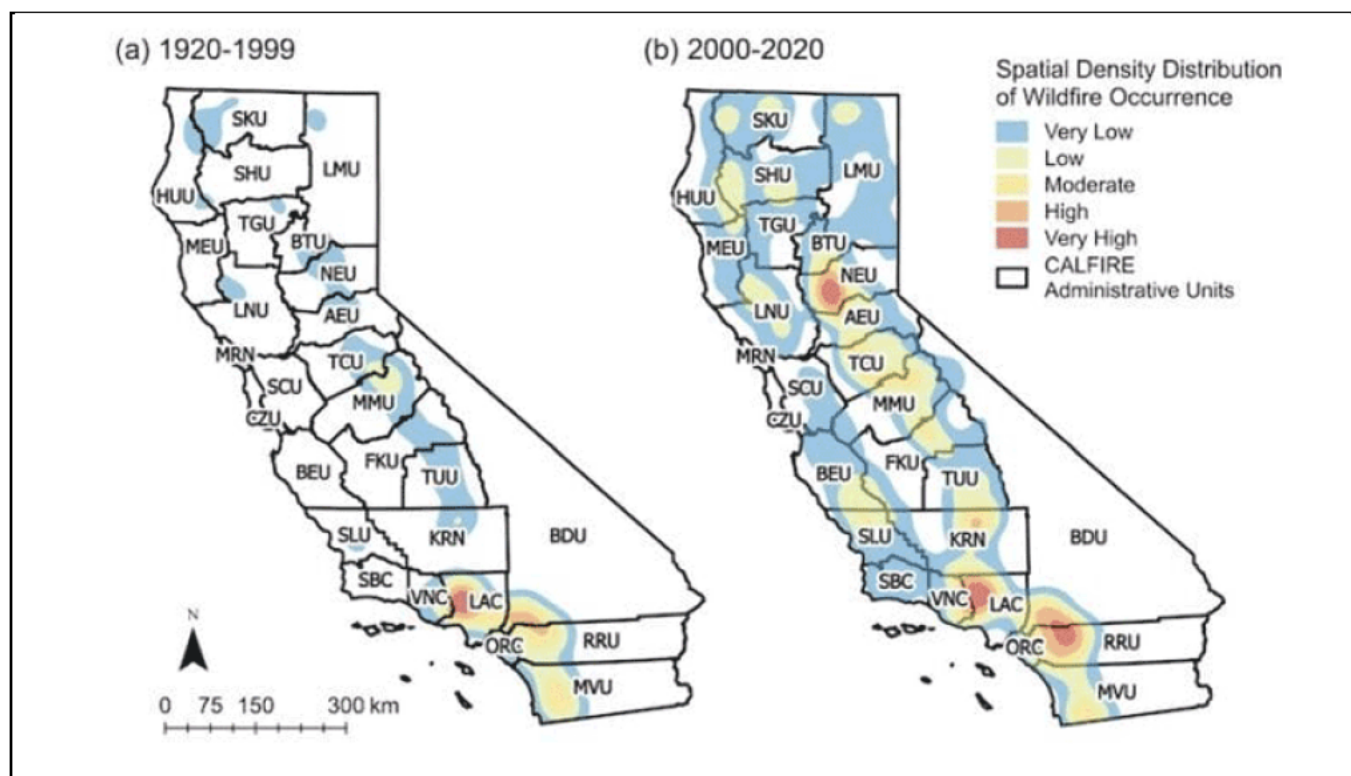
- **Local Responsibility Areas (LRAs)**—LRAs include land in cities, cultivated agriculture lands, non-flammable areas in unincorporated areas, and lands that do not meet the criteria for SRA or FRA. LRA fire protection is typically provided by city fire departments, fire protection districts, and counties, or by CAL FIRE under contract to local governments. LRAs may include flammable vegetation and areas where the financial and jurisdictional responsibility for improvement and wildfire protection is that of a local government agency.

14.1.2 Location

Del Norte County is a mountainous region characterized by steep, inaccessible topography with extensive forest resources (primarily Coast redwood, Douglas fir, and Sitka spruce), which can lead to a large amount of down and dead woody fuel (Del Norte CWPP 2020). The potential for significant damage to life and property exists in areas designated as wildland/urban interface (WUI) areas, where development is adjacent to or intermixed with vegetated areas.

From 1920 to 1999, the only area in California with a very high wildfire density was Los Angeles County; however, in the 21st century, many other areas of the state are now sharing that designation. Figure 14-1 illustrates the rise in wildfire occurrence from the 20th to the 21st century.

Figure 14-1. Spatial Distribution of Wildfire Occurrence in California



Source: (Li and Banerjee 2021)

14.1.3 Extent

Size of Fire

The potential for large wildfires in Del Norte County is lower than in many other parts of California. The wet climate and the infrequent occurrence of strong, dry winds prevent potential fuel from reaching a combustible state. Unlike Southern California's trees, known for their production of an oily, combustible sap and their susceptibility to dry conditions, Del Norte County's forests retain moisture and are resistant to abnormal dry spells.

Although the potential for a disastrous wildland fire is much lower than in other parts of the state, the suppression of wildland fires in recent decades has resulted in a buildup of fuel and has increased the potential for large fires. There have been 17 significant fires (defined as greater than 3,000 acres) in the planning area in 108 years. This amounts to a significant fire occurring in the planning area every six years on average.

The largest recorded fire in the vicinity of Del Norte County was the Biscuit Fire in 2002, which burned in southern Oregon and northern California. It began on July 13, 2002, due to lightning strikes and eventually burned over 500,000 acres. This fire caused the evacuation of Gasquet and surrounding communities. Its heavy smoke contributed to health problems for residents within a 100-mile radius. The Biscuit Fire's boundaries stretched from 10 miles east of the coastal community of Brookings,



Oregon; south to the communities of Hiouchi and Gasquet; east to the Illinois Valley in southern Oregon; and north to within a few miles of the Rogue River in Oregon (Del Norte CWPP 2020).

Fire Hazard Severity Ratings

CAL FIRE has created maps showing three levels of Fire Hazard Severity Zones (FHSZ) in SRAs across the state: moderate, high, and very high. The FHSZ maps are developed based on factors that influence fire likelihood and fire behavior, such as fire history, natural vegetation, predicted flame length, blowing embers, terrain, and typical fire weather. Figure 14-2 shows the FHSZ mapping for Del Norte County. Factors contributing to wildfire hazard and wildfire risk in Del Norte County include the following:

- Overstocked forests, severely overgrown vegetation, and lack of defensible space around structures
- Excessive vegetation along roadsides and hanging over roads, fire engine access, and evacuation routes
- Drought contributing to increased beetle infestation in weakened and stressed trees
- Inadequate or missing street signs on private roads and house address signs
- Property development patterns
- Lightning ignitions
- Increasing population density leading to more ignitions

14.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Table 14-1 lists all wildfire-related presidentially declared disasters that have included Del Norte County.

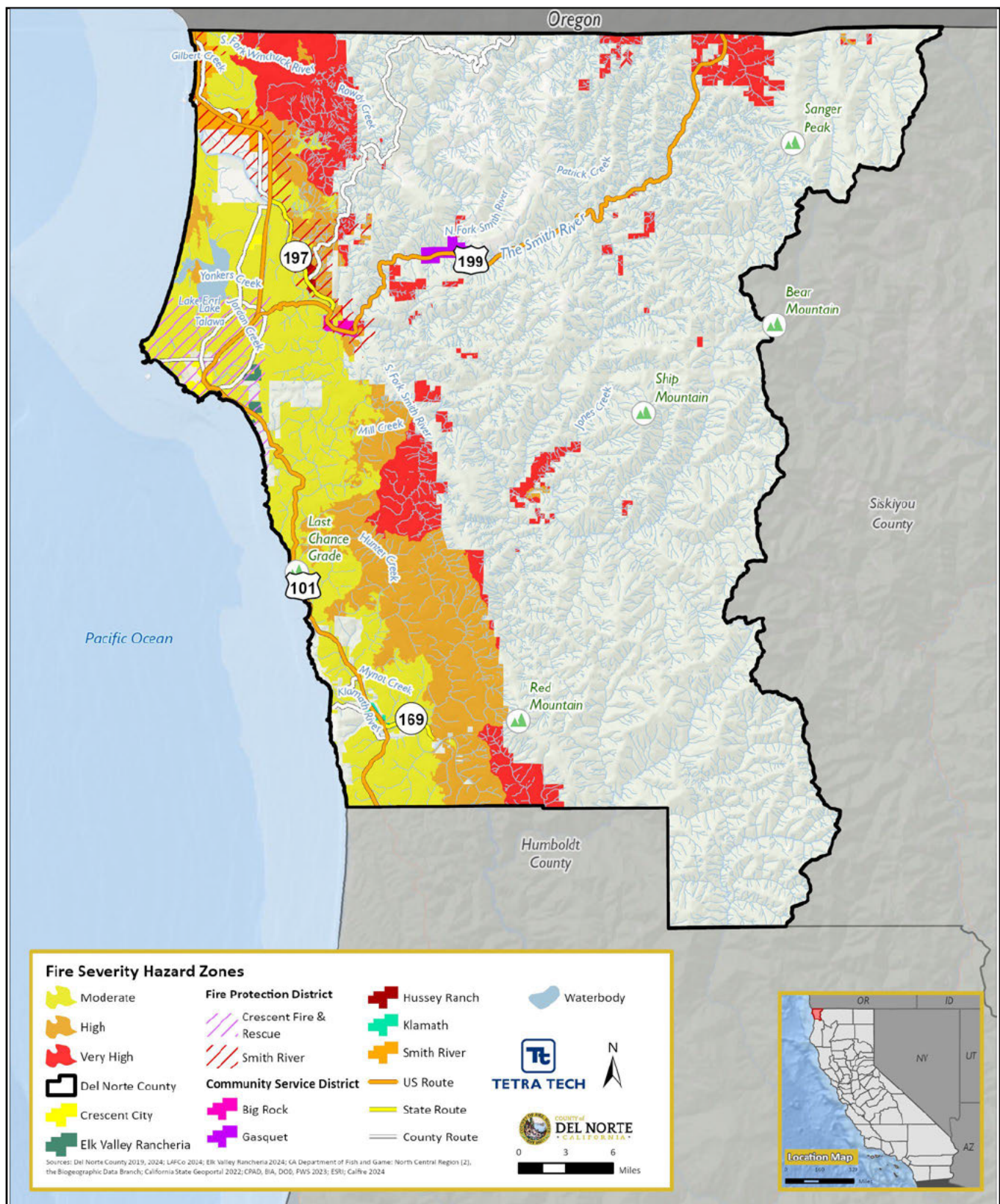
Table 14-1. FEMA Disaster Declarations for Wildfire Events in Del Norte County

Event Date	Declaration Date	Declaration Number	Description
Sep 4, 2020 - Nov 17, 2020	October 16, 2020	DR-4569	Wildfires

Source: (FEMA 2024)



Figure 14-2. Fire Hazard Severity Zones (FHSZ) in Del Norte County





State Emergency Proclamations

Table 14-2 lists all wildfire-related state emergency proclamations that have included Del Norte County.

Table 14-2. State Emergency Proclamations for Wildfire Events in Del Norte County (2019 to 2024)

Proclamation Date	Description
October 17, 2019	The governor declared a statewide state of emergency for a historic wind event that caused red flag conditions throughout most of the state and created extremely dangerous fire weather conditions on October 26, 2019
August 18, 2020	The governor declared a statewide state of emergency for record-breaking high temperatures and red flag warnings that exacerbated hundreds of actively burning wildfires on August 14, 2020
September 25, 2020	The governor declared a state of emergency in Del Norte County for the Slater Fire.
August 29, 2023	The governor declared a state of emergency in Del Norte County after a series of lightning strikes occurred in the Six Rivers National Forest resulting in multiple fires, collectively known as the Smith River Complex.

Source: (Cal OES 2024) (California State Library 2024)

USDA Declarations

Between 2019 and 2024, Del Norte County was not included in any USDA wildfire-related agricultural disaster declarations (USDA 2024).

Previous Events

Table 14-3 lists major recorded wildfire-related events that impacted Del Norte County since the previous HMP was developed. For earlier events, refer to the previous HMP.

Table 14-3. Wildfire Events in Del Norte County (2019 to 2024)

Event Date	Declaration or Proclamation Number	Location Impacted	Description
August 15, 2023	State of Emergency	Dry thunderstorms produced lightning strikes across the Six Rivers National Forest; 27 fires developed within the Gasquet Ranger District creating the Smith River Complex.	The complex grew rapidly in the first weeks of the fire, jumping U.S. highway 199 causing its closure for 3 weeks and resulting in the evacuation of the town of Gasquet. The fire destroyed high tension powerlines powering all of Del Norte County. The county was completely without power through August 25 when generators were installed. Main transmission lines were not repaired until September 10. The fire continued to burn through September into October with fewer impacts to the community with a total of 95,000 acres burned plus 2 residences and 3 minor structures destroyed. The US Small Business Administration issued a disaster declaration for Del Norte County as a result of this wildfire and disaster loans were available to impacted businesses.

Source: (NOAA 2024)



14.1.5 Probability of Future Occurrences

Probability Based on Previous Occurrences

Information on previous wildfire occurrences in the county was used to calculate the probability of future occurrence of such events. Table 14-4 lists the number of events from various sources over the 113-year period from 1910 to 2024, which is the most complete period of record for all sources reviewed. Based on these records and input from the Steering Committee, the probability of occurrence for wildfire in the County is considered “occasional.”

Table 14-4. Probability of Future Wildfire Events in Del Norte County

Hazard Type	Number of Occurrences Between 1910 and 2024	% Chance of Occurring in Any Year
Wildfire	66	58.4%

Source: (FEMA 2024) (California State Library 2024) (NOAA 2024) CAL FIRE FRAP, 2009

Potential Impact of Climate Change on Future Probability

According to California’s Fourth Climate Change Assessment, if GHG emissions continue to rise, California is likely to see a 50 percent increase in fires larger than 25,000 acres and a 77 percent increase in average area burned by 2100 (Cal OES 2023). In addition, Del Norte’s average maximum daily temperature is expected to rise by 7.4 °F by 2099. Higher temperatures will lead to increased evaporation, which could exacerbate drought and extreme heat conditions, increasing the fuel supply and generating conditions that spread wildfires.

14.1.6 Cascading Impacts on Other Hazards

Wildfires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. Wildfires 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 wildfire. Most wildfires 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. Fires can also contaminate drinking water, destroy infrastructure, and degrade air quality.

14.2 VULNERABILITY AND IMPACT ASSESSMENT

A vulnerability analysis was conducted using wildfire hazard data from CAL FIRE (2024) to determine the County’s risk to the wildfire hazard. The County’s assets were examined to determine if they are built in areas of the moderate, high, or very high wildfire hazard area (see Figure 14-2), using the methodology described in Section 4.3.2.



14.2.1 Life, Health, and Safety

Overall Population

Table 14-5 summarizes the estimated population exposed to wildfire hazard areas categorized as moderate, high, or very high. The exposed population includes 1,360 residents in the very high hazard area (5.0 percent of the planning partner total), 528 residents in the high hazard area (1.9 percent of the total), and 12,357 residents in the moderate hazard area (45.0 percent of the total).

Table 14-5. Population in the Moderate, High, and Very High Wildfire Hazard Area

Planning Area	Total Population (2022 ACS 5-Year Estimates)	Moderate Wildfire Hazard Area		High Wildfire Hazard Area		Very High Wildfire Hazard Area	
		Number of Persons	% of Planning Partner Total	Number of Persons	% of Planning Partner Total	Number of Persons	% of Planning Partner Total
Crescent City	6,379	79	1.2%	0	0.0%	0	0.0%
Unincorporated County	21,083	12,278	58.2%	528	2.5%	1,360	6.5%
Del Norte County Total	27,462	12,357	45.0%	528	1.9%	1,360	5.0%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CA Dept. of Geological Survey

Wildfires have the potential to impact human health and life of residents and responders. Emergency responders and those within a short distance of the interface between the built environment and the wildland environment are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility. Smoke generated by wildfire contains particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene).

Socially Vulnerable Population

Economically disadvantaged populations are more vulnerable because they may lack the financial resources to evacuate when a wildfire is approaching. The population over age 65 is more vulnerable because they are more likely to need medical attention that may not be available due to isolation during a wildfire event, and they may have more difficulty evacuating. Smoke and air pollution from wildfires can be a severe health hazard to sensitive populations including children and older people, even from wildfires that are many miles away. Socially vulnerable populations also may lack resources to quickly recover after a wildfire occurs.



Table 14-6 presents the estimated socially vulnerable populations living in the moderate wildfire hazard area. Overall, in Del Norte County, there are 2,570 persons over the age of 65 years, 773 persons under the age of 5 years, 131 non-English speakers, 2,291 persons with a disability, and 1,537 living in poverty located in this hazard area.

Table 14-7 presents the estimated socially vulnerable populations living in the high wildfire hazard area. There are 110 persons over the age of 65 years, 33 persons under the age of 5 years, 5 non-English speakers, 98 persons with a disability, and 65 living in poverty located in this hazard area.

For the very high wildfire hazard area, Table 14-8 shows that there are 283 persons over the age of 65 years, 85 persons under the age of 5 years, 14 non-English speakers, 252 persons with a disability, and 169 living in poverty located in this hazard area.

14.2.2 General Building Stock

Table 14-9 through Table 14-11 provide a summary of the structures located in the moderate, high, and very high wildfire hazard areas in Del Norte County. For an overview of buildings by occupancy class in the moderate, high, and very high wildfire hazard areas, refer to Table 14-12 through Table 14-14.

All current and future buildings and infrastructure, including critical facilities, in Del Norte County are considered at risk from wildfires. Fires can cause significant damage to buildings, ranging from smoke and water damage to total loss.

Certain structures may be more vulnerable than others. Buildings that do not comply with the California Building Code may be more susceptible to wildfires. Building materials and landscaping around the buildings can also impact vulnerability. For example, wood shakes can ignite quickly due to embers, and pine needles may catch roofs on fire if there are blowing embers in the area. Maintaining a buffer area (defensible space) between the vegetation and the structure can decrease risk. Proactive landscaping schemes can be used in fire-prone areas, such as avoiding pine straw and mulch.



Table 14-6. Vulnerable Population in the Moderate Wildfire Hazard Area

Planning Area	Estimated Number of Vulnerable Persons Located in the Moderate Wildfire Hazard Area									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	10	1.2%	2	1.1%	1	0.7%	11	1.2%	12	1.2%
Unincorporated County	2,560	58.2%	771	58.2%	130	58.0%	2,280	58.2%	1,525	58.2%
Del Norte County Total	2,570	48.9%	773	51.3%	131	35.5%	2,291	47.1%	1,537	42.9%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CAL FIRE 2024

Table 14-7. Vulnerable Population in the High Wildfire Hazard Area

Planning Area	Estimated Number of Vulnerable Persons Located in the High Wildfire Hazard Area									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Unincorporated County	110	2.5%	33	2.5%	5	2.2%	98	2.5%	65	2.5%
Del Norte County Total	110	2.1%	33	2.2%	5	1.4%	98	2.0%	65	1.8%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CAL FIRE 2024



Table 14-8. Vulnerable Population in the Very High Wildfire Hazard Area

Planning Area	Estimated Number of Vulnerable Persons Located in the Very High Wildfire Hazard Area									
	Persons Over 65		Persons Under 5		Non-English Speaking Persons		Persons with a Disability		Persons in Poverty	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Crescent City	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Unincorporated County	283	6.4%	85	6.4%	14	6.3%	252	6.4%	169	6.5%
Del Norte County Total	283	5.4%	85	5.6%	14	3.8%	252	5.2%	169	4.7%

Source: U.S. Census Bureau 2022 ACS; Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CAL FIRE 2024

Table 14-9. Buildings in the Moderate Wildfire Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the Moderate Wildfire Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	31	1.8%	\$78,127,012	2.6%
Unincorporated County	12,555	\$11,702,984,573	7,213	57.5%	\$6,231,110,639	53.2%
Del Norte County Total	14,279	\$14,687,618,715	7,244	50.7%	\$6,309,237,651	43.0%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California Geoportal 2022; CA Dept. of Geological Survey; RS Means 2024



Table 14-10. Buildings in the High Wildfire Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the High Wildfire Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	0	0.0%	\$0	0.0%
Unincorporated County	12,555	\$11,702,984,573	324	2.6%	\$246,595,699	2.1%
Del Norte County Total	14,279	\$14,687,618,715	324	2.3%	\$246,595,699	1.7%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California Geoportal 2022; CA Dept. of Geological Survey; RS Means 2024

Table 14-11. Buildings in the Very High Wildfire Hazard Area

Planning Area	Planning Partner Total Buildings		Buildings in the Very High Wildfire Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Planning Partner Total	Value	% of Planning Partner Total
Crescent City	1,724	\$2,984,634,142	0	0.0%	\$0	0.0%
Unincorporated County	12,555	\$11,702,984,573	896	7.1%	\$872,843,461	7.5%
Del Norte County Total	14,279	\$14,687,618,715	896	6.3%	\$872,843,461	5.9%

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California Geoportal 2022; CA Dept. of Geological Survey; RS Means 2024

**Table 14-12. Buildings in the Moderate Wildfire Hazard Area by Occupancy Class**

Planning Area	Buildings in the Moderate Wildfire Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other ^a
Crescent City	15	15	1	0
Unincorporated County	5,389	1,621	65	138
Del Norte County Total	5,404	1,636	66	138

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CAL FIRE 2024

a. Other = Government, Religion, Agricultural, and Education

Table 14-13. Buildings in the High Wildfire Hazard Area by Occupancy Class

Planning Area	Buildings in the High Wildfire Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other ^a
Crescent City	0	0	0	0
Unincorporated County	232	77	4	11
Del Norte County Total	232	77	4	11

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CAL FIRE 2024

a. Other = Government, Religion, Agricultural, and Education

Table 14-14. Buildings in the Very High Wildfire Hazard Area by Occupancy Class

Planning Area	Buildings in the Very High Wildfire Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other ^a
Crescent City	0	0	0	0
Unincorporated County	597	290	1	8
Del Norte County Total	597	290	1	8

Source: Del Norte County 2024; Microsoft 2021; NSI/USACE; California State Geoportal 2022; CAL FIRE 2024

a. Other = Government, Religion, Agricultural, and Education

14.2.3 Community Lifelines and Other Critical Facilities

Excessive heat can cause hazardous materials and fuel storage to rupture, fueling the fire and causing rapid spreading. Communication facilities may become inoperable, exacerbating communication difficulties, and compromised fire stations can hinder fire suppression and support services.

Utility lines, roads, and bridges are also at risk. Damage to utility lines can compromise the functionality of water, sewer, gas, and electricity systems. Due to their geographic extent, roads and utility lines have a higher chance of being impacted by wildfires. If any section of a road or utility line is damaged, the entire system may be affected. For instance, a wildfire that makes one area of a road or bridge impassable can block access to other roads or locations. Many roads may have segments within wildfire risk areas rather than the entire road being within a risk area.



Table 14-15 summarizes the number of community lifelines located in the moderate, high, and very high wildfire hazard areas in Del Norte County. Of the 163 community lifelines in moderate wildfire hazard areas, the greatest number are categorized as transportation. In the high wildfire hazard areas, there are 15 community lifelines, with the greatest number categorized as energy. For the very high wildfire hazard area, there are a total of 38 community lifelines, with the greatest number categorized as transportation.

14.2.4 Economy

Wildfires can significantly impact Del Norte County's economy in various ways. The destruction of homes, businesses, and infrastructure leads to substantial financial losses for property owners and the local economy. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism. The County's reliance on tourism, particularly for attractions like the Redwood National and State Parks, means that wildfires can deter visitors and result in lost revenue for local businesses. Furthermore, the costs associated with firefighting, debris cleanup, and rebuilding can strain local government budgets and resources. Health impacts from smoke and air pollution increase healthcare costs and reduce productivity, further disrupting economic stability and growth in Del Norte County. In addition, wildfires have historically led to power outages in the County, which closes businesses and brings the local economy to a halt.

14.2.5 Natural Resources

Wildfires play a crucial role in maintaining ecosystem health, but intense wildfires can severely damage the environment by killing plant and animal life. These fires can heat narrow and shallow waterways, harming aquatic systems. According to the USGS, post-fire runoff containing debris and contaminants can be extremely detrimental to both terrestrial ecosystems and aquatic life (USGS 2023).

In Del Norte County, the age and density of infrastructure can exacerbate the environmental consequences of wildfires. Burning infrastructure releases chemicals such as iron, lead, and zinc, which may leach into stormwater, contaminating nearby streams and impairing aquatic life. Additionally, intense wildfires that destroy existing ecosystems can lead to an increase in invasive species, which may thrive in areas lacking natural competitors. Urban fires are particularly harmful due to the higher concentration of buildings and infrastructure, which release a wide range of pollutants, including toxic chemicals from materials like plastics and metals (ABC News 2023).

14.2.6 Historic and Cultural Resources

Wildfires pose a major threat to historic resources in Del Norte County, with the potential to cause extensive damage and, in some cases, complete destruction. The impact on historic resources, particularly infrastructure, depends heavily on the materials used for construction. Wildfires can burn historic buildings, destroy cultural landscapes, and erode archaeological sites. This destruction can lead to the loss of invaluable cultural heritage and artifacts, profoundly affecting the community's connection to its history and traditions. Outdoor events are likely to be postponed or canceled due to wildfire conditions, as smoke can have harmful impacts on human health.



Table 14-15. Number of Facilities in the Moderate, High, and Very High Wildfire Hazard Area

Planning Area	Number of Facilities in the Wildfire Hazard Areas, by Lifeline Category									Total Facilities in Hazard Area	
	Communica-tions	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transpor-tation	Water Systems	Other Critical Facilities	Count	% of Planning Partner Total
Moderate Wildfire Hazard Area											
Crescent City	0	1	0	0	0	0	0	0	1	2	1.4%
Unincorporated County	17	9	17	4	8	34	35	17	20	161	36.9%
Del Norte County Total	17	10	17	4	8	34	35	17	21	163	27.9%
High Wildfire Hazard Area											
Crescent City	0	0	0	0	0	0	0	0	0	0	0.0%
Unincorporated County	2	5	0	2	0	2	1	2	1	15	3.4%
Del Norte County Total	2	5	0	2	0	2	1	2	1	15	2.6%
Very High Wildfire Hazard Area											
Crescent City	0	0	0	0	0	0	0	0	0	0	0.0%
Unincorporated County	3	2	7	2	1	6	9	2	6	38	8.7%
Del Norte County Total	3	2	7	2	1	6	9	2	6	38	6.5%

Source: Del Norte County 2019, 2024; HIFLD 2024; California Department of Transportation 2023; California Department of Education 2020; California Department of Motor Vehicles 2020; CAL FIRE 2024



14.3 FUTURE CHANGES THAT MAY AFFECT RISK

14.3.1 Potential or Planned Development

The California Building Code includes minimum standards related to the design and construction of buildings in fire hazard severity zones. Any newly permitted buildings in these areas must conform to standards that remove flammable materials from around the building and construct buildings from fire resistant material. The Del Norte County General Plan and the City of Crescent City General Plan include policies that address managing development in fire hazard severity zones.

14.3.2 Projected Changes in Population

Del Norte County's population is projected to decline in upcoming decades, from 27,648 in 2020 to 25,317 in 2070—an 8.4 percent decrease (CA Department of Finance 2025). A decrease in population can lead to reduced vulnerability to wildfire events. With fewer people living in wildfire-prone areas, the overall risk to lives and property diminishes. This reduction in population density means that fewer homes and infrastructure are at risk of damage, potentially lowering the impact of wildfires on the community.

14.3.3 Climate Change

Climate change is expected to increase the risk of wildfires in California. Rising greenhouse gas emissions could lead to more frequent and larger fires. In Del Norte County, higher temperatures and drought conditions will dry out vegetation, increasing the likelihood of wildfire ignitions and spread.

14.3.4 Other Considerations for Future Planning

Vegetation management, including controlled burns and removal of overgrown vegetation, can reduce fuel for fires. Emergency preparedness, such as robust response plans and community awareness, can mitigate the impact of wildfires. Additionally, advancements in wildfire detection, monitoring, and firefighting technologies can improve response times and effectiveness, helping to reduce overall risk.

Altered fire regimes can destabilize ecosystems and landscapes, creating conditions that promote catastrophic events. They may seriously reduce ecosystem resiliency that would allow burned areas to return to prior levels of productivity. Today, historical policies of fire exclusion and aggressive suppression are giving way to a better understanding of the importance fire plays in the natural cycle of certain forest types.

The wildland fire season in Del Norte County usually begins in June, peaks in August and September, and ends by mid-October. Over 80 percent of wildland fires in the county's history ignited between July and October, although wildland fires have ignited in every month of the year except December. Researchers at the University of California Irvine determined that California's wildfire season has lengthened in recent decades and the peak has shifted from August to July (Li and Banerjee 2021).



15. HAZARD RANKING

Hazard rankings have been used as one of the bases for identifying the jurisdictional hazard mitigation strategies included in Volume 2. These rankings may vary among the jurisdictions. For example, a hazard may be ranked low in one municipality but due to differences in vulnerability and impact, be ranked as high for the County or another municipality. Jurisdictional ranking results are presented in each jurisdictional annex in Volume 2.

15.1 HAZARD RANKING METHODOLOGY

Each jurisdiction participating in this HMP has differing levels of vulnerability to and potential impacts from each of the hazards assessed in this plan. Each jurisdiction needs to recognize the hazards that pose the greatest risk to its community and direct its attention and resources accordingly to manage risk and reduce losses. To achieve this, the hazards of concern were ranked using methodologies promoted by FEMA's hazard mitigation planning guidance and input from all participating jurisdictions. Relative ranking scores were generated by FEMA's Hazus risk assessment tool.

15.1.1 Categories Used in Ranking

The ranking methodology is based on four risk assessment categories (probability of occurrence, consequence, adaptive capacity, and climate change), with the following scoring parameters defined for each category:

- **Level**—The level is a qualitative description of how each hazard rates in each category (such as low to high, or unlikely to frequent)
- **Benchmark value**—The benchmark values are clearly determinable quantities or descriptions that define which level should apply to each hazard
- **Numeric value**—The numeric value is the hazard's score in each category, based on the assigned level
- **Weighting**—The weighting is a multiplier applied to each hazard's numeric value in each category, to represent the relative importance of the category (the higher the weighting, the more important the category)

The following sections describe the categories and their associated scoring parameters.

Probability of Occurrence

For some hazards, probability of occurrence was based on the likelihood that an event scenario of a specified magnitude (such as a 1 percent annual chance flood or a M7.2 earthquake) would occur in any given year. When no scenario was assessed, an examination of the historical record and judgment was used to estimate the probability of occurrence of an event that will impact the County. Table 15-1 summarizes the scoring parameters for probability of occurrence.



Table 15-1. Values and Weights for Probability of Occurrence

Level	Benchmark Value	Numeric Value	Weighting
Unlikely	Hazard event has less than a 1 percent annual probability of occurring.	0	30%
Rare	Hazard event has between 1 and 10 percent annual probability of occurring.	1	
Occasional	Hazard event has between 10 and 100 percent annual probability of occurring.	2	
Frequent	100 percent annual probability; hazard event is likely to occur multiple times per year.	3	

Consequence

Consequence represents the expected vulnerability and impact associated with the hazard. This is rated for three subcategories: vulnerability of people; vulnerability of property; and economic impacts on the community. A numeric value based on defined benchmarks is assigned for each subcategory, and a factor is applied to those values representing the relative importance of each subcategory. The total numeric value for consequence is the sum of the factored numeric values for each subcategory. Table 15-2 summarizes the scoring parameters for consequence.

The hazard ranking methodology for some hazards of concern is based on a scenario event that only impacts specific areas (such as a floodplain), while others are based on their potential risk to the County as a whole. In order to account for these differences, the hazard ranking scores were adjusted using professional judgment.

Adaptive Capacity

Adaptive capacity describes a jurisdiction's administrative, technical, planning/regulatory and financial ability to protect against or withstand a hazard event. Mitigation measures that can increase a jurisdiction's capacity to withstand and rebound from events include codes or ordinances with higher standards to withstand hazards due to design or location; deployable resources; or plans and procedures for responding to an event.

A rating of "weak" for adaptive capacity means a jurisdiction does not have the capability to effectively respond, which increases vulnerability. A "strong" adaptive capacity means the jurisdiction does have the capability to effectively respond, which decreases vulnerability. These ratings were assigned using the results of the core capability assessment, with input from each jurisdiction. Table 15-3 summarizes the scoring parameters for adaptive capacity.



Table 15-2. Values and Weights for Consequence

Level	Benchmark Value	Numeric Value	Factor	Weighting
Population (Numeric Value x 3)				30%
None	No population vulnerable to the hazard	0	3	
Low	14 percent or less of population is exposed to a hazard with potential for measurable life-safety impact due to its extent and location.	1		
Medium	15 to 29 percent of population is exposed to a hazard with potential for measurable life-safety impact due to its extent and location.	2		
High	30 percent or more of population is exposed to a hazard with potential for measurable life-safety impact, due to its extent and location.	3		
Property (Numeric Value x 2)				
None	No property vulnerable to the hazard	0	2	
Low	Property vulnerability is 14 percent or less of the total number of structures for the community.	1		
Medium	Property vulnerability is 15 to 29 percent of the total number of structures for the community.	2		
High	Property vulnerability is 30 percent or more of the total number of structures for the community.	3		
Economy (Numeric Value x 1)				
None	No estimated loss due to the hazard	0	1	
Low	Estimated loss is 9 percent or less of the total replacement cost for the community.	1		
Medium	Estimated loss is 10 to 19 percent of the total replacement cost for the community.	2		
High	Estimated loss is 20 percent or more of the total replacement cost for the community.	3		

Table 15-3. Values and Weights for Adaptive Capacity

Level	Benchmark Value	Numeric Value	Weighting
Weak	Weak, outdated, or inconsistent plans, policies, codes, or ordinances in place; no redundancies; limited to no deployable resources; limited capabilities to respond; long recovery.	1	30%
Moderate	Plans, policies, codes/ordinances in place and meet minimum requirements; mitigation strategies identified but not implemented on a widespread scale; county/jurisdiction can recover but needs outside resources; moderate county/Jurisdiction capabilities.	0	
Strong	Plans, policies, codes/ordinances in place that exceed minimum requirements; mitigation/protective measures in place; county/jurisdiction has ability to recover quickly because resources are readily available, and capabilities are high.	-1	



Climate Change

The hazard ranking addresses climate change in order to help guide and prioritize the mitigation strategy as a long-term future vision for mitigating the hazards of concern. Current climate change projections were evaluated as part of the hazard ranking to account for potential increases in severity or frequency of the hazard. The potential impacts that climate change may have on each hazard of concern are discussed in the risk assessment chapters for each hazard. Table 15-4 summarizes the scoring parameters for climate change.

Table 15-4. Values and Weights for Climate Change

Level	Benchmark Value	Numeric Value	Weighting
Low	No local data are available; modeling projects are uncertain on whether there is increased future risk; confidence level is low (inconclusive evidence).	1	10%
Medium	Studies and modeling projections indicate a potential for exacerbated conditions due to climate change; confidence level is medium to high (moderate evidence).	2	
High	Studies and modeling projections indicate exacerbated conditions and increased future risk due to climate change; very high confidence level (strong evidence, well documented, and acceptable methods).	3	

15.1.2 Total Ranking Score

The ranking score based on the categories described above is calculated using the following equation:

Risk Ranking Score Equation

$$\text{Ranking Score} = [(\text{Consequence on Population} \times 3) + (\text{Consequence on Property} \times 2) + (\text{Consequence on Economy} \times 1) \times 0.3] + [\text{Adaptive Capacity} \times 0.3] + [\text{Climate Change} \times 0.1] + [\text{Probability of Occurrence} \times 0.3]$$

The highest possible ranking score is 6.9. The higher the number, the greater the relative risk. Based on the score for each hazard, a hazard ranking is assigned to each hazard of concern as follows:

- Low = Values less than 3.9
- Medium = Values between 3.9 and 4.9
- High = Values greater than 4.9.

All Planning Partners applied the same methodology to develop the hazard rankings to ensure consistency in the overall ranking of risk. However, each jurisdiction had the ability to alter rankings based on local knowledge and experience in handling each hazard.

15.2 HAZARD RANKING RESULTS

The methodology described above was used for an initial ranking of the identified hazards of concern. Each planning partner had an opportunity to adjust the rankings based on local conditions. The adjusted ranking for each jurisdiction is included in Table 15-5 and in the annexes in Volume 2.



Table 15-5. Adjusted Ranking of Hazards by Jurisdiction

Jurisdiction	Drought	Earthquake	Excessive Rainfall	Extreme Heat	Extreme Wind	Flood	Landslide	Tsunami	Wildfire
Crescent City	Low	Medium	Medium	Low	Medium	Low	Medium	High	Medium
Unincorporated County	Low	Medium	Medium	Low	Medium	Medium	Medium	High	High
Big Rock CSD	Low	Medium	High	Medium	High	Low	High	Low	Medium
Crescent FPD	Low	Medium	Medium	Low	Medium	Medium	Medium	High	High
Elk Valley Rancheria	Medium	Medium	Low	Medium	Low	Low	Low	Medium	High
Gasquet CSD	Medium	Medium	Low	Medium	Low	Low	Low	Low	High
HRC CSD	Low	Medium	Low	Low	Low	Low	Low	Low	High
Klamath CSD	Medium	Medium	Medium	Medium	Medium	Medium	Medium	High	High
Smith River FPD	Low	Medium	Medium	Low	High	Low	Medium	Medium	High
Smith River CSD	Low	Medium	Medium	Low	High	Medium	Medium	Low	High

Note: Low (yellow) = Values less than 3.9; Medium (orange) = Values between 3.9 and 4.9; High (red) = Values greater than 4.9

PART 3:

CAPABILITY

ASSESSMENT





16. CAPABILITY ASSESSMENT

A capability assessment is an inventory of a community's missions, programs, and policies and an analysis of its capacity to carry them out (FEMA 2003). This integral part of the planning process analyzes current governmental programs, policies, regulations, and funding that could either facilitate or hinder mitigation. Through assessing its capabilities, a jurisdiction learns whether it can implement certain mitigation actions by determining the following:

- The range of local and/or state administrative, programmatic, regulatory, financial, and technical resources available to assist in implementing mitigation actions
- Types of mitigation actions that may be technically, legally, administratively, politically, or fiscally challenging or infeasible because they are outside of current capabilities
- Opportunities to enhance local capabilities to support long-term mitigation and risk reduction

This chapter summarizes existing capabilities at all levels of government (federal, state, county, local) for supporting hazard mitigation within the planning area. These capabilities are presented in three categories:

- Planning and regulatory capabilities
- Administrative and technical capabilities
- Fiscal capabilities

Each Planning Partner's annex in Volume 2 also includes a capability assessment specific to those jurisdictions. In addition to the above categories, the annexes review capabilities in the more localized categories of adaptive capacity and education and outreach. Participating jurisdictions evaluated the effectiveness of their capabilities for supporting hazard mitigation and identified opportunities to enhance those capabilities. Each jurisdiction identified how it has integrated hazard mitigation into its existing planning, regulatory, and operational/administrative framework and how it intends to promote ongoing integration

16.1 PLANNING AND REGULATORY CAPABILITIES

Planning and regulatory capabilities are based on ordinances, policies, local laws, state statutes, plans, and programs that relate to managing growth and development. Planning and regulatory capabilities refer not only to current plans and regulations, but also to the jurisdiction's ability to change and improve those plans and regulations as needed. This section summarizes planning and regulatory capabilities for Del Norte County. Further information is provided in the jurisdictional annexes in Volume 2.



16.1.1 Federal

National Flood Insurance Program

The U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968 (FEMA's 2002 NFIP: Program Description). The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. The flood hazard profile in Chapter 11 provides further information on the NFIP as implemented in Del Norte County.

There are three components to the NFIP: flood insurance, floodplain management and flood hazard mapping. Communities participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities. Community participation in the NFIP is voluntary. Flood insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods. Flood damage in the U.S. is reduced by nearly \$1 billion each year through communities implementing sound floodplain management requirements and property owners purchasing flood insurance. Additionally, buildings constructed in compliance with NFIP building standards suffer approximately 80% less damage annually than those not built in compliance (FEMA, 2008).

The City of Crescent City and Del Norte County are the only jurisdictions actively participating in the NFIP. There are two NFIP Repetitive Loss (RL) properties in the County. Further details on the County's flood vulnerability may be found in the flood hazard profile in Chapter 11.

NFIP Community Rating System

As an additional component of the NFIP, the Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance.

As of July 2025, there are no communities in Del Norte County that participate in the CRS program.

U.S. Army Corps of Engineers Permit Program

Under Section 404(e) of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) can issue general permits to authorize activities that have only minimal individual and cumulative adverse environmental effects. There are three types of USACE permits:

- A nationwide permit is a general permit that authorizes activities across the country unless a district or division commander revokes the nationwide permit in a state or other geographic region. There are 57 nationwide permits, and they authorize a wide variety of activities, including linear transportation projects, bank stabilization activities, residential development, commercial and industrial developments, aids to navigation and certain maintenance activities



(USACE 2021). On October 12, 2021, the California State Water Resources Control Board (SWRCB) conditionally granted certification for 15 nationwide permits and denied certification for 28 nationwide permits for activities on non-tribal lands in the State of California (USACE 2021).

- Standard permits are individual permits that involve full public interest review of an individual permit application and includes the issuance of a public notice for any project that does not meet the terms and conditions of a nationwide permit or a Letter of Permission.
- Regional general permits (RGP) are for small, specialized projects. RGP 10 Wildfire Mitigation Activities authorizes activities involving the discharge of dredge or fill material into waters of the United States for the purpose of wildfire protection, prevention, response, clean-up, and recovery. The California SWRCB issued a certification order for RGP 10 on July 7, 2023 (SWRCB 2023)

16.1.2 State

Regulations

Table 16-1 lists state regulations that impact hazard mitigation activities in California.

Table 16-1. State Regulations Impacting Hazard Mitigation

Plan or Regulation	Relevance
AB 70: Flood Liability	A city or county may be required to partially compensate for property damage caused by a flood if it unreasonably approves new development in areas protected by a state flood control project
AB 162: Flood Planning	Cities and counties must address flood-related matters in the land use, conservation, and safety and housing elements of their general plans.
AB 747: General Plans—Safety Element	The safety elements of cities' and counties' general plans must address evacuation routes and include any new information on flood and fire hazards and climate adaptation and resiliency strategies.
AB 1409: Planning and Zoning, General Plan—Safety Element	This bill requires the safety element to be reviewed and updated to identify evacuation locations.
AB 2140: General Plans—Safety Element	This bill enables state and federal disaster assistance and mitigation funding to communities with compliant hazard mitigation plans.
AB 2800: Climate Change—Infrastructure Planning	This act requires state agencies to take into account the effects of climate change when developing state infrastructure.
Alquist-Priolo Earthquake Fault Zoning Act	This act restricts construction of buildings used for human occupancy on the surface trace of active faults.
California Environmental Quality Act	This act establishes a protocol of analysis and public disclosure of the potential environmental impacts of development projects. Any project action identified in this plan will seek full California Environmental Quality Act compliance upon implementation.
California General Planning Law	This law requires every county and city to adopt a comprehensive long-range plan for community development, and related laws call for integration of hazard mitigation plans with general plans.



Plan or Regulation	Relevance
California Health and Safety Code	Establishes regulations applied to public health and safety resources and services in California. Hazard resistant provisions include Division 32—Seismic Safety Building Rehabilitation Loans.
California Multi-Hazard Mitigation Plan	Local hazard mitigation plans must be consistent with their state's hazard mitigation plan.
California State Building Code	Establishes the regulations applied to construction in California. Hazard-resistant provisions include flood and soil provisions. Local communities must adopt and enforce building codes, which include measures to improve buildings' ability to withstand hazard events. Chapter A3 prescribes provisions for seismic strengthening of cripple walls and sill plate anchorage of light, wood frame residential buildings. Hazard resistant provisions include codes for the voluntary retrofit of single-family residences that are wood-framed and have a raised foundation.
California Water Code	Establishes regulations applied to water resources and water service providers in California. Hazard resistant provisions include Division 5—Flood Control and Division 14—California Water Storage District Law.
Division of the State Architect's AB 300 List of Seismically At-Risk Schools	The Division of the State Architect recommends that local school districts conduct detailed seismic evaluations of seismically at-risk schools identified in the inventory that was required by AB 300.
Senate Bill (SB) 32	This bill requires the California State Air Resources Board to ensure the state's greenhouse gas emissions are reduced to 40 percent below 1990 levels by 2030.
SB 92: Public Resources Portion of Biennial Budget Bill	This bill requires dams (except for low-risk dams) to have emergency action plans that are updated every 10 years and inundation maps updated every 10 years, or sooner if specific circumstances change.
SB 97: Guidelines for Greenhouse Gas Emissions	This bill establishes that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for California Environmental Quality Act analysis.
SB 99: General Plans: Safety Element: Emergency Evacuation Routes	This bill requires that safety elements include information to identify residential developments in hazard areas that do not have at least two emergency evacuation routes.
SB 379: General Plans: Safety Element—Climate Adaptation	This bill requires cities and counties to include climate adaptation and resiliency strategies in the safety element of their general plans.
SB 1000: General Plan Amendments—Safety and Environmental Justice Elements	Under this bill, review and revision of general plan safety elements are required to address only flooding and fires (not climate adaptation and resilience), and environmental justice is required to be included in general plans.
SB 1035: Fire, Flood, and Adaptation Safety Element Updates	This bill clarifies that revisions to the safety element to address fire hazards, flood hazards, and climate adaptation and resilience strategies all must occur upon each revision to a housing element or local hazard mitigation program.
SB 1241: Fire Hazards	This bill requires the safety element to be reviewed and updated as necessary to address the risk of fire in state responsibility areas and very high Fire Hazard Severity Zones, taking into account the most recent version of the Office of Planning and Research's "Fire Hazard Planning" document.
Standardized Emergency Management System	Local governments must use this system to be eligible for state funding of response-related personnel costs.



Plans and Studies

California Climate Adaptation Strategy

The 2024 California Climate Adaptation Strategy is a comprehensive plan that aims to enhance the state's resilience to climate change impacts. It focuses on coordinating efforts across various regions and sectors, aligning state agency actions with key climate resilience priorities, and building upon previous successes and lessons learned. The six climate resilience priorities are:

- Strengthen protections for climate vulnerable communities
- Bolster public health and safety to protect against increasing climate risks
- Build a climate resilient economy
- Accelerate nature based climate solutions and strengthen climate resilience of natural systems
- Make decisions based on the best available climate science
- Partners and collaborate to leverage resources

The California Natural Resources Agency is required by law to update the Climate Adaptation Strategy every three years. This ensures that the plan remains current and responsive to evolving climate challenges.

California's Fourth Climate Change Assessment

California's Fourth Climate Change Assessment, released in 2019, provides practical, science-based information to help state and local decision-makers address climate change impacts. It includes detailed regional climate projections for California, tools to incorporate climate data into planning, and recommendations for adapting key sectors like energy, water, and agriculture to climate impacts. The Fourth Assessment includes a statewide report, as well as nine regional and three topical reports, designed to synthesize the findings from the Fourth Assessment—along with additional findings from recent peer-reviewed publications—and to present them in a more accessible format for the public, community organizations, stakeholders, and policy makers. Highlights from the North Coast Region Report include:

- Average annual maximum temperatures are likely to increase by 5-9 degrees throughout the region through the end of the 21st century. Interior regions will experience the greatest degree of warming.
- Annual precipitation is not expected to change significantly but will likely be delivered in more intense storms and within a shorter wet season. As a result, the region is expected to experience prolonged dry seasons and reduced soil moisture conditions, even if annual precipitation stays the same or moderately increases.
- A rise in extreme precipitation events will increase the frequency and extent of flooding in low-lying areas, particularly along the coast where food risk will be enhanced with rising sea levels

The Fifth Climate Assessment is projected to be completed in 2026.



California's Water Supply Strategy: Adapting to a Hotter, Drier Future

California's 2022 Water Supply Strategy is a comprehensive plan developed by state agencies to address the critical challenges of water management in a changing climate. As temperatures rise, the state anticipates potentially losing 10 percent of its water supplies over the next two decades. The strategy focuses primarily on protecting and stabilizing water systems for urban, suburban, and agricultural communities. While its core objectives center on water security for human needs, the plan also encompasses broader environmental and social goals. This includes ongoing efforts to ensure safe drinking water for all Californians and protect ecological systems, demonstrating a holistic approach to water resource management in an increasingly unpredictable climate. Key actions from the strategy include:

- Developing new water supplies through recycling and desalination
- Capturing and saving more stormwater
- Reducing the use of water in cities and on farms
- Improving all water management actions with better data, forecasting, conveyance, and administration of water rights

California Wildfire and Forest Resilience Action Plan

The California Wildfire and Forest Resilience Task Force's 2021 Action Plan is a comprehensive roadmap for managing the state's forests and rangelands. This plan implements the Agreement for Shared Stewardship between California and the US Forest Service, while also aligning efforts across federal, local, tribal, regional, and private organizations. In executing this plan, the responsible entities are dedicated to advancing California's broader goals of achieving carbon neutrality, enhancing climate resilience, promoting equity, and fostering economic growth. This integrated approach ensures that forest management strategies not only address wildfire risks but also contribute to the state's environmental, social, and economic objectives. The four priorities of the plan are:

1. Increase the pace and scale of forest health projects
2. Strengthen protection of communities
3. Manage forests to achieve the state's economic and environmental goals
4. Drive innovation and measure progress

State of California Sea Level Rise Guidance

The Ocean Protection Council developed a statewide collaborative action plan in 2022 aimed at enhancing coastal resilience through coordinated efforts. This action plan addresses both regional and statewide needs, guiding unified and effective actions to support California's coastal communities, ecosystems, and economies. By fostering collaboration among various stakeholders, the plan aims to implement strategies that not only protect these vital areas but also adapt to the challenges posed by climate change and rising sea levels. The plan key themes include:

- The entire coast of California should be prepared and planning for SLR
- SLR adaptation plans should lead to project implementation
- SLR adaptation planning should include pathways to resiliency to 3.5' by 2050 and 6.0' by 2100



- Integrate and prioritize equity and social justice in all SLR adaptation planning and projects
- Nature-based solutions should be pursued when possible
- Coastal habitats including wetlands, beaches, and dunes should be protected and conserved

Protecting Californians from Extreme Heat: A State Action Plan to Build Community Resilience

The California Natural Resources Agency released a comprehensive 2022 action plan addressing the state's approach to mitigating the impacts of rising temperatures and heat waves. This plan outlines a coordinated, government-wide strategy to tackle the health, economic, cultural, ecological, and social challenges posed by increasing average temperatures. Building upon a 2013 report jointly developed by the California Department of Public Health and the California Environmental Protection Agency, the new action plan incorporates updated climate projections and expands on previous recommendations. It represents California's latest effort to proactively address the multifaceted risks associated with extreme heat and climate change. Key action tracks include:

1. Build public awareness and notification
2. Strengthen community services and response
 1. Increase resilience of our built environment
3. Utilize nature based solutions

California State Emergency Plan

The California State Emergency Plan, maintained by Cal OES, describes the methods for conducting emergency operations, rendering mutual aid, emergency response capabilities of state agencies, resource mobilization, public information, and continuity of government during an emergency or disaster.

16.1.3 County

Jurisdictions in California have the ability to develop policies and programs and to implement rules and regulations to protect and serve residents. Local policies are typically identified in a variety of community plans, implemented via a local ordinance, and enforced through a governmental body. A summary of County planning and regulatory capabilities is provided below. Detailed information on each participating jurisdiction's planning and regulatory capabilities is provided in Volume 2.

Del Norte County General Plan

The General Plan serves as the foundational land use and policy document guiding the county's growth and development. It includes elements such as Safety and Noise and Natural Resources/Conservation, which address natural hazard risks and strategies to reduce vulnerability. The plan integrates hazard mitigation goals by directing development away from high-risk areas and promoting resilient infrastructure. Regular updates ensure it reflects current hazard data and mitigation priorities.

Del Norte County Zoning Ordinance

The county's Zoning Ordinance regulates land use and development standards to promote safe building practices and limit exposure to hazards. It incorporates restrictions and design criteria in



hazard-prone areas, such as flood zones or wildfire risk areas. By enforcing zoning provisions, the county reduces the potential for property damage and protects public safety. The ordinance is periodically reviewed to incorporate updated hazard information.

Del Norte County Subdivision Ordinance

This ordinance governs the division of land into parcels and requires developers to meet safety standards related to hazards. It ensures that new subdivisions have adequate infrastructure and access for emergency response and evacuation. The ordinance also mandates assessments of hazard risks and incorporation of mitigation measures in subdivision design. This mechanism helps prevent creation of vulnerable developments in high-risk zones.

Del Norte County Emergency Operations Plan (EOP)

While primarily focused on emergency response, the EOP includes provisions that support hazard mitigation by outlining preparedness and recovery strategies. It establishes roles and responsibilities for agencies during hazard events, facilitating coordinated mitigation efforts. The plan, most recently updated in 2022, also integrates risk assessments and mitigation priorities to reduce future disaster impacts. Regular training and exercises help maintain readiness.

Del Norte County Community Wildfire Protection Plan (CWPP)

The CWPP addresses wildfire risk specifically by identifying vulnerable areas, prioritizing fuel reduction, and recommending mitigation projects. It involves collaboration among local agencies, fire districts, and community members. The 2020 plan supports hazard mitigation by promoting defensible space, fire-resistant construction, and community education. Implementation of CWPP projects reduces wildfire threat and enhances public safety.

16.2 ADMINISTRATIVE AND TECHNICAL CAPABILITIES

This section summarizes administrative and technical capabilities in Del Norte County. Further information is provided in the jurisdictional annexes in Volume 2.

16.2.1 Federal

Federal Emergency Management Agency

FEMA is responsible for providing assistance before, during, and after disasters. FEMA is the federal reviewer of hazard mitigation plans and sets federal standards for local and state hazard mitigation plans.

National Dam Safety Program

The National Dam Safety Program is a partnership of state and federal agencies and other stakeholders that encourages individual and community responsibility for dam safety to protect people from dam failures. It is administered through the Department of Homeland Security and FEMA. The



program improves safety and security around dams by providing grants to state dam safety agencies to assist them in improving their regulatory programs; producing educational materials for dam owners; funding research to enhance technical expertise as dams are built and rehabilitated; establishing training programs for dam safety inspectors; and creating the National Inventory of Dams (FEMA 2023c).

National Weather Service

The National Weather Service (NWS) monitors weather and delivers weather forecasting. Del Norte County is serviced by the Eureka weather forecast office (NWS n.d.-e).

The NWS operates the StormReady program, which provides emergency managers with guidelines on how to improve their communities' hazardous weather operations. To be recognized by the program, a community must establish a 24-hour warning point and emergency operations center; have more than one way to receive severe weather warnings and forecasts and to alert the public; create a system that monitors weather conditions locally; promote the importance of public readiness through community seminars; and develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises (NWS n.d.-f).

The NWS also operates the TsunamiReady program, a voluntary community recognition program that promotes tsunami hazard preparedness as an active collaboration among federal, state/territorial and local emergency management agencies, community leaders and the public. The main goal of the program is to improve public safety before, during and after tsunami emergencies. It aims to do this by establishing guidelines for a standard level of capability to mitigate, prepare for and respond to tsunamis and working with communities to help them meet the guidelines and ultimately become recognized as TsunamiReady by the NWS. The City of Crescent City is a program participant and Del Norte County is currently seeking certification for the program.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) builds and maintains public infrastructure. Projects include dredging, storm damage reduction, and ecosystem restoration in and near waterways (USACE n.d.). The USACE Dam Safety Program is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act and maintains the National Inventory of Dams.

16.2.2 State

Table 16-2. identifies administrative and technical capabilities available at the state level in California.



Table 16-2. State Administrative and Technical Capabilities

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
California Department of Parks and Recreation (State Parks)	Wildfire Hazard	State Parks Resources Management Division has wildfire protection resources available to suppress fires on State Park lands.
California Department of Water Resources (DWR)	Flood Hazard	This department is the state coordinating agency for floodplain management. DWR, on behalf of FEMA, provides individual technical assistance to California communities participating in the NFIP by conducting Community Assistance Visits and Community Assistance Contacts. DWR provides statewide NFIP workshops that are designed to interpret and explain the NFIP regulations and to give an overview of the need for community-based floodplain management (Cal OES 2023a).
California Division of Safety of Dams (DSOD)	Dam Failure Hazard	This division of DWR monitors the dam safety program at the State level and maintains a working list of dams in California.
CAL FIRE	Wildfire Hazard	CAL FIRE has responsibility for wildfires in areas that are not under the jurisdiction of the U.S. Forest Service or a local fire organization.
Cal OES	All Hazards	Cal OES serves as the state's leadership hub during all major emergencies and disasters. This includes responding, directing, and coordinating state and federal resources and mutual aid assets. Cal OES also supports local jurisdictions and communities through planning and preparedness activities, training, and facilitating the immediate response to an emergency through the longer-term recovery phase. During this process, Cal OES serves as the state's overall coordinator and agent to secure federal government resources through FEMA (Cal OES 2024a).
California Fire Alliance	Wildfire Hazard	The alliance works with communities at risk from wildfires to facilitate the development of community fire loss mitigation plans.
California Fire Safe Council	Wildfire Hazard	This council facilitates the distribution of National Fire Plan grants for wildfire risk reduction and education. Del Norte County has an active Fire Safe Council.
Office of the State Fire Marshal	Wildfire Hazard	This office has a wide variety of fire safety and training responsibilities.

16.2.3 County and Local

Table 16-3 lists the administrative bodies in Del Norte County that are available to support hazard mitigation initiatives. Local municipalities have similar departments.



Table 16-3. County Administrative and Technical Capabilities

Agency, Program or Regulation	Relevance
Administration	Coordinates overall county operations, including supporting hazard mitigation planning and interdepartmental collaboration.
Advisory Redistricting Commission	Ensures equitable representation in governance, which can influence community resilience and resource allocation during hazard events.
Agriculture	Manages agricultural resources and monitors pest and disease outbreaks, contributing to mitigation of hazards affecting food security and rural lands.
Assessor	Provides property data essential for risk assessment, damage estimation, and prioritizing mitigation efforts.
Auditor-Controller	Oversees financial management, ensuring proper allocation and tracking of funds for hazard mitigation projects.
Board of Supervisors	Sets policies and approves funding for hazard mitigation programs and emergency preparedness initiatives.
Boards, Commissions, and Committees	Offer specialized advice and oversight on hazard mitigation policies and community resilience strategies.
Building Inspection	Ensures new construction and remodeling projects comply with current building codes designed to reduced vulnerability to natural or man-made hazards.
Clerk/Recorder	Maintains official records, including hazard mitigation plans and agreements, ensuring transparency and accessibility.
Code Enforcement	Enforces building codes and land use regulations that reduce vulnerability to hazards.
County Counsel	Integrates hazard mitigation principles into land use planning and development to promote safer growth.
Emergency Services	Leads emergency preparedness, response, recovery, and mitigation activities to protect lives and property.
Environmental Health	Monitors environmental hazards and health risks, supporting mitigation of natural and man-made hazards.
Health and Human Services	Delivers assistance to vulnerable populations affected by hazards, aiding in recovery and resilience.
Information Technology	Supports communication and data systems critical for hazard monitoring, warning, and coordination.
Parks Department	Manages public lands that can serve as evacuation areas or buffers against certain hazards.
Planning	Develops plans and could integrate hazard risk assessments into community planning.
Public Health	Coordinates public health preparedness and response, addressing human impacts of hazards.
Recreation Department	Oversees recreational facilities that may be impacted by hazards and serve as community gathering points during emergencies.
Roads	Maintains transportation infrastructure essential for evacuation and emergency response.
Sheriff's Office	Provides law enforcement and security during hazard events, supporting evacuation and public safety.



Agency, Program or Regulation	Relevance
Tax Collector	Manages property tax collection, which funds county services including hazard mitigation efforts.
Treasurer	Manages county funds and investments, ensuring financial resources are available for hazard mitigation.
Veterans Services	Supports veteran populations who may have specific needs during disaster response and recovery.

16.3 FISCAL CAPABILITIES

This section summarizes fiscal capabilities in Del Norte County. Further information is provided in the jurisdictional annexes in Volume 2. Appendix O of the 2023 California State Hazard Mitigation Plan describes mitigation-related funding available to eligible jurisdictions to fund mitigation actions.

16.3.1 Federal Hazard Mitigation Funding Opportunities

FEMA administers several programs that provide funding for eligible mitigation planning and projects that reduce disaster losses and protect life and property from future disaster damage:

- The Hazard Mitigation Grant Program (HMGP) assists in implementing long-term hazard mitigation planning and projects following a federal major disaster declaration. HMGP funding is generally 15 percent of the total amount of federal assistance provided to a state, territory, or federally recognized tribe following a major disaster declaration.
- The Pre-Disaster Mitigation (PDM) program provides funds for hazard mitigation planning and projects. PDM funding depends on the amount Congress appropriates each year.
- Flood Mitigation Assistance (FMA) provides funds for planning and projects to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP). FMA funding depends on the amount Congress appropriates each year.

Table 16-4 provides an overview of program funding eligibility and cost share. Federal mitigation grant funding is available to all communities with a current hazard mitigation plan (this plan); however, most of these grants require a “local share” in the range of 10-25 percent of the total grant amount. The FEMA mitigation grant programs are described below.

Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) is a post-disaster mitigation program made available to states after federal disaster declarations. The HMGP can provide up to 75 percent funding for hazard mitigation. The HMGP can be used to fund projects that will protect public or private property in an area covered by a federal disaster declaration or that will reduce damage from future disasters. Examples of projects include acquisition and demolition of structures in hazard-prone areas, flood-proofing or elevation to reduce future damage, minor structural improvements, and development of state or local standards. Projects must fit into an overall mitigation strategy for the area identified as part of a local planning effort. All applicants must have a FEMA-approved hazard mitigation plan (this plan).



Table 16-4. FEMA HMA Grant Cost Share Requirements

Programs	Cost Share(Percent of Federal / Non-Federal Share)
HMGP	75 / 25
HMGP Post Fire	75 / 25
FMA (community flood mitigation, project scoping, individual mitigation of insured properties, and planning grants)	75 / 25
FMA—repetitive loss property	90 / 10
FMA—severe repetitive loss property	100 / 0
PDM	75 / 25
PDM—small and impoverished community	Up to 90 / 10

Source: FEMA 2023; FEMA 2023

Sub-applicants should consult their State Hazard Mitigation Officer (SHMO) for the amount of percentage of HMGP subrecipient management cost funding their State has determined to be passed through subrecipients.

To be eligible for an increased federal cost share, a FEMA-approved state or tribal (standard or enhanced) mitigation plan that addressed repetitive loss properties must be in effect at the time of award, and the property is being submitted for consideration must be a repetitive loss property.

Applicants who are eligible for the HMGP are state and local governments, certain nonprofit organizations or institutions that perform essential government services, and Indian tribes and authorized tribal organizations. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf. Applications are submitted to Cal OES and placed in rank order for available funding and submitted to FEMA for final approval. Eligible projects not selected for funding are placed in an inactive status and may be considered as additional HMGP funding becomes available.

For additional information, see: <https://www.fema.gov/hazard-mitigation-grant-program>

Flood Mitigation Assistance Program

The Flood Mitigation Assistance (FMA) program combines the previous Repetitive Flood Claims and Severe Repetitive Loss Grants into one grant program. The FMA provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The FMA is funded annually; no federal disaster declaration is required. Only NFIP insured homes and businesses are eligible for mitigation in this program. Funding for FMA is very limited and, as with the HMGP, individuals cannot apply directly for the program. Applications must come from local governments or other eligible organizations. The federal cost share for an FMA project is at least 75 percent. At most, 25 percent of the total eligible costs must be provided by a non-federal source. Of this 25 percent, no more than half can be provided as in-kind contributions from third parties. At minimum, a FEMA-approved local flood mitigation plan is required before a project can be approved. The FMA funds are distributed from FEMA to the state. Cal OES serves as the grantee and program administrator for the FMA program.

For additional information, see: <https://www.fema.gov/flood-mitigation-assistance-grant-program>



Rehabilitation of High Hazard Potential Dams Program

The Rehabilitation of High Hazard Potential Dams (HHPD) grant program provides technical, planning, design, and construction assistance for eligible rehabilitation activities that reduce dam risk and increase community preparedness. The HHPD Grant Program will provide assistance for technical, planning, design, and construction activities toward:

- Repair
- Removal
- Structural/nonstructural rehabilitation of eligible high hazard potential dams

For additional information, see: <https://www.fema.gov/emergency-managers/risk-management/dam-safety/rehabilitation-high-hazard-potential-dams>

16.3.2 Federal Disaster and Recovery Assistance Programs

Following a disaster, various types of assistance may be made available by local, state, and federal governments. The types and levels of disaster assistance depend on the severity of the damage and the declarations that result from the disaster event. Among the general types of assistance that may be provided should the President of the United States declare the event a major disaster includes the following:

Individual Assistance

Individual Assistance (IA) provides help for homeowners, renters, and some nonprofit entities after disasters occur. FEMA may provide money and other services to help you recover from losses caused by a presidentially declared disaster, such as damage to your home, car, and other personal items. IA programs include housing assistance, serious needs assistance, mass care and emergency assistance, crisis counseling assistance, disaster case management, disaster legal services, and disaster unemployment assistance. The IA housing assistance includes eligible home mitigation activities to help homeowners repair or rebuild stronger, more durable homes.

For additional information, see: <https://www.fema.gov/individual-disaster-assistance>

Public Assistance

Public Assistance (PA) provides cost reimbursement aid to local governments (state, county, local, municipal authorities, and school districts) and certain nonprofit agencies that were involved in disaster response and recovery programs or that suffered loss or damage to facilities or property used to deliver government-like services. This program is largely funded by FEMA with both local and state matching contributions required.

For additional information, see: <https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit>



Small Business Administration Loans

The Small Business Administration (SBA) provides low-interest disaster loans to homeowners, renters, business of all sizes, and most private nonprofit organizations. SBA disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets.

Homeowners may apply for up to \$200,000 to replace or repair their primary residence. Renters and homeowners may borrow up to \$40,000 to replace or repair personal property (such as clothing, furniture, cars, and appliances) damaged or destroyed in a disaster. Physical disaster loans of up to \$2 million are available to qualified businesses or most private nonprofit organizations. An Economic Injury Disaster Loan provides necessary working capital until normal operations resume after a physical disaster.

For additional information, see: <https://www.sba.gov/managing-business/running-business/emergency-preparedness/disaster-assistance>

Community Development Block Grants

Community Development Block Grants (CDBG) are federal funds intended to provide low and moderate-income households with viable communities, including decent housing, as suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, planning, and administration. Public improvements may include flood and drainage improvements. In limited instances, and during the times of “urgent need” (e.g., post-disaster) as defined by the CDBG National Objectives, CDBG funding may be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event.

For additional information, see: <https://www.hudexchange.info/programs/cdbg-entitlement/>

U.S. Economic Development Administration

The U.S. Economic Development Administration (USEDA) is an agency of the U.S. Department of Commerce that supports regional economic development in communities around the country. It provides funding to support comprehensive planning and makes strategic investments that foster employment creation and attract private investment in economically distressed areas of the United States. Through its Public Works Program, USED A invests in key public infrastructure, such as in traditional public works projects, including water and sewer systems improvements, expansion of port and harbor facilities, brownfields, multitenant manufacturing and other facilities, business and industrial parks, business incubator facilities, redevelopment technology-based facilities, telecommunications, and development facilities. Through its Economic Adjustment Program, USED A administers its Revolving Loan Fund (RLF) Program, which supplies small businesses and entrepreneurs with the gap financing needed to start or expand their business, in areas that have experienced or are under threat of serious structural damage to the underlying economic base. The USED A may receive a disaster



supplemental allocation following a presidentially-declared disaster for a wide variety of activities related to disaster recovery, including economic recovery strategic planning grants, and public works construction assistance.

For additional information, see: <https://www.eda.gov/strategic-initiatives/disaster-recovery/supplemental>

Federal Highway Administration Emergency Relief

Federal Highway Administration Emergency Relief (FHWA-ER) is a grant program that may be used for repair or reconstruction of Federal-aid highways and roads on Federal lands which have suffered serious damage as a result of a disaster.

For additional information, see: https://www.fhwa.dot.gov/bipartisan-infrastructure-law/er_fact_sheet.cfm

Federal Transit Administration Emergency Relief

Federal Transit Administration Emergency Relief (FTA-E) is a grant program that funds capital projects to protect, repair, reconstruct, or replace equipment and facilities of public transportation systems. Administered by the Federal Transit Authority at the U.S. Department of Transportation and directly allocated to metropolitan transit authorities (MTA) and port authorities, this transportation-specific fund was created as an alternative to FEMA PA.

For additional information, see: <https://www.transit.dot.gov/funding/grant-programs/emergency-relief-program>

16.3.3 State Hazard Mitigation Funding Opportunities

CAL FIRE Grants

CAL FIRE grant programs provide funding for fire prevention activities, to improve forest health, and to enhance community resilience. Additional benefits to communities include workforce development in rural and tribal communities, business innovation, and new recreation opportunities.

For additional information, see: <https://www.fire.ca.gov/what-we-do/grants>

DWR Small Communities Flood Risk Reduction Program

The Small Communities Flood Risk Reduction Program is a local assistance program whose objective is to reduce flood risk for small communities protected by State Plan of Flood Control facilities, as well as for legacy communities.

For additional information, see: <https://water.ca.gov/Work-With-Us/Grants-And-Loans/Small-Communities-Flood-Risk-Reduction>



DWR Flood Control Subventions Program

The Flood Control Subventions Program provides financial assistance to local agencies cooperating in the construction of federally authorized flood control projects.

For additional information, see: <https://water.ca.gov/Work-With-Us/Grants-And-Loans/Flood-Control-Subventions-Program>

16.3.4 County and Local

Del Norte County and individual jurisdictions are (legally, not necessarily practically) able to fund mitigation projects through existing local budgets, local appropriations (including referendums and bonding), and a variety of federal and state loan and grant programs. Many jurisdictions noted throughout the planning process that they are faced with increasing fiscal constraints, including decreasing revenues, budget constraints, and tax caps. In an effort to overcome these fiscal challenges, jurisdictions have continued to leverage the sharing of resources and combining available funding with grants and other sources and note that plans and interjurisdictional cooperation are beneficial in obtaining grants.

PART 4: MITIGATION STRATEGY





17. MITIGATION STRATEGY

This chapter presents mitigation strategies for Del Norte County to reduce potential vulnerability and losses identified as concerns in the risk assessment portion of this plan. The Steering Committee reviewed the risk assessment and capability assessment to identify and develop these mitigation strategies.

Hazard mitigation reduces the potential impacts of, and costs associated with, emergency and disaster-related events.

Mitigation actions address a range of impacts, including impacts on the population, property, the economy, and the environment. They can include activities such as revisions to land-use planning, training and education, and structural and nonstructural safety measures.

17.1 MITIGATION GOALS AND OBJECTIVES

This section describes the process of updating hazard mitigation goals and objectives for reducing or avoiding long-term vulnerabilities to identified hazards. For the purposes of this plan, goals and objectives are defined as follows:

"The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards."

44 CFR 201.6(c)(3)(i)

- **Goals** are general guidelines that explain what is to be achieved. They are usually broad, long-term, policy-type statements and represent global visions. Goals help define the benefits that the plan is trying to achieve. The success of the plan, once implemented, should be measured by the degree to which its goals have been met (that is, by the actual benefits in terms of hazard mitigation).
- **Objectives** are short-term aims that form a strategy or course of action to meet a goal. Objectives are stand-alone measurements of the effectiveness of a mitigation action. The objectives also are used to help establish priorities. Broadly defined mitigation objectives were eliminated from the updated strategy unless accompanied by discrete actions.

The Steering Committee reviewed the 2019 goals and objectives and made revisions for the 2026 update based on the following considerations:

- Hazard events and losses since the 2019 plan
- The updated hazard profiles and risk assessment
- The goals and objectives established in the California 2023 SHMP
- The Planning Partnership's interests in integrating this plan with other planning mechanisms, including Del Norte County and local risk management plans
- Direct input from the Steering Committee, stakeholders, and the public on how the County and jurisdictions need to move forward to best manage their hazard risk
- Discussions and research on existing authorities, policies, programs, resources
- Support for mitigation through the protection of natural systems



As a result of this review process, the goals and objectives for the 2026 update were updated to the following:

- **Goal 1**—Reduce the risk of natural hazard impacts to human life and safety in Del Norte County
- **Goal 2**—Protect the continuity of community lifelines and critical services/functions throughout Del Norte County before, during, and after a hazard event
- **Goal 3**—Safeguard Del Norte County’s economy by mitigating risks to public infrastructure and private property/businesses and promote the efficient use of public funds
- **Goal 4**—Foster an educated community on natural hazards to elevate access and awareness of Del Norte County resources, especially for historically vulnerable and marginalized populations
- **Goal 5**—Conserve Del Norte County’s unique environmental and cultural resources that contribute to its rural character

The selected objectives meet multiple goals. Therefore, the objectives serve as a standalone measurement of the effectiveness of a mitigation action, rather than as a subset of a goal. The objectives also are used to help establish priorities.

- **Objective 1**—Prioritize cost-effective and feasible mitigation measures that reduce long-term risk exposure and promote the adaptive capacity of Del Norte County and its constituents
- **Objective 2**—Increase capacity, redundancy, and/or resilience of local infrastructure and utilities to reduce potential for community isolation after a hazard event
- **Objective 3**—Expand awareness of available resources for residents and business owners, focusing on accessibility for individuals in socially vulnerable situations
- **Objective 4**—Protect community lifelines and critical infrastructure to the 100-year or worst-case scenarios to safeguard continuity of operations in Del Norte County
- **Objective 5**—Incorporate the best available hazard data in development and construction standards and long-term capital investments to encourage mitigation in new growth areas in Del Norte County

17.2 MITIGATION STRATEGY DEVELOPMENT AND UPDATE

17.2.1 Update of Local Jurisdiction Mitigation Strategies

Review of Previous Actions

To evaluate progress on local mitigation actions, each planning partner was provided with a Mitigation Action Review Worksheet, pre-populated with the actions identified for their jurisdiction in the prior (2021) plan. The Planning Partners were asked to indicate the status of each action (“No Progress,” “In Progress,” “Ongoing Capability,” “Completed,” “Discontinued”). They were requested to provide comments to quantify the extent of progress and provide reasons for the level of progress or why actions were discontinued. This information is included in the jurisdictional annexes.



Mitigation actions identified as “Complete” or “Discontinued” have been removed from the Planning Partners’ updated mitigation strategies. Actions identified as “No Progress” or “In Progress” have been carried forward in their local updated mitigation strategies. Planning partners were asked to provide further details on these projects to help better define the projects, identify benefits and costs, and improve implementation.

Certain continuous or ongoing actions (Ongoing Capabilities) from the previous plan that represent programs that are now fully integrated into the normal operational and administrative framework of the community are identified in the capabilities assessment of each annex and removed from the updated mitigation strategy (marked as “Discontinued”).

Identifying New Actions

At the kickoff and during subsequent local level planning meetings, all participating jurisdictions were further surveyed to identify completed mitigation actions, in progress actions, or ongoing capabilities, as well as potential new actions. Planning Partners were made aware of potential new mitigation actions as such actions became evident during the plan update process (e.g., through the capability assessment, risk assessment, or the public and stakeholder outreach process).

Developing the Overall Strategy

The Steering Committee and contract consultants worked directly with each jurisdiction (by phone, email, or virtual meetings) to update their annex with mitigation strategies that focus on well-defined, implementable projects that meet the definition or characteristics of mitigation. Mitigation actions were selected with a careful consideration of benefits (risk reduction, losses avoided), costs, and possible funding sources (including mitigation grant programs).

Addressing Known Vulnerabilities

To help support the selection of an appropriate risk-based mitigation strategy, each annex includes a summary of hazard vulnerabilities. These were identified during the plan update process by planning partner representatives, through review of available plans and reports, or through the hazard profiling and risk assessment process.

A mitigation strategy workshop was conducted on March 20, 2025, for all participating jurisdictions to support the development of focused problem statements based on the impacts of natural hazards in the County and their communities. These problem statements provide a detailed description of a problem area, including its impacts on the jurisdiction; past damage; loss of service; etc. These problem statements form a bridge between the hazard risk assessment, which quantifies impacts on each community, and the development of actionable mitigation strategies.

Incorporating a Range of Action Types

Concerted efforts were made to ensure that Planning Partners develop updated mitigation strategies that cover the range of mitigation action types described in recent FEMA planning guidance (FEMA “Local Mitigation Planning Handbook” March 2025):



- **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 Project**—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 community lifelines and other critical facilities. This type of action also involves projects to construct structures to reduce the impact of hazards.
- **Natural Systems Protection**—These are actions that minimize damage and losses to natural systems and preserve or restore their functions.
- **Education and Awareness Programs**—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as the National Flood Insurance Program, Community Rating System, TsunamiReady (NOAA), StormReady (NOAA), and Firewise (NFPA).

Accounting for Climate Change

Planning partner mitigation actions that address vulnerable critical facilities have been proposed in consideration of protection against worst-case scenarios. For projects funded through federal mitigation programs, the level of protection may be influenced by cost-effectiveness as determined through a formal benefit-cost analysis. For locally self-funded projects, local jurisdiction discretion will be used. It must be recognized that the County and jurisdictions have limited authority with regard to mitigation at any level of protection over privately owned critical facilities.

As discussed in the hazard profiles in this HMP, the long-term effects of climate change are anticipated to exacerbate the impacts of weather-related hazards (e.g., flood, drought, and wildfire). Communities are working to evaluate and recognize these long-term implications and to incorporate their mitigation strategies into planning and capital improvement updates.

17.2.2 Update of County Mitigation Strategy

The update of the County-level mitigation strategies included a review of progress on the actions/initiatives identified in the 2019 HMP using a process similar to that used to review local jurisdiction mitigation strategy progress. The County, through their various department representatives, was provided with a Mitigation Action Plan Review Worksheet identifying all County-level actions and initiatives from the 2019 plan. The County reviewed each action and provided progress. For each action, relevant County representatives were asked to indicate the status of each action (*No Progress*, *In Progress*, *Ongoing*, *Completed*, or *Discontinued*), and provide review comments on each.

Actions identified as “*Complete*,” as well as those actions identified as *Discontinued*, have been removed from this plan update. Those actions the County has identified as *No Progress* or *In Progress* have been carried forward in the County’s updated mitigation strategy. Actions considered ongoing capabilities were marked as *Discontinued* and included in the plan as ongoing capabilities.



Throughout the course of the plan update process, additional regional and County-level mitigation actions were identified by the following processes:

- Review of the results and findings of the updated risk assessment
- Review of available regional and County plans, reports, and studies
- Direct input from County departments and other regional agencies
- Input received through the public and stakeholder outreach process

17.2.3 Mitigation Best Practices

Catalogs of hazard mitigation best practices were developed that present a broad range of alternatives to be considered for use in the mitigation strategies, in compliance with 44 CFR Section 201.6(c)(3)(ii). One catalog was developed for each hazard of concern evaluated in this plan. The catalogs present alternatives that are categorized based on the following considerations:

- Who would have responsibility for implementation:
 - Individuals—personal scale
 - Businesses—corporate scale
 - Government—government scale
- What would the alternatives do:
 - Manipulate the hazard
 - Reduce vulnerability to the hazard
 - Reduce impacts from the hazard
 - Build local capacity to respond to or be prepared for the hazard

The alternatives presented include actions that will mitigate current risk from hazards and actions that will help reduce risk from changes in the impacts of these hazards resulting from climate change. The catalogs provide a baseline of mitigation alternatives that are backed by a planning process, are consistent with the established goals and objectives, and are within the capabilities of the Planning Partners to implement. Some of these actions may not be feasible based on the selection criteria identified for this plan. The purpose of the catalogs was to provide a list of what could be considered to reduce risk from natural hazards within the planning area. Appropriate hazard mitigation actions were selected from among the alternatives in the catalogs for inclusion in the mitigation strategies. Actions in the catalog that are not included for the partnership's mitigation strategy were not selected for one or more of the following reasons:

- The action is not feasible
- The action is already being implemented
- There is an apparently more cost-effective alternative
- The action does not have public or political support.

The catalogs are included in Appendix E.



17.2.4 Mitigation Strategy Evaluation

Section 201.c.3.iii of 44 CFR establishes how mitigation strategies are to be prioritized, implemented, and administered by local jurisdictions. For this plan update, each mitigation strategy was prioritized using criteria suitable for evaluating hazard mitigation strategies. This method provided a systematic approach that considered the opportunities and constraints of implementing each mitigation action.

For the plan update there has been an effort to develop a more clearly defined and action-oriented mitigation strategy. The updated strategy includes actions that are seen by the Planning Partnership as the most effective approaches to advance local mitigation goals within the existing capabilities. Ultimately, the County developed an action-oriented and achievable mitigation strategy.

It is noted that jurisdictions may be carrying forward mitigation actions from prior mitigation strategies that were prioritized using a different, but not inherently contrary, approach. Mitigation actions in the prior (2019) Del Norte County HMP were prioritized based on cost and availability of funding, benefit, number of plan objectives achieved, timeframe for project implementation, and eligibility for grant funding programs. At their discretion, jurisdictions carrying forward prior actions were encouraged to re-evaluate their priority, particularly if conditions that would affect the prioritization criteria had changed.

Benefit/Cost Review

Section 201.6.c.3iii of 44 CFR requires the prioritization of the mitigation strategy to emphasize a benefit/cost comparison of the proposed actions. For all actions identified in the local strategies, jurisdictions identified the associated costs and benefits as follows:

- **Costs** presented include the total project estimation. This can include administrative, construction (engineering, design, and permitting), and maintenance costs.
- **Benefits** are the savings from losses avoided through project implementation. These can include life safety, structure and infrastructure damage, loss of service or function, and economic and environmental damage and losses.

When possible, jurisdictions were asked to identify the actual or estimated dollar costs and associated benefits. Where estimates of costs and benefits were available, the ratings were defined follows:

Low $\leq$ \$10,000

Medium = \$10,000 to \$100,000

High $\geq$ \$100,000

Where numerical costs or benefits could not be quantified, jurisdictions evaluated cost-effectiveness using qualitative *high*, *medium*, and *low* ratings based on the following definitions:

- **High Costs:** Existing funding levels are not adequate to cover the costs of the proposed project, and implementation would require an increase in revenue through an alternative source (e.g., bonds, grants, and fee increases)
- **Medium Costs:** 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 Costs:** The project could be funded under the existing budget. The project is part of or can be part of an existing, ongoing program.

Jurisdictions were asked to identify the benefit of each mitigation strategy as it related to reduction of risk.

- **High Benefits:** Project will have an immediate impact on the reduction of risk exposure to life and property.
- **Medium Benefits:** Project 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 Benefits:** 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 medium, medium over low, etc.) are considered cost-effective.

Prioritization Scoring

Each mitigation action was assigned a priority based on the following equation and the scores for costs, benefits, goals, and time frame shown in Table 17-1.

Action Prioritization Equation

$$\text{Priority} = [(\text{Costs}) + (\text{Benefits}) + (\text{Goals Met}) + (\text{Time Frame})]$$

Table 17-1. Scoring System for Prioritizing Mitigation Actions

Criteria	Score
Costs	
High+	1 point
Medium	2 points
Low	3 points
Benefits	
High	3 points
Medium	2 points
Low	1 point
Number of Goals Met	
Each Goal	0.077 points
Implementation Time Frame	
1-5 Years	2 points
1-10 Years	1 point



The numerical results were totaled and then used to help prioritize the action as *low*, *medium*, or *high*. Actions that had a numerical value between 0 and 5 were categorized as *low priority*; actions with numerical values between 5 and 7 were categorized as *medium priority*; and actions with numerical values between 7 and 9 were categorized as *high priority*. While this provided a consistent, systematic methodology to support the evaluation and prioritization of mitigation actions, the individual jurisdictions may have additional considerations that influenced the overall prioritization of mitigation actions.

The final, prioritized mitigation strategies are located in Volume 2.

For some of the Del Norte County actions identified, the Planning Partnership may seek financial assistance under FEMA's Hazard Mitigation Assistance (HMA) programs. These programs require detailed benefit/cost analysis as part of the application process. The benefit/cost review for the prioritization of actions in this update did not include the level of detail required by FEMA for project grant eligibility under HMA grant programs. These analyses will be performed when funding applications are prepared, using FEMA's Benefit-Cost Analysis model.

The Planning Partnership is committed to implementing mitigation strategies with benefits that exceed costs. For projects not seeking financial assistance from grant programs that require this sort of analysis, the Planning Partnership reserves the right to define benefits according to parameters that meet its needs and the goals and objectives of this plan.

PART 5:

PLAN

MAINTENANCE





18. PLAN MAINTENANCE AND IMPLEMENTATION PROCEDURES

This chapter details the formal process that will ensure that the hazard mitigation plan remains an active and relevant document and that the Planning Partnership maintains its 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. In addition, this chapter describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in this plan update 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.

18.1 HMP COORDINATOR AND JURISDICTION POINTS OF CONTACT

The HMP Coordinator is assigned to manage the maintenance and update of the plan during its approval period (the five-year period between FEMA's approval of the plan and its expiration), with the following responsibilities:

- Convene the Planning Partnership
- Be the prime point of contact for questions regarding the plan and its implementation
- Coordinate the incorporation of additional information into the plan
- Manage the monitoring, evaluation, and updating responsibilities identified in this section

Currently, the Del Norte County HMP Coordinator is designated as:

Deborah Otenburg, Emergency Services Manager
Del Norte County Office of Emergency Services
981 H Street, Suite 240
Crescent City, CA 95531
707-464-7255
Email: delnorteoos@co.del-norte.ca.us

As of the date of this plan, primary and secondary mitigation planning representatives (points of contact) are identified in each jurisdictional annex in Volume 2. It will be the responsibility of each jurisdiction and its representatives to inform the HMP Coordinator of any changes in representation.

18.2 MAINTENANCE AND IMPLEMENTATION TASKS

The procedures for monitoring, evaluating, and updating the plan are provided below. The plan maintenance matrix shown in Table 18-1 provides a synopsis of responsibilities for plan monitoring, integration, evaluation, and update, which are discussed in further detail in the sections below.



Table 18-1. Plan Maintenance Matrix

Task	Approach	Timeline	Lead Responsibility	Support Responsibility
Monitoring	Planning partners to recommend update of mitigation strategies, progress toward implementation of actions, identification of new actions, and update of information on funding opportunities.	Each October or after the occurrence of a federally declared disaster	Jurisdictional points of contact identified in Volume 2	Alternate jurisdictional points of contact
Integrating	Distribute the safe growth worksheet (see Table 18-2) for annual review and update by all participating jurisdictions.	June each year with interim email reminders to address integration in county and municipal activities	HMP Coordinator and jurisdictional points of contact identified in Volume 2	Alternate jurisdictional points of contact
Evaluating	Review the status of previous actions, as submitted by the monitoring task lead, and assess the effectiveness of the plan; compile and finalize update of mitigation strategy.	Updated progress report completed by September 30 of each year	Jurisdictional points of contact identified in Volume 2	Alternate jurisdictional points of contact
Updating	Reconvene the Planning Partners to guide a comprehensive update to review and revise the plan.	Every 5 years or upon major update to Comprehensive Plan or after the occurrence of a major disaster	HMP Coordinator	Jurisdictional points of contacts identified in Volume 2
Grant Monitoring	Notify lead agencies about grant opportunities, maintain a list of eligible jurisdiction-specific projects for funding consideration, and notify lead agencies of fiscal year mitigation priorities.	Continuously and as grant opportunities are identified	HMP Coordinator	Jurisdictional points of contacts identified in Volume 2
Public Involvement	Inform the public of hazard events via social media outlets, promote educational workshops on hazard topics, and track and file public comments received regarding the HMP.	Continuously	County Office of Emergency Services Manager	Jurisdictional points of contacts identified in Volume 2

18.2.1 Monitoring

The Planning Partnership will be responsible for monitoring and documenting annual progress on the plan. Each year, beginning one year after plan development, Del Norte County and local Planning Partnership representatives will collect and process information from the persons responsible for initiating or overseeing the mitigation projects in each department, agency, and organization involved in implementing mitigation actions identified in their jurisdictional annexes. Planning Partnership representatives will be expected to document the following:

- Progress on the implementation of mitigation actions
- Obstacles or impediments to implementation of actions



- Any grant applications filed on behalf of any of the participating jurisdictions
- Hazard events and losses occurring in their jurisdiction
- Additional mitigation actions believed to be appropriate and feasible
- Public and stakeholder input.

18.2.2 Integrating the HMP into Local Planning Mechanisms

Hazard mitigation is sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. Integrating hazard mitigation into a community's existing plans, policies, codes, and programs leads to development patterns or redevelopment that reduce risk from known hazards. The Planning Partnership was tasked with identifying how hazard mitigation is integrated into existing planning mechanisms. The jurisdictional annexes in Volume 2 describe how this is done for each planning partner. During this process, many partners recognized the importance and benefits of incorporating hazard mitigation into future local planning and regulatory processes.

Effective mitigation is achieved when hazard awareness and risk management approaches and strategies become an integral part of public activities and decision-making. Within the County, there are many existing plans and programs that support hazard risk management, and it is critical that this HMP integrate and coordinate with and complement those existing plans and programs.

The Capability Assessment (Chapter 16) provides a summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county, and local) that support hazard mitigation within the County. In the jurisdictional annexes in Volume 2, each planning partner identified how it has integrated hazard risk management into its existing planning, regulatory, and administrative framework ("existing integration") and how they intend to promote this integration further ("opportunities for future integration").

It is the intention of Planning Partnership representatives to incorporate mitigation planning as an integral component of daily government operations. Planning Partnership representatives will work with local government officials to integrate the newly adopted hazard mitigation goals and actions into the general operations of government and partner organizations. The sample adoption resolution (Appendix A – Adoption Resolution) includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the Planning Partnership anticipates that:

- Hazard mitigation planning will be formally recognized as an integral part of overall emergency management efforts.
- The HMP, comprehensive plans, emergency management plans and other relevant planning mechanisms will become mutually supportive documents that work in concert to meet the goals and needs of county residents.

Other planning processes and programs to be coordinated with the recommendations of the HMP include the following:

- Emergency response plans



- Training and exercise of emergency response plans
- Debris management plans
- Recovery plans
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments
- Community wildfire protection plans
- Comprehensive flood hazard management plans
- Resiliency plans
- Community Development Block Grant Disaster Recovery action plans
- Public information and improved public participation
- Educational programs
- Continued interagency coordination

During the HMP annual review process, participating jurisdictions will be asked to document how they are utilizing and incorporating the HMP into their day-to-day operations and planning and regulatory processes. Each municipality will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions and include these findings and recommendations in the annual HMP progress report. The checklist in Table 18-2, adapted from FEMA's 2013 Local Mitigation Handbook, will help a community analyze how hazard mitigation is integrated into local plans, ordinances, regulations, and policies. Completing the checklist will help jurisdictions identify areas that currently integrate hazard mitigation and where to make improvements and reduce vulnerability to future development.



Table 18-2. Safe Growth Check List

Planning Mechanisms	Yes	No	How is it being done or how will this be utilized in the future?
Operating, Municipal, and Capital Improvement Program Budgets			
When constructing upcoming budgets, are hazard mitigation actions funded as budget allows?			
Are construction projects evaluated to see if they meet the hazard mitigation goals?			
Does the municipality review mitigation actions when allocating funding during annual budget adoption processes?			
Do budgets limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?			
Do infrastructure policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards?			
Do budgets provide funding for hazard mitigation projects identified in the HMP?			
Human Resource Manual			
Do any job descriptions specifically include identifying and/or implementing mitigation projects/actions or other efforts to reduce natural hazard risk?			
Building and Zoning Ordinances			
Prior to zoning changes or development permitting, does the municipality review the HMP and other hazard analyses to ensure consistent and compatible land use?			
Does the zoning ordinance discourage development or redevelopment within natural areas, including wetlands, floodways, and floodplains?			
Does the zoning ordinance contain natural overlay zones that set conditions			
Does the zoning ordinance require developers to take additional actions to mitigate natural hazard risk?			
Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use?			
Does the zoning ordinance prohibit development within or filling of wetlands, floodways, and floodplains?			
Subdivision Regulations			
Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?			
Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources?			
Do the regulations allow density transfers where hazard areas exist?			



Planning Mechanisms	Yes	No	How is it being done or how will this be utilized in the future?
Comprehensive Plan			
Are the goals and policies of the plan related to those of the HMP?			
Does the future land use map clearly identify natural hazard areas?			
Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?			
Land Use			
Does the future land use map clearly identify natural hazard areas?			
Do the land use policies discourage development or redevelopment in natural hazard areas?			
Transportation Plan			
Does the transportation plan limit access to hazard areas?			
Is transportation policy used to guide growth to safe locations?			
Are transportation systems designed to function under disaster conditions (e.g., evacuation)?			
Environmental Management			
Are environmental systems that protect development from hazards identified and mapped?			
Do environmental policies maintain and restore protective ecosystems?			
Do environmental policies provide incentives to development located outside protective ecosystems?			
Grant Applications			
Are data and maps used as supporting documentation in grant applications?			
Municipal Ordinances			
Is hazard mitigation a priority when updating municipal ordinances?			
Economic Development			
Does the local economic development group take into account information regarding identified hazard areas when assisting new businesses in finding a location?			
Public Education and Outreach			
Does the municipality have any public outreach mechanisms/ programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events?			



18.2.3 Evaluating

Evaluation of the HMP is an assessment of whether the planning process and actions have been effective, whether the HMP goals are being achieved, and whether changes are needed. The HMP Coordinator will consult with the Planning Partnership members to evaluate the effectiveness of the plan implementation and to reflect changes that could affect mitigation priorities or available funding.

The status of the HMP will be discussed and documented at an annual plan review meeting of the Planning Partnership to be held either in person or via teleconference approximately one year from the date of local adoption of this update and successively thereafter. The HMP Coordinator will be responsible for calling participants, coordinating the annual plan review meeting, and soliciting input regarding progress toward meeting plan goals and objectives. At least two weeks before the annual plan review meeting, the HMP Coordinator will advise Planning Partnership members of the meeting date, agenda, and expectations of the members. These evaluations will assess whether:

- Goals and objectives address current and expected conditions
- The nature or magnitude of the risks has changed
- Current resources are appropriate for implementing the HMP and if different or additional resources are now available
- Actions were cost effective
- Schedules and budgets are feasible
- Implementation problems are present, such as technical, political, legal, or coordination issues with other agencies
- Outcomes have occurred as expected
- Changes in local resources impacted plan implementation (e.g., funding, personnel, and equipment)
- New agencies, departments, and staff are included, involving other local governments as defined under 44 CFR 201.6.

Specifically, the Planning Partnership will review the mitigation goals, objectives, and activities using performance-based indicators, including:

- New agencies/departments
- Project completion
- Underspending/overspending
- Achievement of the goals and objectives
- Resource allocation
- Timeframes
- Budgets
- Lead/support agency commitment
- Resources
- Feasibility



Finally, the Planning Partnership will evaluate how other programs and policies have conflicted with or augmented planned or implemented mitigation actions and will identify policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions. Other programs and policies can include those that address:

- Economic development
- Environmental preservation
- Historic preservation
- Redevelopment
- Health and safety
- Recreation
- Land use and zoning
- Public education and outreach
- Transportation

The Planning Partnership should refer to evaluation forms in the FEMA 386-4 guidance document to assist in the evaluation process. Further, the Planning Partnership should refer to any process and plan review deliverables developed by the County or participating jurisdictions as a part of the plan review processes established for prior or existing local HMPs within the county.

The HMP Coordinator will be responsible for preparing an annual HMP progress report for each year of the approval period based on the information provided by the Planning Partners and other information as appropriate. These annual reports will provide data for the five-year update of this HMP and will assist in pinpointing any implementation challenges. By monitoring the implementation of the HMP, the Planning Partnership will be able to assess which actions are completed, which are no longer feasible, and which require additional funding.

Following any major disasters, the HMP will be evaluated and revised to determine if the recommended actions remain relevant and appropriate. The risk assessment will also be revisited to see if any changes are necessary based on the pattern of disaster damage or if data listed in the hazard profiles of this plan has been collected to facilitate the risk assessment. This is an opportunity to increase the community's disaster resistance and build a better and stronger community.

18.2.4 Updating

44 CFR 201.6.d.3 requires that local hazard mitigation plans be reviewed, revised as appropriate, and resubmitted for approval to remain eligible for benefits awarded under the DMA. It is the intent of the Del Norte County HMP Planning Partnership to update this plan on a five-year cycle from the date of initial plan adoption.

To facilitate the update process, the HMP Coordinator, with support of the Planning Partnership, will use the second annual Planning Partnership meeting to develop and commence the implementation of a detailed plan update program. Prior to the five-year update, the HMP Coordinator will invite



representatives from the California Governor's Office of Emergency Services to provide guidance on plan update procedures. At a minimum, this will establish who will be responsible for managing and completing the plan update effort, items that need to be included in the updated plan, and a detailed timeline with milestones to ensure that the update is completed according to regulatory requirements. At this meeting, the project team will determine what resources will be needed to complete the update and seek to secure these resources.

Following each 5-year update of the HMP, the updated plan will be distributed for public comment. After all comments are addressed, the HMP will be revised and distributed to all Planning Partners.

18.2.5 Grant Monitoring and Coordination

Del Norte County intends to be a resource to the Planning Partnership in the support of project grant writing and development. The degree of this support will depend on the level of assistance requested by the Planning Partners during openings for grant applications. As part of grant monitoring and coordination, Del Norte County intends to provide the following:

- Notification to Planning Partners about impending grant opportunities
- A current list of eligible, jurisdiction-specific projects for funding pursuit consideration
- Notification about mitigation priorities for the fiscal year to assist the Planning Partners in the selection of appropriate projects.

18.2.6 Continued Public Involvement

The Planning Partners are committed to the continued involvement of the public in the hazard mitigation process. This HMP update will continue to be posted online at the following link: <https://www.co.del-norte.ca.us/departments/emergencyservices>. In addition, public outreach and dissemination of the HMP will include the following:

- Links to the plan on local websites of each jurisdiction with capability
- Continued utilization of existing social media outlets (Facebook) to inform the public of natural hazard events, such as floods and severe storms; the public can be educated via the jurisdictional websites on how these applications can be used in an emergency situation
- Promotion of articles or workshops on hazards to educate the public and keep them aware of the dangers of hazards

The HMP Coordinator will be responsible for receiving, tracking, and filing public comments regarding this HMP. The public will have an opportunity to comment on the plan via the hazard mitigation website at any time. The HMP Coordinator will ensure that:

- Public and stakeholder comments and input on the plan, and hazard mitigation in general, are collected, recorded, and addressed as appropriate.
- Information about the HMP is available on a County website and updated as appropriate.
- Copies of the latest approved plan are available for review at appropriate county facilities, along with instructions to facilitate public input and comment on the plan.



- Public notices, including media releases, are made (as appropriate) to inform the public of the availability of the plan, particularly during plan update cycles.

A notice regarding annual updates of the plan and the location of plan copies will be publicized annually after the Planning Partnership's annual evaluation and posted on the public website.



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APPENDIX A. PLANNING PARTNER HMP ADOPTION RESOLUTIONS



The Del Norte County and municipal adoption resolutions will be included in this appendix upon receipt of the Federal Emergency Management Agency (FEMA) Approval Pending Adoption (APA) status. Please refer to Chapter 2 (Planning Process) for additional information on plan adoption procedures.

This appendix also includes an example resolution to be submitted by Del Norte County and participating jurisdictions authorizing adoption of the 2026 Del Norte County Hazard Mitigation Plan Update.



SAMPLE RESOLUTION

RESOLUTION NO. XXXX-XX
A RESOLUTION OF THE Governing Body OF THE Jurisdiction Name
AUTHORIZING THE ADOPTION OF THE
2026 DEL NORTE COUNTY HAZARD MITIGATION PLAN

WHEREAS Del Norte County and its jurisdictions recognize the threat that natural hazards pose to people and property within Del Norte County; and

WHEREAS the County and its jurisdictions have prepared a hazard mitigation plan, hereby known as the 2026 Del Norte County Hazard Mitigation Plan, in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS the 2026 Del Norte County Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Del Norte County and its jurisdictions from the impacts of future hazards and disasters; and

WHEREAS adoption by Del Norte County and its jurisdictions demonstrates commitment to hazard mitigation and achieving the goals outlined in the 2026 Del Norte County Hazard Mitigation Plan.

NOW THEREFORE, BE IT RESOLVED BY THE [JURISDICTION NAME], CALIFORNIA, THAT:

In accordance with (local rule for adopting resolutions), the (jurisdiction name) adopts the 2026 Del Norte County Hazard Mitigation Plan. While content related to Del Norte County and [jurisdiction name] may require revisions to meet the plan approval requirements, changes occurring after adoption will not require [jurisdiction name] to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

ADOPTED by a vote of [XX] in favor and [XX] against, and [XX] abstaining, this [XX] day of [Month], [Year].

By: (print name)

ATTEST By: (print name)

APPROVED AS TO FORM By: (print name)



APPROVED PLANNING PARTNER ADOPTION RESOLUTIONS

Adoption resolutions for all participating jurisdictions in this HMP are provided on the following pages.

INSERT WHEN AVAILABLE



FEMA LETTERS OF APPROVAL

Letters from FEMA acknowledge approval of the HMP for all participating jurisdictions are provided on the following pages.

INSERT WHEN AVAILABLE

APPENDIX B. DEFINITION OF TERMS AND ACRONYMS



0.2 percent-annual-chance flood—The flood that has a 0.2 percent chance of being equaled or exceeded in any given year; often referred to as the 500-year flood

1 percent-annual-chance flood—The flood that has a 1 percent chance of being equaled or exceeded in any given year; often referred to as the 100-year flood

AB—Assembly Bill

asset—Any manufactured or natural feature that has value, including 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 percent-annual-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—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.”

benefit/cost analysis—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.

benefit—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.

CAL FIRE—California Department of Forestry and Fire Protection

Cal OES—California Governor’s Office of Emergency Services

Caltrans—California Department of Transportation

capability assessment—An analysis of a community’s 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.

CARB—California Air Resources Board

CCR—California Code of Regulations

CDBG-DR—Community Development Block Grant Disaster Recovery grants

CDC—Centers for Disease Control and Prevention

CFR—Code of Federal Regulations

CGS—California Geological Survey

climate change—A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.

community lifeline—The most fundamental services in the community that, when stabilized, enable all other aspects of society to function

Community Rating System (CRS)—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 asset—Any entity or location—physical or virtual—whose compromise would have a profound and negative effect on critical infrastructure, cause mass casualty, or have a profound and negative symbolic or psychological impact.

critical facilities—Physical facilities and infrastructure that are critical to the health and welfare of the population. Such facilities are a type of community lifeline. They become especially important after any hazard event occurs.

CRS—Community Rating System

dam failure—An uncontrolled release of impounded water due to a partial or complete breach in a dam (or levee) that impacts its integrity.

dam—Any artificial barrier or controlling mechanism that can or does impound or divert water.

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.

DFIRM—Digital Flood Insurance Rate Map

Disaster Mitigation Act (DMA; Public Law 106-390)—The latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving certain federal financial assistance.

DMA —Disaster Mitigation Act

drought—The cumulative impacts of long periods of dry weather. These can include deficiencies in surface and subsurface water supplies and general impacts on health, well-being, and quality of life.

DSOD—Division of Safety of Dams (California)

DWR—Department of Water Resources (California)

EAP—Emergency action plan

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.

emergency action plan—A formal 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.

EOC—emergency operations center

EPA—U.S. Environmental Protection Agency

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.

extreme heat—Temperatures that hover 10 °F or more above the average high temperature for a region and last for several days.

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

federal disaster declaration—Declarations for events that cause more damage than state and local governments and resources can handle without federal government assistance. A federal disaster declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, to help disaster victims, businesses, and public entities.

FEMA—Federal Emergency Management Agency

FERC—Federal Energy Regulatory Commission

fire behavior—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).

FIRM—Flood Insurance Rate Map

flash flood—A flood that occurs with little or no warning when water levels rise at an extremely fast rate

Flood Insurance Rate Map (FIRM)—The official maps on which the Federal Emergency Management Agency delineate the Special Flood Hazard Area.

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

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

floodway—area within a floodplain that is 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.

FMA—Flood Mitigation Assistance grant program

frequency—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.

FZ—forecast zone

geographic information system (GIS)—A computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

g—gravity (%g, percent acceleration force of gravity)

GIS—Geographic Information System

goal—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).

greenhouse gases—Methane, nitrous oxide and other gases that trap heat and warm the Earth, as a greenhouse traps heat from the sun.

ground shaking—The result of rapid ground acceleration caused by seismic waves passing beneath buildings, roads, and other structures.

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

hazard—A source of potential danger or adverse condition that could harm people and/or cause property damage.

hazardous material—A substance or combination of substances (biological, chemical, radiological, and/or physical) that, because of its quantity, concentration, or physical, chemical or infectious characteristics, has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.

Hazus—A GIS-based program used to support the development of risk assessments as required under the DMA. The Hazus software program assesses risk in a quantitative manner to estimate damage and losses associated with natural hazards.

HHPD—high hazard potential dam



high-hazard potential dam—Dams that can cause loss of human life from the failure or improper operation of the dam.

HMA—Hazard Mitigation Assistance (federal grant program)

HMGP—Hazard Mitigation Grant program

HMP—hazard mitigation plan

hydrological drought—Deficiencies in surface and subsurface water supplies.

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

impact—the consequences or effects of a hazard, often expressed in value of loss or damage incurred.

intensity—The measure of the effects of a hazard.

interface area—An area susceptible to wildfires 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.

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.

IPCC—Intergovernmental Panel on Climate Change

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

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

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—The measure of the strength of an earthquake.

mitigation actions—Specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

mitigation—A preventive action taken in advance of an event to reduce or eliminate risk to life or property.

MM—Modified Mercalli Scale

MRP—Mean Return Period

Mw—Moment Magnitude Scale

NCEI—National Centers for Environmental Information

NEHRP—National Earthquake Hazard Reduction Program

NFIP—National Flood Insurance Program

NDMC—National Drought Mitigation Center

NOAA—National Oceanic and Atmospheric Administration

NWS—National Weather Service

Objective—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.

OES—Office of Emergency Services (Nevada County)

PDM—Pre-Disaster Mitigation Grant Program

peak ground acceleration (PGA)—A measure of the highest amplitude of ground shaking that



accompanies an earthquake, based on a percentage of the force of gravity.

PGA—peak ground acceleration

preparedness—Actions that strengthen the capability of government, people, and communities to respond to disasters.

probability of occurrence—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.

RCV—Replacement Cost Value

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.

residual risk—The risk that remains after controls are accounted for.

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

riparian area—The area along the banks of a natural watercourse.

risk assessment—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

risk ranking—Process to score and rank hazards based on the probability that they will occur and the consequence they will have if they do.

risk—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.

riverine—Of or produced by a river. Riverine floodplains have readily identifiable channels.

Robert T. Stafford Act—The statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs (Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107). Signed into law November 23, 1988; amended by the Disaster Relief Act of 1974 (Public Law 93-288).

SFHA—Special Flood Hazard Area

significant-hazard dam—Dams that can cause economic loss, environmental damage, or disruption of lifeline facilities, or can impact other concerns, but not necessarily loss of life.

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

SRA—State Responsibility Area (for firefighting)

stakeholder—business leaders, civic groups, academia, non-profit organizations, major employers, managers of community lifelines, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

steep slope—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%.

USACE—U.S. Army Corps of Engineers

USDA—U.S. Department of Agriculture

USDM—U.S. Drought Monitor



USGS—U.S. Geological Survey

vulnerability—the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

watershed—An area that drains downgradient from areas of higher land to areas of lower land to the lowest point.

wildfire—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.

WUI—wildland/urban interface

zoning ordinance—Ordinance that designates allowable land use and intensities for a local jurisdiction.

APPENDIX C. MEETING DOCUMENTATION



The following are meeting agendas, slides, and minutes (where applicable and available) for meetings convened during the development of the 2026 Del Norte County Hazard Mitigation Plan Update.



AGENDA

JULY 30, 2024 @ 9:30 – 10:30 AM

1. Welcome & Introductions
2. Hazard Mitigation Overview
 - Purpose of plan update
 - What's new for the 2024 plan?
3. Project Organization
 - Key agencies, partners, and stakeholders
4. Planning Partners Roles & Responsibilities
 - Commitment expectations
5. Planning Process Overview
 - Planning Process
 - Risk Assessment
 - Public Involvement Strategy
 - Mitigation Strategy
 - Plan Maintenance
 - Plan Update & Deliverables
 - Plan Review & Adoption
6. Project Schedule
 - Overview and Milestones
 - Meeting Schedule
7. Questions
8. Next Steps



MEETING:	Del Norte County HMP Planning Partnership Kick-off	
LOCATION:	Virtual (Microsoft Teams)	
DATE/TIME:	July 30, 2024 from 9:30 to 10:30 AM	
ATTENDEES:	County Office of Emergency Management • Deborah Otenburg, Emergency Services Manager • Jessica Seaman, Emergency Services Coordinator • Christina Smith, Fiscal Manager County Community Development Department • Heidi Kunstal, Director Big Rock Community Service District • Hank Akin, Commissioner City of Crescent City • Andrew Leighton, Engineering Project Manager Crescent City Harbor District • Tim Petrick, CEO/Harbormaster • Michael Rademaker, Assistant Harbormaster Elk Valley Rancheria • Jennifer Meyer, Emergency Manager	Hussey Ranch Community Service District • Wes White, President Gasquet Community Service District • Steve Kasmar, Chair Klamath Community Services District • Margaret Caldwell, Board President Smith River Fire Protection District • Geoffrey Antil, Project Manager Cal OES • Samantha Karges, Coastal Region Emergency Services Coordinator Tetra Tech • Emma Kilkelly, Lead Planner • Bart Spencer, Project Manager
MEETING PURPOSE:	The purpose of the meeting was to introduce the Planning Partnership and contract consultant, provide an overview of the hazard mitigation planning process, and to begin the information gathering processes and update the hazards of concern.	
ITEM NO.	Description	Action item(s):
1	Welcome & Introductions • Each person was asked to share their name and department in the chat. • Attendees were asked to respond to a poll about their participation in the 2019 planning process. ○ Of those who responded, five attendees did participate in the last planning process, and five did not. • Ms. Otenburg welcomed attendees and introduced Mr. Spencer and Ms. Kilkelly from Tetra Tech.	-



2	Hazard Mitigation Overview • Mitigation is a sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. • A Hazard Mitigation Plan (HMP) provides an overview of the impacts of natural hazards on communities and is a roadmap to reducing the impact of these hazards. ○ Attendees were asked to take a quick poll related to the hazards occurring the most in the County since 2019. Of those who responded, most said severe weather and/or wildfires. • For the 2025 update, the County will be following the revised April 2023 FEMA guidance for local plans	-
3	Project Organization • To complete the HMP update, we will work with individuals, agencies, neighboring jurisdictions, businesses, and other partners. • The project is organized by the following – ○ Core Planning Team - made up of Del Norte County and Tetra Tech. This is a small group that will meet frequently to ensure the project stays on schedule and that we meet all State and FEMA requirements. ○ Planning Partnership - responsible for providing guidance and leadership throughout the planning process. They will actively contribute, review, and provide feedback on plan sections, update the plans' goals and objectives, finalize the list of hazards of concern, and identify mitigation actions. ○ Steering Committee – represents the participating jurisdictions. They will attend meetings, provide information, identify mitigation actions, and adopt the HMP. ○ Stakeholders - must be engaged throughout the planning process. At a minimum, this group should include neighboring counties, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit organizations. We will put together a draft list of stakeholders and ask for your input. ○ Cal OES - provide the County guidance throughout the HMP update and will review/approve the plan.	-
4	Planning Partnership Roles & Responsibilities • Planning Partnership responsibilities include the following: ○ Guide the SC (jurisdictions) through the HMP update process. ○ Oversee the planning process from start to finish. ○ Actively contribute, review, and provide feedback, identify mitigation actions, etc. This includes: ○ Formalizing the natural hazards of concern ○ Updating/developing mitigation goals and objectives	-



	○ Developing a public and stakeholder outreach strategy ○ Assisting with the development of the county-level mitigation strategy ○ Reviewing plan documents	
5	Planning Process Overview ● Following an eight-phase approach to update the HMP. 1. Planning Process – ongoing throughout the update 2. Risk Assessment – identifies the risks of each hazard included in the plan. ▪ 2019 Hazards ● Dam Failure ● Drought ● Earthquake ● Flood ● Landslide ● Severe Weather ● Wildfire ● Climate Change ▪ Proposed 2025 Hazards ● Dam Failure – <i>Ms. Otenburg noted that several of the dams in the area have been decommissioned.</i> ● Drought ● Extreme Temperatures – <i>Ms. Otenburg noted this may not be relevant for the County.</i> ● Flood ● Geological Hazards – <i>includes both landslide and earthquake.</i> ● Severe Weather ● Wildfire ▪ Planning Partnership members said they perceive the following as at risk to hazards in the County. ● Transportation corridors ● Last Chance grade (Highway 101) ● Infrastructure, water, Cascadia ● Flooding ● Flood/tsunami. ● Electrical service ● Economic-driven problems 3. Public Involvement Strategy – ongoing throughout the plan update; we will use the County’s website and StoryMap to help with outreach. ▪ New FEMA guidance emphasizes outreach to socially vulnerable communities and to include these populations in the Risk Assessment	Tetra Tech ● Confirm whether remaining dams and inundation areas may affect the County. Planning Partnership ● Provide input on the hazards of concern: https://forms.office.com/r/iidxZTuicq



	▪ Planning Partnership members suggested the following categories for inclusion in the social vulnerability analysis. • Transient community • Traveling public that may become stranded in the County. • People with disabilities • People experiencing homelessness. • Single-parent households 4. Mitigation Strategy – review/finalize goals/objectives for 2025 HMP; review existing capabilities; review 2019 mitigation strategies and provide status; identify new strategies for the 2025 update. 5. Plan Maintenance – determine the maintenance schedule of the 2025 HMP. 6. Plan Update and Deliverables – update all sections of the HMP; provide to Cal OES for review and approval. 7. Plan Adoption – the County and each participating municipality will adopt the plan after the HMP is approved by FEMA. 8. Project Management and Coordination – ongoing throughout the update	
6	Project Schedule • Planning Partnership Kick-Off – July 30, 2024 • Risk Assessment ○ Data collection – Fall 2024 ○ Preliminary results – Winter 2024/25 • Public Involvement – Continuous • Mitigation Strategy – Winter 2024/25 • Plan Maintenance – Winter/Spring 2025 • Public Draft – Spring 2025 • Draft to State for Review – Spring 2025 • Plan Adoption – Spring 2025	-
7	Questions • A question was asked about linkages between hazards events. Tetra Tech responded that the hazard profiles are not developed in isolation and have designated sections on cascading impacts. • A question was asked about tribal nations’ participation in this process and whether they develop their own plans. The County responded that they could choose to participate and noted that Elk Valley is participating this cycle, as they did in 2019.	-
8	Next Steps • Tetra Tech will develop input on problem areas and new development from Planning Partners and Steering Committee.	Tetra Tech • Develop surveys to get Planning Partners’ input on



	• Tetra Tech to share outreach materials and relevant data sources for Planning	problem areas and new development
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AGENDA

SEPTEMBER 6 @ 11 AM

1. Welcome & Introductions
2. Hazard Mitigation Overview
 - Purpose of plan update
 - What's new for the 2025 plan?
3. Project Organization
 - Key agencies, partners, and stakeholders
4. Steering Committee Roles & Responsibilities
 - Commitment expectations
5. Planning Process Overview
 - Planning Process
 - Risk Assessment
 - Public Involvement Strategy
 - Mitigation Strategy
 - Plan Maintenance
 - Plan Update & Deliverables
 - Plan Review & Adoption
6. Project Schedule
 - Overview and Milestones
 - Meeting Schedule
7. Goals and Objectives Survey
 - Due by Friday 9/20
8. Questions
9. Next Steps



MEETING:	Del Norte County HMP Steering Committee Kickoff	
LOCATION:	Virtual (Microsoft Teams)	
DATE/TIME:	September 6, 2024 from 11 am to 12 pm	
ATTENDEES:	Del Norte County Office of Emergency Management • Deborah Otenburg, Emergency Services Manager • Jessica Seaman, Emergency Services Coordinator • Christina Smith, Fiscal Manager Del Norte County Community Development Department • Heidi Kunstal, Director • Maia Mello, Planner Del Norte County Department of Information Technology • Rachel Sarina, IT Operations Officer Big Rock Community Service District • Hank Akin, Commissioner City of Crescent City • Eric Weir, City Manager Crescent City Harbor District • Tim Petrick, CEO/Harbormaster • Michael Rademaker, Assistant Harbormaster Elk Valley Rancheria • Jennifer Meyer, Emergency Manager Crescent City Fire and Rescue • Kevin Carey, Fire Chief	Gasquet Community Service District • Steve Kasmar, Chair Klamath Community Services District • Margaret Caldwell, Board President Smith River Community Service District • Jeff Beard, Manager Smith River Fire Protection District • Geoffrey Antil, Project Manager Tolowa Dee-ni' Nation • Tim Hoone, Director Yurok Tribe • Amos Pole, Emergency Manager Del Norte Regional Transportation Commission • Tamara Leighton, Director Redwood Coast Transit • Joe Rye, Executive Director Redwood Coast Regional Center • Ronald Lee, Emergency Manager Non-governmental Organizations • Daphne Cortese-Lambert, Mission Possible • Hilda Contreras, Open Door Health • Janet Gasquet Neighbors Helping Neighbors • Charlaine Mazzei, Del Norte Senior Center Unaffiliated/Private Resident • Mary Dorman • Charles Tweed Tetra Tech • Emma Kilkelly, Lead Planner • Bart Spencer, Project Manager
MEETING PURPOSE:	The purpose of the meeting was to introduce the Steering Committee and contract consultant, provide an overview of the hazard mitigation planning process, and to begin the information gathering processes and update the hazards of concern.	



ITEM NO.	Description	Action item(s):
1	Welcome & Introductions - Each person was asked to share their name and department in the chat. - Attendees were asked to respond to a poll about their participation in the 2019 planning process. - Of those who responded, five attendees did participate in the last planning process, and five did not. - Ms. Otenburg welcomed attendees and introduced Mr. Spencer and Ms. Kilkelly from Tetra Tech.	-
2	Hazard Mitigation Overview - Mitigation is a sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. - A Hazard Mitigation Plan (HMP) provides an overview of the impacts of natural hazards on communities and is a roadmap to reducing the impact of these hazards. - Attendees were asked to take a quick poll related to the hazards occurring the most in the County since 2019. Of those who responded, most said severe weather and/or wildfires. - For the 2025 update, the County will be following the revised April 2023 FEMA guidance for local plans	-
3	Project Organization - To complete the HMP update, we will work with individuals, agencies, neighboring jurisdictions, businesses, and other partners. - The project is organized by the following – - Core Planning Team - made up of Del Norte County and Tetra Tech. This is a small group that will meet frequently to ensure the project stays on schedule and that we meet all State and FEMA requirements. - Planning Partnership - responsible for providing guidance and leadership throughout the planning process. They will actively contribute, review, and provide feedback on plan sections, update the plans' goals and objectives, finalize the list of hazards of concern, and identify mitigation actions. - Steering Committee – represents the participating jurisdictions. They will attend meetings, provide information, identify mitigation actions, and adopt the HMP. - Stakeholders - must be engaged throughout the planning process. At a minimum, this group should include neighboring counties, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private	-



	and nonprofit organizations. We will put together a draft list of stakeholders and ask for your input. ○ Cal OES - provide the County guidance throughout the HMP update and will review/approve the plan.	
4	Steering Committee Roles & Responsibilities ● Steering Committee responsibilities include the following: ○ Guide the SC (jurisdictions) through the HMP update process. ○ Oversee the planning process from start to finish. ○ Actively contribute, review, and provide feedback, identify mitigation actions, etc. This includes: ○ Formalizing the natural hazards of concern ○ Updating/developing mitigation goals and objectives ○ Developing a public and stakeholder outreach strategy ○ Assisting with the development of the county-level mitigation strategy ○ Reviewing plan documents	-
5	Planning Process Overview ● Following an eight-phase approach to update the HMP. 1. Planning Process – ongoing throughout the update 2. Risk Assessment – identifies the risks of each hazard included in the plan. ▪ 2019 Hazards ● Dam Failure ● Drought ● Earthquake ● Flood ● Landslide ● Severe Weather ● Wildfire ● Climate Change ▪ Proposed 2025 Hazards ● Earthquake ● Landslide ○ Debris flow ○ Other mass movements ● Tsunami ● Flooding ○ Riverine/stream ○ Coastal	



	○ Sea level rise ○ Erosion ○ Levee failure ● Wildfire ● Drought ● Extreme wind ● Extreme rainfall ▪ Steering Committee members said they perceive the following as at risk to hazards in the County. ● Transportation corridors ● Last Chance grade (Highway 101) ● Infrastructure, water, Cascadia ● Flooding ● Flood/tsunami. ● Electrical service ● Economic-driven problems 3. Public Involvement Strategy – ongoing throughout the plan update; we will use the County’s website and StoryMap to help with outreach. ▪ New FEMA guidance emphasizes outreach to socially vulnerable communities and to include these populations in the Risk Assessment ▪ Steering Committee members suggested the following categories for inclusion in the social vulnerability analysis. ● Transient community ● Traveling public that may become stranded in the County. ● People with disabilities ● People experiencing homelessness. ● Single-parent households 4. Mitigation Strategy – review/finalize goals/objectives for 2025 HMP; review existing capabilities; review 2019 mitigation strategies and provide status; identify new strategies for the 2025 update. 5. Plan Maintenance – determine the maintenance schedule of the 2025 HMP. 6. Plan Update and Deliverables – update all sections of the HMP; provide to Cal OES for review and approval. 7. Plan Adoption – the County and each participating municipality will adopt the plan after the HMP is approved. 8. Project Management and Coordination – ongoing throughout the update.	
6	Project Schedule ● Project Kickoff – complete ● Risk Assessment	-



	○ Data collection – Fall 2024 ○ Preliminary results – Winter 2024/25 ● Public Involvement – Continuous ● Mitigation Strategy – Winter 2024/25 ● Plan Maintenance – Winter/Spring 2025 ● Public Draft – Spring 2025 ● Draft to State for Review – Spring 2025 ● Plan Adoption – Spring 2025	
7	Questions ● None	-
8	Next Steps ● Tetra Tech will develop input on problem areas and new development from Planning Partners and Steering Committee.	Tetra Tech ● Develop surveys to get input on problem areas and new development



AGENDA

SEPTEMBER 13 @ 11 AM

1. Welcome & Meeting Objective

2. Jurisdictional Annexes

- Purpose
- Process
- Timeline

3. Worksheets

- Hazard Event History
- Capability Assessment
- Previous Mitigation Actions
- National Flood Insurance Program (NFIP) Summary
- Building Permits

4. Deadlines

- Worksheets must be submitted by Friday, October 11
- Must be digital copies (typed or scanned)
- Send to emma.kilkelly@tetrattech.com

5. Questions

6. Next Steps



MEETING:	Del Norte County HMP Planning Partnership Workshop	
LOCATION:	Virtual (Microsoft Teams)	
DATE/TIME:	September 13, 2024 from 11 am to 12 pm	
ATTENDEES:	County Office of Emergency Management - Deborah Otenburg, Emergency Services Manager - Jessica Seaman, Emergency Services Coordinator - Christina Smith, Fiscal Manager County Community Development Department - Heidi Kunstal, Director Big Rock Community Service District - Hank Akin, Commissioner City of Crescent City - Andrew Leighton, Engineering Project Manager - Eric Weir, City Manager Elk Valley Rancheria - Jennifer Meyer, Emergency Manager	Klamath Community Services District - Margaret Caldwell, Board President Smith River Fire Protection District - Geoffrey Antil, Project Manager Smith River Community Services District - Jeff Beard, Manager Cal OES - Nadilyn Encinas - Samantha Karges, Coastal Region Emergency Services Coordinator - Victoria LaMar-Haas, Mitigation Planning Division Chief Tetra Tech - Emma Kilkelly, Lead Planner - Bart Spencer, Project Manager
MEETING PURPOSE:	The purpose of the meeting was to inform and educate the Planning Partners on the requirements of participating in the hazard mitigation process to ensure they maintain their eligibility for FEMA funding.	
ITEM NO.	Description	Action item(s):
1	Welcome & Meeting Objective - Mr. Spencer welcomed attendees and introduced himself and Ms. Kilkelly from Tetra Tech. - Mr. Spencer asked attendees to write their name and agency in the chat. - Ms. Kilkelly reviewed the purpose of today's workshop which is to make sure Planning Partners understand their worksheet assignments, so they are able to return them to the County before the deadline.	-
2	Jurisdictional Annexes - Each incorporated municipalities and special district must have its own annex, per FEMA requirements to remain eligible for certain funding. - The annex is focused specifically on one jurisdiction's and provides and individualized report of its capabilities, assets, vulnerabilities, and mitigation priorities. - Annexes also are a first step to determining which projects jurisdictions may pursue for FEMA funding in the coming years.	-



3	Worksheets - Ms. Kilkelly reviewed the following worksheets: - Worksheet A: Hazard Event History - Worksheet B: Capability Assessment - Worksheet C: Previous Mitigation Actions - Worksheet D: NFIP Summary - Worksheet E: Building Permits - All jurisdictions must complete Worksheets A, B, and C. - Jurisdictions that participate in the NFIP must complete Worksheet D. - Jurisdictions that issue building permits must complete Worksheet E. - Ms. Kilkelly reviewed the purpose and process for each worksheet and emphasized the availability of Tetra Tech to provide assistance.	-
4	Deadlines - Worksheets must be emailed to Ms. Kilkelly (emma.kilkelly@tetrattech.com) by Friday, 10/11. - The County and Tetra Tech will follow up with any jurisdictions that have not submitted all the completed worksheets.	-
5	Questions - Does the hazard event history worksheet include any preposition events that makes resources available ahead of impending hazard? - No. It includes events that received State/Federal disaster declarations or were recorded in federal databases. - Can the previous mitigation action worksheet include activities that are related to mitigation, but not included in the last plan? - Yes. - Will the links be sent again? - Yes.	-
6	Next Steps - Jurisdictions will review worksheets and contact Tetra Tech with any questions. - Jurisdictions must record their time spent <u>outside of meetings with the County/Tetra Tech</u> throughout this process, including time spent on filling out the worksheets. https://www.surveymonkey.com/r/5BWVQJF - REMINDER: Goals & Objectives Survey due next Friday, 9/20. https://forms.office.com/r/m5sZePWfy0	Planning Partners: Begin reviewing and filling out worksheets.



AGENDA

MARCH 20, 2025 @ 2-3 PM

1. Welcome
2. Project Status
3. Strengths, Weaknesses, Obstacles, and Opportunities
4. Mitigation Strategy Overview
5. Project Schedule and Next Steps
6. Questions



MEETING:	Del Norte County HMP Mitigation Workshop	
LOCATION:	Virtual (Microsoft Teams)	
DATE/TIME:	March 20, 2025, from 2 to 3 pm	
ATTENDEES:	County Office of Emergency Management - Deborah Otenburg, Emergency Services Manager County Community Development Department - Heidi Kunstal, Director County Department of Information Technology - Rachel Sarina, IT Operations Officer City of Crescent City - Eric Weir, City Manager Crescent City Harbor District - Michael Rademaker, Assistant Harbormaster Del Norte Regional Transportation Commission - Tamera Leighton, Director Del Norte Unified School District - Jeff Harris, Superintendent	HRC Community Services District - Wes White, President Open Door - Hilda Contreras Smith River Fire Protection District - Geoff Antill, Project Manager Yurok Tribe - Amos Pole, Emergency Manager Tetra Tech - Sasha Jones, Lead Planner - Bart Spencer, Project Manager - Mark Stalcup, Planner
MEETING PURPOSE:	The purpose of the meeting was for the Planning Partners to outline a Mitigation Strategy and identify Mitigation Actions for the Hazards of Concern.	
ITEM NO.	Description	Action item(s):
1	Welcome - Ms. Jones welcomed attendees and introduced - Ms. Jones asked attendees to write their name and agency in the chat. - Ms. Jones reviewed the purpose of today's workshop which is to provide project status, SWOO analysis, mitigation strategy overview, project schedule and next steps.	
2	Project Status - Public outreach has been successful. - A survey created for stakeholders will be released after this meeting, and attendees are encouraged to spread this amongst other stakeholders in the community. - The Del Norte County preparedness website (www.PrepareDelNorte.com), contains a lot of helpful information for residents, including a section about the HMP. - A StoryMap will be released shortly to give residents ability to identify locations on maps that are vulnerable to specific hazards.	Tetra Tech Stakeholder survey will be sent out to attendees for distribution through networks



	• Risk Assessment results just released, and at the next Steering Committee Meeting, those results will be presented.	
3	Strengths, Weaknesses, Obstacles, and Opportunities • The SWOO was an opportunity for committee members to engage in the planning process • What do you guys have available that's working well? • What things can be improved upon? • What things are standing in your way? Local, state, federal level... • What can be done to eliminate some of those obstacles? • Polled audience in chat feature to present their STRENGTHS: • Communication from OES (Wes White) • Neighbors Helping Neighbors • www.preparedelnorte.com • Community members dedicated to participation in preparedness (Deborah) • Super support from Bi-coastal media, radio stations.(Deborah) • Relationship with NWS Eureka for subject matter expertise (weather and tsunami) (Deborah) • Tsunami preparedness (Wes) • WEAKNESSES • Mutual support w/local tribes (Deborah) • Backup for electrical outages (Wes) • Limited staffing, limited availability of funds, challenges rebuilding capabilities lost during Covid (rebuilding CERT, etc.) (Deborah) • Power issues, limited access routes (Deborah) • OBSTACLES • Availability of medical professionals (Wes) • Grant apps and the bureaucracy surrounding it as well as the funding • Cross connection availability with Coos Curry for electrical needs during electrical outages - problem with buy in with Pac Power and Bonneville Power and regulatory issues they have if wanted to implement cross connection (Wes) • Opposition to regulations/policies (Deborah) • OPPORTUNITIES • What can be improved upon? What are trends or hot topics that can be leveraged to support mitigation projects? • More involvement by community members (Wes) • TsunamiReady program, Fire Wise, etc. (Deborah)	Tetra Tech • SWOO results will be send to participating jurisdictions
4	Mitigation Strategy Overview • Describes the purpose of mitigation strategy and how mitigation actions • Once hazards are ID, risk and vulnerability impact studied, how has new changes affected the new plan so the next step in this process is to find	



	projects, activities, and programs that can be put together so that it results in a mitigation action item. • #1 → How to minimize the risk for a hazard? • #2 → Make your plan so that these actions are written in such a way that they can be extracted for grant applications. • We look for a range of actions, one that you can have a success story in five years. Also, for every hazard, there has to be at least one action item • Four areas of a strategy: Plans and Regulations, Structure and Infrastructure Studies and Projects, Natural Systems Protection Studies and Projects, and Educational and Awareness Programs • There needs to be a connection between the identified vulnerability or risk and the mitigation action. The problem is identified, ways to address the problem identified, feasibility, etc. • Hazards of Concern and how there can be variability just across the county. • When TT receives worksheets back, we'll review that no info is missing and how things are written – so that they give some task to occur • Actions have various components that we are looking for: estimated cost, timeline, funding source(s), etc. • CALOES will be looking at how actions tie back to each hazard. TT will also examine the 2019 projects. • Other Mitigation Actions to Consider: Planning partners received two sources of information → Mitigation Ideas and Mitigation Resource Guide • Bart presented various examples of each type of action: Planning and Regulations, Structural and Infrastructure Projects, Education and Awareness Programs, and Natural Systems Protection	
6	Project Schedule and Next Steps • TT will be presenting the initial results of Risk Assessment at the start of next meeting (May 5) • June to July: draft plan for the public review period/comment period • Early July: TT will have Steering Committee review the draft plan as well as discuss the various sections of the plan • Early July: Public Meeting for Draft Plan • July-August: submit to Cal OES and FEMA for formal review	
7	Questions • Sasha opens the floor to questions – none proposed. One question in the chat asked if they can receive a copy of today's slides – Mark replied and said copies of the slides would go out following the call	Tetra Tech • Presentation and meeting minutes will be sent to attendees



AGENDA

MAY 15, 2025 @ 2:00 PM

1. Welcome
2. Public Survey Results
3. Hazard Ranking Overview
4. Risk Assessment Results
5. Questions and Next Steps



MEETING:	Del Norte County HMP Risk Assessment	
LOCATION:	Virtual (Microsoft Teams)	
DATE/TIME:	May 15, 2025 from 2-3 pm	
ATTENDEES:	County Office of Emergency Management - Deborah Otenburg, Emergency Services Manager County Community Development Department - Heidi Kunstal, Director Big Rock Community Service District - Joe (Hank) Akin, Commissioner City of Crescent City - Andrew Leighton, Engineering Project Manager Elk Valley Rancheria - Jennifer Meyer, Emergency Manager Klamath Community Services District - Sandy Moreno - Margaret Caldwell, Board President Smith River Fire Protection District - Geoffrey Antil, Project Manager Smith River Community Services District - Jeff Beard, General Manager American Red Cross - Mary Dorman, Volunteer and Board Member	CAL FIRE - James Ausboe, Fire Captain Del Norte Local Transportation Commission - Tamera Leighton, Director Del Norte and Tribal Lands Community Food Council - Iya Mahan, Program Director Pacific Corp - Holly Powers, Emergency Manager Sutter Health - Stevin Strickland, Emergency Manager Yurok Tribe - Amos Pole, Emergency Manager Tetra Tech - Sasha Jones, Lead Planner - Bart Spencer, Project Manager - Mark Stalcup, Planner
MEETING PURPOSE:	The purpose of the meeting was to provide an overview of the Risk Assessment methodology to the planning partners and identify strengths, weaknesses, obstacles, and opportunities of the Hazard Mitigation Plan.	
ITEM NO.	Description	Action item(s):
1	Welcome - Ms. Otenburg welcomed participants and thanked them for attending. - Ms. Jones reviewed the purpose of today's meeting and asked participants to introduce themselves in the chat.	



2	Public Survey Results • 196 responses received • Full results will be available as an appendix in the plan. Results sent out to planning participants earlier today. • Power outage, cold weather, tsunami warnings, and poverty were some of the write-in answers. • Not much concern for drought or extreme heat. 73% very concerned about wildfire. • Mass notifications were the most popular response for alert and warning. • Top mitigation efforts: protecting private property, protecting critical facilities, reducing damage to utilities Stakeholder Survey • Please take the survey for one last week. Please send to organizations, businesses, or critical facility operators,	Planning Partnership • Promote the stakeholder survey to local organizations.
3	Hazard Ranking Overview • Purpose of Risk Assessment – IDs the hazards that affect you and your community. We look at location, the severity, past occurrences, and probability of future occurrences, • Hazard Ranking (Countywide) – tsunami and wildfire are high • Hazard ranking worksheet – due tomorrow • Adaptive Capacity definitions – Weak, Moderate, or Strong	Planning Partnership • Complete hazard ranking worksheet
4	Risk Assessment Results • Drought – Low, entire county is exposed to drought • Excessive Rainfall – Medium, entire county is exposed to drought • Extreme Heat - Low, Gasquet is an area of concern • Extreme Wind – Medium, entire county is exposed to extreme wind • Earthquake – Medium, areas of concern include NEHRP soils, Cascadia Subduction Zone, Mendocino Triple Junction • Flood – Low, 3% of population and 4% of buildings in the 1% annual chance flood area • Landslide – Low, areas of concern include the Smith River Fire burn scar and the Last Chance Grade • Tsunami – High, 15% of population and 17% of building located in tsunami zone • Wildfire – High, uses new Wildfire Hazard severity areas. Common theme in public survey was the power outage from wildfires.	
7	Questions and Next Steps • There will be a 14-day public comment period. Each participating jurisdiction must advertise the public comment period to their public. • Stakeholders are encouraged to promote the plan to ensure the opportunity is shared with as many people as possible.	Planning Partnership • Promote the public comment period.



AGENDA

DECEMBER 17, 2025 @ 6:00 PM

DEL NORTE COUNTY ADMINISTRATION BUILDING 981 H STREET CRESCENT CITY, CA 95531 AND ZOOM

1. Welcome
2. Planning Process Overview
3. 2025 Del Norte County HMP Review
4. Draft Plan Review Process
5. Questions and Next Steps



MEETING:	Del Norte County HMP Draft Plan	
LOCATION:	Del Norte County Administration Building 981 H Street Crescent City, CA 95531 and Virtual (Zoom)	
DATE/TIME:	December 17, 2025, from 6-7 pm	
ATTENDEES:	County Office of Emergency Management - Christina Smith, Fiscal Manager - Jessica Seaman, Emergency Manager County Community Development Department - Heidi Kunstal, Director American Red Cross - Mary Dorman, Volunteer and Board Member Pulikla Tribe - Gail Tarbell	Sutter Health - Stevin Strickland, Emergency Manager Members of Public - Four Tetra Tech - Sasha Jones, Lead Planner
MEETING PURPOSE:	The purpose of the meeting was to provide an overview of the draft Hazard Mitigation Plan for participating jurisdictions and the public. The public comment procedures were discussed.	
ITEM NO.	Description	Action item(s):
1	Welcome Ms. Jones reviewed the purpose of today's meeting and invited the audience to ask questions throughout the meeting.	
2	Planning Process Overview - There were ten participating jurisdictions and more than 20 regional stakeholders that participated throughout the planning process, which kicked off in July of 2024. - Today is the fourth Steering Committee meeting and the second in-person public meeting. - This plan was created to integrate with county, municipal, and regional plans, such as the Del Norte General Plan, Community Wildfire Protection Plan, Municipal, Service Reviews, and more. - From January through May of 2025, the public was invited to take a hazard mitigation survey to inform the plan. 196 responses were received.	



3	2025 Del Norte County HMP Review • The Plan includes 2 volumes – the base plan and the jurisdictional annexes. • Information about the planning process, risk assessment results, and plan maintenance are contained in the base plan. • All jurisdiction-specific information, including the mitigation strategy, is contained in the jurisdictional annexes.	
4	Draft Plan Review Process • The public comment period began on December 15 and will be open through December 29. • The draft plan is available at www.preparedelnorte.com. • Comments may be submitted through the online survey on the website.	
7	Questions and Next Steps • Once the public feedback is integrated into the plan, it will be submitted to Cal OES for review and approval. • After Cal OES reviews the plan, it will go to FEMA for review and approval. • The approved plan will then be adopted by all participating jurisdictions.	Planning Partnership • Promote the public comment period.

APPENDIX D. SURVEY RESULTS



DEL NORTE COUNTY PUBLIC SURVEY RESULTS

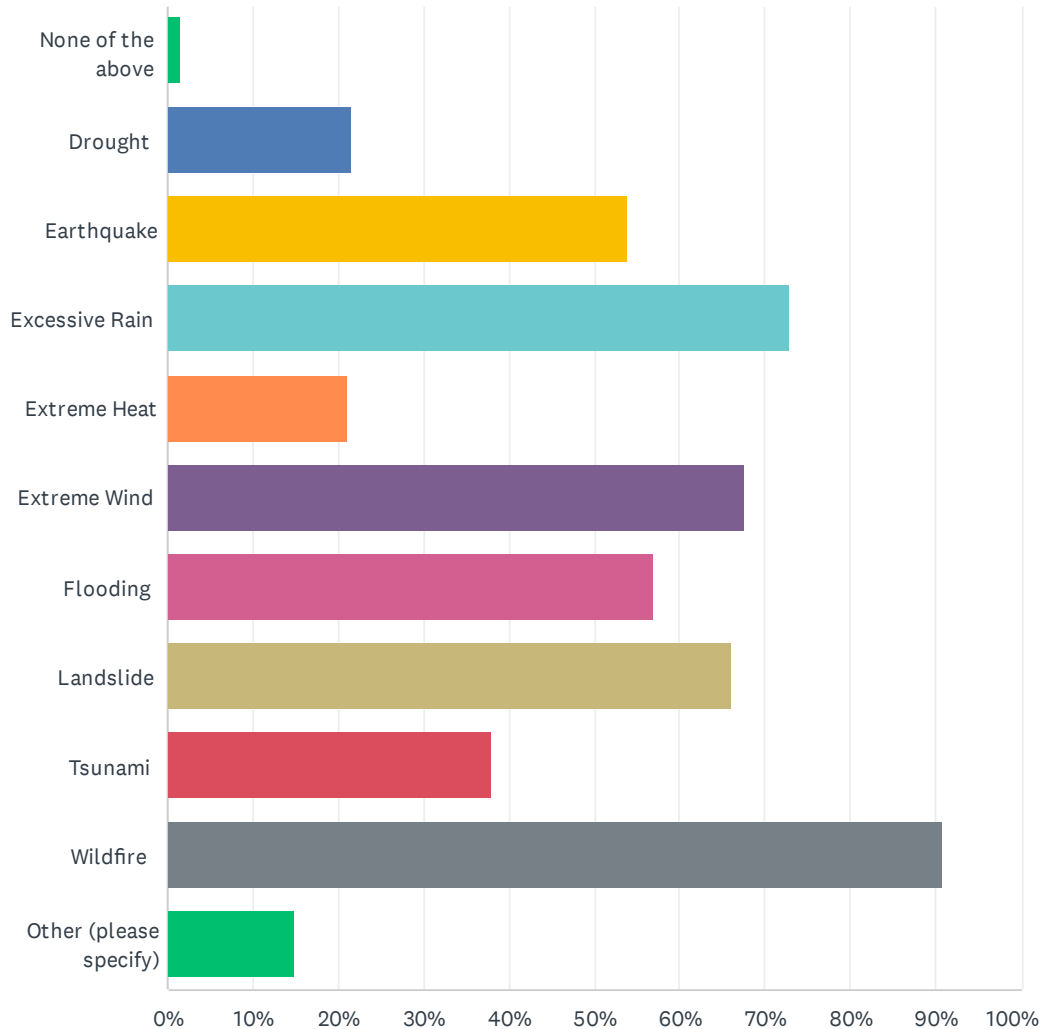
This section contains information and results gathered from the Del Norte County Public Survey. The results were both in English and Spanish. The main objective of this survey was to gather information from citizens regarding their level of knowledge regarding hazard vulnerability and knowledge of hazard mitigation information for their local communities. The survey results are provided in the following pages, with personal information redacted.

STAKEHOLDER SURVEY

A stakeholder survey was designed to identify general needs for hazard mitigation and resiliency within Del Norte County from the perspective of stakeholders, as well as to identify specific projects that may be included in the mitigation plan. It was distributed to identified stakeholders, including county and municipal departments and agencies. Feedback was reviewed by the Steering Committee and integrated where appropriate in the plan.

Q1 In the last five years, which of the following hazards have you witnessed in Del Norte County? Check all that apply.

Answered: 195 Skipped: 1



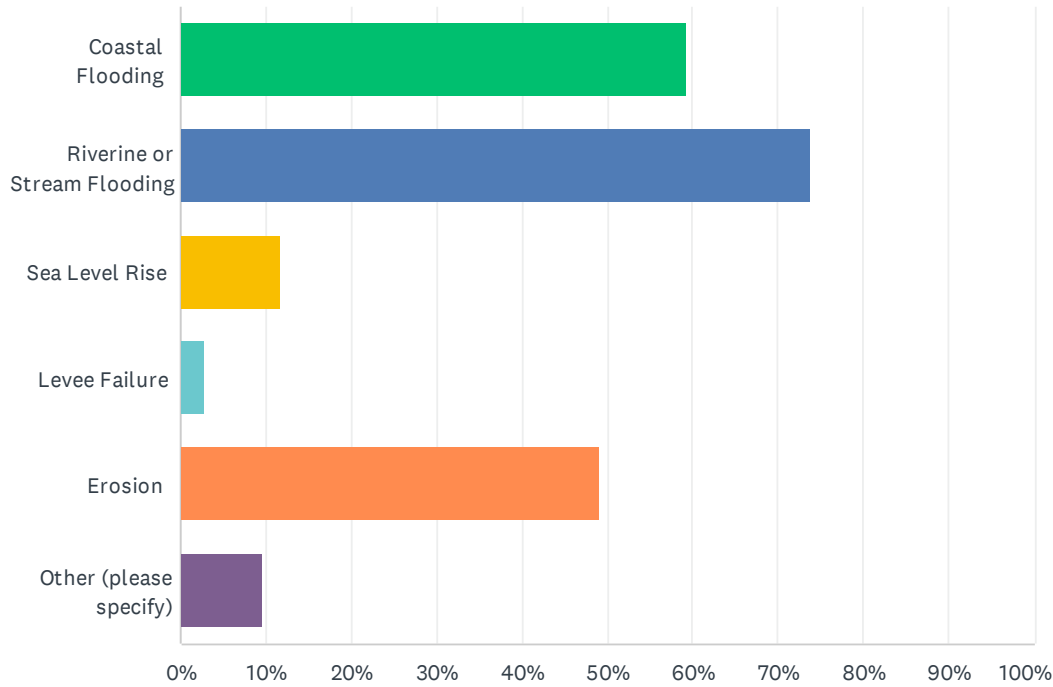
ANSWER CHOICES	RESPONSES
None of the above	1.54% 3
Drought	21.54% 42
Earthquake	53.85% 105
Excessive Rain	72.82% 142
Extreme Heat	21.03% 41
Extreme Wind	67.69% 132
Flooding	56.92% 111
Landslide	66.15% 129
Tsunami	37.95% 74
Wildfire	90.77% 177
Other (please specify)	14.87% 29
Total Respondents: 195	

#	OTHER (PLEASE SPECIFY)	DATE
1	Hazmat	3/20/2025 7:37 PM
2	Extreme Cold (Snow)	3/4/2025 1:59 PM
3	Power Outage	2/26/2025 6:12 PM
4	Homeless population increase/theft	2/25/2025 7:31 PM
5	Cold weather- needed a shelter	2/25/2025 6:48 PM
6	Widespread loss of power	2/25/2025 1:25 PM
7	Long duration power outage	2/25/2025 11:21 AM
8	snow and/or severe cold	2/24/2025 6:24 PM
9	Tsunami Warning due to earthquake activity	2/24/2025 12:26 PM
10	Used needles and other items.	2/21/2025 7:38 PM
11	tsunami warning	2/21/2025 6:55 PM
12	Highway speed limits, excessive speeds on hiway 199	2/20/2025 4:28 PM
13	Covid-19 pandemic, Power outages/utility failures, Air quality concerns due to wildfires, sever winter storms	2/20/2025 2:58 PM
14	Lack of Communication to our Seniors	2/20/2025 1:22 PM
15	Tsunami evacuation	2/20/2025 9:30 AM
16	Hazmat and pandemic	2/19/2025 7:00 PM
17	Tsunami warning	2/19/2025 6:46 PM
18	extreme poverty with limited resources for assistance	2/19/2025 6:27 PM
19	Tsunami warnings	2/19/2025 6:25 PM
20	Dark city streets. Not all lights work and some streets have no streetlights.	2/15/2025 4:46 PM
21	Abnormal cold	2/12/2025 9:06 AM

22	Out of electricity for oxygen machine	2/11/2025 10:14 PM
23	Downed trees	1/30/2025 12:23 AM
24	Drainage along roads needs to be addressed	1/28/2025 12:05 PM
25	Lack of forest maintenance before Smith complex fire. Such as cutting and burning undergrowth and dead trees. They used to do this every few years behind neighborhood.	1/28/2025 1:56 AM
26	Dangerous highway 199	1/27/2025 6:02 PM
27	Power outage for 3 weeks	1/27/2025 7:36 AM
28	Clean drinking water, similar to drought but more so with well water	1/7/2025 1:05 PM
29	Possible Tsunami (threat)	1/2/2025 5:29 PM

Q2 If you answered "Flooding" to Q1, what types of flooding issues have you witnessed in Del Norte County?

Answered: 145 Skipped: 51



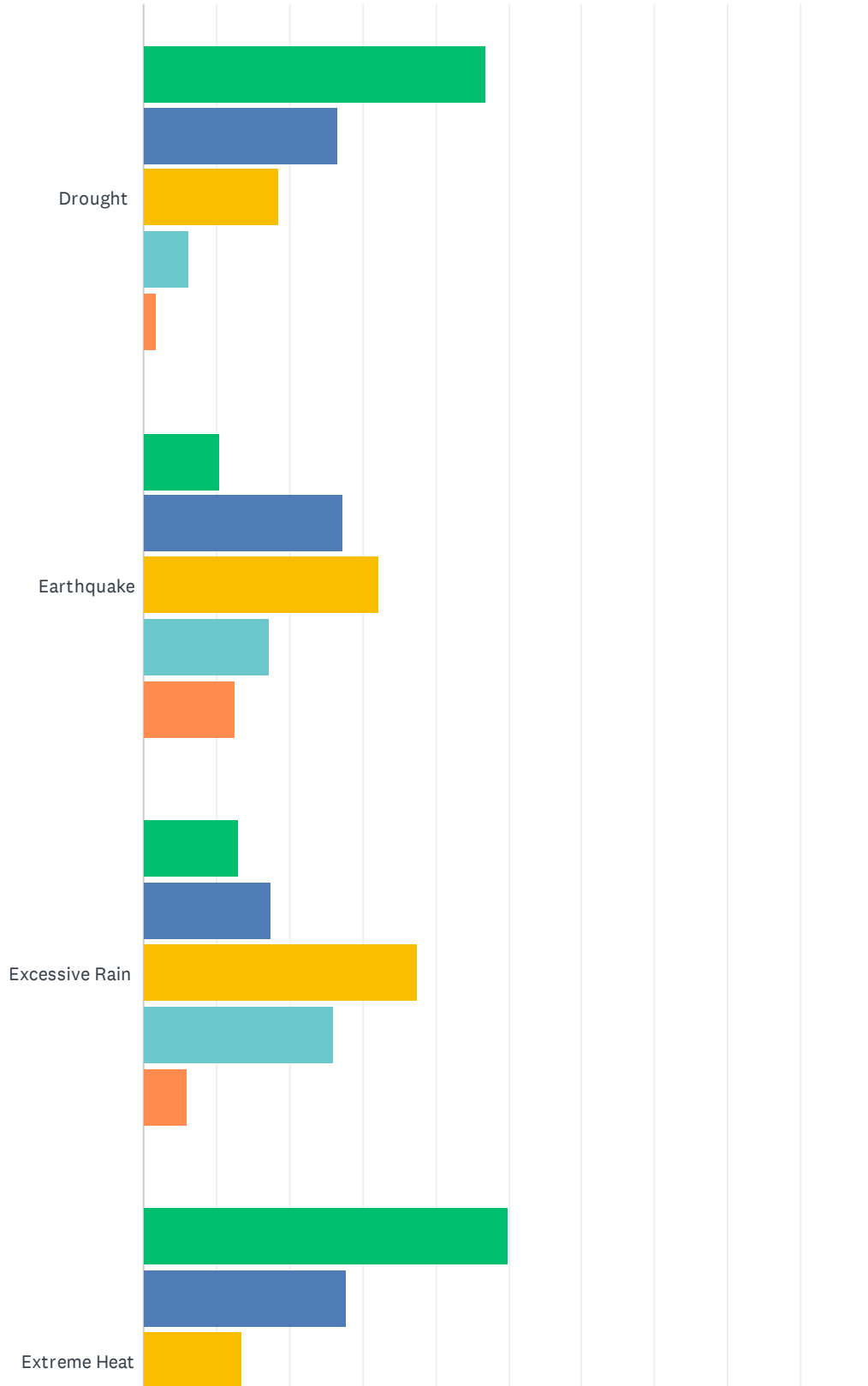
ANSWER CHOICES	RESPONSES	
Coastal Flooding	59.31%	86
Riverine or Stream Flooding	73.79%	107
Sea Level Rise	11.72%	17
Levee Failure	2.76%	4
Erosion	48.97%	71
Other (please specify)	9.66%	14
Total Respondents: 145		

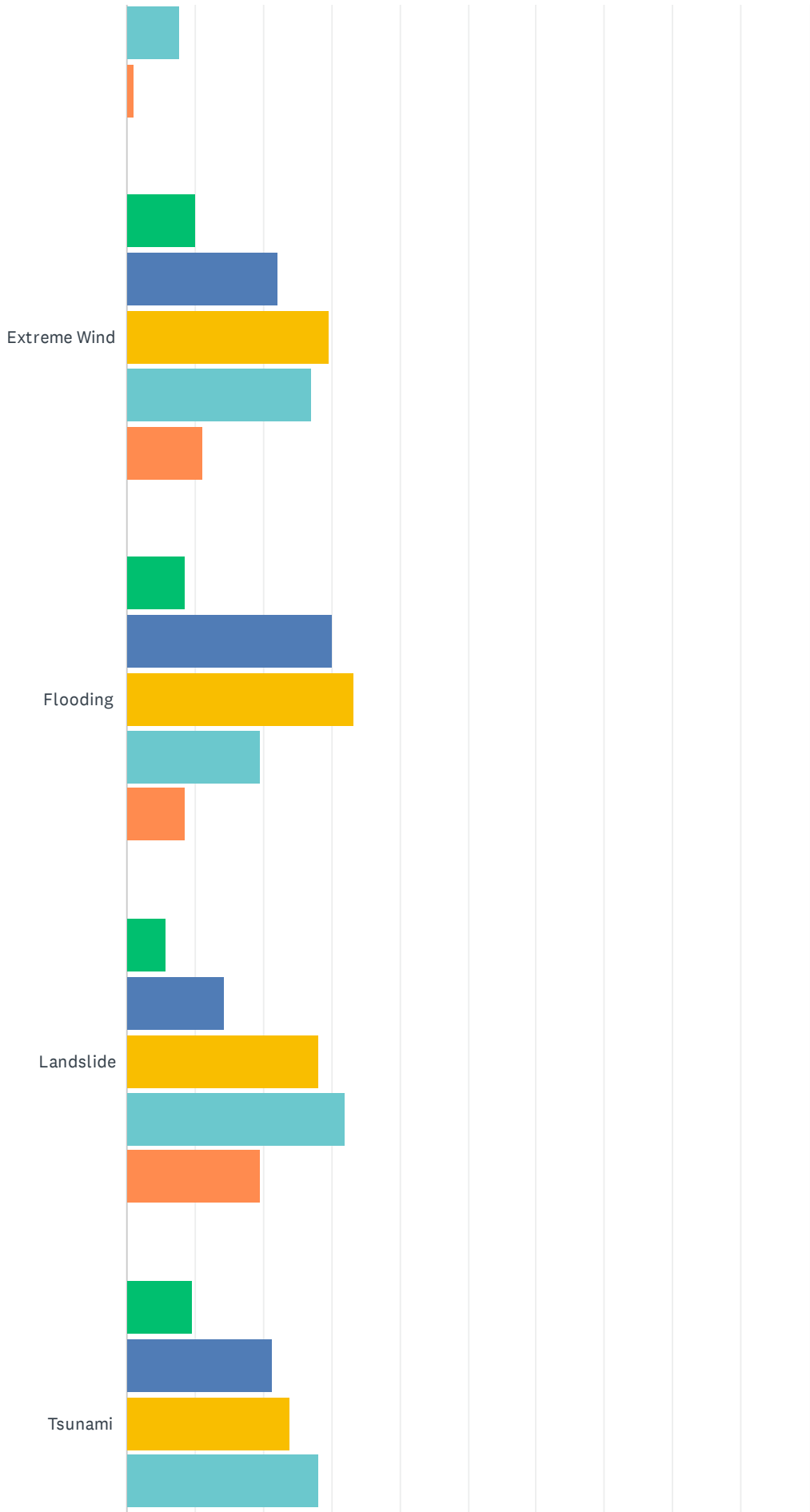
#	OTHER (PLEASE SPECIFY)	DATE
1	None from historical rainfall	2/26/2025 9:10 AM
2	I did not	2/25/2025 7:58 PM
3	Roads and driveway	2/25/2025 11:21 AM
4	NA	2/25/2025 3:16 AM
5	Flooding from clogged drainage systems (In town)	2/24/2025 11:39 AM
6	NA	2/20/2025 1:22 PM
7	N/A	2/19/2025 7:36 PM

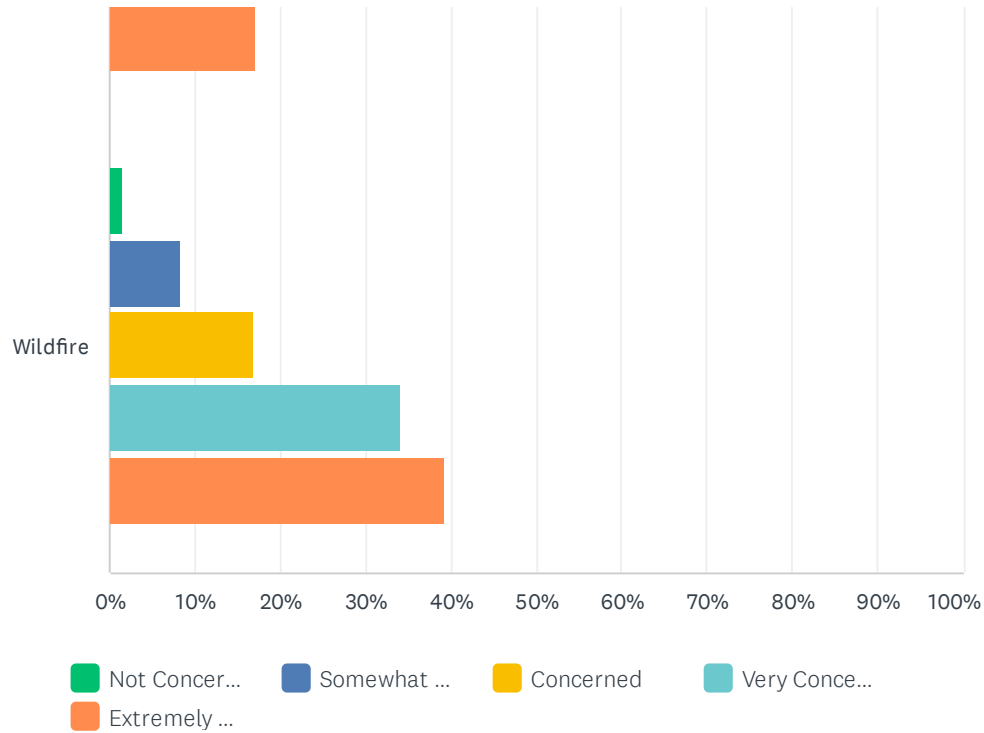
8	road flooding	2/19/2025 6:46 PM
9	Property flooding	2/11/2025 10:14 PM
10	Street flooding.	2/11/2025 2:45 PM
11	water on hywy 199	1/28/2025 12:57 PM
12	home flooded from over flowing creek	1/27/2025 6:37 PM
13	Water over hwy 101 by south beach, Anchor Way in harbor debris from storms on roadway -	1/8/2025 12:24 PM
14	Road flooded (non-passable), closing Tribal office business one day for becoming inaccessible.	1/2/2025 5:29 PM

Q3 How concerned are you about the following hazards in Del Norte County?

Answered: 194 Skipped: 2



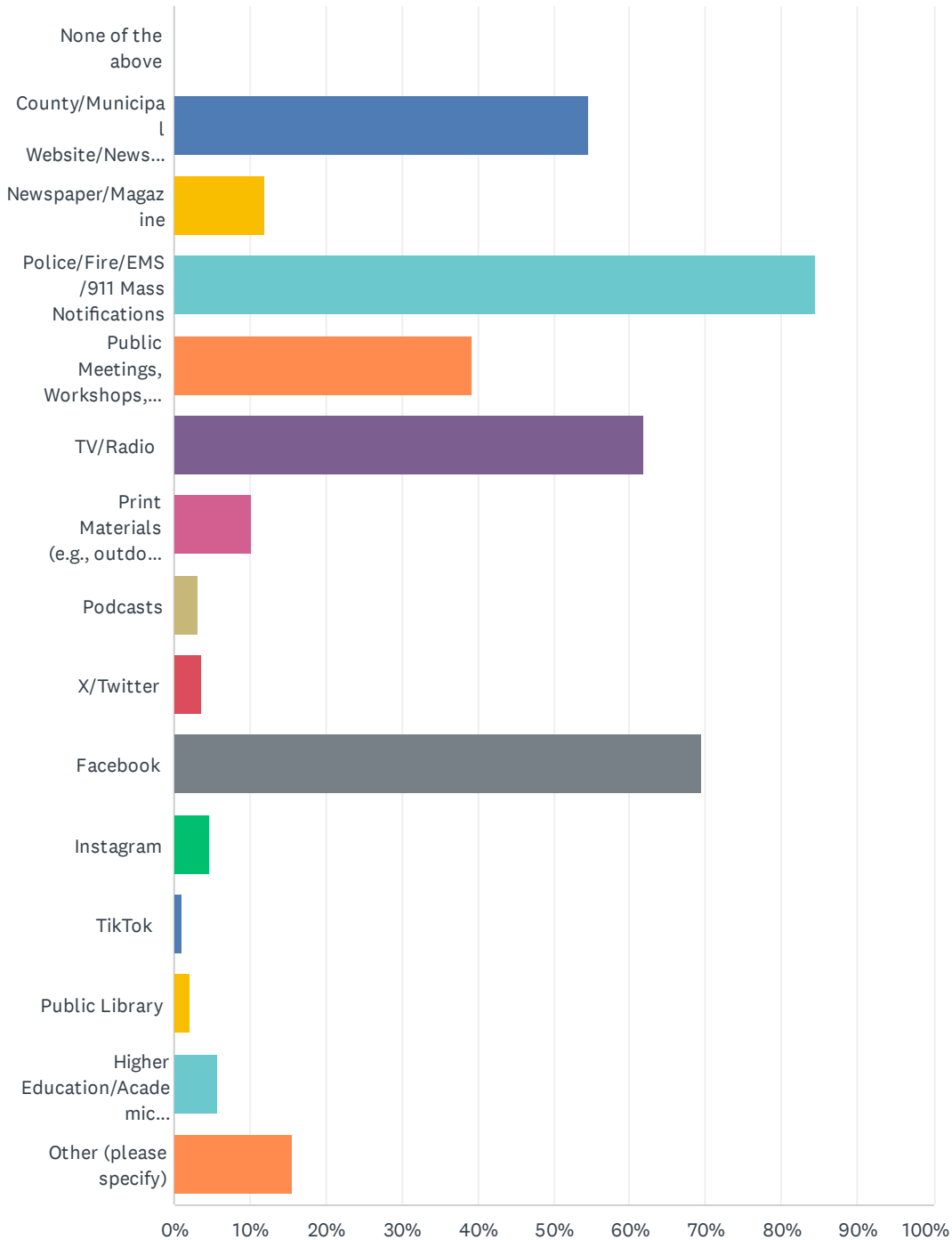




	NOT CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	TOTAL
Drought	46.89% 83	26.55% 47	18.64% 33	6.21% 11	1.69% 3	177
Earthquake	10.53% 20	27.37% 52	32.11% 61	17.37% 33	12.63% 24	190
Excessive Rain	13.04% 24	17.39% 32	37.50% 69	26.09% 48	5.98% 11	184
Extreme Heat	50.00% 90	27.78% 50	13.33% 24	7.78% 14	1.11% 2	180
Extreme Wind	10.05% 19	22.22% 42	29.63% 56	26.98% 51	11.11% 21	189
Flooding	8.47% 16	30.16% 57	33.33% 63	19.58% 37	8.47% 16	189
Landslide	5.85% 11	14.36% 27	28.19% 53	31.91% 60	19.68% 37	188
Tsunami	9.57% 18	21.28% 40	23.94% 45	28.19% 53	17.02% 32	188
Wildfire	1.57% 3	8.38% 16	16.75% 32	34.03% 65	39.27% 75	191

Q4 How do you receive your information concerning a disaster? Check all that apply.

Answered: 194 Skipped: 2



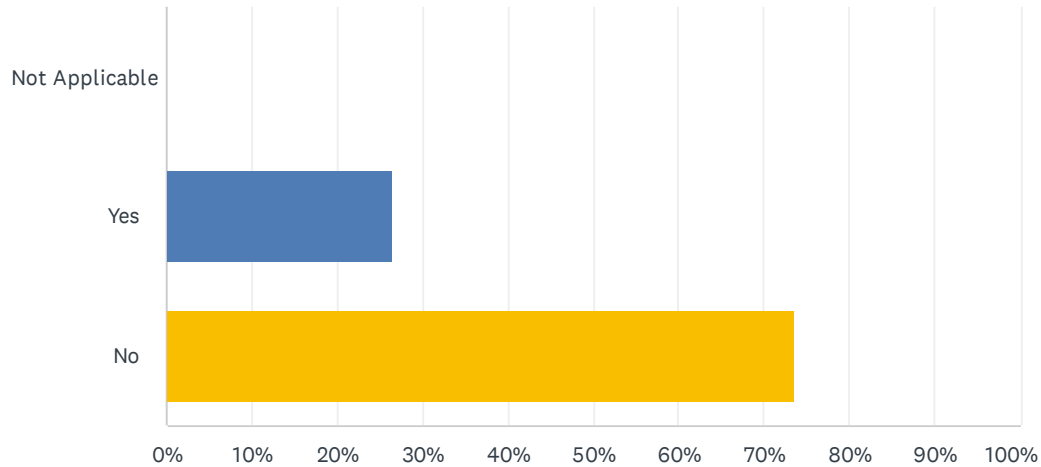
ANSWER CHOICES	RESPONSES
None of the above	0.00% 0
County/Municipal Website/Newsletters	54.64% 106
Newspaper/Magazine	11.86% 23
Police/Fire/EMS/911 Mass Notifications	84.54% 164
Public Meetings, Workshops, Public Awareness Events	39.18% 76
TV/Radio	61.86% 120
Print Materials (e.g., outdoor advertisements, flyers/posters, brochures, etc.)	10.31% 20
Podcasts	3.09% 6
X/Twitter	3.61% 7
Facebook	69.59% 135
Instagram	4.64% 9
TikTok	1.03% 2
Public Library	2.06% 4
Higher Education/Academic Institutions	5.67% 11
Other (please specify)	15.46% 30
Total Respondents: 194	

#	OTHER (PLEASE SPECIFY)	DATE
1	Text messaging	3/9/2025 3:42 AM
2	Radio	3/8/2025 4:05 PM
3	Internet/websites for weather	3/8/2025 9:52 AM
4	Text, phone, and email communications from OES	2/28/2025 2:29 PM
5	Sutter Coast Hospital staff awareness bulletins, etc.	2/26/2025 6:12 PM
6	Tolowa-dee	2/26/2025 8:38 AM
7	Tsunami Siren	2/25/2025 5:54 PM
8	Everbridge, coworkers, friends, and family	2/25/2025 11:21 AM
9	Word of mouth	2/24/2025 6:14 PM
10	Everbridge	2/24/2025 10:17 AM
11	Phone alerts, weather websites.	2/21/2025 7:38 PM
12	County/City Emergency alarm system	2/21/2025 7:33 PM
13	Neighbors and coworkers	2/21/2025 3:03 PM
14	Please do t rely on Facebook. Many people are not on it.	2/20/2025 7:51 PM
15	word of mouth, incident command post	2/20/2025 6:40 PM
16	Internet	2/20/2025 4:49 PM
17	Neighborhood alerts	2/20/2025 4:12 PM

18	Prepare Del Norte Alert System / FB groups: DN-OES, DN Sheriff Office, Cal Fire, Cal Trans, USFS	2/20/2025 2:58 PM
19	Red Cross and Ham radio	2/20/2025 1:22 PM
20	KCRE	2/20/2025 12:11 PM
21	Everbridge	2/20/2025 9:30 AM
22	Word of mouth	2/19/2025 6:58 PM
23	American Red Cross and Watch Duty app	2/13/2025 6:28 PM
24	"Watch Duty" phone app	2/12/2025 12:30 PM
25	Siren	2/11/2025 10:14 PM
26	Watch Duty for fire	1/30/2025 12:23 AM
27	OES	1/27/2025 5:52 PM
28	Public message boards	1/7/2025 1:05 PM
29	Various mobile apps	1/6/2025 5:52 PM
30	Phone internet IF there is service and power in Klamath (very sketchy service).	1/2/2025 5:29 PM

Q5 Has a hazard event ever damaged your property in Del Norte County (e.g., floodwaters entering your home or downed trees falling on car)?

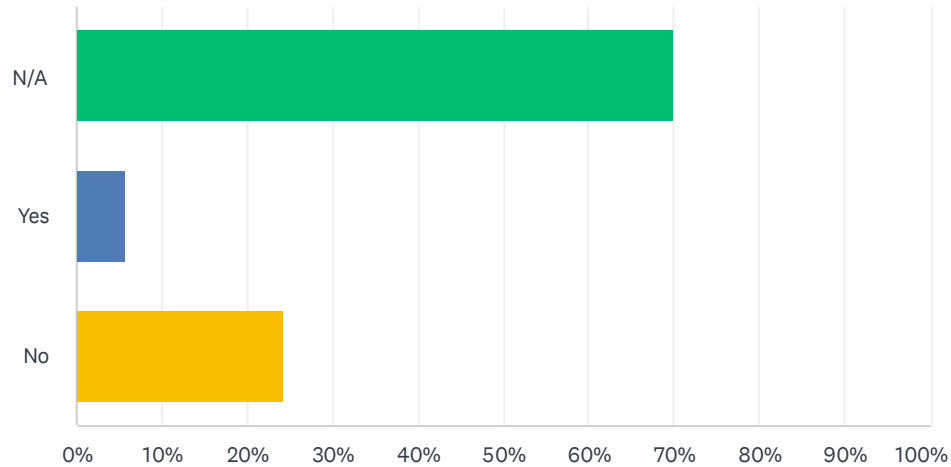
Answered: 193 Skipped: 3



ANSWER CHOICES	RESPONSES	
Not Applicable	0.00%	0
Yes	26.42%	51
No	73.58%	142
TOTAL		193

Q6 Did you report the damages to your local police or fire departments or to an emergency management agency?

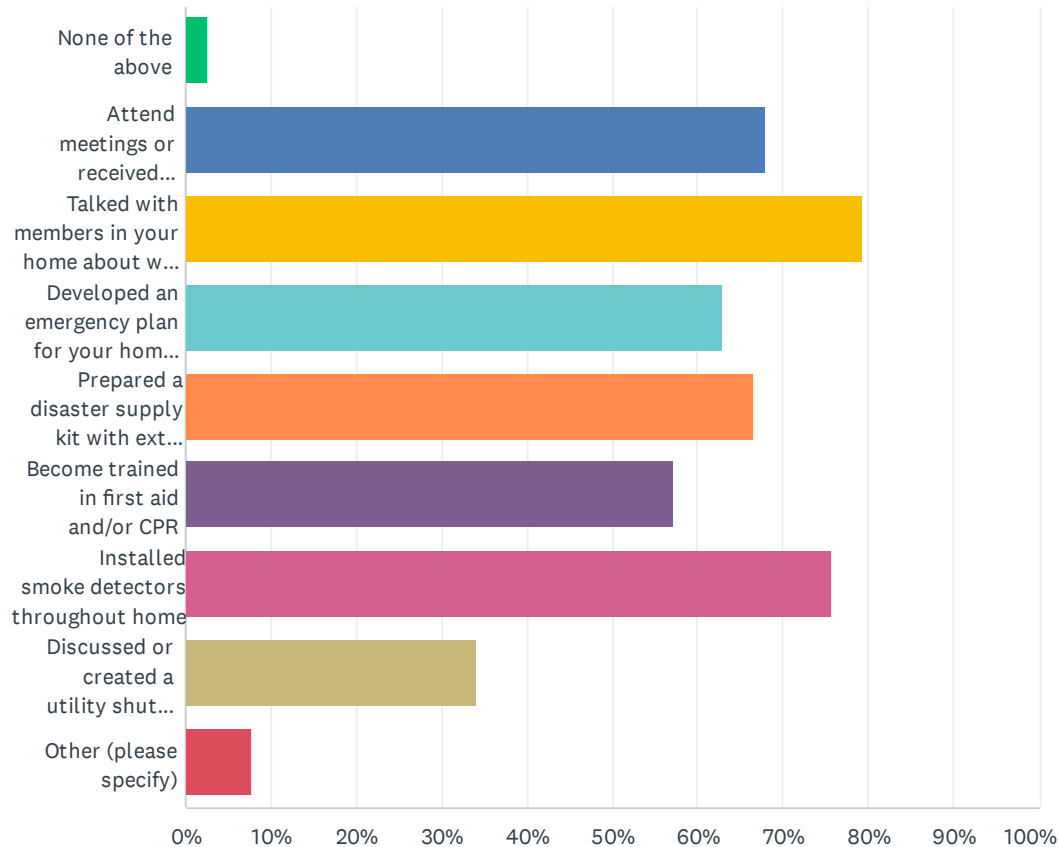
Answered: 193 Skipped: 3



ANSWER CHOICES	RESPONSES	
N/A	69.95%	135
Yes	5.70%	11
No	24.35%	47
TOTAL		193

Q7 Have you or anyone in your household completed or has plans to complete the following preparedness activities?

Answered: 194 Skipped: 2

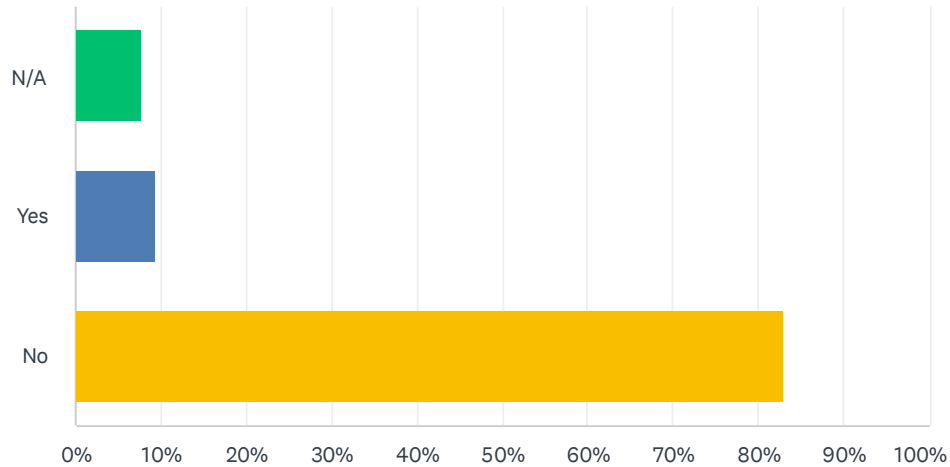


ANSWER CHOICES	RESPONSES	
None of the above	2.58%	5
Attend meetings or received information on natural disasters or emergency preparedness	68.04%	132
Talked with members in your home about what to do in case of a natural disaster or emergency	79.38%	154
Developed an emergency plan for your home and family in order to decide what everyone will do in the event of a disaster or emergency	62.89%	122
Prepared a disaster supply kit with extra food, water, batteries, etc.	66.49%	129
Become trained in first aid and/or CPR	57.22%	111
Installed smoke detectors throughout home	75.77%	147
Discussed or created a utility shutoff procedure in the event of a natural disaster	34.02%	66
Other (please specify)	7.73%	15
Total Respondents: 194		

#	OTHER (PLEASE SPECIFY)	DATE
1	Headed a community awareness program	3/20/2025 7:37 PM
2	Discussed emergency escape routes and meeting places in the event of a natural disaster or mass emergency	3/9/2025 3:42 AM
3	Y	3/8/2025 10:21 AM
4	Made sure I have some disaster supplies in two different areas of our property.	2/24/2025 6:14 PM
5	home hardening (fire)	2/20/2025 6:40 PM
6	Developed To Go packing list for 15 min. 30 min. And one hour warning times.	2/19/2025 8:47 PM
7	Organized community response	2/19/2025 7:00 PM
8	I have a portable generator	2/19/2025 6:58 PM
9	purchased backup battery	2/12/2025 12:30 PM
10	clear area around home, maintain trees	1/28/2025 10:22 PM
11	Changed the soffit vents to fire resistant	1/28/2025 12:23 PM
12	Roof sprinkler system, done extensive brush clearing on our property	1/28/2025 10:28 AM
13	Personal Preparedness training	1/24/2025 4:42 PM
14	Development of a community resilience hub and CERT	1/7/2025 1:05 PM
15	Host community awareness neighbors helping neighbors	1/6/2025 5:52 PM

Q8 To the best of your knowledge, is your property located in a designated floodplain? If you do not know, click here to find out.

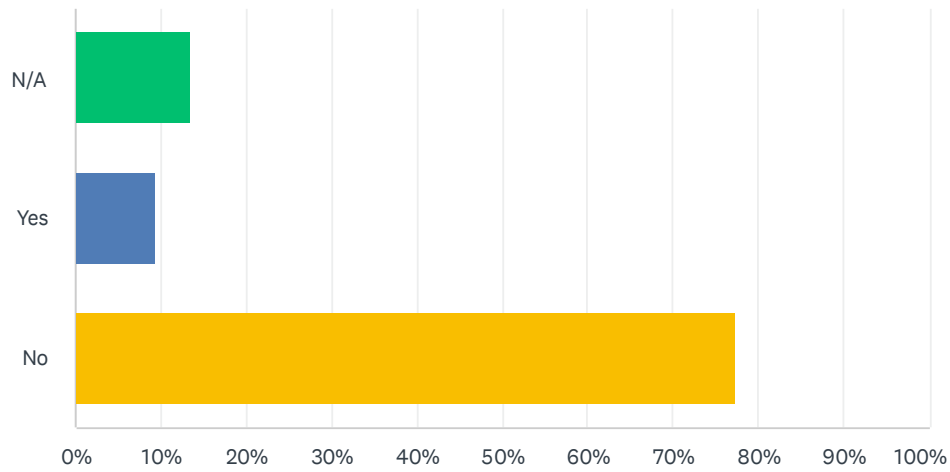
Answered: 194 Skipped: 2



ANSWER CHOICES	RESPONSES	
N/A	7.73%	15
Yes	9.28%	18
No	82.99%	161
TOTAL		194

Q9 Do you have flood insurance?

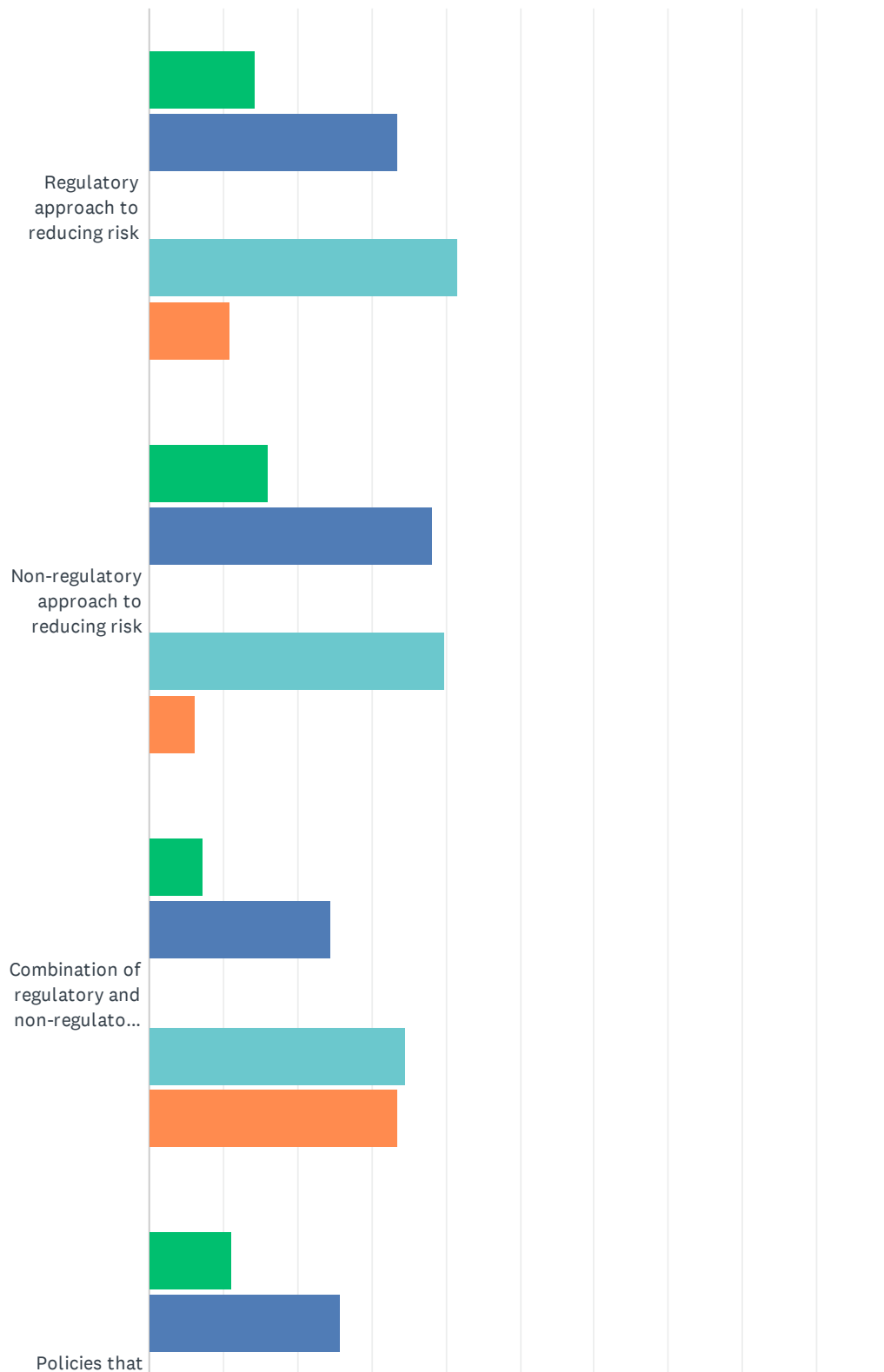
Answered: 194 Skipped: 2

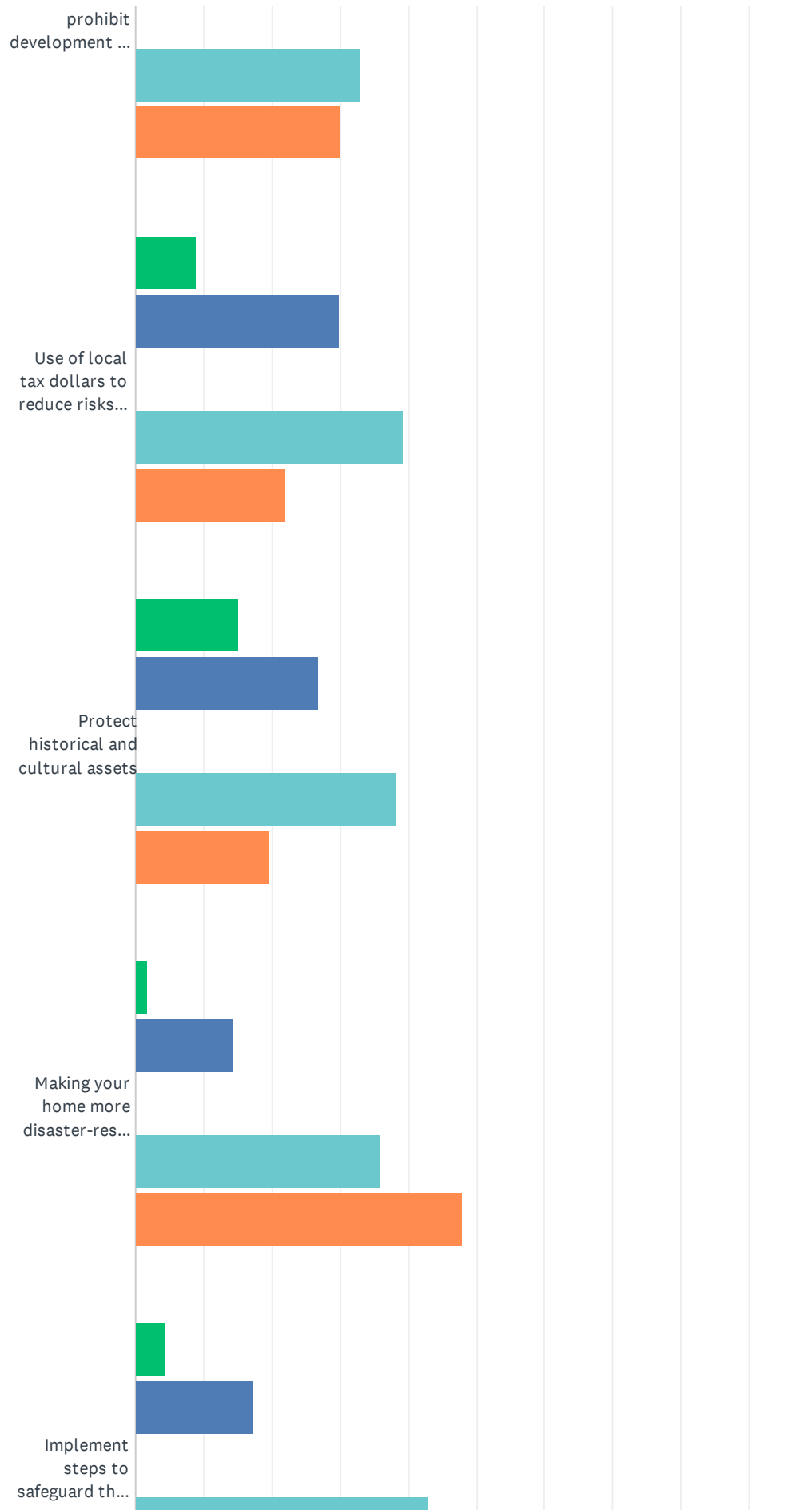


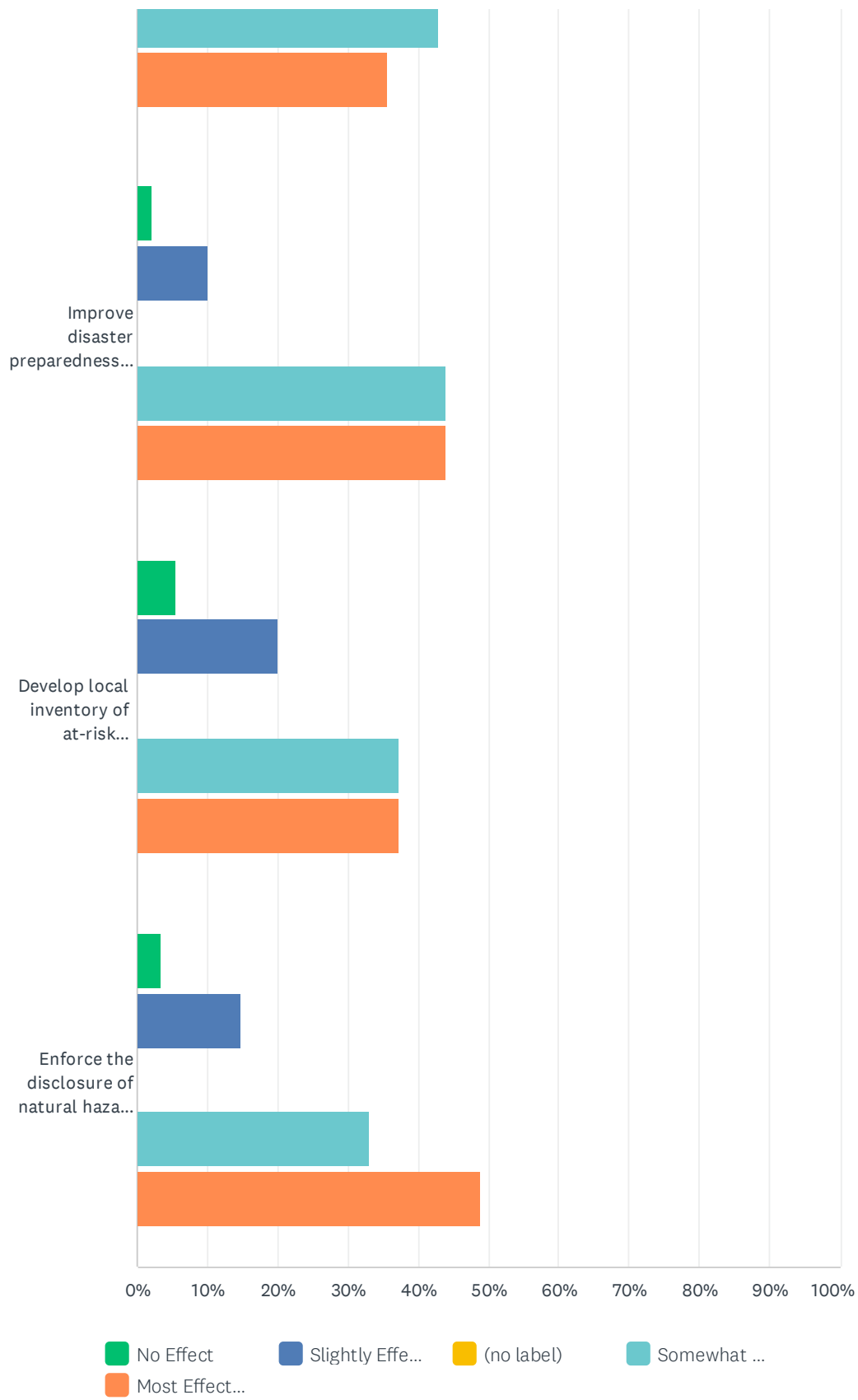
ANSWER CHOICES	RESPONSES	
N/A	13.40%	26
Yes	9.28%	18
No	77.32%	150
TOTAL		194

Q10 The following list includes examples of ways to reduce the risk and loss associated with natural hazards in Del Norte County. Of these, which do you feel would be the most effective for the County?

Answered: 185 Skipped: 11



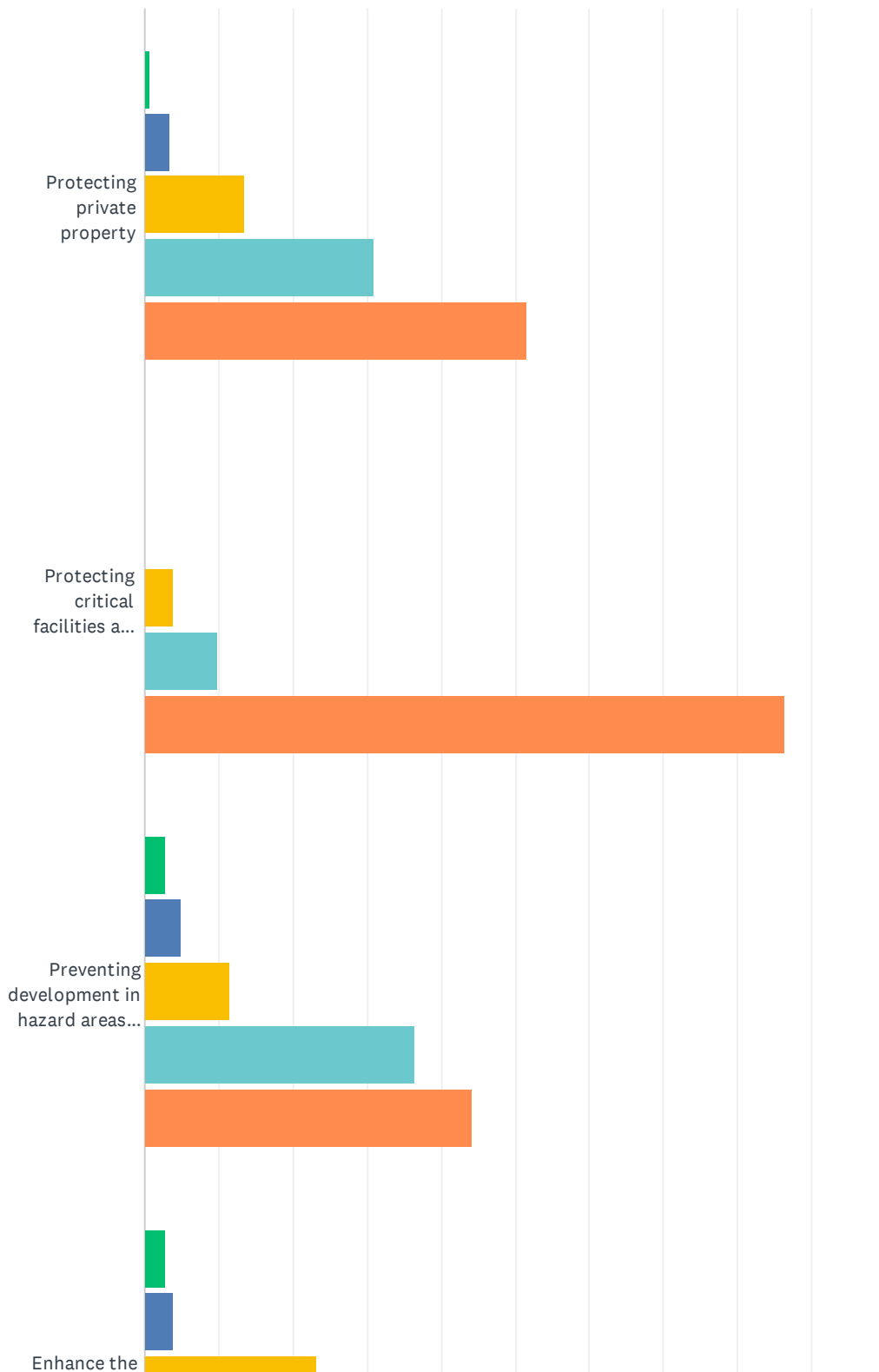




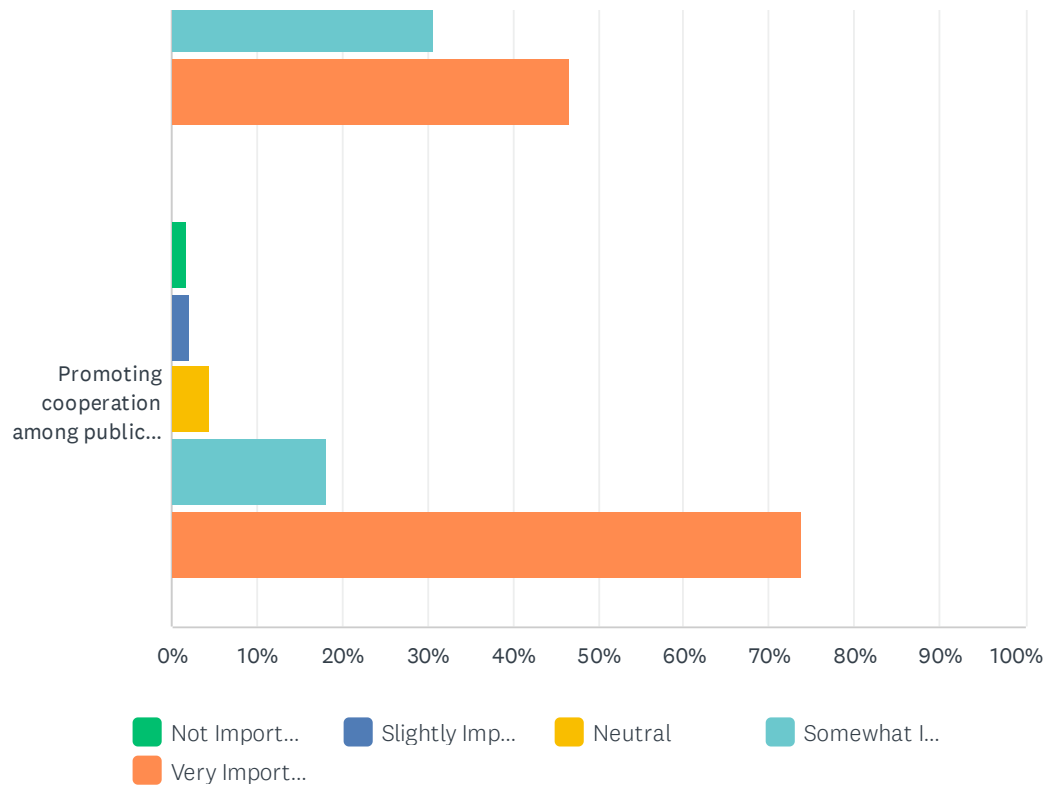
	NO EFFECT	SLIGHTLY EFFECTIVE	(NO LABEL)	SOMEWHAT EFFECTIVE	MOST EFFECTIVE	TOTAL
Regulatory approach to reducing risk	14.20% 25	33.52% 59	0.00% 0	41.48% 73	10.80% 19	176
Non-regulatory approach to reducing risk	15.91% 28	38.07% 67	0.00% 0	39.77% 70	6.25% 11	176
Combination of regulatory and non-regulatory approaches to reducing risk	7.26% 13	24.58% 44	0.00% 0	34.64% 62	33.52% 60	179
Policies that prohibit development in areas subject to natural hazards	11.17% 20	25.70% 46	0.00% 0	32.96% 59	30.17% 54	179
Use of local tax dollars to reduce risks and losses from natural hazards	8.99% 16	29.78% 53	0.00% 0	39.33% 70	21.91% 39	178
Protect historical and cultural assets	15.17% 27	26.97% 48	0.00% 0	38.20% 68	19.66% 35	178
Making your home more disaster-resilient	1.66% 3	14.36% 26	0.00% 0	35.91% 65	48.07% 87	181
Implement steps to safeguard the local economy following a disaster	4.44% 8	17.22% 31	0.00% 0	42.78% 77	35.56% 64	180
Improve disaster preparedness of local schools	2.22% 4	10.00% 18	0.00% 0	43.89% 79	43.89% 79	180
Develop local inventory of at-risk buildings and infrastructure	5.56% 10	20.00% 36	0.00% 0	37.22% 67	37.22% 67	180
Enforce the disclosure of natural hazard risks during real estate transactions	3.37% 6	14.61% 26	0.00% 0	33.15% 59	48.88% 87	178

Q11 Planning for natural hazards can lessen potential property damage and harm by prioritizing certain objectives. How important are the following statements to mitigation efforts in Del Norte County?

Answered: 184 Skipped: 12







	NOT IMPORTANT	SLIGHTLY IMPORTANT	NEUTRAL	SOMEWHAT IMPORTANT	VERY IMPORTANT	TOTAL
Protecting private property	0.56% 1	3.37% 6	13.48% 24	30.90% 55	51.69% 92	178
Protecting critical facilities and community lifelines	0.00% 0	0.00% 0	3.80% 7	9.78% 18	86.41% 159	184
Preventing development in hazard areas (e.g., restrict building in the floodplain)	2.76% 5	4.97% 9	11.60% 21	36.46% 66	44.20% 80	181
Enhance the functions of natural features (e.g., streams)	2.78% 5	3.89% 7	23.33% 42	35.00% 63	35.00% 63	180
Protecting environmental and cultural resources that contribute to its rural character	3.89% 7	7.78% 14	23.33% 42	28.89% 52	36.11% 65	180
Protecting and reducing damages to utilities	0.00% 0	0.54% 1	4.35% 8	20.65% 38	74.46% 137	184
Strengthening emergency services (e.g., police, fire, EMS)	0.00% 0	4.35% 8	6.52% 12	15.22% 28	73.91% 136	184
Disclosing natural hazard risks during real estate transactions	3.30% 6	4.95% 9	14.29% 26	30.77% 56	46.70% 85	182
Promoting cooperation among public agencies, special districts, residents, non-profit organizations, and local businesses	1.64% 3	2.19% 4	4.37% 8	18.03% 33	73.77% 135	183

#	OTHER (PLEASE SPECIFY)	DATE
1	Community education of procedures during emergencies and mitigation strategies	3/8/2025 9:52 AM
2	Plan before a Natural disaster not during	2/25/2025 7:31 PM

3	Creating age appropriate lessons/workshops for our youth in schools (including home school) that talk about emergency preparedness (both home and community) to ensure these ideas are not foreign to our youth.	2/25/2025 11:21 AM
4	Public readiness meeting or video showing where to go or who to contact.	2/21/2025 7:38 PM
5	More public transparency	2/21/2025 6:49 PM
6	Having an Emergency Services person with experience,	1/27/2025 5:29 PM
7	Accepting responsibility for your own family and your property.	1/24/2025 4:42 PM

Q12 Please identify any specific vulnerabilities that you are aware of in your community (e.g., flood-prone areas or specific properties, critical facilities that lack backup power, etc.). Please list street names and other specific identifiers if possible.

Answered: 99 Skipped: 97

#	RESPONSES	DATE
1	Power grid is fragile! Roadways impacted by natural events flooding /slides high risk!	3/20/2025 7:37 PM
2	Kellog	3/10/2025 5:19 PM
3	None to my knowledge	3/8/2025 2:03 PM
4	Village of Gasquet for fire mitigation	3/8/2025 10:21 AM
5	Traffic blockage in town and on 101 during evacuation. Need for in-town safety zone identification and public education of appropriate emergency procedures. Parents pulling children from schools in safety zones and potentially taking them into unsafe areas unknowingly.	3/8/2025 9:52 AM
6	Lack of back up power in all of Del Norte County. Limited exit or supply routes.	3/4/2025 1:59 PM
7	Overarching reliance on electrical surveillance systems to predict when emergency responses are needed. These can all go out. What do you do?	2/26/2025 6:12 PM
8	Loss of power	2/26/2025 9:10 AM
9	I am unsure.	2/25/2025 7:58 PM
10	Waldo, Kerby, Benson, State, & Shirley Streets were built on a old river bed. we bought our mobile home with no disclosure of this. We have one insurance company that covers mobile homes in our area and it is very expensive. CA is prone to Earthquakes & being on the coastline we get tsunamis. We live on the border of the tsunami safe zone, but we are surrounded by forest and a swamp. Our roads have pot & sink holes there are no drainage available. We did not hear the siren on the last tsunami we had to evacuate for. We got notified by neighbors with scanner. The homeless people have an enlarged camp at the end of Waldo St. & two more camps behind the transfer station. Crime has increased to where police & CHP must make multiple cruises per day in the area. Lighting & cameras is what we are told to up our own security. & when it rains for days they will seek shelter in our yards, sheds, & vehicles. Snow makes thing even worse. Shelters start being open from when winter weather starts in October until it ends in April or May. But this will need temporary staffing.	2/25/2025 7:31 PM
11	Backup power for County's public sewer system in Crescent City.	2/25/2025 5:54 PM
12	Dispatch located in Tsunami zone	2/25/2025 1:25 PM
13	The neighborhood around Port O'Pints has terrible roads and relies on culverts that get clogged and very outdated to prevent flooding. Some of the culverts are filled in by property owners which strains the entire system. Northcrest seems to have deep water in multiple areas from 101 to Old Mill Road when there are heavy rains.	2/25/2025 11:21 AM
14	Most streets beyond the flood zone, in Crescent City and the Birch Track, DO NOT have adequate street lights. Those areas are very dangerous after dark.	2/24/2025 6:24 PM
15	Surf Apartments 108 H Street had issues during our countywide power outage due to mobility issues of residents on floors other than the ground floor level.	2/24/2025 6:14 PM
16	power outages are very common in our city	2/24/2025 1:58 PM
17	Bertsch-track community: When the power goes out, there is no cell service for a large portion of the community. If an emergency were to happen while the power is out, such as needing to	2/24/2025 11:47 AM

	evacuate, many people would not be aware.	
18	No specifics that I can report at the moment	2/24/2025 11:39 AM
19	sandmine	2/24/2025 11:37 AM
20	Harbor prone to tsunamis and residences and roads in Smith River bottoms	2/24/2025 10:48 AM
21	Complete lack of any plan that I know of to notify, evacuate, assist the unhoused in various camps.	2/22/2025 2:55 PM
22	Earthquake and Tsunami. Concern over a subduction zone earthquake causing major damage and tsunami. Crescent City in general.	2/21/2025 8:10 PM
23	Due to living in Gasquet, the community in whole is very vulnerable to flooding and wildfires. Fallen trees that destroy power lines. etc.	2/21/2025 7:58 PM
24	Wonder Stump Road- Branches, flooding, drainage issues, debris on road	2/21/2025 7:43 PM
25	Our power lines seem vulnerable to failure. Homeless camps and squatters.	2/21/2025 7:38 PM
26	Last Chance on 101	2/21/2025 7:19 PM
27	Sandmine road	2/21/2025 7:02 PM
28	I don't have any.	2/21/2025 6:56 PM
29	Flood-prone areas on 101, landslides 199, fires. Roads can be cut off to neighboring areas and isolate the town.	2/21/2025 6:55 PM
30	power lines being above ground is an issue for solar CME and wildfire damage	2/21/2025 6:49 PM
31	Transmission power lines through the mountains. City sewer plant and water systems.	2/21/2025 3:58 PM
32	Lack of water from well when power is out. North of Washington Ave, most people are on a well	2/21/2025 3:03 PM
33	Na	2/21/2025 3:01 PM
34	Last Chance Grade	2/21/2025 11:33 AM
35	Kellogg Road, Lower Lake Road - subject to flooding from high lake levels.	2/21/2025 10:31 AM
36	electric well pumps in Fort Dick and other areas flooding along South Bank Road preventing evacuation water storage capacity with SRCSD, and reliance on decreasing surface water draw from Rowdy Creek poor cell reception, esp if towers are on genny power around Smith River increasing wildfire/WUI risk that threatens homes and infrastructure along Rowdy Creek Road, Ocean View Drive, South Bank Road, North Bank Road, US199, US101 south of CC tsunami risk in CC landslides along major travel routes	2/20/2025 6:40 PM
37	Community at risk of wildfire damage	2/20/2025 5:27 PM
38	power line running down Gasquet Flat Rd. It is trimmed periodically by utility, but they have left the trimmings on the ground. By Stagecoach and Gasquet Flat Road, and elsewhere	2/20/2025 5:04 PM
39	Lack of defensible space and home hardening. No enforcement.	2/20/2025 4:49 PM
40	Lack of local backup power, infrastructure needs vast improvement: communications, water sewer, power. Updated tsunami response training and community training and notifications	2/20/2025 4:00 PM
41	critical facilities in the Tsunami evacuation zone that are vulnerable	2/20/2025 2:58 PM
42	The village of Gasquet is surrounded on all 4 sides by USFS land. Without established and maintained fuel breaks ..wildfire has easy access to the community.	2/20/2025 2:58 PM
43	Many seniors and elders have less communication during a disaster. About 26% of seniors and elders know how to navigate the internet let alone understand a PC.	2/20/2025 1:22 PM
44	Lack Backup Power: Sewer lift stations for City/County. Backup power for some of the Community Service Districts	2/20/2025 12:11 PM
45	Highway 169 (slides and floods that cause power outages) the only way I can get home! Terwer creek flood!	2/20/2025 9:30 AM

46	I don't have that information except that the entire community is vulnerable. The tsunami warning recently is an example of lack of preparedness with people trying to get out of the zone and backup of traffic and chaos.	2/19/2025 11:40 PM
47	Critical telephone infrastructure still located in run-up zone on 3rd St. We still do not have back-up power if we again loose power from our main line from Grants Pass.	2/19/2025 8:47 PM
48	Only power comes down hwy199. Need backup from Oregon. Lots of dry or seasonal wells. Need city water to Fort Dick. WWTP in tsunami zone must move.	2/19/2025 8:17 PM
49	None	2/19/2025 7:36 PM
50	Madrone trailer park. Low income, elderly and mobility impaired high risk	2/19/2025 7:00 PM
51	Backup generators for gas stations (if they don't already have them)	2/19/2025 6:58 PM
52	Backup power when electrical lines burn. Trees in and around electric lines. Flooding and landslides on the roadways in and out of Del Norte County (101 and 199)	2/19/2025 6:46 PM
53	No secondary power source county wide.	2/19/2025 6:41 PM
54	Del Norte Transfer Station does not have backup power. Solid Waste continues to flow during disasters and cleanup ramps up quickly. This operation must stay open along with the 199 Hwy to ensure the transport of solid waste to the landfill.	2/19/2025 6:35 PM
55	front street crescent city with tsunami or sea level rise	2/19/2025 6:27 PM
56	Not sure	2/15/2025 4:46 PM
57	Community infrastructure lacks backup power.	2/13/2025 9:58 AM
58	no option to get above the tsunami zone if you cannot leave the area quickly. Japan has tsunami evacuation towers. the last tsunami warning was total gridlock from people trying to leave in their cars. Please continue to investigate putting Crescent City town on separate power grid so we are not without power for days during wildfires or other disasters. thank you	2/12/2025 12:30 PM
59	Lack of resources for unhoused especially during disasters. Lack of communication and late commitment to shelters for any disaster except fires. Lack of use of fairground billboard or other large signage to alert the public.	2/12/2025 9:06 AM
60	Na	2/11/2025 10:14 PM
61	Vertical evacuation platforms must be built in harbor area and probably beachfront area near swi.ming pool!	2/11/2025 3:05 PM
62	Tsunami zone is full of neighborhoods and businesses. Powerlines line the 101 corridore and should be underground. Watertreatment plant is in tge Tsunami zone. We have one power source from Oregon going through forest (burned last year). People in town do not know where to go for Tsunamis and choke 199 north through dense forest.	2/11/2025 2:45 PM
63	electric! We are so vulnerable . Very old infrastructure, power goes out regularly	2/11/2025 1:18 PM
64	Flooding- houses along south bank and the one on Lake Earl near Lake street and the creek Schools do not have or use back up generators= no heat and no landlines No way out of town in large earthquake with bridges questionable to pass	2/11/2025 1:00 PM
65	Flooding on Felterwood Ln crosses the road several times a year	2/10/2025 2:21 PM
66	Hey 199 vulnerable to flooding, downed trees, and landslides. Gasquet water district has only 3 days back up supply during flood event that prompts shut down. Frequent power outages in Gasquet.	1/30/2025 12:23 AM
67	Creek that floods multiple properties that runs along Gasquet Flat Rd. Need to maintain defensible space and emergency access to Gasquet Community Service District water plant.	1/29/2025 4:27 PM
68	Azalea Floods during big rains. A utility (Verizon) had a company run new wires and removed part of a culvert.	1/28/2025 6:51 PM
69	Smith river	1/28/2025 12:54 PM
70	I'd have to think about this before answering.	1/28/2025 12:23 PM

Del Norte County Hazard Mitigation Plan Update - Public Survey

SurveyMonkey

71	Gasquet Flat Road	1/28/2025 11:38 AM
72	N/A	1/28/2025 3:37 AM
73	All of Gasquet is vulnerable when and if highway 199 is closed due to natural disasters, fires of 2023 cut off power which cut off cell phone service and internet, no communication outside of area.. deadly situation	1/28/2025 2:01 AM
74	Fire preparation, fire prevention for Gasquet	1/27/2025 10:37 PM
75	Gasquet - high risk for wildfire	1/27/2025 10:18 PM
76	Gasquet	1/27/2025 9:33 PM
77	Protect electric power grid and create program to supply power in case of long term disruption. This is imperative.	1/27/2025 9:26 PM
78	Gasquet-wild fire	1/27/2025 8:25 PM
79	In Gasquet, we have a ditch that runs parallel to Gasquet Flat Road. After heavy rainfall. It fills & floods some properties. It should be dug out, after YEARS of buildup of dirt & debris.	1/27/2025 8:05 PM
80	Small creek runs through gasquet that constantly floods. Maintaining and creating better outlets would greatly help.	1/27/2025 8:02 PM
81	Wildfire risk Gasquet	1/27/2025 7:21 PM
82	Flooding creek drainage that runs parallel to Gasquet Flat Rd.	1/27/2025 7:15 PM
83	East and Southside of Gasquet are at Very High Risk of Wildfire. We need to fund the Del Norte Fire Safe Council to clear property, and convince the USFS to do more fuel reduction and prescribed burns.	1/27/2025 6:50 PM
84	North Fork Rd Gasquet Calif. for fire prevention	1/27/2025 6:38 PM
85	Access roads if hwy 199 is down there are back roads available but not maintained	1/27/2025 6:37 PM
86	Fire Gasquet CA	1/27/2025 6:10 PM
87	Remove fire hazards in overgrown yards and by roads	1/27/2025 6:02 PM
88	High wildfire risk for the entire Gasquet community.	1/27/2025 5:30 PM
89	None	1/27/2025 5:29 PM
90	CA 199	1/27/2025 4:58 PM
91	Landslides on the 101 hwy. Last chance Grade. Also the 199hwy . Only two ways into our town	1/27/2025 7:36 AM
92	The entire county is vulnerable to loss of electrical power because of the PPL transmission corridor along Hwy 199.	1/25/2025 12:17 PM
93	Coastal erosion in developed urban areas. US 199 slip outs and slides. US 101 at Last Chance Grade. US 101 at South Beach. Anchor Way. All of Del Norte is still without electric power redundancy. Much of Lower Lake Road. The housing areas surrounding Lake Earl. Sandmine Road at US 101 intersection.	1/24/2025 4:42 PM
94	Gasquet residents receive their water from Gasquet Community Services District. The water plant is on the east side of the Middle Fork River. A water pipe goes under the bridge to service the west side of the village. The bridge is very old. Damage from an earthquake is always a concern for me.	1/17/2025 3:37 PM
95	back up power for water supply to HRC CSD (well head on Peacock meadow)	1/8/2025 12:24 PM
96	The entire township of Klamath and the Requa estuary	1/7/2025 1:05 PM
97	Water tanks throughout Smith River are prone to trees falling on them during High wind events	1/7/2025 11:38 AM
98	N/A	1/6/2025 5:52 PM
99	The Klamath community can become quickly isolated during slides (Last Chance) and other. Life-line services are critical.	1/2/2025 5:29 PM

Q13 Please identify any specific vulnerabilities that you are aware of in the County, outside your community (e.g., flood-prone areas or specific properties, critical facilities that lack backup power, etc.). Please list the jurisdiction, street names, and other specific identifiers if possible.

Answered: 79 Skipped: 117

#	RESPONSES	DATE
1	Access through Hwy 101 north and south, Hwy 199	5/1/2025 2:22 PM
2	US 199, 197	3/20/2025 7:37 PM
3	Not sure	3/8/2025 2:03 PM
4	All of the county	3/4/2025 1:59 PM
5	N/A	2/26/2025 9:10 AM
6	I am unsure.	2/25/2025 7:58 PM
7	Roads & sewer systems are in need of updating. Forest areas need cleaning up. Access & service roads need serving also.	2/25/2025 7:31 PM
8	The tsunami siren in Crescent City did not remain on during the entire most recent tsunami warning. When it shut off people thought the tsunami warning had been lifted which ended up endangering the public. Then a significant time period later the siren turned back on and people thought a new tsunami warning had been issued. Then the siren shut off again premature to the tsunami warning being lifted. This needs to be corrected.	2/25/2025 5:54 PM
9	Pebble beach drive is facing massive erosion problems with below surface waterways making their way to the ocean. Many residents throughout Del Norte County do not have back up power available to them unless they have a generator. With our large amount of trees that continue to grow, our power lines are at risk for fire and disruption of service. It is an impossible task to ensure all power lines throughout the county do not have branches touching or won't touch with heavy winds or new branch growth. Please consider underground power lines at some point for our community.	2/25/2025 11:21 AM
10	Electric lines run along the hwy 199, when fire happened in that area, the whole town lost power!	2/24/2025 6:24 PM
11	Last Chance Grade, Hwy 101 and Hw 199 and 197.	2/24/2025 5:57 PM
12	NA	2/24/2025 1:58 PM
13	Last Chance Grade	2/24/2025 1:04 PM
14	No specifics that I can report at the moment	2/24/2025 11:39 AM
15	last chance grade	2/24/2025 11:37 AM
16	Big Flat and Gasquet areas for fires	2/24/2025 10:48 AM
17	Klamath is flood prone.	2/21/2025 8:10 PM
18	Many areas off 199 that are flood prone.	2/21/2025 7:58 PM
19	Hiouchi/Gasquet- Wildfire, Emergency power to the county, flooding on South Bank Road	2/21/2025 7:43 PM
20	Landslides affecting travel on the 101 and 199. Poor phone reception.	2/21/2025 7:38 PM
21	Last Chance on 101	2/21/2025 7:19 PM
22	Flooding - The intersection of Redwood Hwy (Hwy 101 going south) and Sandman Rd is a potential flooding area because of the swamp. When there is heavy rainfall or a tsunami, the	2/21/2025 7:09 PM

	water can rise up to 2 feet and can potentially stop traffic or cause traffic accidents.	
23	None	2/21/2025 7:02 PM
24	I don't have any.	2/21/2025 6:56 PM
25	Adults with functional needs and disabilities. Need for identify those at highest risk prior to natural disaster.	2/21/2025 6:55 PM
26	lack of power back ups we had a mass power outage during the last major fire	2/21/2025 6:49 PM
27	Bridges leading in and out of the county. Main highways that are prone to landslides, and flooding that hinder services being restored in cut off areas.	2/21/2025 3:58 PM
28	Landslides on highways 199 and 101 out of Crescent City	2/21/2025 3:37 PM
29	Landslides Hwy 101 and 199	2/21/2025 3:03 PM
30	Na	2/21/2025 3:01 PM
31	Nothing to add.	2/21/2025 10:31 AM
32	That would take more time than I have on a Survey Monkey quick check	2/20/2025 7:51 PM
33	see above	2/20/2025 6:40 PM
34	Flooding on 101 during high tides	2/20/2025 5:27 PM
35	Lack of proper fuel reduction around all communities.	2/20/2025 4:49 PM
36	Lack of power, county wide	2/20/2025 4:28 PM
37	Backup generators everywhere are needed. Community training and information. Our community is not prepared.	2/20/2025 4:00 PM
38	Information/communication system failures, especially to those the AFN populations in the outlying areas	2/20/2025 2:58 PM
39	Excessive rain often leads to minor and major slides on Highway 199. Extended closure of the highway, northbound or southbound, results in lack of access to doctors, hospitals, and other support services	2/20/2025 2:58 PM
40	Bridges collapsing and no supplies by road. Air?	2/20/2025 1:22 PM
41	Terwer Creek and highway 169	2/20/2025 9:30 AM
42	The incomplete bridge at 101/197 - Dr. Fine Bridge, I believe it is.	2/19/2025 11:40 PM
43	Still no back-up power source if we again loose our main power line from Grants Pass.	2/19/2025 8:47 PM
44	None	2/19/2025 8:17 PM
45	None	2/19/2025 7:36 PM
46	Infrastructure, bridges and water system	2/19/2025 7:00 PM
47	Federal and State forest have lacked good management for years.	2/19/2025 6:41 PM
48	Hwy 199	2/19/2025 6:35 PM
49	curry county will not be able to assist- seems very limited	2/19/2025 6:27 PM
50	Downtown, Hwy 101 at south beach, harbor	2/15/2025 4:46 PM
51	Community sewer and water systems.	2/13/2025 9:58 AM
52	Storm water infrastructure on lower lake road should be improved to accommodate heavy rainfall	2/12/2025 5:28 PM
53	N/a	2/12/2025 9:06 AM
54	?	2/11/2025 10:14 PM
55	HRC water District has no back up generator if power goes out	2/11/2025 3:11 PM

56	Hwy 101 in town.	2/11/2025 2:45 PM
57	unstable roads from landslides or floodnig could leave the whole community stranded and isolated	2/11/2025 1:18 PM
58	Schools	2/11/2025 1:00 PM
59	Crescent City vulnerable to traffic jams during tsunami flooding	1/30/2025 12:23 AM
60	Lack of accessibility during natural disasters - small number of routes out of Del Norte County, many which are routinely closed due to landslides/erosion. Highway 199 and 101 both have frequent closures due to landslides.	1/29/2025 4:27 PM
61	(This list is county-wide, including the City and special districts) Sheriff's Office/Jail/Dispatch has problematic generator: not plumbed in, requires manual fuel refilling, does not automatically kick on, does not supply enough power for regular operations. The facility is located at 650 5th St, Crescent City, CA 95531. Pacific Power transmission corridor runs through the Smith River National Recreational Area from Cave Junction, Oregon and powers all of Del Norte County. Hazards impacting our singular transmission corridor can cause power to be lost county-wide, sometimes for weeks on end. The Sheriff's Office/Jail/Dispatch and Crescent City Police Department are both located in the tsunami hazard zone. The Sheriff's Office is located at 650 5th St, Crescent City, CA 9553, and CCPD is located at 686 G St, Crescent City, CA 95531. Several of the Del Norte County Department of Health and Human Services offices serving some of Del Norte's most vulnerable community members are in the tsunami hazard zone, including the Public Health branch, located at 400 L St, Crescent City, CA 95531, the Behavioral Health Branch, located at 455 K St., Crescent City, CA, 95531, The Legacy (long-term supportive housing) at 65 L St., Crescent City, CA, 95531, and the main DHHS offices at 880 Northcrest Dr., Crescent City, CA, 95531. Residents and staff in tsunami hazard zone at the southern end of the City including the South Beach area, Bertsch-Oceanview, Elk Valley, and the Harbor have walk times of up to 40 minutes to reach the safe zone in a tsunami threat. Tsunami waves from a local source earthquake (which includes Humboldt County, where the Menodocino Triple Junction is- the most seismically active fault zone in California) could arrive in as few as ten minutes.	1/29/2025 11:57 AM
62	Again would have to think about it. Public meetings would be a good way to get people involved	1/28/2025 12:23 PM
63	Gasquet California.	1/28/2025 11:38 AM
64	N/A	1/28/2025 3:37 AM
65	Last Chance Grade	1/27/2025 10:37 PM
66	Road access in the event of an emergency. Highway 199 has limited access when there's natural disasters including landslides, flooding or wildfire.	1/27/2025 10:18 PM
67	Gasquet	1/27/2025 9:33 PM
68	Wastewater Treatmentplant, 210 Battery Street, Crescent City is in the tsunami zone.	1/27/2025 9:26 PM
69	Small creek that runs down gasquet Flat Road behind the residences from the old school house all the way to the bait my hook house.	1/27/2025 8:02 PM
70	Wildfire on North, East, and South parts of the County	1/27/2025 6:50 PM
71	Communication been evacuated 4 occasions each time is like it's the first time while DN does Tsunami practice no such preparedness happens with wildfires	1/27/2025 6:37 PM
72	Flood, Tsunami Crescent City	1/27/2025 6:10 PM
73	risk of downed powerlines	1/27/2025 5:30 PM
74	In the tsunami zone is our 911 Dispatch and Sheriffs office	1/27/2025 7:36 AM
75	Fire district does not have generators to operate during a power outage.	1/25/2025 12:17 PM
76	Klamath Glenn, Requa boat ramp, riverside RV park, Chinook RV resorts 17505-US-101	1/7/2025 1:05 PM
77	no back up power	1/7/2025 11:38 AM
78	Public services underfunded (law enforcement)	1/6/2025 5:52 PM

79 Many roads are dark throughout the county and need reflectors on the roads for night driving. Dangerous road conditions on Hwy 101 needs rails in some areas where cars go off the edge. (Example: across the road and north from Damnation Creek trail parking).

1/2/2025 5:29 PM

Q14 Do you have any other comments, questions, or concerns regarding hazard mitigation in Del Norte County?

Answered: 73 Skipped: 123

#	RESPONSES	DATE
1	Need to be more creative on ways to get the public involved in the process. Door prizes, food, etc.	5/1/2025 2:22 PM
2	Need information to ask qu	3/8/2025 2:03 PM
3	Need more fire mitigation around Gasquet, Hiouchi and Big Flat areas	3/8/2025 10:21 AM
4	We should incorporate short-term weather impacts too.	3/4/2025 1:59 PM
5	no	2/28/2025 4:21 PM
6	It is funny to talk to people who live in larger cities about their emergency concerns: their views of what an emergency is are wildly different from ours. They are more naive. We often don't recognize how very resourceful and strong the people of Del Norte County and our environs truly are. :-)	2/26/2025 6:12 PM
7	Not at this time	2/26/2025 9:10 AM
8	Thank you to all the emergency service people and roads maintenance. You all do an excellent job in Del Norte.	2/25/2025 8:07 PM
9	No. Thank you.	2/25/2025 7:58 PM
10	City and county need to update their emergency services & they need more staff.	2/25/2025 7:31 PM
11	Helping Residents of Del-Norte with Disaster prep kits. Due to the cost of items and such needed. Some can't afford these things.	2/25/2025 6:48 PM
12	I didn't realize the survey I completed previously was over and didn't get to include: The primary source of electronic information provided by the County needs to be hosted by the County. A County webpage is likely most appropriate. Facebook is a third party that not everyone has/wants to utilize and the County ultimately does not have control over. Additionally, disaster updates need to be provided in diary form (i.e., date and time) so that prior information can be referenced and it can be easily verified that information being provided has changed. It would help a lot with is it a rumor or is it outdated information.	2/25/2025 5:59 PM
13	Easy access to information in both digital and hard copy form at consistent designated locations prior to, during, and post disasters.	2/25/2025 5:54 PM
14	I am happy that we are thinking ahead and collecting data from community members and employees. I hope this information is helpful for future endeavors for Del Norte community members.	2/25/2025 11:21 AM
15	We don't have adequate medical care in this town. People die in the hospital because the doctors on staff don't actually care about their patients and the preventative care we have is so backed up that appointments are either scheduled way in advance or not at all. Dental care for Medical patients is even worse.	2/24/2025 6:24 PM
16	It is my understanding that Pacific Power is taking steps to ensure that there is a 10 foot area cleared around every power pole with a transformer in Del Norte County.	2/24/2025 6:14 PM
17	No	2/24/2025 1:58 PM
18	N/A	2/24/2025 11:47 AM
19	I think a big issue we face is not enough economic growth within the county and our environmental/infrastructure integrity is lacking (ie natural sealife barriers not being protected	2/24/2025 11:39 AM

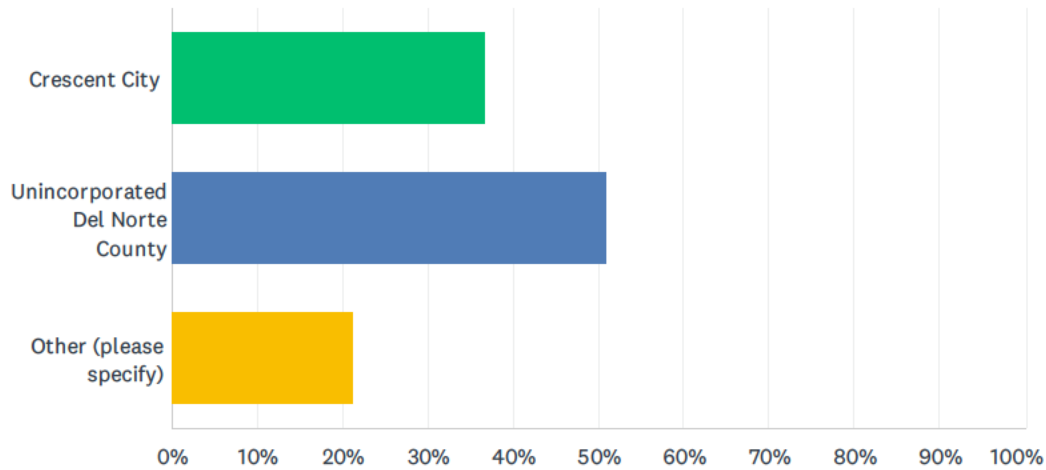
	that help prevent landslides and structures, both private and commercial, suffer structure damage during any wind storm, like roofs.)	
20	Help county employees with some basic disaster supplies (they gave a full emergency backpack years ago) We are the Disaster Services Workers. The sooner we are ok the sooner we can help others.	2/21/2025 8:10 PM
21	No	2/21/2025 7:58 PM
22	none	2/21/2025 7:43 PM
23	No	2/21/2025 7:19 PM
24	No	2/21/2025 7:02 PM
25	No.	2/21/2025 6:56 PM
26	N/A	2/21/2025 6:55 PM
27	we need a more updated digital platform in which to get not just "Official", but developing data on local disasters so families can better plan their needs	2/21/2025 6:49 PM
28	No	2/21/2025 3:03 PM
29	No	2/21/2025 3:01 PM
30	No.	2/21/2025 10:31 AM
31	No	2/20/2025 7:51 PM
32	no	2/20/2025 5:27 PM
33	Adopt County Ordinances to enforce California defensible space laws.	2/20/2025 4:49 PM
34	We need solid updated and consistently evolving mitigation planning	2/20/2025 4:00 PM
35	We need a whole community response approach in emergency preparedness/response through a robust community engagement/training/exercises	2/20/2025 2:58 PM
36	I believe the Critical part of hazard mitigation is individual responsibility to be prepared and ready. It seems the "it won't happen to me" mentality is the biggest challenge	2/20/2025 2:58 PM
37	Remember that hazards will change over time, so we all need to be informed about local emergency preparedness efforts and updates to hazard mitigation plans.	2/20/2025 1:22 PM
38	not at this time.	2/20/2025 12:44 PM
39	Yes our warning sirens don't work at all in Klamath Glenn and the dyke needs to be cleared of all debris!	2/20/2025 9:30 AM
40	None	2/19/2025 11:40 PM
41	Thank you for all you are doing to prepare, keep our community safe, and respond to all emergencies.	2/19/2025 8:47 PM
42	No	2/19/2025 8:17 PM
43	None	2/19/2025 7:36 PM
44	Low income communities, lack of critical medical, law enforcement, and Emergency Services funding. County wide inclusion.	2/19/2025 7:00 PM
45	Reactivate the CERT program	2/19/2025 6:58 PM
46	EOC should focus on clean-up and response after disaster strikes not just response to the disaster itself.	2/19/2025 6:41 PM
47	No	2/19/2025 6:35 PM
48	no	2/19/2025 6:35 PM
49	Not at this time	2/15/2025 4:46 PM
50	Del Norte OES has not provided timely consistent information in the same locations during	2/13/2025 9:58 AM

disaster events, ex: Smith River Complex Fire and recent tsunami warning. There should be a County webpage that is always up to date, not Facebook or another third party. Information should not be deleted or modified. It should look like a diary entry so a member of the public can verify that details have in fact changed over time. Not everyone has Facebook and the County does not have control over the policies of a third party. The tsunami warning siren should not stop while the tsunami warning is in effect. Several people thought the warning was over when the siren was turned off but then quite a while later it was turned on again briefly but still the tsunami warning wasn't over when it was turned off.

51	The County OES should have their own emergency radio broadcast that disseminates information during disasters. Critical information should only come from official sources so that the public has a guarantee of the integrity of the information being given.	2/12/2025 5:28 PM
52	Make sure everyone, especially county offices, have the correct and current map. During the Tsunami Evacuation last year, county workers were told their office was not in the Evacuation area, when it was in fact in the Evacuation area. I felt held hostage and as if my life mattered less than the general public because I can be a disaster service worker during a disaster even though we were not activated and were considered public at that time.	2/12/2025 9:06 AM
53	During the fires, we had no power for my husband's oxygen machine. This attributed to his failing health that lead to his demise. His oxygen tanks would only get filled halfway so it was 3 trip a day to fort dick to fill.	2/11/2025 10:14 PM
54	Build some vertical evacuation areas! Some have been built in Washington!	2/11/2025 3:05 PM
55	Building near cliffs. Building in forests with only one way in and no turnaround space.	2/11/2025 2:45 PM
56	not directly related, but the lack of good, available health care is a huge concern	2/11/2025 1:18 PM
57	The schools were a mess during the tsunami warning and recent evacuation. Messaging said just to evacuate and if in tsunami zone. This made wild parents running into the schools demanding kids as they thought they were in danger	2/11/2025 1:00 PM
58	Increase household independence and resiliency to endure critical emergency events... Support local rural community resources for citizens to endure emergency events. Provide homeowners with assistance in property management to decrease damage from emergency events.	1/30/2025 12:23 AM
59	No	1/28/2025 12:54 PM
60	There are hazards everywhere. We're heavily wooded and I would like to see more local involvement in mitigating fire hazard	1/28/2025 12:23 PM
61	I hope that we can someday slow traffic through Gasquet. So many animals are killed right in town.	1/27/2025 10:37 PM
62	Continue reducing fuel loading in and around inland communities (i.e. Hiouchi and Gasquet)	1/27/2025 10:18 PM
63	N/A	1/27/2025 9:33 PM
64	Just to complimyour Cal Trans crew, in Gasquet. For always keeping our roadways safe! They do an EXCELLENT job!	1/27/2025 8:05 PM
65	We need to push for fire prevention more than just suppression.	1/27/2025 6:50 PM
66	Have National Forest Service maintain a perimeter when property is shared with private citizens would create a fire defense	1/27/2025 6:37 PM
67	No	1/27/2025 6:10 PM
68	no	1/27/2025 5:30 PM
69	None	1/27/2025 7:36 AM
70	High wind tends to bring down trees, which affect roadways and power grid.	1/25/2025 12:17 PM
71	Climate change, sea level rise, Tsunami evacuation trails or platforms and earthquakes, Mass evacuation and transportation routes	1/7/2025 1:05 PM
72	no	1/7/2025 11:38 AM
73	Please include the southern area of Del Norte County as much as possible. Thank you.	1/2/2025 5:29 PM

Q15 Please indicate the municipality in which you live or work:

Answered: 188 Skipped: 8



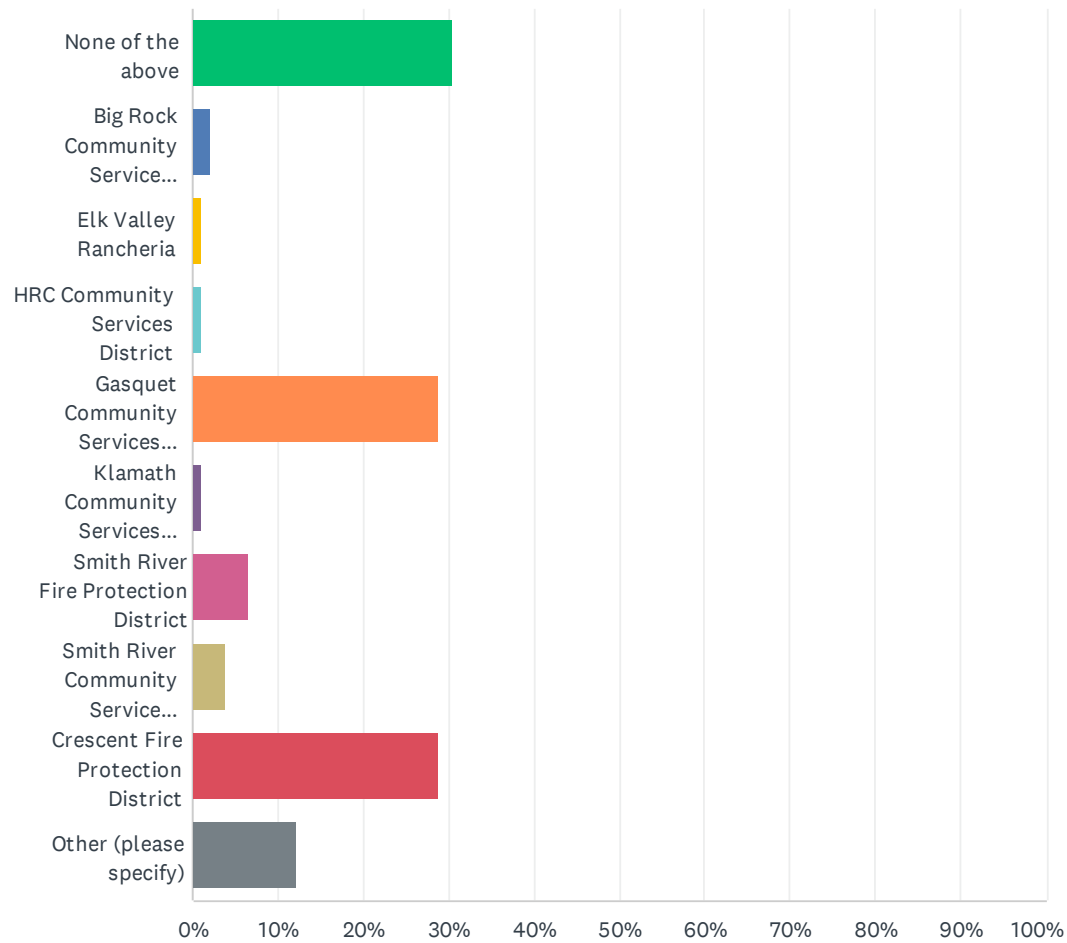
ANSWER CHOICES	RESPONSES	
Crescent City	36.70%	69
Unincorporated Del Norte County	51.06%	96
Other (please specify)	21.28%	40
Total Respondents: 188		

#	OTHER (PLEASE SPECIFY)	DATE
1	private	2/26/2025 1:28 PM
2	Smith River California	2/26/2025 8:40 AM
3	Del Norte County Public Health	2/24/2025 1:07 PM
4	Oregon	2/21/2025 6:56 PM
5	Caltrans	2/21/2025 11:35 AM
6	Gasquet	2/20/2025 5:05 PM
7	Gasquet	2/20/2025 3:41 PM
8	the Village of Gasquet	2/20/2025 3:00 PM
9	Elk Valley Rancheria	2/20/2025 12:46 PM
10	Klamath Glen	2/20/2025 9:31 AM
11	Humboldt	2/19/2025 6:31 PM
12	unincorporated brookings	2/19/2025 6:28 PM
13	I think we are just outside of city limits, we just moved	2/15/2025 4:47 PM
14	Gasquet	1/29/2025 4:29 PM
15	Gasquet	1/28/2025 10:24 PM

16	Gasquet	1/28/2025 12:58 PM
17	Gasquet	1/28/2025 12:56 PM
18	Gasquet	1/28/2025 12:53 PM
19	In forested area east of town	1/28/2025 12:28 PM
20	Gasquet	1/28/2025 3:39 AM
21	Gasquet	1/28/2025 2:02 AM
22	Gasquet	1/28/2025 1:57 AM
23	Gasquet	1/27/2025 10:40 PM
24	Gasquet	1/27/2025 9:33 PM
25	Gasquet	1/27/2025 9:27 PM
26	Gasquet	1/27/2025 9:07 PM
27	Gasquet	1/27/2025 8:28 PM
28	Gasquet	1/27/2025 8:26 PM
29	Gasquet	1/27/2025 8:06 PM
30	Gasquet	1/27/2025 8:03 PM
31	Gasquet	1/27/2025 7:41 PM
32	Gasquet	1/27/2025 7:25 PM
33	Gasquet	1/27/2025 7:16 PM
34	DN Gasquet	1/27/2025 6:38 PM
35	Gasquet CA	1/27/2025 6:11 PM
36	Gasquet	1/27/2025 5:30 PM
37	the Village of Gasquet	1/17/2025 3:38 PM
38	Yurok Tribal Nation	1/7/2025 1:10 PM
39	Hiouchi	1/6/2025 5:54 PM
40	Klamath	1/2/2025 5:31 PM

Q16 Do you receive services from any of the following special districts?

Answered: 181 Skipped: 15

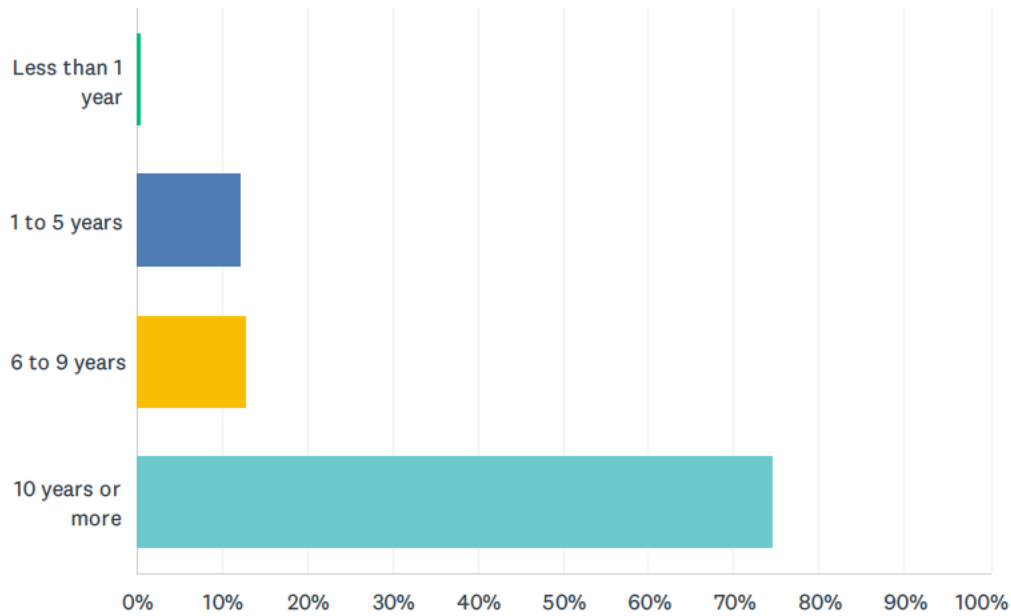


ANSWER CHOICES	RESPONSES	
None of the above	30.39%	55
Big Rock Community Service District	2.21%	4
Elk Valley Rancheria	1.10%	2
HRC Community Services District	1.10%	2
Gasquet Community Services District	28.73%	52
Klamath Community Services District	1.10%	2
Smith River Fire Protection District	6.63%	12
Smith River Community Service District	3.87%	7
Crescent Fire Protection District	28.73%	52
Other (please specify)	12.15%	22
Total Respondents: 181		

#	OTHER (PLEASE SPECIFY)	DATE
1	Sheriff	3/20/2025 7:39 PM
2	I'm not sure what this question is asking. I think I answered correctly	2/28/2025 2:32 PM
3	Not a complete list of special districts providing services in the County.	2/25/2025 5:55 PM
4	Gasquet FPD	2/20/2025 5:28 PM
5	Gasquet vol. fire department	2/20/2025 3:41 PM
6	Gasquet Volunteer Fire Department, Six Rivers USFS	2/20/2025 3:00 PM
7	Fort Dick Fire	2/20/2025 12:12 PM
8	Not sure	2/15/2025 4:47 PM
9	Ft. Dick Fire	2/11/2025 1:45 PM
10	Gasquet VFD	1/28/2025 10:24 PM
11	I don't know	1/28/2025 12:53 PM
12	We are on the ridge behind Low Divide. Would like to develop a plan for this area.	1/28/2025 12:28 PM
13	Gasquet Fire Department	1/27/2025 11:13 PM
14	Gasquet vol. fire department	1/27/2025 8:28 PM
15	Gasquet Fire	1/27/2025 8:03 PM
16	Gasquet FPD	1/27/2025 5:31 PM
17	Suburban Propane	1/25/2025 12:18 PM
18	Gasquet Volunteer Fire Department	1/17/2025 3:38 PM
19	Klamath fire protection district	1/7/2025 1:10 PM
20	County Sheriff	1/6/2025 5:54 PM
21	Fort Dick Fire	1/6/2025 12:13 PM
22	Redwood Park Community Services District (Klamath Drive, Klamath)	1/2/2025 5:31 PM

Q17 How long have you lived/worked in Del Norte County?

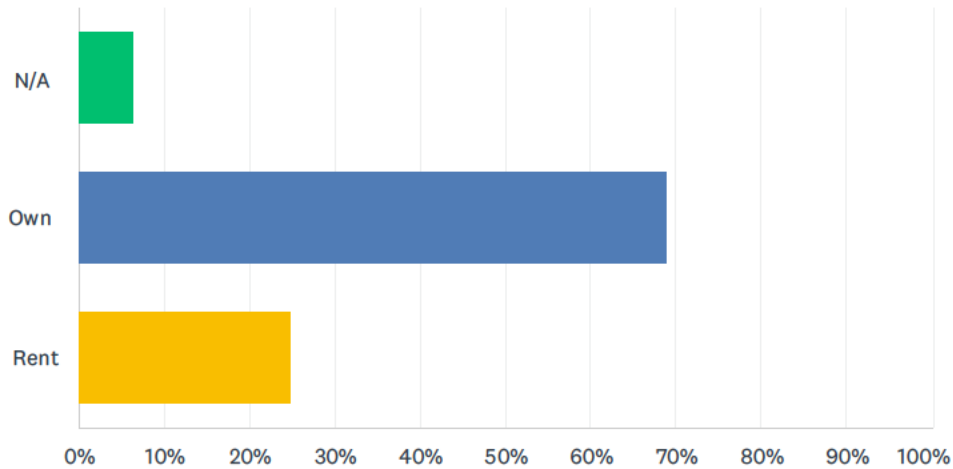
Answered: 189 Skipped: 7



ANSWER CHOICES	RESPONSES	
Less than 1 year	0.53%	1
1 to 5 years	12.17%	23
6 to 9 years	12.70%	24
10 years or more	74.60%	141
TOTAL		189

Q18 If you live in Del Norte County, do you own or rent your place of residence?

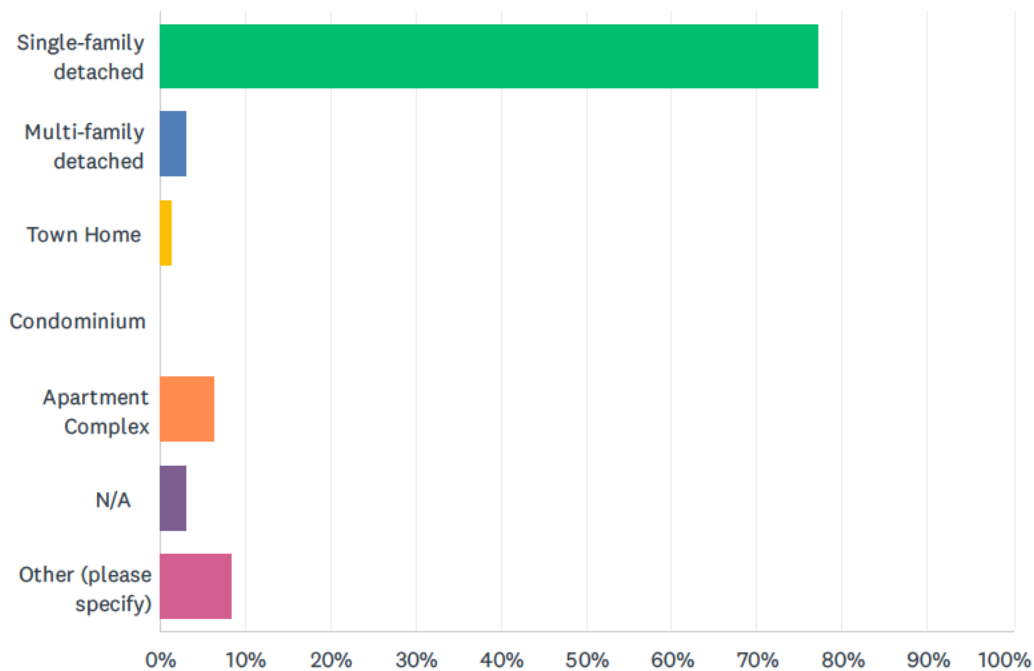
Answered: 189 Skipped: 7



ANSWER CHOICES	RESPONSES	
N/A	6.35%	12
Own	68.78%	130
Rent	24.87%	47
TOTAL		189

Q19 If you live in Del Norte County, what type of residence do you live in?

Answered: 189 Skipped: 7



ANSWER CHOICES	RESPONSES	
Single-family detached	77.25%	146
Multi-family detached	3.17%	6
Town Home	1.59%	3
Condominium	0.00%	0
Apartment Complex	6.35%	12
N/A	3.17%	6
Other (please specify)	8.47%	16
TOTAL		189

#	OTHER (PLEASE SPECIFY)	DATE
1	Home	2/25/2025 8:00 PM
2	Mobile home in park	2/25/2025 7:35 PM
3	RV	2/25/2025 3:17 AM
4	renovated business that was turned into a 4 unit apartment complex	2/24/2025 11:43 AM
5	House	2/24/2025 11:18 AM
6	single family home	2/21/2025 6:51 PM
7	Mobile home park	2/21/2025 6:44 PM

8	Travel Trailer	2/21/2025 6:32 PM
9	Mobile home	2/21/2025 3:04 PM
10	Mobile Home	2/20/2025 7:53 PM
11	mobile home	2/19/2025 8:10 PM
12	attached apartment to a single-family	2/19/2025 7:00 PM
13	Trailer park	2/12/2025 9:07 AM
14	Manufactured home	1/28/2025 12:56 PM
15	Mobile Home	1/28/2025 12:53 PM
16	Mobile home	1/27/2025 7:25 PM

Q20 What street is your property on?(Optional, will be kept confidential - only used to identify hazard areas such as flood prone areas.)

Answered: 135 Skipped: 61

#	RESPONSES	DATE
1		3/20/2025 7:39 PM
2		3/14/2025 11:17 PM
3		3/13/2025 2:20 PM
4		3/11/2025 6:07 AM
5		3/10/2025 5:19 PM
6		3/8/2025 4:07 PM
7		3/8/2025 2:04 PM
8		3/8/2025 10:23 AM
9		3/8/2025 9:54 AM
10		2/28/2025 4:22 PM
11		2/28/2025 2:32 PM
12		2/26/2025 6:56 PM
13		2/26/2025 6:12 PM
14		2/26/2025 1:28 PM
15		2/26/2025 9:12 AM
16		2/26/2025 8:40 AM
17		2/25/2025 8:00 PM
18		2/25/2025 7:35 PM
19		2/25/2025 6:58 PM
20		2/25/2025 6:49 PM
21		2/25/2025 1:26 PM
22		2/25/2025 1:17 PM
23		2/25/2025 11:31 AM
24		2/25/2025 11:17 AM
25		2/25/2025 3:17 AM
26		2/24/2025 10:23 PM
27		2/24/2025 6:25 PM
28		2/24/2025 6:16 PM
29		2/24/2025 5:58 PM
30		2/24/2025 1:11 PM
31		2/24/2025 1:07 PM

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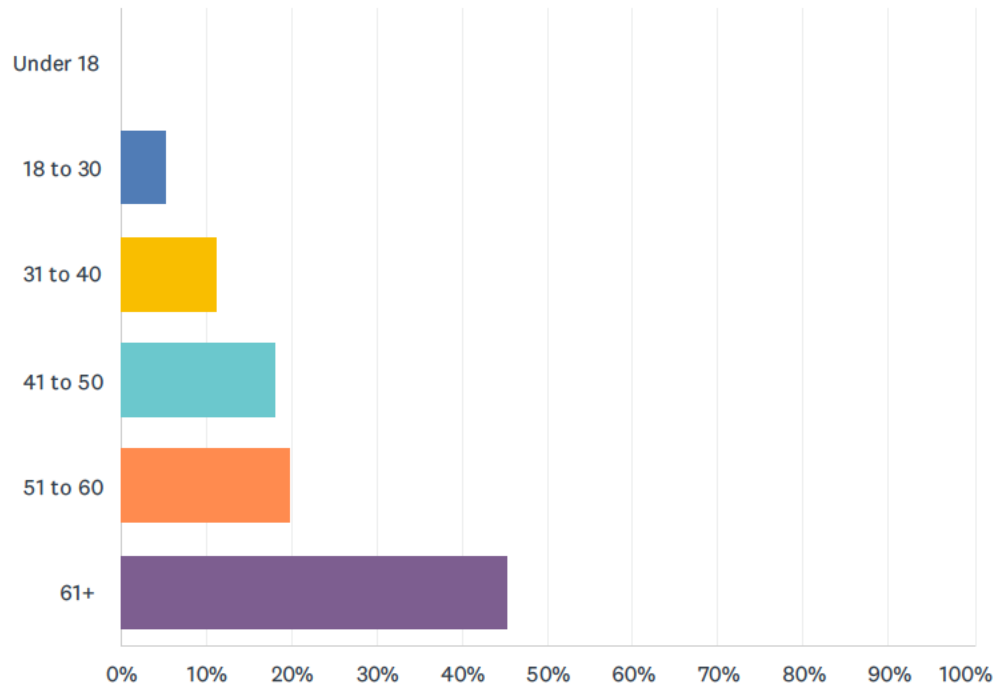
2/24/2025 12:27 PM
2/24/2025 11:49 AM
2/24/2025 11:43 AM
2/24/2025 11:38 AM
2/24/2025 11:18 AM
2/24/2025 11:00 AM
2/24/2025 10:49 AM
2/24/2025 10:18 AM
2/22/2025 2:56 PM
2/21/2025 8:11 PM
2/21/2025 7:44 PM
2/21/2025 7:39 PM
2/21/2025 7:39 PM
2/21/2025 7:34 PM
2/21/2025 7:20 PM
2/21/2025 7:10 PM
2/21/2025 7:03 PM
2/21/2025 6:56 PM
2/21/2025 6:56 PM
2/21/2025 6:51 PM
2/21/2025 6:44 PM
2/21/2025 6:38 PM
2/21/2025 6:32 PM
2/21/2025 6:32 PM
2/21/2025 3:59 PM
2/21/2025 3:37 PM
2/21/2025 3:04 PM
2/21/2025 3:03 PM
2/21/2025 11:35 AM
2/21/2025 10:32 AM
2/20/2025 7:53 PM
2/20/2025 6:42 PM
2/20/2025 5:28 PM
2/20/2025 5:05 PM
2/20/2025 4:51 PM
2/20/2025 4:01 PM
2/20/2025 3:41 PM
2/20/2025 3:00 PM

70		2/20/2025 2:59 PM
71		2/20/2025 1:23 PM
72		2/20/2025 12:46 PM
73		2/20/2025 12:12 PM
74		2/20/2025 9:31 AM
75		2/20/2025 2:23 AM
76		2/19/2025 8:49 PM
77		2/19/2025 8:18 PM
78		2/19/2025 7:37 PM
79		2/19/2025 7:02 PM
80		2/19/2025 7:00 PM
81		2/19/2025 6:38 PM
82		2/19/2025 6:36 PM
83		2/17/2025 9:35 PM
84		2/15/2025 4:47 PM
85		2/13/2025 6:29 PM
86		2/12/2025 5:29 PM
87		2/12/2025 9:07 AM
88		2/11/2025 10:48 PM
89		2/11/2025 3:12 PM
90		2/11/2025 2:47 PM
91		2/11/2025 1:53 PM
92		2/11/2025 1:01 PM
93		2/10/2025 2:22 PM
94		1/30/2025 12:24 AM
95		1/29/2025 10:27 PM
96		1/29/2025 4:29 PM
97		1/29/2025 4:29 PM
98		1/29/2025 11:58 AM
99		1/28/2025 10:24 PM
100		1/28/2025 6:51 PM
101		1/28/2025 12:56 PM
102		1/28/2025 12:53 PM
103		1/28/2025 12:28 PM
104		1/28/2025 11:39 AM
105		1/28/2025 3:39 AM
106		1/28/2025 12:38 AM
107		1/27/2025 11:13 PM

108		1/27/2025 10:40 PM
109		1/27/2025 10:39 PM
110		1/27/2025 10:19 PM
111		1/27/2025 9:33 PM
112		1/27/2025 9:07 PM
113		1/27/2025 8:53 PM
114		1/27/2025 8:28 PM
115		1/27/2025 8:26 PM
116		1/27/2025 8:06 PM
117		1/27/2025 7:44 PM
118		1/27/2025 7:41 PM
119		1/27/2025 7:25 PM
120		1/27/2025 7:16 PM
121		1/27/2025 6:51 PM
122		1/27/2025 6:38 PM
123		1/27/2025 6:11 PM
124		1/27/2025 6:03 PM
125		1/27/2025 5:52 PM
126		1/27/2025 5:31 PM
127		1/27/2025 5:30 PM
128		1/27/2025 4:59 PM
129		1/27/2025 7:38 AM
130		1/25/2025 12:18 PM
131		1/24/2025 4:44 PM
132		1/8/2025 12:25 PM
133		1/7/2025 1:10 PM
134		1/7/2025 11:41 AM
135		1/6/2025 5:54 PM

Q21 Please indicate your age range:

Answered: 187 Skipped: 9



ANSWER CHOICES	RESPONSES	
Under 18	0.00%	0
18 to 30	5.35%	10
31 to 40	11.23%	21
41 to 50	18.18%	34
51 to 60	19.79%	37
61+	45.45%	85
TOTAL		187

Responses Overview Active

Responses

10

Average Time

32:50

Duration

138 Days

1. The answers provided in this section will be treated as **CONFIDENTIAL** and will be used solely for the purpose of preparing this plan.

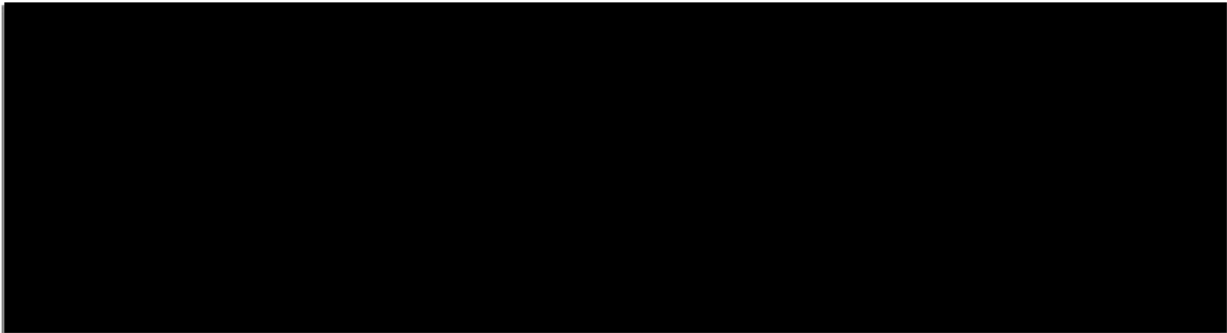


2. Name

10

Responses

Latest Responses



3. Department/Agency

10

Responses

Latest Responses

"Gasquet Community Service District"

"Facilities/Sutter Coast Hospital"

"Big Rock Community Service District"

...

2 respondents (20%) answered Sutter Coast for this question.



4. Title

10

Responses

Latest Responses

"Board Member, Chair"

"Emergency Management and HazMat Coordinator"

"President"

...

5 respondents (50%) answered Coordinator for this question.



5. Phone Number

10

Responses

Latest Responses

6. Email Address

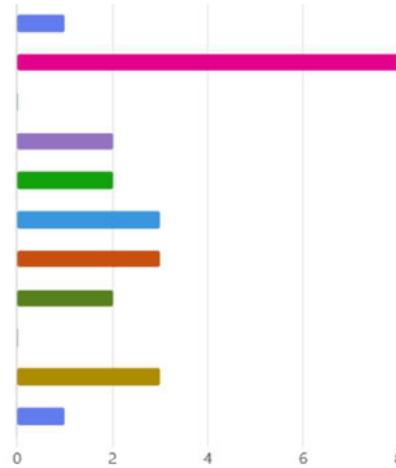
10
Responses

Latest Responses



7. Which of the following sectors do you represent? *Check all that apply.*

- Climate Change 1
- Emergency Management 8
- Economic Development 0
- Health and Social Services 2
- Housing, Food, Water, Shelter 2
- Infrastructure 3
- Land Use and Development 3
- Natural and Cultural Resources 2
- Social and Cultural Equity 0
- Socially Vulnerable and/or Underserved Populations 3
- Other 1



8. Based on the above category, please provide a brief description (1-2 sentences) of your organization's mission and services offered to the community.

10
Responses

Latest Responses

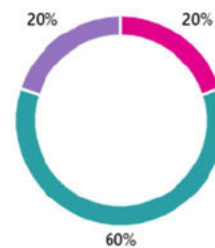
"Gasquet Community Service District Provides Potable Drinking Water to Gasquet"
 "Our motto is, "Patients First, People Always." Sutter Coast strives to be a vital part... "
 "Dual entity. One hat cover information to residents to self rescue in emergencies. ..."
 ...

6 respondents (60%) answered community for this question.

resilient community Emergency Community Service sustainable workforce
 Norte County supports and services people **community** services communities across Oregon
 drinking water Sutter Coast vision customer service community and resources
 protection of our community

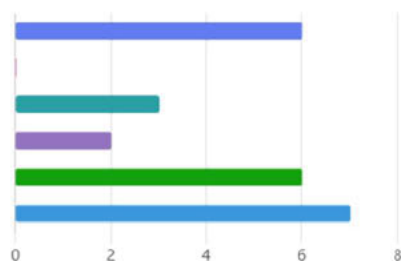
9. Where is your organization's primary service area?

● Crescent City	0
● Unincorporated Del Norte County	2
● Del Norte County (entire area)	6
● Other	2



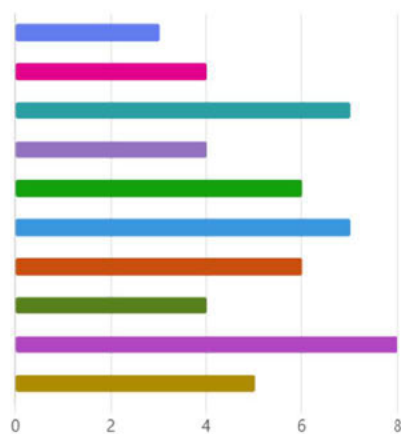
10. Does your organization maintain or manage any of the following within your designated service area? *Check all that apply.*

● Buildings	6
● Bridges	0
● Roads	3
● Stormwater	2
● Water/Sewer	6
● Other	7



11. Has your organization been impacted by any of the following hazards (e.g., facility damage, service interruptions)? *Check all that apply.*

● Drought	3
● Earthquake	4
● Excessive Rain	7
● Extreme Heat	4
● Extreme Wind	6
● Flood	7
● Landslide	6
● Tsunami	4
● Wildfire	8
● Other	5



12. If applicable, please briefly describe the event(s) and the damage/loss of service/property.

10

Responses

Latest Responses

"Town was evacuate from Wildfires"

"If 80% of healthcare workers experience violence in their work center and law enf..."

"Rain/ landslide is hand in hand. Road closure property damage. Wild fire threat/e..."

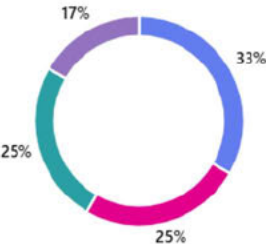
...

3 respondents (30%) answered Del Norte for this question.



13. What are your agency's primary concerns regarding hazards?

Vulnerability of specific facilities	8
Response capabilities	6
Likelihood of specific hazard events	6
Other	4



14. What challenges or barriers do you see in regards to reducing hazard vulnerability in Del Norte County?

10

Responses

Latest Responses

"Funding"

"Challenging mindset that CC/DNC will always have the same vulnerabilities. It wo..."

"Barriers include no ability to reduce hazard. Challenged; aftermath recover is dep..."

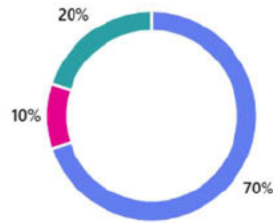
...

4 respondents (40%) answered resource for this question.



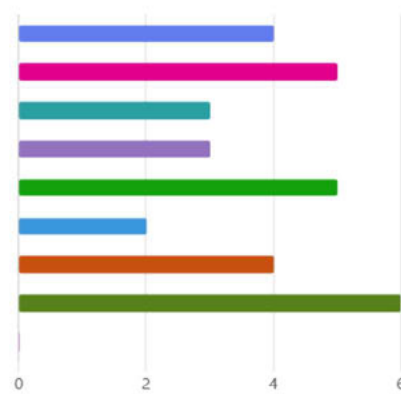
15. Does your agency own or lease facilities?

Yes	7
No	1
Unsure	2



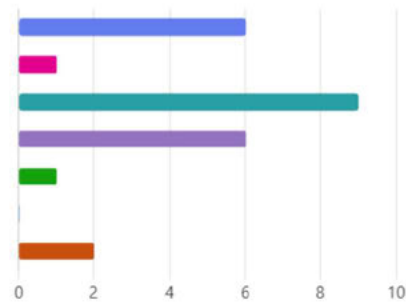
16. Of those facilities that your agency owns or leases, are any viewed as critical facilities or community lifelines? Check all the community lifeline sectors that apply.

Safety and Security (i.e., Law Enforcement/Security, Fire Service, Search and...	4
Food, Hydration, Shelter (i.e., Food, Hydration, Shelter, Agriculture)	5
Health and Medical (i.e., Medical Care, Public Health, Patient Movement, Medical Supply Chain,...	3
Energy (i.e., Power Grid, Fuel)	3
Communications (i.e., Infrastructure, Responder Communications, Alerts Warnings and Messages,...	5
Transportation (i.e., Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime)	2
Hazardous Materials (i.e., Facilities, HAZMAT, Pollutants, Contaminants)	4
Water Systems (i.e., Potable Water Infrastructure, Wastewater Management)	6
None of the above	0



17. Does your organization have any one of the following plans/strategies? *Check all that apply.*

Business Continuity Plan	6
Continuity of Government Plan	1
Emergency Operations Plan	9
Continuity of Operations Plan	6
Unsure	1
None of the above	0
Other	2



18. What projects, plans, or studies has your agency developed that relate to hazards, the climate, new or existing facilities, vulnerable populations, or other areas related to hazard mitigation?

10
Responses

Latest Responses

"We are in the process of extending our water service and installing fire hydrants i..."
 "Annually update BCP, HVA, and all contingency policies. New training program fo..."
 "Neighbors helping neighbors plans. New water facility. Emergency response plan...."

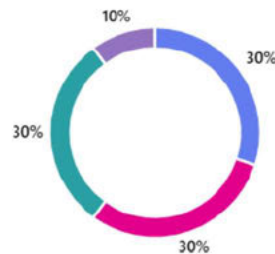
...

4 respondents (40%) answered Mitigation Plan for this question.



19. Is your agency currently involved in conducting any studies or developing any programs/projects which would further support Del Norte County's hazard mitigation efforts? Studies can include hazard-specific information, data gathering which supports risk assessments, including economic data, or statistical data of other types.

Yes	3
No	3
Unsure	3
Other	1



20. If yes, please briefly describe the type of study underway, and list the anticipated year of completion.

10
Responses

Latest Responses

"Any Study is Specific to Gasquet CSD"
 "My answer is no due to HIPPA Privacy laws."
 "N/A"

...

3 respondents (30%) answered Plan for this question.



21. **Social vulnerability** is understood as the potential for loss within an individual or social group, recognizing that some characteristics influence an individual's or group's ability to prepare, respond, cope or recover from an event. These characteristics can overlap within populations to create heightened vulnerability, which may be compounded by infrastructure deficiencies within communities and historic or existing discriminatory government policies.

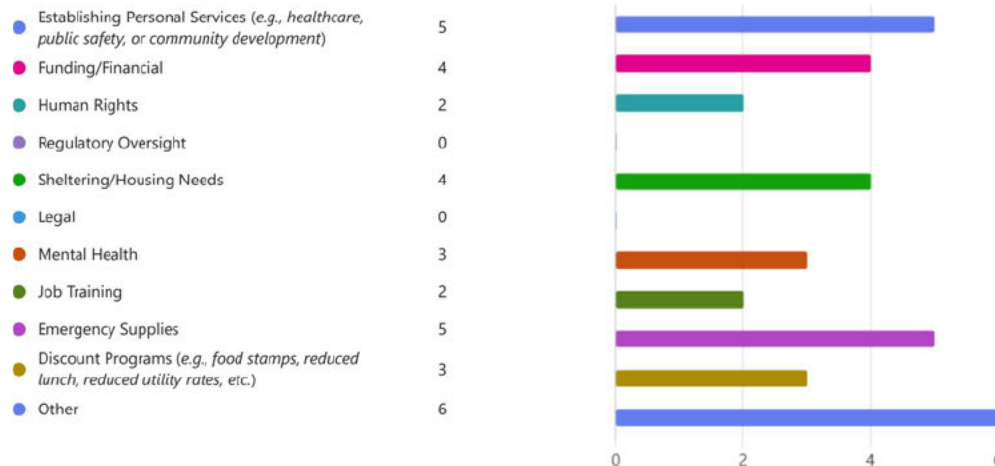
Underserved Communities refer to populations sharing a particular characteristic, as well as geographic communities that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. The barriers to opportunity and participation these communities face have been occurring throughout history and continue today.



22. Does your agency provide assistance to any socially vulnerable or underserved populations in Del Norte County?



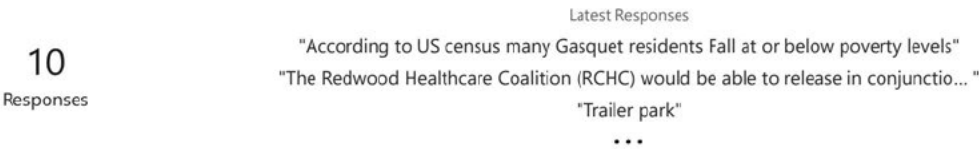
23. If yes, what types of services do you provide?



24. Are you aware of the vulnerable populations in your community/operating area and where they are located?



25. Please provide a list of the populations or communities served by your agency.



2 respondents (20%) answered Tribal members for this question.



26. Do you provide these services during times of disaster?



27. What barriers and community characteristics exist within Del Norte County that may create additional vulnerabilities to hazards? This may include but is not limited to access to transportation, broadband access, economic disadvantages, physical health (chronic diseases), limited physical mobility, age (older adults and children), and rural communities.

10

Responses

Latest Responses

"Limited Cell Service, Limited Public Transportation, Aging Populus, Very Rural Co..."

"Narcotics, sex, trafficking, and others are the ones we come most in contact with ..."

"Remote location to resources, access to transportation, supplies and funding"

...

4 respondents (40%) answered services for this question.



28. Do you have any questions or comments for Del Norte County?

8

Responses

Latest Responses

"Would like to see funding come to Gasquet from the County for Hazard Mitigation..."

"The survey is done quite professionally."

...

2 respondents (25%) answered County for this question.



APPENDIX E. MITIGATION CATALOG

Mitigation Action Catalog

2025

Del Norte County
Multijurisdictional
Hazard Mitigation Plan



COUNTY of
DEL NORTE
★ CALIFORNIA ★

Drought

Mitigation Action Catalog

Personal Scale	Organizational Scale	Government Scale
Reduce the probability of hazard events: ❖ Recycle gray water Limit risk to people or structures: ❖ Drought-resistant native landscapes ❖ Reduce water system losses ❖ Modify plumbing systems (through water saving kits) Increase ability to respond to or be prepared for hazard: ❖ Practice active water conservation ❖ Increased access to water testing ❖ For homes with on-site water systems: increase storage and utilize rainwater catchment	Reduce the probability of hazard events: ❖ Recycle gray water Limit risk to people or structures: ❖ Support alternative irrigation techniques to reduce water use and use climate-sensitive water supplies ❖ Drought-resistant landscapes ❖ Reduce private water system losses ❖ For businesses with on-site water systems, increase storage and utilize rainwater catchment Increase ability to respond to or be prepared for hazard: ❖ Practice active water conservation ❖ Participate in the Integrated Regional Water Management Program	Reduce the probability of hazard events: ❖ Groundwater recharge through stormwater management Limit risk to people or structures: ❖ Identify and create groundwater backup sources ❖ Water use conflict regulations ❖ Reduce water system losses ❖ Distribute water saving kits Increase ability to respond to or be prepared for hazard: ❖ Public education on drought resistance* ❖ Encourage water recycling ❖ Identify alternative water supplies for times of drought; mutual aid agreements with alternative suppliers ❖ Develop drought contingency plan ❖ Develop criteria “triggers” for drought-related actions ❖ Improve accuracy of water supply forecasts ❖ Modify rate structure to influence active water conservation techniques ❖ Consider the probable impacts of climate change on the risk associated with the drought hazard ❖ Support, participate in and advocate for funding for the Integrated Regional Water Management Program

2025 Del Norte County Hazard Mitigation Plan

		❖ Develop non-English and culturally sensitive educational materials
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Nature-based opportunities

- ❖ *Promote and use reclaimed water supplies*
 - ❖ *Increase capacity for stored surface water to create habitats and ecosystems for aquatic species.*
 - ❖ *Promote and use active groundwater recharge*
-

Earthquake

Mitigation Action Catalog

Personal Scale	Organizational Scale	Government Scale
Reduce the probability of hazard events: ❖ None Limit risk to people or structures: ❖ Locate outside of hazard area (off soft soils) ❖ Apply engineering solutions to reduce the hazard ❖ Retrofit structure (anchor house structure to foundation) ❖ Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances) ❖ Build to higher design Increase ability to respond to or be prepared for the hazard: ❖ Practice drop, cover, and hold ❖ Develop household mitigation plan, such as a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event ❖ Keep cash reserves for reconstruction ❖ Become informed on the hazard and risk reduction alternatives available. ❖ Develop a post-disaster action plan for your household	Reduce the probability of hazard events: ❖ None Limit risk to people or structures: ❖ Locate or relocate mission-critical functions outside hazard area ❖ Apply engineering solutions that minimize or eliminate the hazard ❖ Build redundancy for critical functions and facilities ❖ Retrofit critical buildings and areas housing mission-critical functions Increase ability to respond to or be prepared for hazard: ❖ Adopt higher standard for new construction; consider “performance-based design” when building new structures ❖ Keep cash reserves for reconstruction ❖ Inform your employees on the possible effects of earthquake and how to deal with them at your work facility.* ❖ Develop a continuity of operations plan	Reduce the probability of hazard events: ❖ None Limit risk to people or structures: ❖ Locate community lifelines or functions outside hazard area ❖ Apply engineering solutions that minimize or eliminate the hazard ❖ Harden infrastructure ❖ Provide redundancy for critical functions ❖ Adopt higher regulatory standards Increase ability to respond to or be prepared for hazard: ❖ Provide better hazard maps ❖ Provide technical information and guidance ❖ Enact tools to help manage development in hazard areas (e.g., tax incentives, information) ❖ Include retrofitting and replacement of critical system elements in capital improvement plan ❖ Develop strategy to take advantage of post-disaster opportunities ❖ Warehouse critical infrastructure components such as pipe, power line, and road repair materials ❖ Develop and adopt a continuity of operations plan

2025 Del Norte County Hazard Mitigation Plan

		❖ Initiate triggers guiding improvements (such as <50% substantial damage or improvements) ❖ Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities. ❖ Develop a post-disaster action plan that includes grant funding and debris removal components. ❖ Develop non-English and culturally sensitive educational materials.
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Nature-based opportunities

❖ *None identified*

Extreme Heat

Mitigation Action Catalog

Personal Scale	Organizational Scale	Government Scale
Reduce the probability of hazard events: ❖ Plant trees to create shade in urban areas ❖ Remove concrete and other hard surfaces and replace them with native vegetation Limit risk to people or structures: ❖ Insulate residential and non-residential structures to provide greater thermal efficiency ❖ Provide redundant power sources ❖ Get air conditioning installed ❖ Plant appropriate trees near home and power lines ("Right tree, right place" National Arbor Day Foundation Program) Increase ability to respond to or be prepared for hazard: ❖ Promote 72-hour self-sufficiency ❖ Obtain a NOAA weather radio ❖ Obtain an emergency generator or community microgrid	Reduce the probability of hazard events: ❖ Plant trees in urban areas experiencing urban heat island effects or with below average tree canopy coverage* ❖ Remove concrete and other hard surfaces and replace them with native vegetation Limit risk to people or structures: ❖ Relocate critical infrastructure (such as power lines) underground ❖ Reinforce or relocate critical infrastructure such as power lines meet resiliency expectations against all-hazard impacts ❖ Install tree wire ❖ Provide cooling centers for employees* ❖ Install "cool roofs" and "green roofs." Increase ability to respond to or be prepared for hazard: ❖ Create redundancy in power supply ❖ Equip facilities with a NOAA weather radio ❖ Equip vital facilities with emergency power sources	Reduce the probability of hazard events: ❖ Plant trees in urban areas experiencing urban heat island effects or with below average tree canopy coverage* ❖ Remove concrete and other hard surfaces and replace them with native vegetation Limit risk to people or structures: ❖ Harden infrastructure such as locating utilities underground ❖ Trim trees back from power lines ❖ Install "cool roofs," "green roofs," and other green infrastructure ❖ Use the best available technology to enhance warning systems for all severe weather events Increase ability to respond to or be prepared for hazard: ❖ Increase communication alternatives ❖ Enhance public awareness campaigns on actions to take during extreme heat events ❖ Coordinate severe weather warning capabilities and the dissemination of warning among agencies with the highest degree of capability ❖ Modify land use and environmental regulations to support vegetation management activities that

2025 Del Norte County Hazard Mitigation Plan

		improve reliability in utility corridors ❖ Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines ❖ Provide NOAA weather radios to the public ❖ Review and update heat response plan in light of climate change projections ❖ Promote programs that support community-scale microgrids ❖ Evaluate and revise, as needed, building codes to address and mitigate extreme heat impacts on residents ❖ Develop non-English and culturally sensitive educational materials.
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Nature-based opportunities

- ❖ *Green roofs can be up to 40 °F cooler than typical roofs and reduce community temperatures by up to 5 °F. They can reduce building air conditioning costs by up to 75 percent. Green roofs provide benefits up to \$14 more per square foot than traditional roofs*
- ❖ *Trees can lower surface temperatures by providing shade and through evapotranspiration, which can reduce peak local summer temperatures by 2 °F to 9° F. Shady areas can be between 20 °F and 45 °F cooler than sunny areas, providing safe resting places outside.*
- ❖ *The Planting of native plants—including along parking lots, streets, and in yards—can provide cooling effects. Vertical gardens, also referred to as green or living walls, involve planting on walls to provide shade for buildings. This helps to cool the building and surrounding area*
- ❖ *Convert built environments to natural environments such as forests, wetlands, and vegetation to aid in lowering temperatures. Natural environments provide more shade, moisture, and evaporation to help reduce temperatures. These systems sequester carbon, helping to minimize future warming*

Excessive Rain

Personal Scale	Organizational Scale	Government Scale
Reduce the probability of hazard events: ❖ None Limit risk to people or structures: ❖ Plant rain gardens to absorb excess water ❖ Remove concrete and other hard surfaces that encourage runoff; replace them with native vegetation ❖ Water-proof residential and non-residential structures ❖ Provide redundant power sources ❖ Plant appropriate trees near home and power lines ("Right tree, right place" National Arbor Day Foundation Program) Increase ability to respond to or be prepared for hazard: ❖ Promote 72-hour self-sufficiency ❖ Obtain a NOAA weather radio ❖ Obtain an emergency generator or community microgrid	Reduce the probability of hazard events: ❖ None Limit risk to people or structures: ❖ Plant rain gardens in commercial areas ❖ Remove concrete and other hard surfaces and replace them with native vegetation ❖ Relocate critical infrastructure (such as power lines) underground ❖ Reinforce or relocate critical infrastructure such as power lines meet resiliency expectations against all-hazard impacts Increase ability to respond to or be prepared for hazard: ❖ Create redundancy in power supply ❖ Equip facilities with a NOAA weather radio ❖ Equip vital facilities with emergency power sources	Reduce the probability of hazard events: ❖ None Limit risk to people or structures: ❖ Plant rain gardens in urban areas ❖ Remove concrete and other hard surfaces and replace them with native vegetation ❖ Harden infrastructure such as locating utilities underground ❖ Use the best available technology to enhance warning systems for all severe weather events Increase ability to respond to or be prepared for hazard: ❖ Enhance public awareness campaigns on actions to take during excessive rainfall events ❖ Coordinate severe weather warning capabilities and the dissemination of warning among agencies with the highest degree of capability ❖ Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors ❖ Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines ❖ Provide NOAA weather radios to the public

2025 Del Norte County Hazard Mitigation Plan

		❖ Develop non-English and culturally sensitive educational materials.
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Nature-based opportunities

❖ *None identified*

Extreme Wind

Mitigation Action Catalog

Personal Scale	Organizational Scale	Government Scale
Reduce the probability of hazard events: ❖ None Limit risk to people or structures: ❖ Contact municipality or utilities to trim or remove trees that could affect power lines. ❖ Plant appropriate trees near home and power lines ("Right tree, right place" National Arbor Day Foundation Program). Increase ability to respond to or be prepared for the hazard: ❖ Improve awareness of impending severe weather (e.g. obtain a NOAA weather radio). ❖ Promote 72-hour self-sufficiency.	Reduce the probability of hazard events: ❖ None Limit risk to people or structures: ❖ Locate or relocate mission-critical functions outside hazard area ❖ Apply engineering solutions that minimize or eliminate the hazard ❖ Build redundancy for critical functions and facilities ❖ Retrofit critical buildings and areas housing mission-critical functions Increase ability to respond to or be prepared for hazard: ❖ Adopt higher standard for new construction; consider "performance-based design" when building new structures ❖ Keep cash reserves for reconstruction ❖ Inform your employees on the possible effects of earthquake and how to deal with them at your work facility.* ❖ Develop a continuity of operations plan	Reduce the probability of hazard events: ❖ Increase tree plantings. ❖ Encourage installation of green roofs to provide shade and remove heat. ❖ Encourage the use of cool roofing products that reflect sunlight and heat away from a building. Limit risk to people or structures: ❖ Harden infrastructure such as locating utilities underground. ❖ Trimming trees back from power lines. ❖ Designate and strengthen critical road sections and bridges. ❖ Adopt ordinances that regulate the type and quantity of trees planted near utility lines. ❖ Relocate critical infrastructure, such as power lines, underground. ❖ Require minimum temperatures in housing/landlord codes. Increase ability to respond to or be prepared for hazard: ❖ Support programs such as "Tree Watch" that proactively manage problem areas by use of selective removal of

2025 Del Norte County Hazard Mitigation Plan

		hazardous trees, tree replacement, etc. ❖ Enforce building codes. ❖ Increase communication alternatives. ❖ Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors. ❖ Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines. ❖ Promote awareness and participation in alert systems. ❖ Provide NOAA weather radios to the public. ❖ Create/Enhance "mutual aid" agreements for response to all emergencies. ❖ Create/identify evacuation routes to be utilized during severe storm events. ❖ Develop debris management plans. ❖ Join "Storm-Ready" program. ❖ Provide early warning of impending severe storm events to identified critical or essential facilities. This would include facilities such as large employments centers, schools, hospitals. ❖ Promote emergency power supplies to private property.
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2025 Del Norte County Hazard Mitigation Plan

		❖ Improve, expand, or harden communications facilities and services. ❖ Recruit additional emergency personnel or use mutual aid agreements. ❖ Increase sheltering capabilities. ❖ Increase capability to respond to power outages and downed power lines. Establish partnerships with utility providers through proactive planning.
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Nature-based opportunities

❖ *None identified*

Flood

Mitigation Action Catalog

Personal Scale	Organizational Scale	Government Scale
Reduce the probability of hazard events: ❖ Clear storm drains and culverts ❖ Use green infrastructure Limit risk to people or structures: ❖ Locate outside of hazard area ❖ Elevate utilities above base flood elevation ❖ Use low-impact development techniques ❖ Raise structures above base flood elevation ❖ Elevate items within house above base flood elevation ❖ Build new homes above base flood elevation ❖ Flood-proof structures Increase ability to respond to or be prepared for hazard: ❖ Buy flood insurance ❖ Develop household plan, such as retrofit savings, communication with outside, 72-hour self-sufficiency during and after an event	Reduce the probability of hazard events: ❖ Clear storm drains and culverts ❖ Use low-impact development techniques Limit risk to people or structures: ❖ Locate community lifelines or functions outside hazard area ❖ Use low-impact development techniques ❖ Build redundancy for critical functions or retrofit critical buildings ❖ Provide flood-proofing when new critical infrastructure must be located in floodplains Increase ability to respond to or be prepared for hazard: ❖ Keep cash reserves for reconstruction ❖ Support and implement hazard disclosure for sale of property in risk zones. ❖ Solicit cost-sharing through partnerships with others on projects with multiple benefits.	Reduce the probability of hazard events: ❖ Maintain drainage system ❖ Institute low-impact development techniques on property ❖ Dredging, levee construction, and providing regional retention areas ❖ Structural flood control, levees, channelization, or revetments. ❖ Stormwater management regulations and master planning ❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff Limit risk to people or structures: ❖ Locate or relocate community lifelines outside of hazard area ❖ Acquire or relocate identified repetitive loss properties ❖ Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks. ❖ Adopt land development criteria such as planned unit developments, density transfers, clustering

2025 Del Norte County Hazard Mitigation Plan

		❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff ❖ Harden infrastructure, bridge replacement program ❖ Provide redundancy for critical functions and infrastructure ❖ Adopt regulatory standards such as freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non-conversion deed restrictions. ❖ Stormwater management regulations and master planning. ❖ Adopt “no-adverse impact” floodplain management policies that strive to not increase the flood risk on downstream communities. ❖ Expand the Stormwater Capture Parks Program to collect rainwater and urban runoff. ❖ Create Tree Canopy neighborhoods to reduce stormwater runoff by catching rainfall on branches and leaves and increasing evapotranspiration. Increase ability to respond to or be prepared for hazard: ❖ Produce better hazard maps ❖ Provide technical information and guidance ❖ Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information)
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2025 Del Norte County Hazard Mitigation Plan

		❖ Incorporate retrofitting or replacement of critical system elements in capital improvement plan ❖ Develop strategy to take advantage of post-disaster opportunities ❖ Warehouse critical infrastructure components ❖ Develop and adopt a continuity of operations plan ❖ Maintain and collect data to define vulnerability and potential impacts ❖ Train emergency responders ❖ Create an elevation inventory of structures in the floodplain ❖ Develop and implement a public information strategy ❖ Charge a hazard mitigation fee ❖ Integrate floodplain management policies into other planning mechanisms within the planning area. ❖ Consider the probable effects of climate change on the risk associated with the flood hazard ❖ Consider the residual risk associated with structural flood control in future land use decisions ❖ Enforce National Flood Insurance Program ❖ Adopt a Stormwater Management Master Plan ❖ Develop non-English and culturally sensitive educational materials
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Nature-based opportunities

- ❖ *Restore and reconnect floodplains that have been degraded by development and structural flood control.*
- ❖ *Use soft approaches for stream bank restoration and hardening (e.g., introducing large woody debris into a system).*
- ❖ *Set back levees on systems that rely on levee protection to allow the river channel to meander, which reduces erosion and scour potential.*

2025 Del Norte County Hazard Mitigation Plan

- ❖ *Acquire property within the floodplain, remove or relocate structures, and preserve these areas as open space in perpetuity.*
 - ❖ *Preserve floodplain storage capacity by limiting or prohibiting the use of fill in the floodplain.*
 - ❖ *Incorporate green infrastructure into stormwater management facilities*
 - ❖ *Protect and/or restore riparian buffers*
-

Landslide

Mitigation Action Catalog

Personal Scale	Organizational Scale	Government Scale
Reduce the probability of hazard events: ❖ Stabilize slope (dewater, armor toe) ❖ Reduce weight on top of slope ❖ Minimize vegetation removal and the addition of impervious surfaces. ❖ Apply engineering solutions that minimize/eliminate the hazard Limit risk to people or structures: ❖ Locate structures outside of hazard area (off unstable land and away from slide-run out area) ❖ Retrofit home Increase ability to respond to or be prepared for hazard: ❖ Institute warning system, and develop evacuation plan* ❖ Keep cash reserves for reconstruction ❖ Educate yourself on risk reduction techniques for landslide hazards	Reduce the probability of hazard events: ❖ Stabilize slope (dewater, armor toe) ❖ Reduce weight on top of slope ❖ Apply engineering solutions that minimize/eliminate the hazard Limit risk to people or structures: ❖ Locate structures outside of hazard area (off unstable land and away from slide-run out area) ❖ Retrofit at-risk facilities Increase ability to respond to or be prepared for hazard: ❖ Institute warning system, and develop evacuation plan* ❖ Keep cash reserves for reconstruction ❖ Develop a continuity of operations plan ❖ Educate employees on the potential vulnerability to landslide hazards and emergency response protocol.	Reduce the probability of hazard events: ❖ Stabilize slope (dewater, armor toe) ❖ Reduce weight on top of slope ❖ Apply engineering solutions that minimize/eliminate the hazard Limit risk to people or structures: ❖ Acquire properties in high-risk landslide areas. ❖ Adopt land use policies that prohibit the placement of habitable structures in high-risk landslide areas. ❖ Adopt higher regulatory standards for new development within unstable slope areas. ❖ Armor/retrofit critical infrastructure against landslides. Increase ability to respond to or be prepared for hazard: ❖ Produce better hazard maps ❖ Provide technical information and guidance ❖ Enact tools to help manage development in hazard areas: better land controls, tax incentives, information ❖ Develop strategy to take advantage of post-disaster opportunities

2025 Del Norte County Hazard Mitigation Plan

		❖ Warehouse critical infrastructure components ❖ Develop and adopt a continuity of operations plan ❖ Educate the public on the landslide hazard and appropriate risk reduction alternatives ❖ Develop non-English and culturally sensitive educational materials
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Nature-based opportunities

- ❖ *Replace or restore native vegetation known to stabilize steep slope areas.*
 - ❖ *Soil bioengineering can be used to mitigate risk in larger areas that have a potential for shallow, slow-moving landslides or areas abandoned after past landslides that show signs of reactivation and have a high landslide hazard potential*
 - ❖ *Hybrid solutions refer to conventional engineering solutions that are combined with nature-based solutions using appropriate vegetation.*
-

Tsunami

Mitigation Action Catalog

Personal Scale	Organizational Scale	Government Scale
Reduce the probability of hazard events: ❖ None Limit risk to people or structures: ❖ Locate outside of hazard area ❖ Apply personal property mitigation techniques to your home such as anchoring your foundation and foundation openings to allow flow through Increase ability to respond to or be prepared for hazard: ❖ Develop and practice a household evacuation plan ❖ Become educated about the risk exposure from the tsunami hazard and ways to minimize that risk ❖ Understand tsunami warning signs and signals	Reduce the probability of hazard events: ❖ Implement tsunami construction measures at a project level, including elevated living spaces and debris deflection structures Limit risk to people or structures: ❖ Locate structure or mission critical functions outside of hazard area whenever possible ❖ Mitigate property for the impacts of tsunami ❖ Construct vertical evacuation shelters Increase ability to respond to or be prepared for hazard: ❖ Develop and practice a corporate response and evacuation plan ❖ Educate employees on the risk exposure from the tsunami hazard and ways to minimize that risk	Reduce the probability of hazard events: ❖ Build wave abatement structures (e.g., sea walls and the “jacks- looking structures designed by the Japanese) Limit risk to people or structures: ❖ Locate structure or functions outside of hazard area whenever possible ❖ Harden infrastructure for tsunami impacts ❖ Relocate identified critical facilities located in tsunami high hazard areas ❖ Adopt higher regulatory standards that will provide higher levels of protection to structures built in a tsunami inundation area ❖ Use tsunami mapping and land use planning to guide development away from high-risk areas ❖ Construct vertical evacuation shelters Increase ability to respond to or be prepared for hazard: ❖ Use probabilistic tsunami mapping and land use guidance from the State ❖ Provide incentives to guide development away from hazard areas

2025 Del Norte County Hazard Mitigation Plan

		❖ Improve the tsunami warning and response system ❖ Provide residents with updated tsunami hazard and inundation maps for the coast and vulnerable in-land lakes ❖ Join NOAA's Tsunami Ready program ❖ Develop and communicate evacuation time products and routes ❖ Enhance the public information program to include risk reduction options for the tsunami hazard ❖ Develop products useful for tsunami mitigation and recovery ❖ Utilize multi-hazard mitigation strategies that address tsunami hazards and sea-level rise from global climate change ❖ Provide tsunami products useful for the maritime industry
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Nature-based opportunities

- ❖ *Restore wetlands, mangroves, marshes, and oyster reefs, and install living shorelines to help reduce wave impacts*
- ❖ *Preserve/restore tidal marshes*
- ❖ *Establish living shorelines (plants and natural elements designed to stabilize and protect coastlines) to prevent erosion*
- ❖ *Incentivize voluntary retreat from coastal hazard areas*

Wildfire

Mitigation Action Catalog

Personal Scale	Organizational Scale	Government Scale
Reduce the probability of hazard events: ❖ Clear potential fuels on property such as dry overgrown underbrush and diseased trees Limit risk to people or structures: ❖ Create and maintain defensible space around structures ❖ Locate outside of hazard area ❖ Mow regularly ❖ Create and maintain defensible space around structures and provide water on site ❖ Use fire-retardant building materials ❖ Create defensible spaces around home Increase ability to respond to or be prepared for hazard: ❖ Employ techniques from the National Fire Protection Association's Firewise Communities program to safeguard home ❖ Identify alternative water supplies for fire fighting ❖ Install/replace roofing material with non-combustible roofing materials	Reduce the probability of hazard events: ❖ Clear potential fuels on property such as dry underbrush and diseased trees Limit risk to people or structures: ❖ Create and maintain defensible space around structures and infrastructure ❖ Locate outside of hazard area ❖ Create and maintain defensible space around structures and infrastructure and provide water on site ❖ Use fire-retardant building materials ❖ Use fire-resistant plantings in buffer areas of high wildland/urban interface fire threat. Increase ability to respond to or be prepared for hazard: ❖ Support Firewise community initiatives ❖ Create /establish stored water supplies to be utilized for firefighting	Reduce the probability of hazard events: ❖ Clear potential fuels on property such as dry underbrush and diseased trees ❖ Implement best management practices on public lands. ❖ Remove invasive non-native hazardous fuels in riparian areas and restore native habitat Limit risk to people or structures: ❖ Create and maintain defensible space around structures and infrastructure ❖ Locate outside of hazard area ❖ Enhance building code to include use of fire resistant materials in high hazard area. ❖ Ensure compliance with State Minimum Fire Safe Regulations ❖ Create and maintain defensible space around structures and infrastructure ❖ Use fire-retardant building materials ❖ Use fire-resistant plantings in buffer areas of high

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		wildland/urban interface fire threat ❖ Consider higher regulatory standards (such as Class A roofing) ❖ Establish biomass reclamation activities Increase ability to respond to or be prepared for hazard: ❖ More public outreach and education efforts ❖ Possible weapons of mass destruction funds available to enhance fire capability in high-risk areas ❖ Identify fire response and alternative evacuation routes ❖ Seek alternative water supplies ❖ Manage fuel load through thinning and brush removal ❖ Use academia to study impacts/solutions to wildland/urban interface fire risk ❖ Establish/maintain mutual aid agreements between fire service agencies. ❖ Create/implement fire plans ❖ Consider the probable impacts of climate change on the risk associated with the wildland/urban interface fire hazard in future land use decisions ❖ Develop non-English and culturally sensitive educational materials
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Nature-based opportunities

- ❖ *Manage invasive species (i.e., Pampas Grass) that are susceptible to increased wildfire risk.*
- ❖ *Create riparian corridors in wildfire hazard areas as fire breaks*
- ❖ *Incorporate nature-based wildfire risk reduction buffers into existing ecosystem-friendly land uses (e.g., green space, trails, or community parklands)*
- ❖ *Implement and fund ecological thinning and prescribed fire and cultural fire and, where appropriate, manage wildfire for resource benefit*

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- ❖ *Fund and implement ecological restoration programs to convert exotic grasslands to native scrub and chaparral and control invasive species*
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