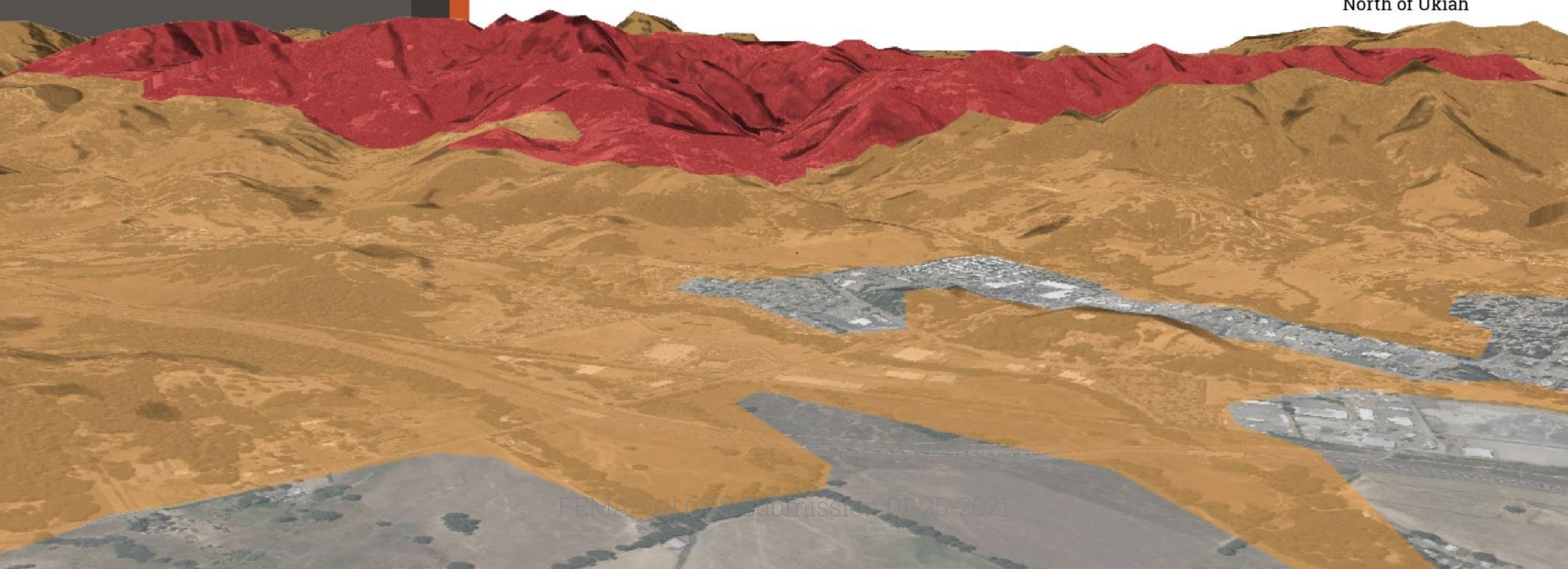
MENDOCINO COUNTY

MULTI-JURISDICTIONAL
HAZARD MITIGATION PLAN

MENDOCINO COUNTY EXECUTIVE OFFICE
OFFICE OF RECOVERY AND
OFFICE OF EMERGENCY SERVICES
951 LOW GAP ROAD
UKIAH, CA 95482

DEPICTED BELOW:
Composite Wildfire Layer North of Ukiah



Mendocino County

Multi-Jurisdiction Hazard Mitigation Plan

Volume 1

Planning-Area-Wide Elements

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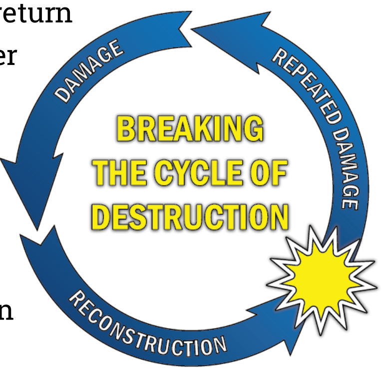
Executive Summary

MENDOCINO COUNTY
MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

Mendocino County prepared this hazard mitigation plan to guide County and City Officials and School District Administrators in protecting the people and property within the County from the effects of natural disasters and hazard events. This plan demonstrates Mendocino County's commitment to reducing risk from natural hazards through mitigation and serves as a tool to direct County resources to achieve optimum results with available administrative, technical, and financial resources.

The term **"hazard mitigation"** refers to actions or strategies that can reduce or eliminate long-term risks caused by natural disasters. Mitigation activities can be developed, planned, and implemented before or after a disaster occurs. After disasters, repairs and reconstruction often are completed in such a way as to simply restore damaged property to pre-disaster conditions. These efforts may return property and infrastructure to "the norm", but the replication of pre-disaster conditions may result in a repetitive cycle of damage and reconstruction. Hazard mitigation planning in Mendocino County can break this repetitive cycle by reducing vulnerability to hazards through smart construction and proper planning of future development and critical infrastructure. Hazard mitigation activities can be conducted through a wide variety of mitigation strategies, such as construction of regional flood control projects or implementing fuel reduction around buildings within high wildfire risk areas.



What is a hazard mitigation plan?

This hazard mitigation plan provides an explanation of prevalent hazards within the County. Is also describes how hazards may affect the County and participating jurisdictions differently based upon various relationships to natural hazards. This plan also identifies risks to vulnerable assets, both people and property. Most importantly, the mitigation strategy presented in this plan responds to the identified vulnerabilities within each community and provides prescriptions or actions to achieve the greatest risk reduction based upon available resources. The County and participating jurisdictions intend to save lives, reduce injuries, reduce property damage, and protect natural resources for future generations through mitigation activities.

Why have a hazard mitigation plan?

The passage of the Disaster Mitigation Act in 2000 (DMA 2000) requires proactive pre-disaster planning as a condition of receiving certain federal financial assistance under the Robert T. Stafford Act. DMA 2000 encourages state and local authorities to work together on pre-disaster planning to assist local governments to accurately assess mitigation needs, resulting in faster allocation of funding and more cost-effective risk reduction projects under FEMA's Hazard Mitigation Assistance program. The purpose of this Multi-jurisdictional Hazard Mitigation Plan (MJHMP) is twofold. First, it provides the County and participating jurisdictions continued access to grant funding from FEMA to conduct hazard mitigation activities for participating jurisdictions. Secondly, it provides resources for residents wishing to conduct hazard mitigation efforts by identifying areas of extreme risk and providing financial and technical mitigation resources based upon current gaps.

Why is the plan updated so often?

As a DMA 2000 requirement, the plan must be updated every five years to remain in compliance with federal mitigation grant conditions. Federal regulations require hazard mitigation plans to include a plan for monitoring, evaluating, and updating the hazard mitigation plan. An update process provides an opportunity to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies over time. Grant compliance is contingent on meeting the plan update requirements that are contained in the Code of Federal Regulations (CFRs). Jurisdictions that allow a plan to expire are not able to pursue funding under the Robert T. Stafford Act.

Participating Jurisdictions

The Mendocino County MJHMP has multiple participating jurisdictions and geographically covers the entire area within Mendocino County (hereinafter referred to as the "planning area"). A planning partnership was formed to develop and steer content in this Plan. This partnership consists of Mendocino County stakeholders and participating jurisdictions who have worked together to create the goals, objectives, mitigation strategies, and implementation methods to reduce risk. Any local government or non-profit agency with the ability to regulate building or infrastructure development or maintenance may participate in the planning process. However, to obtain FEMA approval, each of the local jurisdictions must meet all FEMA planning requirements outline in federal regulations at 44 CFR § 201.6 *et seq*. A list of jurisdictions that have elected to participate in this MJHMP can be found in Table 2-1.

Plan Development and Update Methods

Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies identified. This plan documents the hazard mitigation planning process the County and participating jurisdictions used to increase natural hazard resiliency in the community. Mendocino County and all participating jurisdictions followed the recommended FEMA four-step process to develop this 2020 updated plan. This update included a reorganization of planning partners to provide clear delineation of jurisdiction information, development of a new risk assessment, revaluation of goals and objectives, development of new mitigation actions, new enhancements for implementing mitigation actions, updates to all sections of the 2014 plan, and a new website for stakeholder involvement and public information.

Risk Assessment

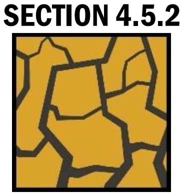
The risk assessment measures the potential loss of life, personal injury, economic injury, and property or infrastructure damage resulting from natural hazards in order to determine vulnerability. For this update, the risk assessment utilized new data and technologies that have become available since 2014. The County and participating jurisdictions used risk assessment information to rank risks and to gauge the potential impacts of each hazard of concern in the Operational Area. The risk assessment included:

- Hazard identification and profiling,
- Assessment of the impact of hazards on physical, social, and economic assets,
- Identification of particular areas of vulnerability,
- Additional impacts of each hazard due to climate change, and
- Estimates of the cost of potential damage.

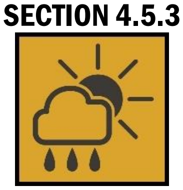
The following natural hazard threats were identified and profiled as County priority hazards:

Dam Failure
SECTION 4.5.1

Drought
SECTION 4.5.2



Climate Change
SECTION 4.5.3

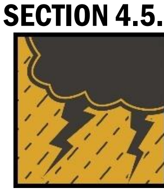


Earthquake
SECTION 4.5.4

Pandemic
SECTION 4.5.5

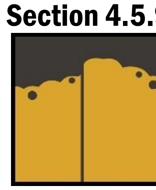
Flood
SECTION 4.5.6

Severe Weather
SECTION 4.5.7

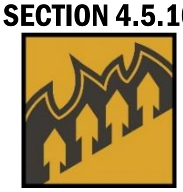


Slope Failure
SECTION 4.5.8

Soil
Section 4.5.9



Wildfire
SECTION 4.5.10



Participating jurisdictions also individually assessed risks applicable to their jurisdiction. Many participating jurisdictions identified fewer than the County-identified hazards. Those jurisdiction-specific profiles are included in Volume 2 of this MJHMP.

Hazard Exposure and Damage Estimation

In Mendocino County, earthquakes, flooding, slope failure, dam failure, sea-level rise, naturally occurring asbestos, and wildfire have known geographic extents and corresponding spatial information, which make exposure and damage estimation possible. In order to describe vulnerability for each hazard, it is important to understand the total population and total assets at risk. This provides the estimated damage and losses expected during a "worst case scenario" event for each hazard.

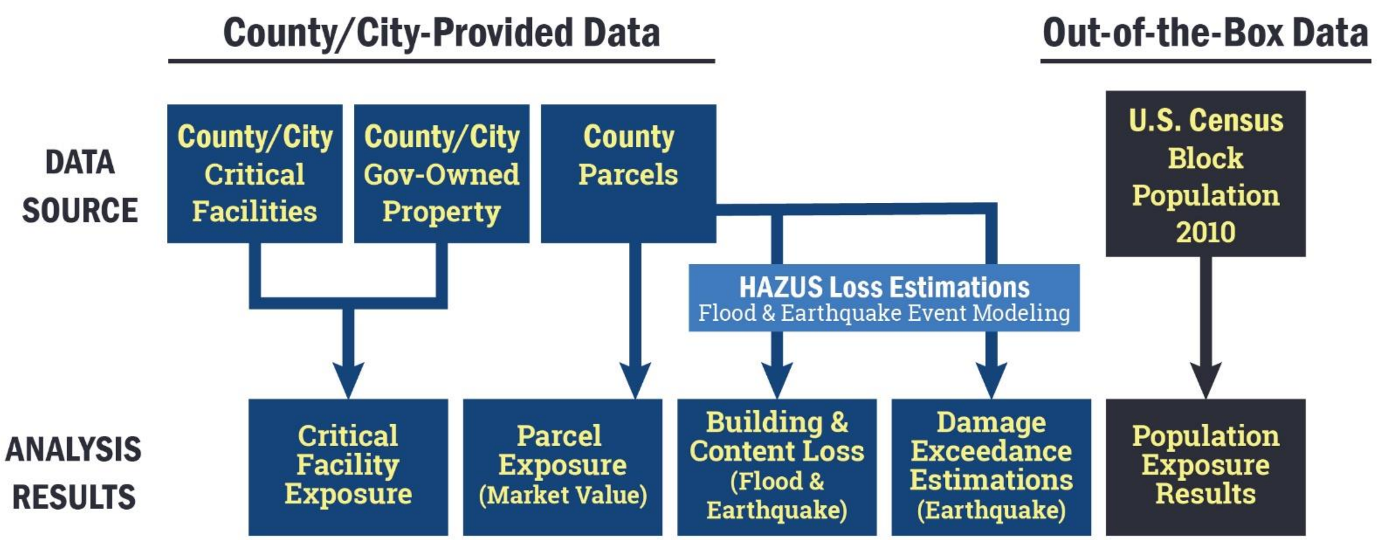


Figure ES 1: Risk Assessment Methodology Summary

Population and Asset Exposure

The total counts of parcels, people, facilities, assets, and the sum of values within the planning area which could be exposed to a hazard event is referred to as the "exposure" in this plan. A natural hazards overlay was developed to reflect the combination of many known natural hazard spatial footprints. The spatial overlay method enables summarization of building values, parcel counts, population exposure, and critical facility exposure within a hazard's geographic extents (see Figure ES 2 exposure example). This method has been used to evaluate exposure for earthquakes, landslides, flooding, dam inundation, and wildfire. For a more detailed explanation on Risk Assessment Methods, see Section 4.4 and Appendix A at A1-3.

Figure ES 2: Exposure explanation graphic

Damage Assessments

FEMA's Hazus software was used to conduct a detailed loss estimation for flood and earthquake. Hazus is a nationally-applicable, standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. Hazus uses Geographic Information Systems (GIS) technology to estimate physical, economic, and social impacts of disasters. For this planning effort, Hazus was used to generate damage estimations due to possible earthquakes and flooding. The estimated damage and losses provided by the Hazus Software is a "worst case scenario" event and provides the ability to understand possible widescale damage to buildings and facilities.

In the hypothetical map in Figure ES 3, even though both structures are exposed to flooding, it is predicted that the structure with a first floor height below the depth of flooding will receive significantly more damage than the structure with a first floor height above the expected water depth. For a more detailed explanation on risk Assessment Methods, see Section 4.4 and Appendix A at A1-3.

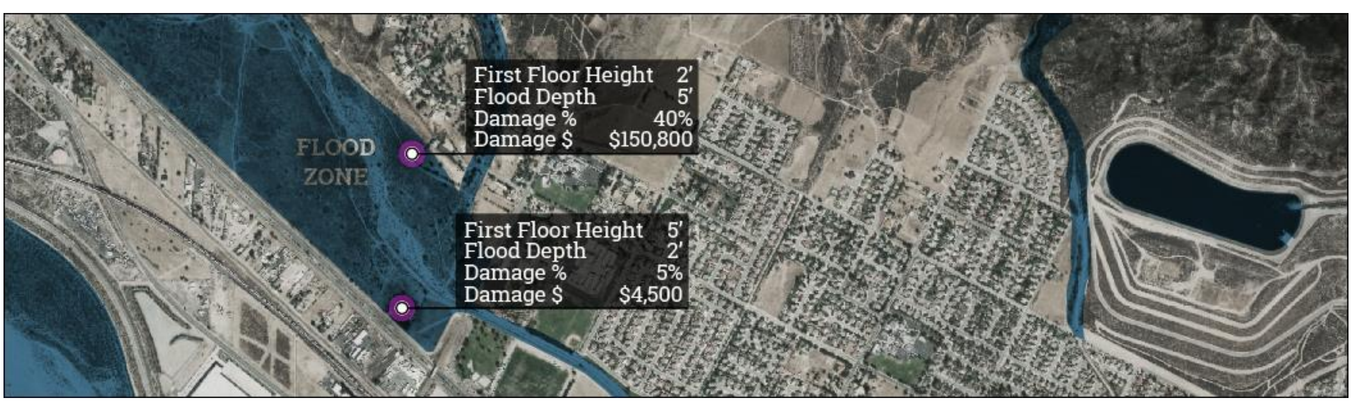
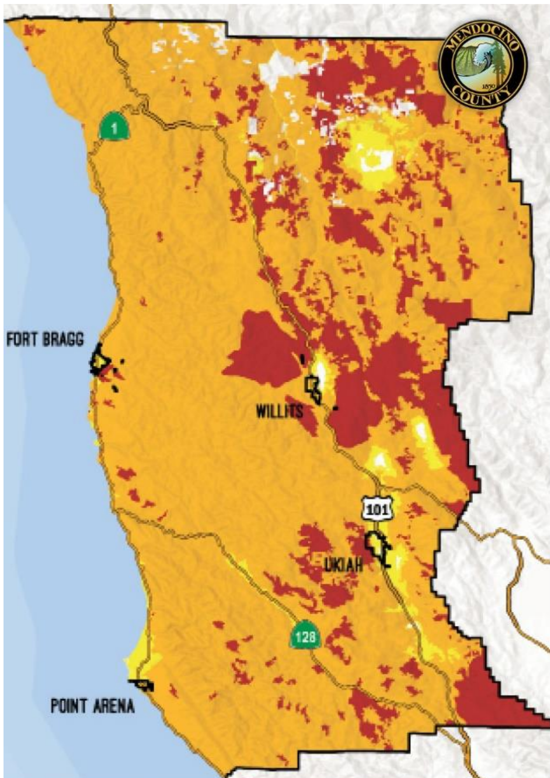


Figure ES 3: Hazus Damage Estimation Example

Summary of Vulnerable Assets: People, Property Value, and Infrastructure

Hazards with spatial boundaries can be analyzed to demonstrate the amount of population, critical infrastructure, and parcels within each hazard's footprint. At-risk populations, critical infrastructure, improved parcels, and loss results for each hazard category are provided in bar chart summary tables throughout this plan to evaluate the percentage of assets exposed to different types of hazards. The side-by-side comparison allows officials to evaluate the impacts of potential hazards to determine toward what hazards to direct energy and financial resource for mitigation activities. For detailed vulnerability assessment information, see the individual hazard specific sections presented in Section 4.5. This Executive Summary provides map summaries for the profiled hazards in Figure ES 4 through Figure ES 7.



WILDFIRE RISK EXPOSURE

MODERATE
HIGH
VERY HIGH

CAL FIRE, CPUC

HAZARD EXPOSURE SUMMARIES*

POPULATION
COUNT OF PERSONS
42,883 73%

PARCEL
COUNT
17,668 72%

PARCEL VALUE
SUM OF IMPROVEMENT
$3,123,610,383 69%

SUM OF CONTENT
$1,711,753,135 64%

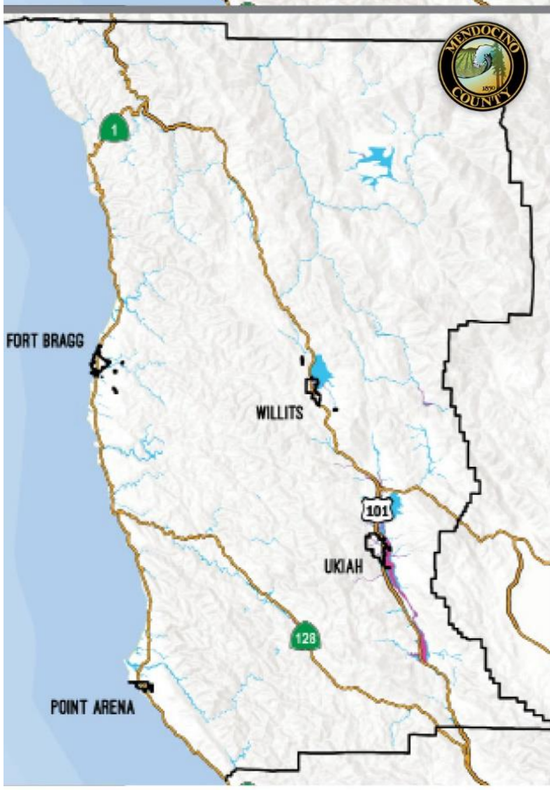
CRITICAL INFRASTRUCTURE
POINT COUNT

Essential Facilities	47	61%
High Potential Loss	184	39%
Transportation & Lifeline	241	70%

LINEAR MILEAGE

Transportation & Lifeline	17,129	93%

*Exposure summaries include high and very high wildfire risk. Hazard data sources: Cal Fire, CPUC.



FEMA FLOOD RISK EXPOSURE

100-YR
100-YR COASTAL
100-YR FLOODWAY
500-YR

FEMA

HAZARD EXPOSURE SUMMARIES*

POPULATION
COUNT OF PERSONS
7,005 12%

PARCEL
COUNT
1,236 5%

PARCEL VALUE
SUM OF IMPROVEMENT
$275,508,413 6%

SUM OF CONTENT
$223,710,644 8%

CRITICAL INFRASTRUCTURE
POINT COUNT

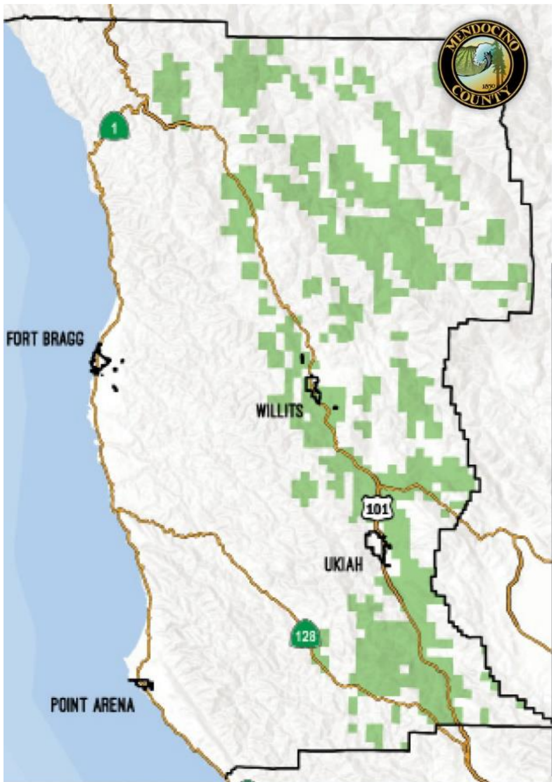
Essential Facilities	4	5%
High Potential Loss	33	7%
Transportation & Lifeline	125	36%

LINEAR MILEAGE

Transportation & Lifeline	614	3%

*Exposure summaries include 100yr, 100yr coast, and 500yr flood zones. Hazard data sources: FEMA.

Figure ES 4: Wildfire and FEMA Flood Risk Snapshots



NATURALLY OCCURRING ASBESTOS

MCAQMD

NATURALLY OCCURRING ASBESTOS

HAZARD EXPOSURE SUMMARIES*

POPULATION
COUNT OF PERSONS
20,571 35%

PARCEL
COUNT
7,721 32%

PARCEL VALUE
SUM OF IMPROVEMENT
$1,444,250,947 32%

SUM OF CONTENT
$909,637,874 34%

CRITICAL INFRASTRUCTURE
POINT COUNT

Essential Facilities	20	26%
High Potential Loss	116	24%
Transportation & Lifeline	109	32%

LINEAR MILEAGE

Transportation & Lifeline	4,154	22%

*Exposure summaries include asbestos risk areas. Hazard data sources: MCAQMD.

DAM INUNDATION EXPOSURE

CGS

INUNDATION ZONE

HAZARD EXPOSURE SUMMARIES*

POPULATION
COUNT OF PERSONS
6,268 11%

PARCEL
COUNT
1,643 7%

PARCEL VALUE
SUM OF IMPROVEMENT
$425,701,155 9%

SUM OF CONTENT
$346,094,215 13%

CRITICAL INFRASTRUCTURE
POINT COUNT

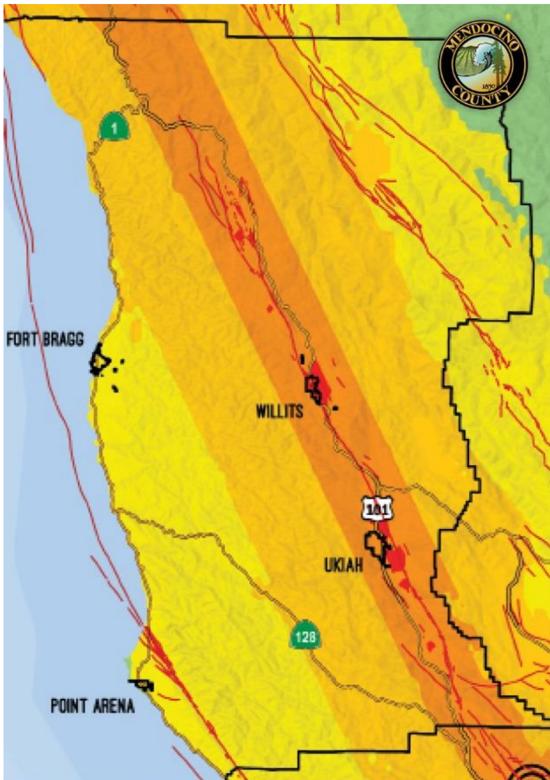
Essential Facilities	6	8%
High Potential Loss	72	15%
Transportation & Lifeline	70	20%

LINEAR MILEAGE

Transportation & Lifeline	436	2%

*Exposure summaries include dam inundatino zones. Hazard data sources: CGS.

Figure ES 5: Naturally Occurring Asbestos and Dam Inundation Snapshot



M7.4 MAACAMA GARBERVILLE

III	IV	V	VI	VII	VIII	IX	X
WEAK	LIGHT	MODERATE	STRONG	VERY STRONG	SEVERE	VIOLENT	EXTREME

MMI

USGS

HAZARD EXPOSURE SUMMARIES*

POPULATION
COUNT OF PERSONS
58,870 100%

PARCEL
COUNT
24,357 100%

PARCEL VALUE
SUM OF IMPROVEMENT
$4,542,077,319 100%
SUM OF CONTENT
$2,692,625,869 100%

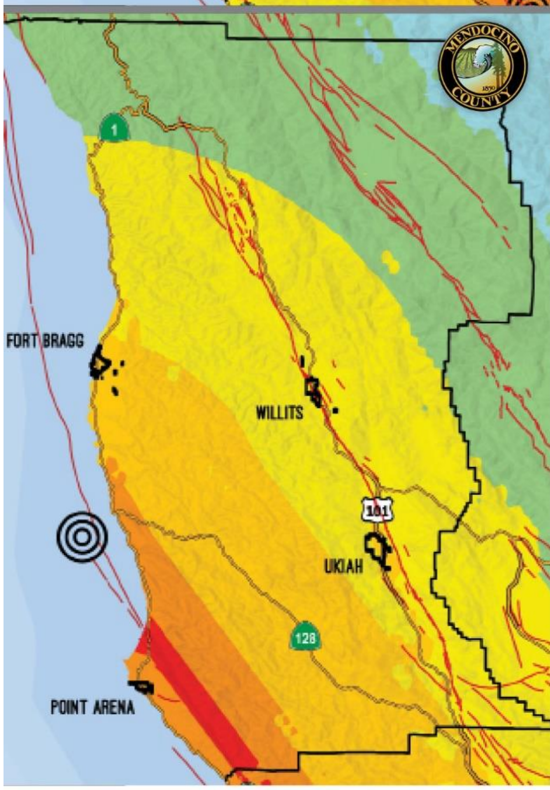
CRITICAL INFRASTRUCTURE
POINT COUNT

Essential Facilities	76	99%
High Potential Loss	472	100%
Transportation & Lifeline	343	100%

LINEAR MILEAGE

Transportation & Lifeline	18,122	98%

*Exposure summaries include violent, severe, very strong, and strong MMI shake areas. Hazard data sources: USGS.



M7.8 N. SAN ANDREAS - N. COAST - PENINSULA - SC MTN

III	IV	V	VI	VII	VIII	IX	X
WEAK	LIGHT	MODERATE	STRONG	VERY STRONG	SEVERE	VIOLENT	EXTREME

MMI

USGS

HAZARD EXPOSURE SUMMARIES*

POPULATION
COUNT OF PERSONS
55,319 94%

PARCEL
COUNT
22,376 92%

PARCEL VALUE
SUM OF IMPROVEMENT
$4,367,628,069 96%
SUM OF CONTENT
$2,587,544,399 96%

CRITICAL INFRASTRUCTURE
POINT COUNT

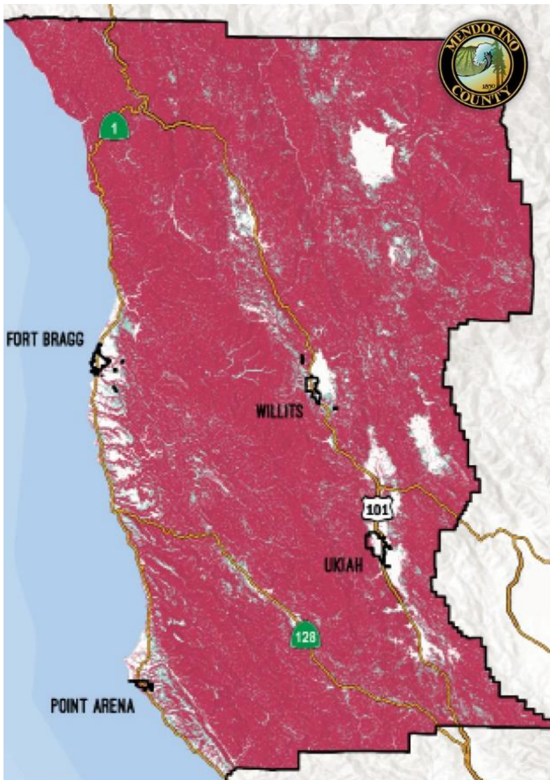
Essential Facilities	64	83%
High Potential Loss	430	91%
Transportation & Lifeline	292	85%

LINEAR MILEAGE

Transportation & Lifeline	13,559	73%

*Exposure summaries include violent, severe, very strong, and strong MMI shake areas. Hazard data sources: USGS.

Figure ES 6: Maacama Garberville and N. San Andreas – N. Coast – Peninsula – SC MTN Snapshot



LANDSLIDE RISK EXPOSURE

LOW
MODERATE
HIGH
CGS

HAZARD EXPOSURE SUMMARIES*

POPULATION
COUNT OF PERSONS
28,500 48%

PARCEL
COUNT
7,627 31%

PARCEL VALUE
SUM OF IMPROVEMENT
$1,246,794,278 27%
SUM OF CONTENT
$715,530,178 27%

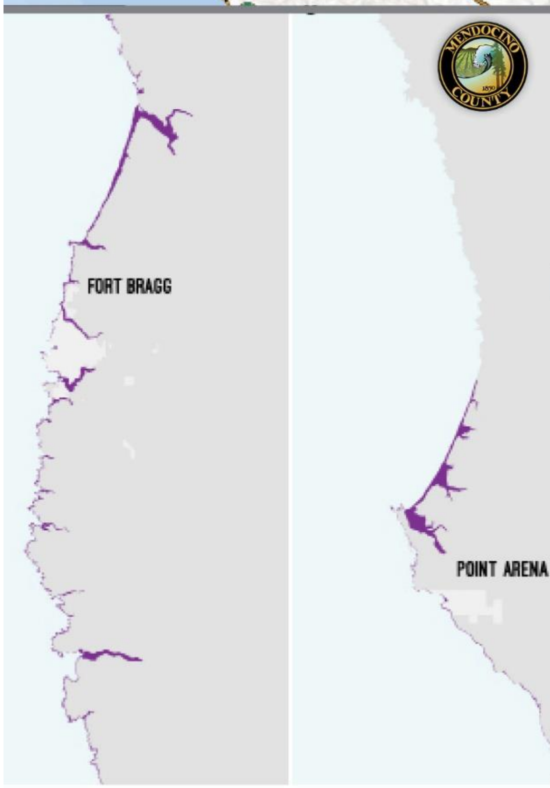
CRITICAL INFRASTRUCTURE
POINT COUNT

Essential Facilities	5	6%
High Potential Loss	68	14%
Transportation & Lifeline	82	24%

LINEAR MILEAGE

Transportation & Lifeline	11,877	64%

*Exposure summaries include high landslide risk areas. Hazard data sources: CGS.



TSUNAMI RUN-UP AREA

TSUNAMI RUN-UP
CGS

HAZARD EXPOSURE SUMMARIES*

POPULATION
COUNT OF PERSONS
264 0%

PARCEL
COUNT
52 0%

PARCEL VALUE
SUM OF IMPROVEMENT
$17,276,416 0%
SUM OF CONTENT
$14,053,136 1%

CRITICAL INFRASTRUCTURE
POINT COUNT

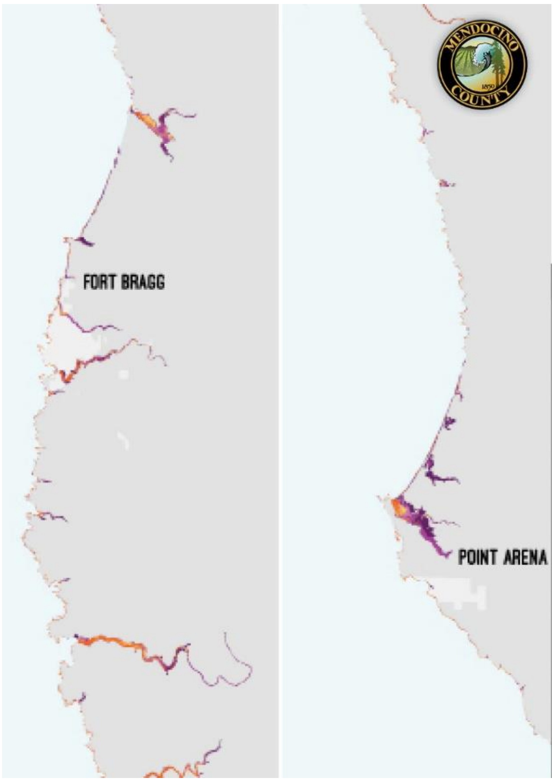
Essential Facilities	0	0%
High Potential Loss	1	0%
Transportation & Lifeline	6	2%

LINEAR MILEAGE

Transportation & Lifeline	17	0%

*Exposure summaries include tsunami runup areas. Hazard data sources: CGS.

Figure ES 7: Landslide and Tsunami Run-up Area Snapshot



SEA LEVEL RISE

AMOUNT OF RISE	
EXTREME	INTERMEDIATE
HIGH	INTERMEDIATE LOW
INTERMEDIATE HIGH	LOW

NOAA - CLASSIFIED BY SCENARIOS LOW RISE TO EXTREME RISE

HAZARD EXPOSURE SUMMARIES*

POPULATION

COUNT OF PERSONS

423 1%

PARCEL

COUNT

45 0%

PARCEL VALUE

SUM OF IMPROVEMENT

$11,766,672 0%

SUM OF CONTENT

$11,546,374 0%

CRITICAL INFRASTRUCTURE

POINT COUNT

Essential Facilities	0	0%
High Potential Loss	2	0%
Transportation & Lifeline	5	1%

LINEAR MILEAGE

Transportation & Lifeline	23	0%

*Exposure summaries include all potential sea level rise amounts. Hazard data sources: NOAA - Classified by scenarios low rise to extreme rise.

Figure ES 8: Sea-level rise Snapshot

Mitigation Goals

The Steering Committee reviewed and updated the goals from the 2014 Mendocino County Hazard Mitigation Plan. The following updated goals guided the Steering Committee and planning partners in selecting actions contained in this plan update:

Goal 1: Reduce loss of life, injuries, and structural and economic damage through the use of planning, regulations, and preventative measures.

Goal 2: Reduce loss of life, injuries, and structural and economic damage through the use of property protection measures.

Goal 3: Reduce loss of life, injuries, and structural and economic damage through the use of public education and awareness programs.

Goal 4: Reduce loss of life, injuries, and structural and economic damage through the use of natural resource/ systems protection.

Goal 5: Reduce loss of life, injuries, and structural and economic damage through the use of structural/ infrastructure projects.

Goal 6: Reduce loss of life, injuries, and structural and economic damage through the use of emergency services in relation to natural hazards.

Mitigation Strategy

The mitigation strategies and activities designed to reduce or eliminate losses resulting from natural hazards are the centerpiece of the mitigation planning process. Through the mitigation actions, participating jurisdictions will become more resilient to disasters. Actions identified in this plan may or may not be geared toward grant funding under HMA. Rather, the focus was the initiatives' effectiveness in achieving the goals of the plan within each jurisdiction's capabilities.

Participating jurisdictions individually selected a range of appropriate mitigation actions to work toward achieving the MJHMP's goals, compiled in Volume 2 jurisdictional annexes to the HMP. In addition, the

Steering Committee and participating jurisdictions identified countywide actions benefiting the whole partnership, as listed in Volume 1. These initiatives also are summarized in the following tables.

County Wide Priority Mitigation Actions

Mitigation No.	Hazard Type	Year	Title/Description
ma-AH-MC-134	All Hazard	2008	Develop a public outreach program that distributes consistent hazard mitigation content and mitigation tips for property owners. For example, wildfire outreach should focus on necessary ignition resistance and home hardening features - including defensible space - for county residents.
ma-AH-MC-205	All Hazard	2020	Develop an education program to inform both existing Class K structure owners and applicants of building permits for Class K structures of the inherent risks of such structures to all natural hazards
ma-AH-MC-299	All Hazard	2020	Construct evacuation routes as needed to ensure multiple egress routes from neighborhoods.
ma-CC-MC-221	Climate Change	2020	Offer agricultural disaster training and networking opportunities for farmers and agricultural regulatory agencies.
ma-CC-MC-298	Climate Change	2020	Develop public outreach to educate the public on household practices that can lessen the impacts of climate change.
ma-DF-MC-126	Dam Failure	2014	Develop a public outreach program that informs property owners located in the dam or levee inundation areas about voluntary flood insurance.
ma-DF-MC-199	Dam Failure	2020	Design and implement County-wide warning system program, with all other HMP participating jurisdictions as secondary participants, to warn everyone within a dam inundation zone of impending dam failure
ma-DR-MC-196	Drought	2020	Develop a public education campaign to encourage water conservation during drought.
ma-DR-MC-197	Drought	2020	Amend land use codes to incorporate regulations that encourage and incentive water savings for development.
ma-DR-MC-198	Drought	2020	Replace existing turf grass and water intensive landscaping with drought resistant landscaping

Mitigation No.	Hazard Type	Year	Title/Description
ma-EQ-MC-127	Earthquake	2014	Seismically retrofit or replace County and local ramps and bridges that are categorized as structurally deficient by Caltrans, identified as needing replacement by the County, are located in an high ground shaking areas, and/or are necessary for first responders to use during and/or immediate after a disaster or emergency.
ma-EQ-MC-200	Earthquake	2020	Encourage privately owned critical facilities (e.g. churches, hotels, other gathering facilities) to evaluate the ability of the buildings to withstand earthquakes and to address any deficiencies identified.
ma-EQ-MC-201	Earthquake	2020	Retrofit / Harden County-owned critical facilities (including water & sewer infrastructure) and buildings and their ability to withstand earthquakes.
ma-EQ-MC-202	Earthquake	2020	Retrofit non-compliant suspended ceilings in County buildings. This includes Non-Structural Suspended Gypsum Dry-Wall & Cement Plaster Ceilings built 1950-1974.
ma-EQ-MC-203	Earthquake	2020	Install seismic gas shut-off valves on County buildings to prevent the flow of gas into buildings during a seismic event
ma-WS-MC-118	Extreme Weather	2014	Manage vegetation in areas within and adjacent to rights-of-way and in close proximity to critical facilities in order to reduce the risk of tree failure and property damage and avoid creation of wind acceleration corridors within vegetated areas.
ma-EW-MC-207	Extreme Weather	2020	Routinely inspect storm water channels for vegetation build up or encroachment, trash and debris, silt and gravel build up, and erosion or bank failure.
ma-EW-MC-208	Extreme Weather	2020	Perform a feasibility study for flood proofing options and analyze the drainage systems County-wide.
ma-FL-MC-125	Flood	2014	Acquire, relocate, or elevate residential structures, in particular those that have been identified as Repetitive Loss (RL) properties that are located within the 100-year floodplain.
ma-FL-MC-210	Flood	2020	Elevate and retrofit bridges and culverts to allow proper stormwater / 100-YR flows.
ma-FL-MC-213	Flood	2020	Draft a Floodplain Management Plan to address County-wide flooding and identify specific mitigation projects to reduce the magnitude, frequency, and severity of flooding in Mendocino County.
ma-FL-MC-215	Flood	2020	Adopt higher regulatory standards (including but not limited to freeboard, comp storage, lower substantial damage thresholds, setback and fill restrictions) as means to reduce future flood risk and support a no-adverse-impact (NAI) philosophy to floodplain management.
ma-PN-MC-222	Pandemic	2020	Assess and institute necessary upgrades to critical facilities to allow for usage during pandemic, including adequate ventilation and physical barriers

Mitigation No.	Hazard Type	Year	Title/Description
ma-PN-MC-223	Pandemic	2020	Institute necessary structural improvements to evacuation centers/sheltering locations to allow for proper ventilation, space for staff, and structural barriers to be used during pandemic and hazard event.
ma-PN-MC-224	Pandemic	2020	Develop alternative sheltering/ evacuation locations for social distancing required during pandemic and other hazard event
ma-SF-MC-139	Slope Failure	2008	Construct a lightweight fill prism under roads to prevent the slip plain from further movement and subsequent damage to roads.
ma-SF-MC-225	Slope Failure	2020	Establish a priority list of slope failure locations and implement slope stabilization projects in the highest risk areas.
ma-SH-MC-206	Soil Hazard	2020	Develop educational outreach during the building permit process to raise awareness about the presence naturally occurring asbestos.
ma-SH-MC-226	Soil Hazard	2020	Establish a priority list of coastal erosion locations and implement slope stabilization projects in the highest risk areas.
ma-WF-MC-123	Wildfire	2014	Create and/or help strengthen existing vegetation management programs that provides vegetation management services to elderly, disabled, or low-income property owners who lack the resources to remove flammable vegetation from around their homes.
ma-WF-MC-227	Wildfire	2020	Retrofit critical facilities (adult care, child care, schools, railways) with fire-resistant materials and create defensible space around structures.
ma-WF-MC-228	Wildfire	2020	Ensure addresses and locations are easily accessed during emergency, especially in the WUI. Methods include installation of high visibility address markers, partnering wiht County Fire Chief to reduce overlapping, duplicate, or misordered street and address markings, and developing GPS-based locating options for more remote or hard to find locations.
ma-WF-MC-238	Wildfire	2020	Update County Code/ Land Use Regulations/Subdivision Design Guidelines to include design and siting standards to incorporate, for example, emergency response access and turn around space or fire suppression water needs.
ma-WF-MC-239	Wildfire	2020	Coordinate with fire protection agencies to develop vegetation management program to remove understory brush, hazardous trees, and excessive fuels around County roads and evacuation routes.
ma-WF-MC-287	Wildfire	2020	Implement and continue to re-prioritize Mendocino County CWPP Mitigation Projects and support smaller scale neighborhood and community plans as appropriate.

Mitigation No.	Hazard Type	Year	Title/Description
ma-WF-MC-300	Wildfire	2020	Identify and develop a plan and maintenance schedule for key fuel breaks currently existing around population centers and other key resources; develop new fuel breaks as identified.
ma-WF-MC-301	Wildfire	2020	Continue to support programs to reduce fuel loads in the County, including but not limited to continuing the chipper program, mastication and removal of fuels, and encouraging prescribed burns when practicable.
ma-WF-MC-302	Wildfire	2020	Develop a program to map and manage emerging high risk fuel sources.

Mitigation Action Implementation

Despite County efforts, no amount of planning or mitigation can prevent disasters from occurring or eliminate the risk and impacts of such events. Hazard events will continue to occur, and the County and participating jurisdictions will take actions to reduce the risks these hazards pose to life, property, and the economy. While this MJHMP identifies opportunities for reasonable mitigation actions, each individual has a responsibility to be aware of the potential hazards where they live and to minimize their own household's vulnerability.

The County's ability to carry out mitigation is limited to those facilities over which it has authority. The County does not have direct authority over schools, water and sanitation districts, private gas, electric and communication utilities, state and federal highways and facilities, private hospitals, or neighboring cities and tribes. The County will focus on actions within its authority to do while seeking to cooperatively work with other entities to address mutual areas of vulnerability and interdependence.

Full implementation of the plan's recommendations will take time and resources. The measure of the plan's success will be the coordination and pooling of resources within the participating jurisdictions and maintaining these successes over time. Teaming together to seek financial assistance at the state and federal level will be a priority to initiate projects that are dependent on alternative funding sources. This plan was built upon the effective leadership of a multi-disciplined steering committee and a process that relied heavily on public input and support. The plan will succeed for the same reasons.

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Adoption Records

To comply with DMA 2000, the Mendocino County Board of Supervisors officially adopt this Mendocino County Multi-Jurisdictional Hazard Mitigation Plan on December 8, 2020. The adoption of the MJHMP in its entirety recognizes the County's commitment to reducing the impacts of natural hazards within the Cities and County. Other participating jurisdictions adopted Volume 1 and their respective annex. See the Record of Adoptions, below.

Table 1-1. Date of Jurisdictional Adoptions

Jurisdiction	Date of Adoption
Mendocino County	December 8, 2020
Ukiah	November 18, 2020
Fort Bragg	December 14, 2020
Point Arena	December 15, 2020
Willits	December 9, 2020
Mendocino County Office of Education	November 9, 2020

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RESOLUTION 20-168

A RESOLUTION FOR MENDOCINO COUNTY TO ADOPT THE 2020 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN FOR MENDOCINO COUNTY AS ITS OFFICIAL PLAN

WHEREAS, Mendocino County, a political subdivision of the State of California, is an official participating jurisdiction of the "2020 Mendocino County Multi-Jurisdictional Hazard Mitigation Plan" (MJHMP); and

WHEREAS, Mendocino County recognizes the MJHMP as the official hazard mitigation plan for the County and participating jurisdictions; and

WHEREAS, Mendocino County has gathered information and prepared the MJHMP in accordance with Federal Emergency Management Agency (FEMA) requirements at 44 C.F.R. § 201.6; and

WHEREAS, Volume 1 of the MJHMP recognizes the threat that natural hazards pose to people and property within Mendocino County; and

WHEREAS, Mendocino County has reviewed the MJHMP and affirms that the plan actions in Volume 1 will reduce the potential for harm to people and property from future hazard occurrences with our community; and

WHEREAS, Congress passed the Disaster Mitigation Act of 2000 (Disaster Mitigation Act) emphasizing the need for pre-disaster mitigation of potential hazards; and

WHEREAS, the Disaster Mitigation Act made available mitigation grants to state and local governments; and

WHEREAS, an adopted multi-hazard plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, Mendocino County fully participated in the FEMA-prescribed mitigation planning process to prepare this MJHMP; and

WHEREAS, the citizens of Mendocino County were afforded opportunities to comment and provide input in the MJHMP and the actions in the Plan, including a public comment period for the MJHMP from October 13, 2020, to October 26, 2020; and

WHEREAS, the County of Mendocino, as a fully participating jurisdiction of the MJHMP is an eligible sub-applicant to the State of California under FEMA's hazard mitigation grant program guidance; and

WHEREAS, on October 29, 2020, the County transmitted the MJHMP to the California Office of Emergency Services (Cal OES) and FEMA Region IX, which have reviewed the MJHMP, and approved it contingent upon this official adoption by the participating governing body; and

WHEREAS, the Board of Supervisors desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the MJHMP; and

WHEREAS, adoption by the Board of Supervisors for Mendocino County demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this MJHMP; and

WHEREAS, adoption of this plan helps to coordinate the responsible agencies to carry out their responsibilities under the MJHMP;

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of Mendocino County:

1. That Mendocino County adopts the 2020 Multi-Jurisdictional Hazard Mitigation Plan Volume 1 for Mendocino County, as approved by FEMA and Cal OES, as the mitigation plan for Mendocino County.

2. That the Board of Supervisors directs the County Emergency Services Manager/CEO to submit an approved and signed copy of this resolution to the Cal OES and for FEMA Region IX officials to enable the plan's final approval.

The foregoing Resolution introduced by Supervisor McCowen, seconded by Supervisor Brown, and carried this 8th day of December, 2020, by the following vote:

AYES:	Supervisors Brown, McCowen, Haschak, Gjerde, and Williams
NOES:	None
ABSENT:	None

WHEREUPON, the Chair declared said Resolution adopted and SO ORDERED.

John Haschak

JOHN HASCHAK, Chair
Mendocino County Board of Supervisors

ATTEST: CARMEL J. ANGELO
Clerk of the Board

Lindsey Daugherty
Deputy

I hereby certify that according to the provisions of Government Code Section 25103, delivery of this document has been made.

APPROVED AS TO FORM:
CHRISTIAN M. CURTIS
County Counsel

Christian M. Curtis

BY: CARMEL J. ANGELO
Clerk of the Board

Lindsey Daugherty
Deputy

City of Ukiah - Adoption Resolution

RESOLUTION NO. 2020-65

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH ADOPTING THE 2020 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN FOR MENDOCINO COUNTY

WHEREAS:

1. The City of Ukiah is a political subdivision of the State of California and an official participating jurisdiction in the "2020 Mendocino County Multi-Jurisdictional Hazard Mitigation Plan" (MJHMP); and

2. The MJHMP is set forth in Exhibit A, attached hereto and by reference incorporated herein; and

3. The City of Ukiah recognizes the MJHMP as the official hazard mitigation plan for the County and participating jurisdictions; and

4. The City of Ukiah, with the assistance from the County, has gathered information and prepared the MJHMP in accordance with Federal Emergency Management Agency (FEMA) requirements pursuant to 44 C.F.R. § 201.6; and

5. The City of Ukiah Jurisdictional Annex set forth in Volume 2 of the MJHMP recognizes the threat that natural hazards pose to people and property within our community; and

6. The City of Ukiah has reviewed the MJHMP and affirms that the hazard mitigation plan actions in the City of Ukiah's Jurisdictional Annex will reduce the potential for harm to people and property from future hazard occurrences with our community; and

7. Congress passed the Disaster Mitigation Act of 2000 (Disaster Mitigation Act) emphasizing the need for pre-disaster mitigation of potential hazards; and

8. The Disaster Mitigation Act made available mitigation grants to state and local governments; and

9. An adopted multi-hazard mitigation plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

10. The City Council fully participated in the FEMA-prescribed mitigation planning process to prepare this MJHMP; and

11. Citizens residing within the City's jurisdiction were afforded opportunities to comment and provide input in the MJHMP and the actions in the Plan; and

12. The City of Ukiah, as a fully participating jurisdiction of the MJHMP, is an eligible sub-applicant to the State of California under FEMA's hazard mitigation grant program guidance; and

13. The California Office of Emergency Services (Cal OES), and the FEMA Region IX officials have reviewed the MJHMP, and approved it contingent upon this official adoption by the participating governing body; and

14. The City Council desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the MJHMP; and

15. Adoption by the City Council for the City of Ukiah demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this MJHMP; and

16. Adoption of this Plan helps to coordinate the responsible agencies to carry out their responsibilities under the MJHMP.

NOW, THEREFORE, BE IT RESOLVED that:

1. That the City of Ukiah adopts the 2020 Multi-Jurisdictional Hazard Mitigation Plan Vol. 1 for Mendocino County and the City of Ukiah Jurisdictional Annex in Vol. 2, as approved by FEMA and Cal OES, as the hazard mitigation plan for the City of Ukiah.

2. That the City Council orders the City Manager to submit an approved and signed copy of this resolution to the Cal OES and FEMA Region IX officials to enable the plan's final approval.

PASSED AND ADOPTED this 18th day of November, 2020, by the following roll call vote:

AYES: Councilmembers Mulheren, Brown, Scalmanini, Orozco, and Mayor Crane
NOES: None
ABSENT: None
ABSTAIN: None

Douglas F Crane

Douglas F. Crane, Mayor

ATTEST:

Kristine Lawler

Kristine Lawler, City Clerk

RESOLUTION NO. 4338-*2020*

RESOLUTION OF THE FORT BRAGG CITY COUNCIL ADOPTING THE 2020 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN FOR MENDOCINO COUNTY AS THE CITY OF FORT BRAGG'S OFFICIAL PLAN

WHEREAS, the City of Fort Bragg is a political subdivision of the State of California and an official participating jurisdiction of the "2020 Mendocino County Multi-Jurisdictional Hazard Mitigation Plan" (MJHMP); and

WHEREAS, the City of Fort Bragg recognizes the MJHMP as the official hazard mitigation plan for the County and participating jurisdictions; and

WHEREAS, the City of Fort Bragg, with the assistance from Mendocino County, has gathered information and prepared the MJHMP in accordance with Federal Emergency Management Agency (FEMA) requirements at 44 C.F.R. § 201.6; and

WHEREAS, the City of Fort Bragg Annex in Volume 2 of the MJHMP recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, the City of Fort Bragg has reviewed the MJHMP and affirms that the plan actions in the City of Fort Bragg's Annex will reduce the potential for harm to people and property from future hazard occurrences with our community; and

WHEREAS, Congress passed the Disaster Mitigation Act of 2000 (Disaster Mitigation Act) emphasizing the need for pre-disaster mitigation of potential hazards; and

WHEREAS, the Disaster Mitigation Act made available mitigation grants to state and local governments; and

WHEREAS, an adopted multi-hazard plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the City Council fully participated in the FEMA-prescribed mitigation planning process to prepare this MJHMP; and

WHEREAS, the citizens were afforded opportunities to comment and provide input in the MJHMP and the actions in the Plan; and

WHEREAS, the City of Fort Bragg, as a fully participating jurisdiction of the MJHMP is an eligible sub-applicant to the State of California under FEMA's hazard mitigation grant program guidance; and

WHEREAS, the California Office of Emergency Services (Cal OES), and the FEMA Region IX officials have reviewed the MJHMP, and approved it contingent upon this official adoption by the participating governing body; and

WHEREAS, the City Council desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the MJHMP; and

WHEREAS, adoption by the City Council for the City of Fort Bragg demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this MJHMP; and

WHEREAS, adoption of this plan helps to coordinate the responsible agencies to carry out their responsibilities under the MJHMP;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Fort Bragg:

1. That the City of Fort Bragg adopts the 2020 Multi-Jurisdictional Hazard Mitigation Plan Vol. 1 for Mendocino County and the City of Fort Bragg Annex in Vol. 2, as approved by FEMA and Cal OES, as the mitigation plan for the City of Fort Bragg.

2. That the City Council authorizes the City Manager to submit an approved and signed copy of this resolution to the Cal OES and FEMA Region IX officials to enable the plan's final approval.

The above and foregoing Resolution was introduced by Councilmember Albin-Smith, seconded by Councilmember Peters, and passed and adopted at a regular meeting of the City Council of the City of Fort Bragg held on the 14th day of December, 2020, by the following vote:

AYES:	**Councilmembers Albin-Smith, Morsell-Haye, Norvell, Peters and Mayor Lee.**
NOES:	**None.**
ABSENT:	**None.**
ABSTAIN:	**None.**
RECUSED:	**None.**

Bernie Norvell
Mayor

ATTEST:

Cristal Munoz

For **June Lemos, CMC**
City Clerk

City of Point Arena - Adoption Resolution

RESOLUTION NO. 2020-32

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF POINT ARENA ADOPTING THE 2020 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN FOR MENDOCINO COUNTY AS ITS OFFICIAL PLAN

WHEREAS, the City of Point Arena is a political subdivision of the State of California and an official participating jurisdiction of the “2020 Mendocino County Multi-Jurisdictional Hazard Mitigation Plan” (MJHMP); and

WHEREAS, the City of Point Arena recognizes the MJHMP as the official hazard mitigation plan for the County and participating jurisdictions; and

WHEREAS, the City of Point Arena, with the assistance from Mendocino County, has gathered information and prepared the MJHMP in accordance with Federal Emergency Management Agency (FEMA) requirements at 44 C.F.R. § 201.6; and

WHEREAS, the City of Point Arena Annex in Volume 2 of the MJHMP recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, the City of Point Arena has reviewed the MJHMP and affirms that the plan actions in the City of Point Arena’s Annex will reduce the potential for harm to people and property from future hazard occurrences with our community; and

WHEREAS, Congress passed the Disaster Mitigation Act of 2000 (Disaster Mitigation Act) emphasizing the need for pre-disaster mitigation of potential hazards; and

WHEREAS, the Disaster Mitigation Act made available mitigation grants to state and local governments; and

WHEREAS, an adopted multi-hazard plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the City Council fully participated in the FEMA-prescribed mitigation planning process to prepare this MJHMP; and

WHEREAS, the citizens were afforded opportunities to comment and provide input in the MJHMP and the actions in the Plan; and

WHEREAS, the City of Point Arena, as a fully participating jurisdiction of the MJHMP is an eligible sub-applicant to the State of California under FEMA’s hazard mitigation grant program guidance; and

WHEREAS, the California Office of Emergency Services (Cal OES), and the FEMA Region IX officials have reviewed the MJHMP, and approved it contingent upon this official adoption by the participating governing body; and

WHEREAS, the City Council desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the MJHMP; and

WHEREAS, adoption by the City Council for the City of Point Arena demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this MJHMP; and

WHEREAS, adoption of this plan helps to coordinate the responsible agencies to carry out their responsibilities under the MJHMP;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Point Arena:

1. That the City of Point Arena adopts the 2020 Multi-Jurisdictional Hazard Mitigation Plan Vol. 1 for Mendocino County and the City of Point Arena Annex in Vol. 2, as approved by FEMA and Cal OES, as the mitigation plan for the City of Point Arena.

2. That the City Council directs the City Manager to submit an approved and signed copy of this resolution to the Cal OES and FEMA Region IX officials to enable the plan's final approval.

PASSED AND ADOPTED The foregoing Resolution No. 2020-32 was passed and adopted at a Regular meeting of the Point Arena City Council on the 15th day of December 2020 by the following vote. Motion by Vice Mayor Burkey, Seconded by Councilmember Dobbins.

AYES: Ignacio, Burkey, Dobbins, Ford, Dahlhoff

SCOTT IGNACIO
Mayor

ATTEST:

Richard Shoemaker, City Clerk

RESOLUTION 2020-67

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF WILLITS TO ADOPT THE 2020 MENDOCINO COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, the City of Willits is a political subdivision of the State of California and an official participating jurisdiction of the "2020 Mendocino County Multi-Jurisdictional Hazard Mitigation Plan" (MJHMP); and

WHEREAS, the City of Willits recognizes the MJHMP as the official hazard mitigation plan for the County and participating jurisdictions; and

WHEREAS, the City of Willits, with the assistance from Mendocino County, has gathered information and prepared the MJHMP in accordance with Federal Emergency Management Agency (FEMA) requirements at 44 C.F.R. § 201.6; and

WHEREAS, the City of Willits Annex in Volume 2 of the MJHMP recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, the City of Willits has reviewed the MJHMP and affirms that the plan actions in the City of Willits's Annex will reduce the potential for harm to people and property from future hazard occurrences with our community; and

WHEREAS, Congress passed the Disaster Mitigation Act of 2000 (Disaster Mitigation Act) emphasizing the need for pre-disaster mitigation of potential hazards; and

WHEREAS, the Disaster Mitigation Act made available mitigation grants to state and local governments; and

WHEREAS, an adopted multi-hazard plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the City Council fully participated in the FEMA-prescribed mitigation planning process to prepare this MJHMP; and

WHEREAS, the citizens were afforded opportunities to comment and provide input in the MJHMP and the actions in the Plan; and

WHEREAS, the City of Willits, as a fully participating jurisdiction of the MJHMP is an eligible sub-applicant to the State of California under FEMA's hazard mitigation grant program guidance; and

WHEREAS, the California Office of Emergency Services (Cal OES), and the FEMA Region IX officials have reviewed the MJHMP, and approved it contingent upon this official adoption by the participating governing body; and

WHEREAS, the City Council desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the MJHMP; and

WHEREAS, adoption by the City Council for the City of Willits demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this MJHMP; and

WHEREAS, adoption of this plan helps to coordinate the responsible agencies to carry out their responsibilities under the MJHMP;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Willits hereby adopts the 2020 Multi-Jurisdictional Hazard Mitigation Plan Vol. 1 for Mendocino County and the City of Willits Annex in Vol. 2, as approved by FEMA and Cal OES, as the mitigation plan for the City of Willits.

AND BE IT FURTHER RESOLVED that the City Council authorizes the City Manager to submit an approved and signed copy of this resolution to the Cal OES and FEMA Region IX officials to enable the plan's final approval.

The above and foregoing Resolution was introduced by Councilmember Gonzalez seconded by Councilmember Stranske, and passed and adopted at a regular meeting of the City Council of the City of Willits held on the 9th day of December 2020, by the following vote:

AYES:	Stranske, Gonzalez, Kanne, Rodriguez, and Strong
NOES:	None.
ABSENT:	None.

Madge Strong

MADGE STRONG, Mayor
City Council of the City of Willits

ATTEST:

Cathy Moorhead

CATHY MOORHEAD
Deputy City Manager/City Clerk

Resolution of the Mendocino County Board of Education No. 20.11. 1

A RESOLUTION FOR THE MENDOCINO COUNTY OFFICE OF EDUCATION TO ADOPT THE 2020 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN FOR MENDOCINO COUNTY AS ITS OFFICIAL PLAN

WHEREAS, the County Office of Education is a political subdivision of the State of California and an official participating jurisdiction of the "2020 Mendocino County Multi-Jurisdictional Hazard Mitigation Plan" (MJHMP); and

WHEREAS, the County Office of Education recognizes the MJHMP as the official hazard mitigation plan for the County and participating jurisdictions; and

WHEREAS, the County Office of Education, with the assistance from Mendocino County, has gathered information and prepared the MJHMP in accordance with Federal Emergency Management Agency (FEMA) requirements at 44 C.F.R. § 201.6; and

WHEREAS, the County Office of Education Annex in Volume 2 of the MJHMP recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, the County Office of Education has reviewed the MJHMP and affirms that the plan actions in the County Office of Education's Annex will reduce the potential for harm to people and property from future hazard occurrences with our community; and

WHEREAS, Congress passed the Disaster Mitigation Act of 2000 (Disaster Mitigation Act) emphasizing the need for pre-disaster mitigation of potential hazards; and

WHEREAS, the Disaster Mitigation Act made available mitigation grants to state and local governments; and

WHEREAS, an adopted multi-hazard plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the Board of Education fully participated in the FEMA-prescribed mitigation planning process to prepare this MJHMP; and

WHEREAS, the citizens were afforded opportunities to comment and provide input in the MJHMP and the actions in the Plan; and

WHEREAS, the Office of Education, as a fully participating jurisdiction of the MJHMP is an eligible sub-applicant to the State of California under FEMA's hazard mitigation grant program guidance; and

WHEREAS, the California Office of Emergency Services (Cal OES), and the FEMA Region IX officials have reviewed the MJHMP, and approved it contingent upon this official adoption by the participating governing body; and

WHEREAS, the Board of Education desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the MJHMP; and

WHEREAS, adoption by the Board of Education demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this MJHMP; and

WHEREAS, adoption of this plan helps to coordinate the responsible agencies to carry out their responsibilities under the MJHMP;

NOW, THEREFORE, BE IT RESOLVED by the Board of Education of the Mendocino County Office of Education:

1. That the Mendocino County Board of Education adopts the 2020 Multi-Jurisdictional Hazard Mitigation Plan Vol. 1 for Mendocino County and Office of Education Annex in Vol. 2, as approved by FEMA and Cal OES, as the mitigation plan for the Office of Education.

2. That the Board orders the County Superintendent to submit an approved and signed copy of this resolution to the Cal OES and FEMA Region IX officials to enable the plan's final approval.

By Order of the Mendocino County Board of Education

Dated: November 9, 2020

Michelle Hutchins

Michelle Hutchins, Ex Officio Secretary
County Superintendent of Schools

Donald Cruser

Donald Cruser, President
Mendocino County Board of Education

Volume 1

MENDOCINO COUNTY
MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

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Section 1. Introduction

1.1 Purpose

Mendocino County and many other participating jurisdictions prepared this Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), originally approved by the Federal Emergency Management Agency (FEMA) in 2006 and updated in 2014. The plan in its current form reflects a comprehensive update in 2020. The purpose of this plan is to guide hazard mitigation planning to better protect the people and property of the County from the effects of hazard events. This plan demonstrates the commitment of each participating jurisdiction to reducing risks from hazards and serves as a tool to help decision-makers direct mitigation activities and resources. This plan was also developed to ensure Mendocino County and participating jurisdictions' continued eligibility for certain federal disaster assistance, specifically the FEMA Hazard Mitigation Assistance (HMA) grants, including the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC), and Flood Mitigation Assistance Program (FMA). The plan is also important for maintaining and improving the standing of the County in the National Flood Insurance Program's Community Rating System (CRS), which provides for lower flood insurance premiums to the residents in the unincorporated areas.

1.2 Background and Scope

Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses incurred by insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be reduced or even eliminated. Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities demonstrates that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $6 in avoided future losses in addition to saving lives and preventing injuries. (National Institute of Building Sciences, 2017)

1.3 Participating Jurisdictions

The Mendocino County Multi-Jurisdictional Hazard Mitigation Plan geographically covers the entire area within Mendocino County's jurisdictional boundaries (hereinafter referred to as the "planning area"). A planning partnership was formed to develop and steer content in this plan. This partnership consists of Mendocino County and local government planning partners who worked together to create the goals, objectives, mitigation strategies, and implementation methods to reduce natural hazard risk within the planning area. Any jurisdiction or organization may participate in the planning process. However, to obtain Federal Emergency Management Agency (FEMA) approval, each local jurisdiction must meet all requirements of hazard mitigation planning outlined in 44 C.F.R. § 201.6. Participating jurisdictions are listed in Table 2-1 and are shown in Figure 1-1.

1.4 Why Update This Plan?

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

The Federal Disaster Mitigation Act of 2000 (DMA 2000) required state and local governments to develop hazard mitigation plans as a condition of federal disaster grant assistance. (Pub. L. No. 106-390; 42 U.S.C. § 5121 *et seq.*) Prior to 2000, federal disaster funding focused on disaster relief and recovery, with limited funding for hazard mitigation planning. DMA 2000 increased the emphasis on planning for disasters before they occur.

DMA 2000 encourages state and local authorities to work together on pre-disaster planning and promotes sustainability. Sustainable hazard mitigation includes the sound management of natural resources and the recognition that hazards and mitigation must be understood in the broadest possible social and economic context. The enhanced planning network called for by DMA 2000 helps local governments articulate accurate mitigation needs, resulting in faster allocation of funding and more cost-effective risk reduction projects.

1.4.1 Purposes for Planning

This Hazard Mitigation Plan identifies resources, information, and strategies for reducing risk from natural hazards. Mendocino County and the local jurisdictions that participated as planning partners (collectively "the planning partners") initiated this planning effort for several key reasons. The Mendocino County area has significant exposure to numerous natural hazards that have caused millions of dollars in past damage. The planning partners want to be proactive in preparing for the probable impacts of natural hazards. Finally, limited local resources make it difficult to implement proactive risk-reduction measures. Federal and State financial assistance is paramount to successful hazard mitigation in the area.

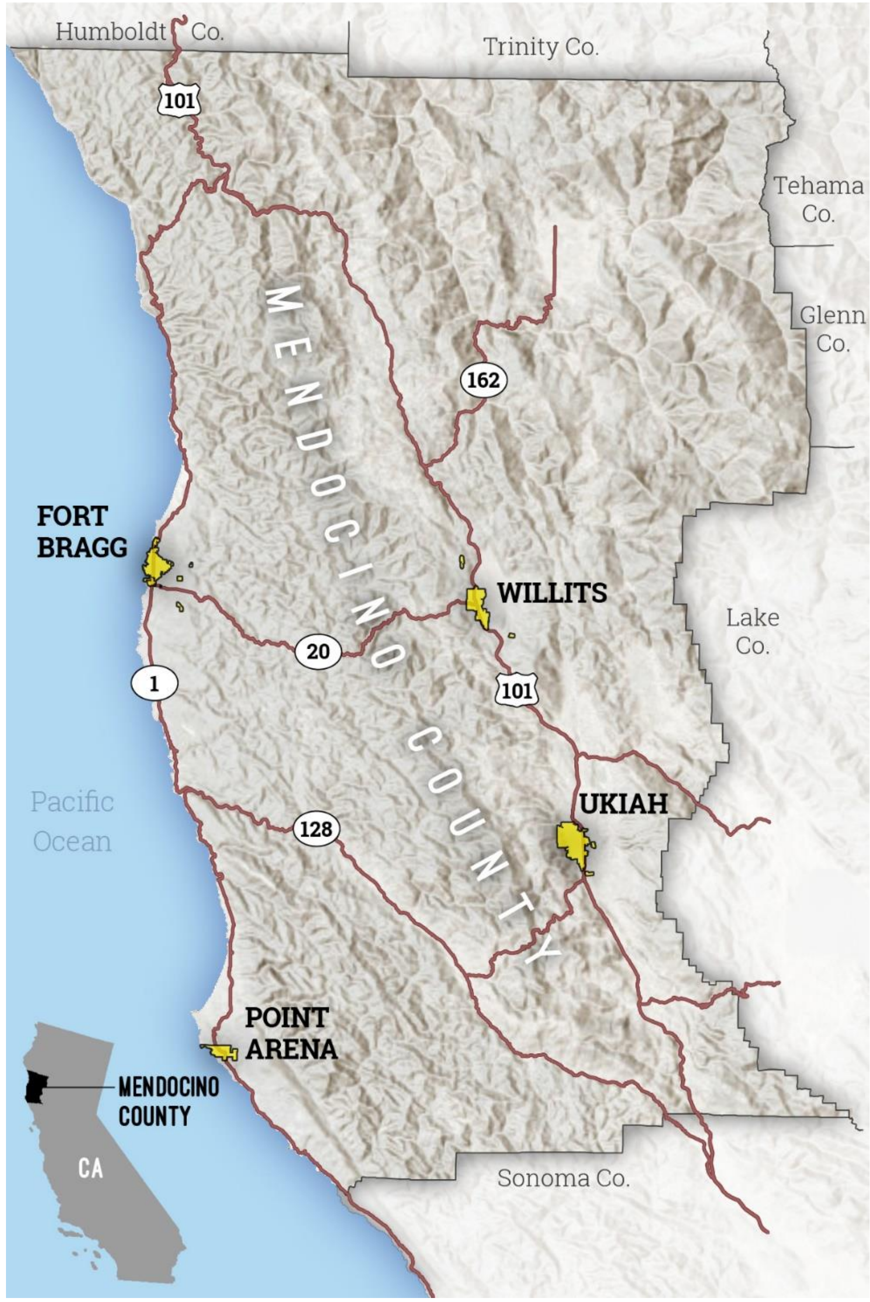

Figure 1-1: Participating Jurisdiction Map

Elements and strategies in the plan were selected because they best meet the needs of the planning partners and their citizens. The plan was developed to meet the following objectives:

- Meet or exceed requirements of the DMA 2000 and the 2015 California legislation requiring the incorporation of climate adaptation strategies into hazard mitigation planning (SB 379).
- Enable all planning partners to continue using federal grant funding to reduce risk through mitigation.
- Meet the needs of each planning partner as well as state and federal requirements.
- Create a risk assessment that focuses on Mendocino County hazards of concern.

- Create a single planning document that integrates all planning partners into a framework that supports partnerships within the County and puts all partners on the same planning cycle for future updates.
- Coordinate existing plans and programs so that high-priority initiatives and projects to mitigate possible disaster impacts are funded and implemented.

1.5 Who Will Benefit from This Plan?

One benefit of multi-jurisdictional planning is the ability to pool resources and eliminate redundant activities within a planning area with fairly uniform risk exposure and vulnerabilities. FEMA encourages multi-jurisdiction planning under its guidance for the DMA 2000. The plan will help guide and coordinate mitigation activities throughout Mendocino County.

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

1.6 How to Use This Plan

This plan has been set up in two volumes to separate jurisdiction-specific elements (Volume 2) from those that apply to the whole planning area (Volume 1):

- **Volume 1**—Volume 1 includes all federally-required elements of a hazard mitigation plan that apply to the entire planning area. This volume includes the description of the planning process, public involvement strategy, goals and objectives, countywide hazard risk assessment, countywide mitigation initiatives, and a plan maintenance strategy. Volume 1 includes the following appendices:
  - Appendix A—Annex Methodology
  - Appendix B—Planning Process Documentation
- **Volume 2**—Volume 2 includes all federally-required, jurisdiction-specific elements for each participating jurisdiction. All planning partners have adopted Volume 1 in its entirety and each partner's jurisdiction-specific annex.

Section 2. What's New

This section includes background information on the 2014 MJHMP and this MJHMP Update. The 2014 mitigation actions were reviewed and have been changed, updated, and revised to reflect new priorities in this MJHMP. Only the information and data still valid from the 2014 Plan were carried forward as applicable to this MJHMP update. The sections below describe the planning process for this update. This update profiles the following ten hazards: dam failure, drought, climate change, earthquake, pandemic disease, flood, severe weather, soil, slope failure, and wildfire hazards.

2.1 Participating Jurisdictions in the 2014 HMP vs MJHMP Update

In September of 2014, the County met all approval requirements from the DMA and officially adopted an update to the 2006 HMP. The eligibility status of the planning partnership was monitored by the Mendocino County Point of Contact (POC) over the five-year update process. A partner was deemed to be meeting participation requirements based on:

- Progress reports being submitted annually by the specified time frames,
- Partners notifying the POC of changes in designated points of contact,
- Partners supporting the Steering Committee by attending designated meetings or responding to needs identified by the Committee, and
- Partners continuing to be supportive as specified in the planning partner expectations package provided to them at the beginning of the process.

Table 2-1 identifies the 2014 and 2020 Participating Jurisdictions.

Table 2-1: Participating Jurisdiction Tracker

Jurisdiction Name	2014 Participating Jurisdiction	2020 Participating Jurisdiction
County		
Mendocino County	Y	Y
Education		
Mendocino County Office of Education	Y	Y
Municipalities		
City of Fort Bragg	Y	Y
City of Point Arena	Y	Y
City of Ukiah	Y	Y
City of Willits	Y	Y

2.2 Mitigation Actions

During this MJHMP update process, each of the 2014 County-wide mitigation actions were examined for relevancy and the potential for future implementation and then evaluated for potential follow-up. Some mitigation actions developed during the 2014 HMP effort are an inherent part of the HMP update process or were not detailed enough for implementation at a local jurisdiction level, and thus were not included in this update. The County has made significant changes to other 2014 Mitigation Actions because of the updated risk assessment and implementation strategy, to include more detail, or to update based on current mitigation practices.

Table 2-2 provides a record of *cancelled* County-wide Mitigation Actions and an explanation for why the mitigation action was cancelled. *Ongoing or pending* mitigations actions from previous HMPs are included within the Mitigation Action Plan in Table 5-6. *Completed* previous Mitigation Actions for the County are detailed in Table 2-3.

Table 2-2: Cancelled Previous Mitigation Actions

Mitigation No.	Hazard Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Reason Cancelled
ma-AH-MC-133	All Hazard	Cancelled	2008	Mendocino County	Integrate elements from the MHMP into other local planning documents, including the safety element section of general plans, hazard-specific zoning ordinances, and emergency operation plans.		not a mitigation action; opportunity for integration explored in capabilities assessment
ma-AH-MC-140	All Hazard	Cancelled	2008	Mendocino County	Examine and mitigate critical infrastructure that has been identified as currently being too narrow or having too many tight turns to ensure the safe transportation of truck loads within Mendocino County.		Does not address a profiled hazard in the HMP
ma-DF-MC-144	Dam Failure	Cancelled	2014	Mendocino County	Implement a flood warning system, including the use of stream gauges, for the Coyote Valley Dam. *	Mendocino County Inland Water and Power Commission	Incorporated into MC-199
ma-EQ-MC-128	Earthquake	Cancelled	2014	Mendocino County	Seismically retrofit or replace public works and/or emergency response facilities that are necessary during and/or immediately after a disaster or emergency.	Planning and Building Services	Incorporated into MC-201 and MC-202

Mitigation No.	Hazard Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Reason Cancelled
ma-EQ-MC-132	Earthquake	Cancelled	2008	Mendocino County	Strengthen, abate, or downgrade in occupancy, any structures that are owned or leased by Mendocino County or incorporated communities that do not meet the California Building Code (CBC) requirements for seismic safety or the California Codes Essential Services Building Act.		Incorporated in MC-201 and MC-202
ma-FL-MC-129	Flood	Cancelled	2014	Mendocino County	Acquire, relocate, elevate, and/or floodproof critical facilities that are located within the 100-year floodplain.	Planning and Building Services	Incorporated into MC-125
ma-FL-MC-130	Flood	Cancelled	2014	Mendocino County	Reinforce County and local ramps, bridges, and roads from flooding through protection activities, including elevating the road and installing culverts beneath the road or building a higher bridge across the area that experiences regular flooding.	Planning and Building Services	Incorporated into MC-210
ma-FL-MC-135	Flood	Cancelled	2008	Mendocino County	Continue to participate in the NFIP program by enforcing the floodplain management ordinance to reduce future flood damage.		Incorporated into MC-148
ma-HM-MC-122	HazMat	Cancelled	2014	Mendocino County	Conduct a public awareness and educational campaign to raise awareness about the presence of hazardous materials throughout the County, including naturally occurring asbestos.	Office of Emergency Services	Incorporated into MC-206
ma-IN-MC-143	Insects	Cancelled	2014	Mendocino County	Implement an infestation public awareness and educational campaign.	Department of Agriculture	Insect hazards were not prioritized in the 2020 HMP and this MA is no longer relevant

Mitigation No.	Hazard Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Reason Cancelled
ma-TS-MC-136	Tsunami	Cancelled	2008	Mendocino County	Participate in the Tsunami Ready Program. This new program, sponsored by the National Weather Service, is designed to provide communities with incentives to reduce their tsunami risks.		Incorporated into MC-154
ma-WF-MC-138	Wildfire	Cancelled	2008	Mendocino County	Develop a countywide chipper program in which local residents and business owners do their own vegetation management and the community offers free or reduced-cost roadside chipping.	Mendocino County	This is a duplicate MA that has been marked as completed (MC-142).

2.3 New Analysis and Risk Assessment Methodology

The County strengthened this plan by using new research methods and information systems. Geographic Information Systems (GIS) mapping provided the County with the tools to develop more comprehensive data sets than those in the 2014 MJHMP.

This MJHMP focuses on natural hazards. New MJHMP mitigation actions focus on four different classifications, including:

- Local Plans and Regulations – intended to reduce the County's vulnerability to future hazard events through the implementation of codes and regulations.
- Structure and Infrastructure Projects – intended to protect existing structures by retrofitting, relocating, or modifying the structure to withstand a hazard event.
- Natural Systems – to reduce the effects of hazards on the natural resources within a region by preserving and/or restoring natural areas along with their mitigation functions.
- Public Information and Awareness – to advise residents, potential buyers, and visitors about hazards, potentially hazardous areas, and mitigation techniques.

2.4 Successful Mitigation Activities

The 2014 Mendocino County HMP guiding principle, goals, objectives, and mitigation actions have been implemented through various on-going projects, plans, and programs. The County has made improvements toward reducing natural hazard risks to life and property, with significant risk reduction efforts for floodplain management, flood damage prevention, and fire hazard reduction. Table 2-3 summarizes the completed mitigation actions since 2014. These successful policies, programs, and projects are summarized below.

Table 2-3: Completed Previous Mitigation Actions

Mitigation No.	Hazard Type	Status	Year	Primary Agency	Title/Description
ma-AH-UN-190	All Hazard	Completed	2008	Mendocino County	Develop a sustained public outreach program that encourages consistent hazard mitigation content. For example, consider publishing tsunami inundation maps in telephone books, wildland fire defensible space tips with summer water bills or along highway billboards, and the safe handling and disposal of hazardous waste and chemicals with garbage bills.
ma-EQ-UN-189	Earthquake	Completed	2008	Mendocino County	Strengthen, abate, or downgrade in occupancy, any structures that are owned or leased by Mendocino County or incorporated communities that do not meet the California Building Code (CBC) requirements for seismic safety or the California Codes Essential Services Building Act.
ma-FL-MC-131	Flood	Completed	2008	Mendocino County	Carry out minor flood and stormwater management projects that would reduce damage to infrastructure and residential buildings due to flooding. These projects include the modifying or replacing existing culverts and bridges, upgrading capacity of storm drains, stabilizing stream banks, clearing stream banks of debris and vegetation, and creating of debris or flood/stormwater retention basins in small watersheds.
ma-WF-MC-142	Wildfire	Completed	2008	Mendocino County	Develop a countywide chipper program in which local residents and business owners do their own vegetation management and the community offers free or reduced-cost roadside chipping.
ma-WF-UN-188	Wildfire	Completed	2008	Mendocino County	Create a vegetation management program that provides vegetation management services to elderly, disabled, or low-income persons who lack the resources to remove flammable vegetation around their homes.

SUCCESS STORY: ***Wildfire Prevention Initiative near Ukiah***

In 2019, the County in partnership with the City of Ukiah began an effort to increase wildfire mitigation capabilities. The County and City began conducting inspections in the region to identify any fire prone areas. They also conducted outreach by consulting local homeowners about their knowledge of fire safety issues and experiences with wildfire in the area.

During the same period, a number of Fire Safe Councils were created in and around the city. These Fire Safe Councils mapped non-ambulatory neighborhood residences. The Mendocino County Fire Safe Council, in particular, is managing the Ukiah Valley Fire Fuels Reduction Project. The Project's objective is to reduce fire fuels by performing roadside clearing, creating shaded fuel breaks, and holding neighborhood chipper days. An additional collaboration between the County, the City, and CalFire developed the shaded fuel breaks on the western hills above Ukiah in the unincorporated areas of the County. The City also provides debris bins free of charge for neighborhoods in order to minimize any risk from discarded debris.

2.5 Incorporation into other Planning Mechanisms

Over the past five years, the 2014 HMP was incorporated into other planning mechanisms as a demonstration of progress in local hazard mitigation efforts. This newly-updated HMP will be referenced in Mendocino County's 2020 Safety Element Update and in the 2020 Climate Vulnerability Assessment. This update also will be incorporated into planning documents such as the County Flood Mitigation Plan, Groundwater Management Plan, Groundwater Sustainability Plan, General Plan, Wildfire Protection Plan, and the North Coast Integrated Regional Water Management Plan in the future.

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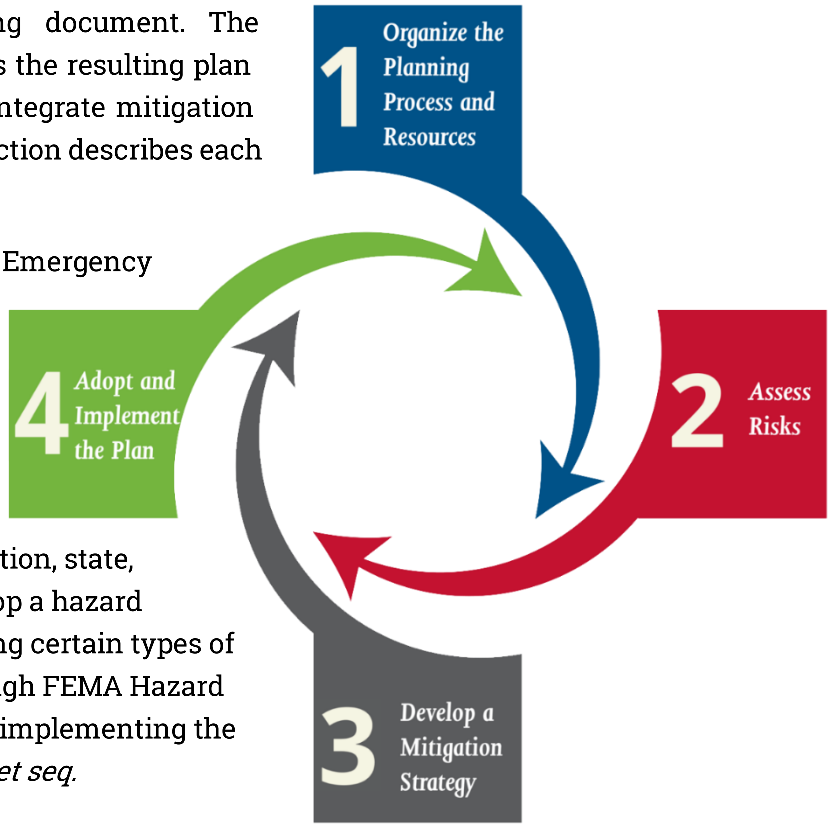
Section 3. Planning Process

This section describes each stage of the planning process used to develop the MJHMP. The planning process provides a framework for document development and follows the FEMA recommended steps as enumerated in federal regulation and outlined herein. This MJHMP is a community-driven, living document. The planning process itself is as important as the resulting plan because it encourages communities to integrate mitigation with day-to-day decision making. This section describes each stage of the planning process.



The Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by the Disaster Mitigation Act of 2000 (DMA 2000, 42 U.S.C. § 5165), is intended to "reduce the loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from natural disasters." Under this legislation, state, tribal, and local governments must develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance through FEMA Hazard Mitigation Assistance. FEMA regulations implementing the DMA 2000 are located at 44 C.F.R. § 201.6 *et seq.*

FEMA prescribes four major planning steps:

- **Step 1: Organize Resources**
- **Step 2: Assess Risk**
- **Step 3: Develop a Mitigation Strategy**
- **Step 4: Adopt and Implement the Plan**

Each jurisdiction that participated in the MJHMP independently followed the FEMA four-step process. Figure 3-1 provides a detailed, phased breakdown of the planning process that each participating jurisdiction completed. These four steps are integrated with a ten-step planning process that FEMA's Community Rating System uses to establish floodplain management credit in addition to Flood Mitigation Assistance programs.

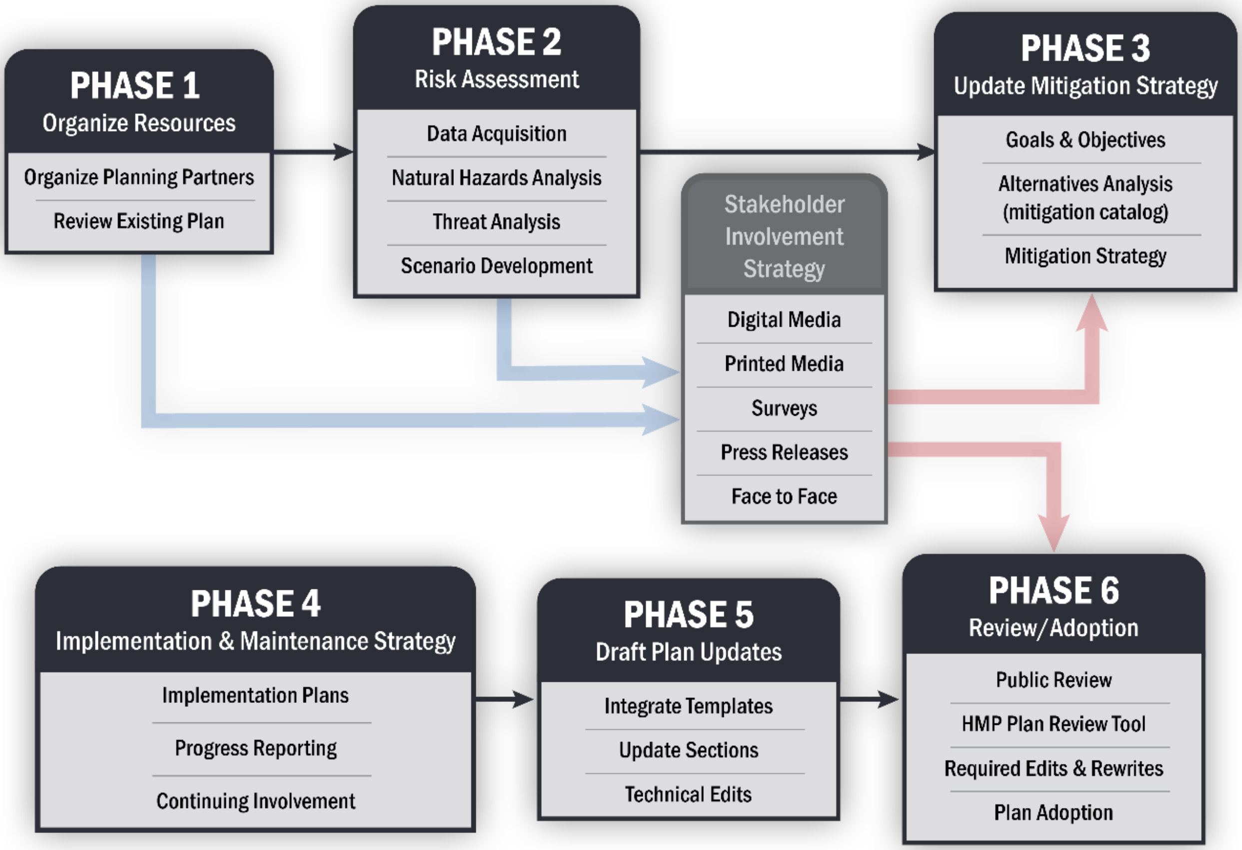


Figure 3-1: Mendocino County MHJHMP Planning Process

STEP 1: Organize Resources

The first step of the MJHMP planning process was organizing resources, consisting of developing the Planning Committee, reviewing relevant existing documents, and organizing public outreach.

Building the Planning Committee

The Planning Committee was comprised of participants from all participating jurisdictions and stakeholders who worked together to develop the MJHMP. The Planning Committee consisted of a Steering Committee, staff from participating jurisdictions, a broader group of regional stakeholders, and an HMP consultant used for plan development and facilitation.

Steering Committee

The Steering Committee was at the core of the MJHMP planning process and was integral to ensuring the success of the planning process, its implementation, and future maintenance. Members of the Steering Committee, listed in Table 3-1 below, represented jurisdictional leads from each planning partner and were also a part of the MJHMP Planning Committee, discussed below and in the individual annexes in Volume 2.

Table 3-1: MJHMP Steering Committee

Jurisdiction	Point of Contact	Title
Mendocino County Executive Office	Nash Gonzalez	Mendocino County Disaster Recovery Director
Mendocino County Office of Education	Steve Turner	Director of Maintenance and Operations
City of Fort Bragg	John Smith	Director of Public Works
City of Point Arena	Paul Anderson	Administrative Assistant
City of Ukiah	Tami Bartolomei	Office of Emergency Management Coordinator
City of Willits	Dusty Duley	Community Development Director

Planning Committee

The MJHMP Planning Committee consisted of multiple key decisionmakers with specific expertise to contribute to the planning process from each participating jurisdiction and regional stakeholders such as relevant agencies, neighboring jurisdictions, and members of the public. The Planning Committee served as liaisons to the greater community.

The Planning Committee was involved in the following planning processes:

- Structured coordination and meetings
- Collection of valuable local information and other requested data
- Decision making on plan process and content
- Development of mitigation actions
- Review and comment on plan drafts
- Coordination of the public input process

While all Planning Committee members were included in all communications about the MJHMP Update and were invited to all Planning Committee meetings. However, not all members attended stakeholder group meetings; some participated by reviewing draft documents, assisting in individual jurisdictional vulnerability assessments, with public outreach, or at other stages of the process. Table 3-2 provides a list of the Planning Committee Members. Documentation of Planning Committee invitations are provided in Appendix B.

Table 3-2: MJHMP Planning Committee

NAME	TITLE	DEPARTMENT
MENDOCINO COUNTY		
Anne Molgaard	Director	Child Support Services
Barbara Moed	Executive Officer	Mendocino County Air Quality Management District (MCAQMD)
Bekkie Emery	Assistant Director	Social Services Division - Health and Human Services
Brentt Blaser	Emergency Services Coordinator	Mendocino County Sheriff's Office
Cody Snider	Executive Office	Information Systems Division Manager
Darcie Antle	Deputy CEO	Executive Office - Finance
Sarah Duckett	Water Agency	Mendocino County Water Agency
Greg Glavich	County of Mendocino County	Communications Coordinator
Heather Correll Rose	Executive Office	Risk Management
Howard Dashiel	Director	Department of Transportation
Leif Far	Mendocino County	Information Systems (GIS)
Matt Kendall	Sheriff	Mendocino County Sheriff
Michael Oliphant	Department of Planning and Building, Building Official	Mendocino County Building Official

NAME	TITLE	DEPARTMENT
Nash Gonzalez	Mendocino County Disaster Recovery Director	Mendocino County Executive Office
Shannon Barney	Lieutenant Sheriff's Department	Emergency Operations Center (EOC)
Steve Dunicliff	Deputy CEO County Facilities	Mendocino County Executive Office
Tammy Moss Chandler	Agency Director	Health and Human Services Agency (HHSA)
William Schurtz	Director	Human Resources
Xuyen Ung	Administrative Analyst	Recovery/CEO
Richard Molinari	Shelter Manager	Ukiah Animal Shelter
Joe Zicherman	Chairman	Mendocino County Fire Safe Council
Paul Duncan	Operations Chief	Cal Fire - Mendocino Unit
Anthony Massucco	Fire Captain	Cal Fire -Howard Forest Emergency Command Center
CITY OF FORT BRAGG		
John Naulty	Interim Chief	City of Fort Bragg Police Department
Tabatha Miller	City Manager	City Manager's Office
John Smith	Director of Public Works	City of Fort Bragg
CITY OF UKIAH		
Douglas Hutchison	Fire Chief	City of Ukiah
Greg Owen	Airport Manager	City of Ukiah
Justin Wyatt	Police Chief	City of Ukiah Police Department
Sage Sangiacomo	City Manager	City of Ukiah
Tami Bartolomei	Office of Emergency Management Coordinator	City of Ukiah
Tim Eriksen	Public Works Director	City of Ukiah
Craig Schlatter	City of Ukiah Community Development Director	Community Development
CITY OF WILLITS		
Cathy Moorhead	Deputy City Manager/City Clerk	City of Willits
Dusty Duley	Community Development Director	Community Development
Gregory Allen	Chief	City of Willits Police
Stephanie Garrabrant-Sierra	City Manager	Administration and Fiscal Services
CITY OF POINT ARENA		
Paul Anderson	Administrative Assistant	City of Point Arena
Richard Shoemaker	City Manager	City of Point Arena
MENDOCINO OFFICE OF EDUCATION		
Steve Turner	Director of Maintenance and Operations (retired 2021)	Mendocino County Office of Education

NAME	TITLE	DEPARTMENT
Rebecca Jefferies	Assistant Superintendent of Business and Admin. Services	Mendocino County Office of Education
NEIGHBORING JURISDICTIONS		
Amy Travis	Deputy Director, Office of Emergency Services	Glenn County
Andy Houghtby	Sergeant, Office of Emergency Services	Tehama County
Chris Godley	OES	Sonoma County
Chris Macedo	OES	Lake County
Dale Carnathan	OES	Lake County
Ed Prestley	Office of Emergency Services Manager	Trinity County
Jeff DuVall	OES	Sonoma County
Kim Hunter	Director of Building & Planning	Trinity County
Ryan Derby	OES	Humboldt County
Melanie Collins	Department of Emergency Management	Sonoma County
PARTICIPATING STAKEHOLDERS		
Andres Avila	Chief	Anderson Valley Fire Department
Andrew Watson	Field Office Chief	US Geological Survey, California Water Science Center
Ann Carlson	Supervisor's office	USDA Forest Service
Bill Pauli	Chief	Potter Valley Fire Department
Bob Matson	Chief	Elk VFD
Carla Meyer	General Manager	Mendocino Transit Authority (MTA)
Don Dale	Chief	Redwood Valley-Calpella Fire Department
Gregg Warner	Chief	South Coast Fire Protection District
Chris Dilks	Captain	South Coast Fire Protection District
Chris Wilkes	Chief	Little Lake Fire Protection District
Christopher Bartow	Mitigation Lands Project Manager	Resource Conservation District
Clay Eubank	Battalion Chief	Anderson Valley Fire Department
Dan Maxey	Chief	Westport VFD
Davey Beak	Chief	Comptche VFD
David Latoof	Chief	Mendocino VFD
Doren Freeman	Chief	Covelo Fire Department
Elizabeth Salomone	General Manager	Mendocino County Russian River Flood Control and Water Conservation Improvement District
George Gonzalez	Unit Chief	Cal Fire - Mendocino Unit

NAME	TITLE	DEPARTMENT
Hilary White	Outreach & Development Manager	Mendocino Land Trust
Jason Warner	Chief	Redwood Coast Fire Department
Jeff Adair	Training Division Chief	Ukiah Valley Fire Authority
Jim Kessler	Captain	Brooktrails Fire Department
Joaquin Jones	Training Officers Chief	Mendocino VFD
Jon K. Noyer	Chief	Brooktrails CSD Fire Department
JP McMillian	Training Officers Chief	Mendocino VFD
Let Reighter	Chief	Leggett Valley Fire Protection District
Marigold Klein	Community Events Team Member	Red Cross Mendocino County
Michael Rees	Asst. Chief/Training Officer	Albion-Little River VFD
Michael Suddith	Fire Protection Chief	Redwood Coast Fire Department
Mike Leskar	Chief	Whale Gulch (whitethorn) Fire Department
Mitch Franklin	Chief	Hopland Fire Protection District
Nephele Barrett	Executive Officer to MCOG	Mendocino Council of Governments (MCOG)
Patrick Landergen	Chief	Piercy Fire Protection District
R.D. Beacon	Chief	Greenwood Ridge Fire Department
Scott Cratty	Executive Director	Fire Safe Council
Steve Orsi	Chief	Fort Bragg Fire Department
Steve Unzi	Training Officer	Comptche VFD
Steve Wells	Fire Prevention	Fort Bragg Fire Department
Sue Carberry	Chief	Long Valley Fire Protection District/Laytonville Fire Department
Ted Williams	Chief	Albion-Little River VFD
Todd Crabtree	Executive Director	Community Development Commission - Housing Authority
EMS Officer	Training Officer/EMS Officer	Anderson Valley Fire Department
Vincent Heim	Associate Environmental Planner	Caltrans
Molly Nilsson	Environmental Protection Specialist	BLM Point Arena-Stornetta Unit

Consultant Team

The County enlisted a Consultant Team comprised of Atlas Planning Solutions and Dynamic Planning + Science (DP+S) due to its expertise in assisting public sector entities with developing hazard mitigation plans. The Team facilitated the planning process, collected and analyzed data, produced meeting materials, and produced drafts of the MJHMP for review. The MJHMP Consultant Team, as shown in Table 3-3, consisted of a variety of hazard mitigation and certified urban planning professionals.

Table 3-3: MJHMP Update Consultant Team

HMP Update Project Team	HMP Update Project Team Role
Aaron Pfannenstiel, AICP	Project Manager, Atlas Planning Solutions
Ethan Mobley, AICP	Assistant Project Manager, DP+S
Brian Greer	GIS Specialist/Spatial Analyst, DPS
Torie Jarvis	Outreach Manager, HMP Planner, DPS
Ty Johnson	Hazard Mitigation Planner, DPS
Daniel Spivak	Hazard Mitigation Planner, DPS
Alex Krebs	GIS Associate, DPS

Planning Committee Meetings

The Planning Committee met throughout the development of the updated MJHMP. Table 3-4 charts those meetings, including date, type, and topics discussed. Meeting documentation, including agendas, hazard maps, PowerPoint presentations, minutes, sign-in sheets, and other relevant handouts, are provided in Appendix B.

Table 3-4: Meeting Summary

Date	Meeting Type	Topics
March 5th, 2020	Planning Committee Kickoff Meeting	▪ *Mendocino County LHMP/Safety Element Update* ▪ *DMA 2000 Requirements* ▪ *Public Engagement* ▪ *Project Schedule* ▪ *Data Calls/Data Review*
April 29th, 2020	Planning Committee Meeting #1	▪ *Mitigation Planning Defined* ▪ *Expectations from Participating Jurisdictions* ▪ *Planning Process Review* ▪ *Project Schedule* ▪ *Website Review* ▪ *FEMA Hazard Mitigation Program* ▪ *2012 Mitigation plan Review* ▪ *What has Changed?* ▪ *Outreach*
May 27th, 2019	Planning Committee Meeting #2	▪ *Risk Assessment/ Community Vulnerability Review* ▪ *Jurisdictional Exercise* ▪ *RAMP Tool Review* ▪ *RAMP Tool Exercises* ▪ *Review Outreach Materials*
June 19th, 2019	Planning Committee Meeting #3	▪ *Planning Process Recap* ▪ *Mitigation Alternatives* ▪ *Setting Plan Goals* ▪ *Mitigation Action Review*

Review and Incorporation of Existing Documents

The Planning Committee and Consulting Team reviewed and incorporated existing plans, studies, reports, and technical information in the formation of this MJHMP. Those documents are cited throughout the hazard profiles (Section 4.5) and are examined more closely in the Capabilities Assessment (Section 5.3) and in each hazard profiles' plans, policies, and regulatory environment section.

All documents cited in this MJHMP are included in Section 7, Works Cited.

Public Involvement and Outreach

Public involvement is an important and requisite component of any HMP update. The public outreach strategy for this update maximized public involvement throughout the planning process and utilized websites, local media, and community efforts. Due to the unfolding COVID-19 pandemic during the development of this HMP, discussed in detail in Section 4.5.5, all outreach was conducted digitally.

As required by FEMA, the general public was given an opportunity to be involved in the planning process while developing the HMP Update through surveys, a project website, and public review periods. Each is described below.

Surveys

An 8-question community survey was distributed by the County via a number of online platforms. A total of 376 survey responses were collected. The results of the survey were used to ensure that the priorities of the County and participating jurisdictions match those of the residents/community members. For example, community members were asked if they believe their property was at risk from a natural hazard disaster; 79% said "yes." An example survey result is displayed in Figure 3-2, while full results are summarized in Section 5.5.1.2. Full results and pie chart graphics can be found in Appendix B.

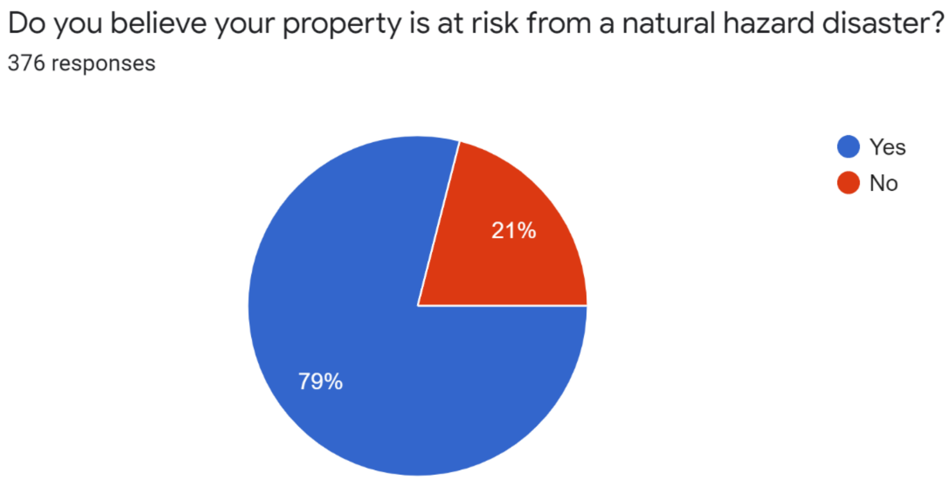


Figure 3-2: Snapshot of community survey results

HMP Update Website

For this MJHMP, a project portal at https://mitigatehazards.com/mendocino-county/ served and will continue to serve as a centralized project information and file-sharing platform. This website provides a tool for project management, collaborative content, and a one-stop-shop for mitigation planning resources.

In addition to internal coordination, the project portal played a critical role in public involvement throughout the planning process and documenting public involvement, including the community survey, meetings, and working sessions. Resources such as the Risk Assessment Mapping Platform (RAMP) and links to all meeting summaries are available to the public via the website. Project participants and stakeholders used the website as a project resource for the duration of the planning process and will continue to have access during the 5-year update cycle and beyond.

Public Review of Draft HMP

The public reviewed the draft HMP during October of 2020. The County and several other jurisdictions announced the available public draft via their websites, and the drafts were available at https://mitigatehazards.com/mendocino-county/. The public was able to provide comment via a collaborative PDF, an online submission form, or an email. The County made considerable changes to Volume 1 and mitigation actions in particular based on productive public feedback. Notably, given the severe wildfire season of 2020, many comments focused on vulnerabilities and mitigation actions for wildfire. The notice and response to comments received are available in Appendix B.

STEP 2: Assess the Risk

In accordance with FEMA requirements, the Planning Committee identified and prioritized the natural hazards affecting both Mendocino County as a whole and each participating jurisdiction individually. It also assessed the vulnerability of those identified hazards. Results from this risk assessment aided subsequent identification of appropriate mitigation actions. While the process is described below, the substance of this risk assessment is detailed in Section 4.

Identify/Profile Hazards

Based on a review of past hazard events, existing plans, reports, and other technical studies, data, and information, the Planning Committee determined if regional hazards could affect the planning area. The Planning Committee completed screening and prioritization processes to determine priority hazards to be assessed. A risk assessment finalized the prioritization process by ranking hazards according to the impact and threat to the County in Volume 1 and each participating jurisdiction in Volume 2.

Assess Vulnerabilities

Assessing vulnerabilities exposes the unique characteristics of individual hazards and begins the process of narrowing down which areas within Mendocino County are vulnerable to specific hazard events. The vulnerability assessment a GIS overlaying method for examining such vulnerabilities more in-depth. Planning partners completed this exercise both singly and jointly with the County, and the identified hazards varied widely depending on the geographic make-up of, priorities of, and services provided by the participating jurisdiction. Using these methods, planning partners estimated vulnerable populations, infrastructure, and potential losses from hazards.

> ***Updated content for each hazard profile for the County, including vulnerability, is provided in Section 4.5. Planning partners are profiled individually in Volume 2 of this plan.***

Web-Based Risk Assessment Mapping and Analysis

The web-based and interactive Risk Assessment Mapping Platform (RAMP), accessed via the project website at www.mitigatehazards.com, allows interactive discovery of risk, vulnerability, and exposure data developed especially for Mendocino County. RAMP is a mapping platform built specifically for mitigation planning. It displays County facilities and buildings overlaid with natural hazards layers to bring interactivity and individual discovery to the GIS analysis performed for the MJHMP. Figure 3-3 shows the location of RAMP on the project website.

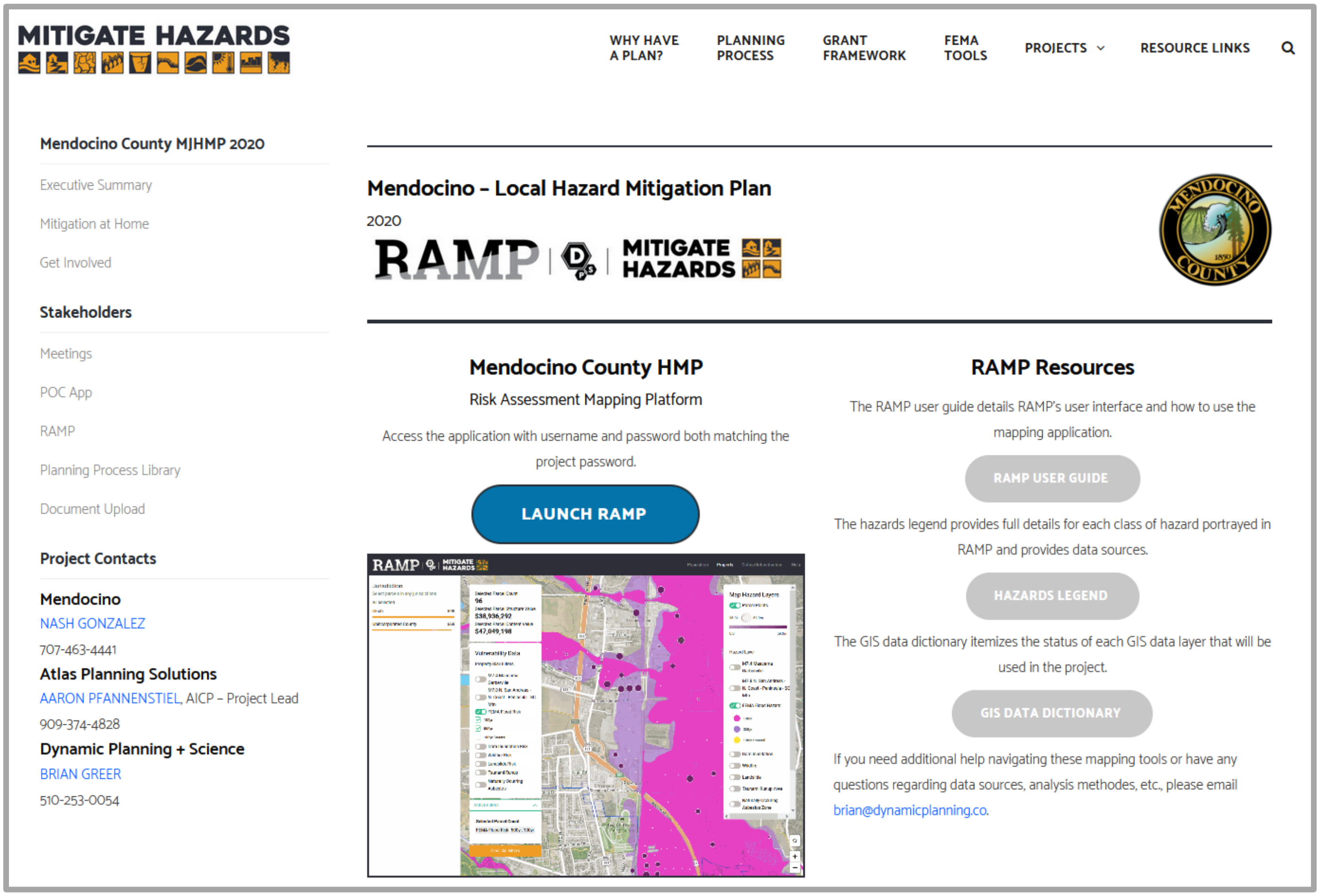


Figure 3-3: RAMP Access at mitigatehazards.com

The Planning Committee used RAMP to understand vulnerabilities to the County and participating jurisdiction populations, critical facilities, and properties exposed to hazards with spatial footprints. Users interactively filter facilities and buildings by natural hazard zones and construction characteristics.

RAMP's robust data filtering and summation calculations allow the user to understand and visualize vulnerabilities at the facility level with detailed information on the number of structures exposed to various natural hazards. RAMP enables Mendocino County to pinpoint vulnerabilities and reinforces problem statements in the mitigation strategy. Figure 3-4 demonstrates the RAMP web-based interface.

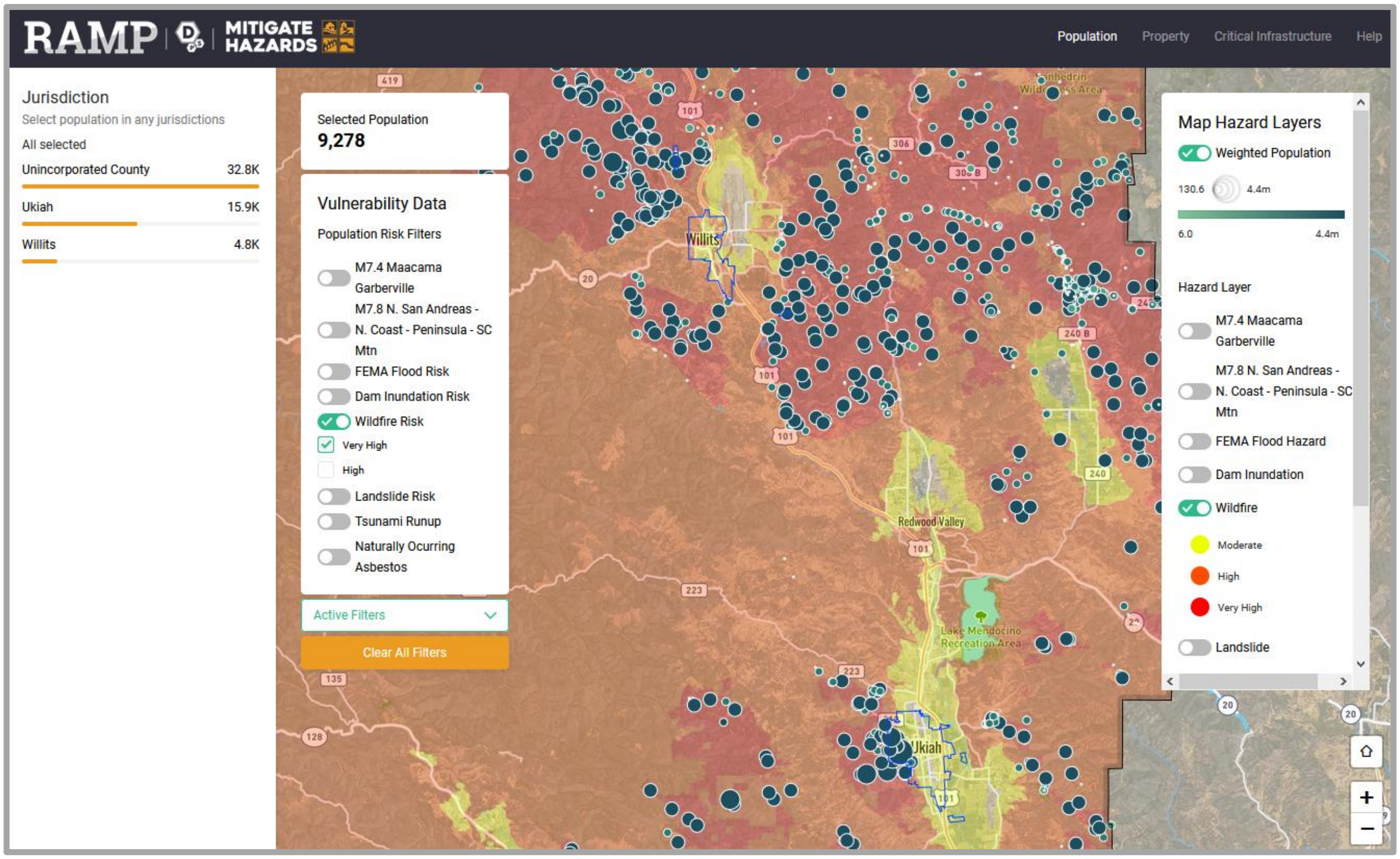


Figure 3-4: RAMP showing the population of Fort Bragg overlaid with FEMA Flood Hazard

STEP 3: Develop a Mitigation Strategy

This plan provides an explicit strategy and blueprint for reducing potential losses identified in the risk assessment based on existing authorities, policies, programs and resources, and participating jurisdictions' abilities to expand on and improve these existing tools. MJHMP development included identifying goals, assessing existing capabilities, reviewing the 2014 HMP goals, and identifying new mitigation actions. The MJHMP was prepared in accordance with requirements from DMA 2000 and the California Office of Planning and Research (OPR) and FEMA's HMP guidance. The process is described below; the substance of the mitigation strategy is detailed in Section 5 for the County and within Volume 2 for each participating jurisdiction.

Identify Goals

The Planning Committee reviewed the 2014 HMP goals and determined their current validity, consistent with FEMA requirements. The goals were updated to meet the current hazard environments and to be consistent with the changing policies and goals of participating jurisdictions. The goals are presented in Section 5.4.

Develop Capabilities Assessment

A capabilities assessment is a comprehensive review of participating jurisdictions' capabilities and tools to implement the mitigation actions in the MJHMP. The Planning Committee identified technical, financial, and administrative capabilities to implement mitigation actions, as detailed in Section 5.3 and in Volume2 for each participating jurisdiction.

Identify Hazard Problem Statements

The Planning Committee developed mitigation actions, as both planning activities and projects, to address problems that could originate from hazards identified in the risk assessment, in line with identified capability of each jurisdiction. Mitigation actions were created first by developing problem statements for prioritized hazards. As a rule of thumb, each hazard problem statement should be mitigated with a combination of short-term and long-range planning activities, through operational or physical projects. Hazard Problem Statements are located at the conclusion of each hazard profile in table format and are also uploaded in an interactive web-based Mitigation Action Support Tool (MAST), described below. Hazard problem statements for the County and other planning partners are categorized as impact-related, victim-related, or threat-related, as described in Figure 3-5.

IMPACT

- Casualties
- Property Damage
- Business Interruption
- Financial Loss
- Environmental Contamination

VICTIM

- School Children in High Hazard Areas
- Care Facilities in High Hazard Areas
- Vulnerable Population Exposed to Hazards

THREAT

- Increased Fuels due to Drought
- Hotter, Drier Climate
- More Intense Storms
- Impervious Surfaces = Greater Runoff
- Increases of Invasive Species

Figure 3-5: Categories of issues addressed in problem statements

Identify Mitigation Actions

As part of the MJHMP planning process, the Planning Committee reviewed and analyzed the status of the mitigation actions identified in the 2014 HMP. The Consultant Committee and Planning Committee then worked together to identify and develop new mitigation actions with implementation elements. The Planning Committee prioritized and further detailed the implementation strategies during Planning Committee Meeting #3. Additional detail on these mitigation actions is provided in Section 5.3.

Mitigation Action Support Tool (MAST)

Hazard problem statements and mitigation activities are presented and will be updated through a web interface application developed specifically for participating jurisdictions, creating a living document that can continue to be a valuable resource into the future. The Mitigation Action Support Tool (MAST) is accessible through www.mitigatehazards.com

MAST is a web-based interactive tool that enables multiple users to search, view, enter, and update mitigation actions, ideas or projects, and other information. MAST provides planning partners and plan reviewers (California Office of Emergency Services (Cal OES) and FEMA) access to valuable mitigation information that can be leveraged by future planning or other risk reduction efforts within the County. Planning partners can update the status of their mitigation projects throughout the planning lifecycle, and this web-based tool will improve participating jurisdiction's ability to apply for FEMA's Hazard Mitigation Assistance (HMA) grant programs including initial grant application processes through Cal OES.

County Planning Processes Library

Mendocino County has completed the MJHMP planning process as per FEMA guidelines. This process is detailed in this section, and it consists of the following elements:

- **Risk Assessment:** the risk assessment measures the potential impact to life, property, and the economy resulting from natural hazards. The intent of the Risk Assessment is to identify the vulnerabilities of a community to the greatest extent possible given available data. The risk assessment increases understanding of natural hazard impacts to the community and provides a foundation to develop and prioritize mitigation actions.
    - Mendocino County: View Maps / Download Maps
    - Fort Bragg: View Maps / Download Maps
    - Ukiah: View Maps / Download Maps
    - Willits: View Maps / Download Maps
    - Point Arena: View Maps / Download Maps
    - County Office of Education: View Maps / Download Maps

- **Hazard Prioritization:** the MJHMP Planning Committee considered and screened a broad set of hazards presented in relevant local, regional, and statewide hazard planning documents. The crosswalk of documents reviewed and the results of screening the relevant hazards to be reviewed are outlined in Section 4.1.1. The MJHMP then considered past hazard events in Mendocino County to help prioritize hazards to be evaluated in this document, as outlined in Section 4.1.2.d
    - Mendocino County: View Risk Matrix
    - Fort Bragg: View Risk Matrix
    - Ukiah: View Risk Matrix
    - Willits: View Risk Matrix
    - Point Arena: View Risk Matrix
    - County Office of Education: View Risk Matrix

- **Areas of Concern:** the MJHMP Planning Committee identified the areas of concern and potential impacts of each of the identified hazards on the community. Developing these "problem statements" for areas of concern, which describe the nature of the consequences or effects of a hazard occurrence on the community and its assets, ensures the identified mitigation actions are tailored to the specific problems created by various hazard scenarios and are specific to each participating jurisdiction.
    - Mendocino County: View Problem Statements
    - Fort Bragg: View Problem Statements
    - Ukiah: View Problem Statements
    - Willits: View Problem Statements
    - Point Arena: View Problem Statements
    - County Office of Education: View Problem Statements

- **Capability Assessments**: A capabilities assessment consists of an analysis of the existing planning and regulatory capabilities of the County. Planning and regulatory tools typically used by local jurisdictions to implement hazard mitigation activities are building codes, zoning regulations, floodplain management policies, and other municipal planning documents.
    - Mendocino County: View Capability Assessment
    - Fort Bragg: View Capabilities Assessment
    - Ukiah: View Capabilities Assessment
    - Willits: View Capabilities Assessment
    - Point Arena: View Capabilities Assessment
    - County Office of Education: View Capabilities Assessment

Multi-Jurisdiction Planning Process

Multi-jurisdiction hazard mitigation planning offers many benefits, such as increased coordination and efficiency in planning and implementation efforts. At the same time, each jurisdiction has specific hazards and specific mitigation actions that must be addressed individually. The MJHMP balances the benefits of a comprehensive, coordinated approach to hazard mitigation with the specific realities of individual participating jurisdictions. Multi-jurisdiction plans are contemplated under FEMA regulations at 44 C.F.R. § 201.6(4).

Volume 2 of this MJHMP documents each jurisdiction's HMP resources. Each participating jurisdiction individually assessed hazards, explored hazard vulnerability, developed mitigation strategies, and followed the same planning process as Mendocino County to create annexes. Volume 2 provides each participating jurisdiction's stand-alone annex.

STEP 4: Adopt and Implement the Plan

Once the risk assessment and mitigation strategy were completed, information, data, and associated narratives were compiled into the MJHMP. Section 2 provides detailed information on new and updated elements of the MJHMP.

Plan Review and Revision

Once the *Draft* MJHMP Update was completed, a public and government review period was established for official review and revision. Public comments were accepted, reviewed, and incorporated into this update. Applicable comments from the public have been received and addressed prior to submitting to FEMA and Cal OES. The notice of the public comment period is included in Appendix B.

Plan Adoption and Submittal

This plan has been submitted and approved by FEMA and adopted by the County. Copies of the resolutions are provided in forward of this document.

Implement, Evaluate, and Revise the Plan

The true worth of any mitigation plan is its implementation and success under FEMA's grant programs. This MJHMP has been assembled to reduce the risk of natural hazards, and also to meet the requirements of the DMA 2000 and maintain eligibility under FEMA's Hazard Mitigation Assistance (HMA) grant programs.

FEMA administers three programs that provide funding for local agencies with approved mitigation plans:

- **Hazard Mitigation Grant Program (HMGP),** which assists in implementing long-term hazard mitigation planning and projects following a Presidential major disaster declaration.
- **Building Resilient Infrastructure and Communities (BRIC),** which provides funds for hazard mitigation planning and projects on an annual basis.
- **Flood Mitigation Assistance (FMA),** which 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) on an annual basis.

For more information about FEMA HMA, visit: https://www.fema.gov/hazard-mitigation-assistance.

Plan Maintenance

The County will update and monitor this plan in accordance with all FEMA requirements in order maintain eligibility for FEMA HMA. Evaluation and revision procedures for this plan are detailed in Section 6.

Section 6 includes the measures Mendocino County and planning partners will take to ensure the MJHMP's continuous long-term implementation, including MJHMP monitoring, reporting, evaluation, maintenance, and updating. Most of this implementation and maintenance will be done through MAST. Figure 3-6 demonstrates how MAST information will translate into Cal OES NOIs and grant Sub application requests. Section 6 also contains specifics on integrating mitigation with day-to-day decision making.

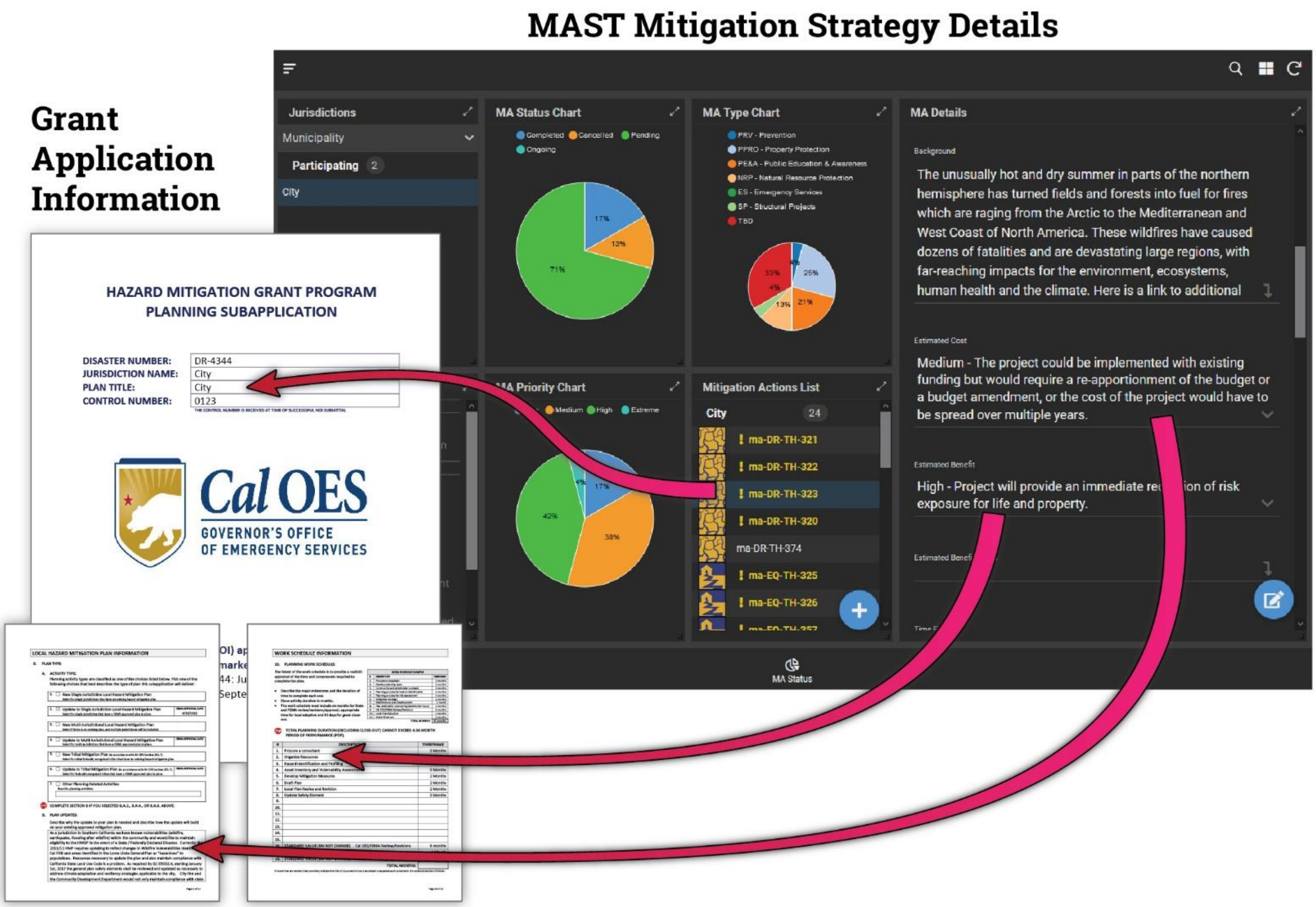


Figure 3-6: MAST elements and Cal OES Grant Applications

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Section 4. Risk Assessment

The risk assessment measures the potential impact on life, property, and the economy resulting from natural hazards. The intent of the Risk Assessment is to identify the qualitative and quantitative vulnerabilities of a community to the greatest extent possible given available data. The risk assessment increases understanding of natural hazard impacts to the community and provides a foundation to develop and prioritize mitigation actions. In turn, mitigation actions reduce damage from natural disasters through increased preparedness and focus resources to areas of greatest vulnerability.

This risk assessment section evaluates potential loss from a hazard event by assessing the vulnerability of buildings, infrastructure, and people. It identifies the characteristics and potential consequences of hazards, explores how much of the County could be affected by a hazard, and assesses the impact on County assets. The risk assessment approach consists of three components:

- **HAZARD IDENTIFICATION AND SCREENING**
  Identification and screening of hazards (Section 4.1)
- **HAZARD PRIORITIZATION**
  Identifying "priority hazards" for each participating jurisdiction to be profiled in more detail (Section 4.1.3)
- **VULNERABILITY ASSESSMENT**
  Determination of potential losses or impacts to buildings, infrastructure, and population This section contains HAZARD PROFILES for individual priority hazards (Section 4.5)

Other sections provide background and context for the risk assessment. Section 4.3 provides a geographic and demographic overview of Mendocino County. Section 4.4 explains in-depth the methods applied to the risk assessment.

4.1 Hazard Identification and Screening

Per FEMA Guidance, the first step in developing the risk assessment is identifying the hazards. This step includes two parts. First, the MJHMP Planning Committee considered and screened a broad set of hazards presented in relevant local, regional, and statewide hazard planning documents. The crosswalk of documents reviewed and the results of screening the relevant hazards to be reviewed are outlined in Section 4.1.1. Second, the MJHMP considered past hazard events in Mendocino County to help prioritize hazards to be evaluated in this document, as outlined in Section 4.1.2.

4.1.1 Hazard Screening

The County's MJHMP Planning Committee first reviewed previously-prepared hazard mitigation plans and other relevant documents to determine the realm of natural hazards that have the potential to affect the County and the nearby region. Table 4-1 provides a crosswalk of hazards identified in the 2014 Mendocino County MJHMP, 2009 Mendocino County General Plan, and the 2018 California State Hazard Mitigation Plan. Eighteen different hazards were identified based on a thorough document review. The crosswalk was used to develop a preliminary hazards list, providing a framework for MJHMP Planning Committee members to evaluate which hazards were truly relevant to planning partners and which ones were not. For example, volcanoes were considered to have no relevance to the County, while earthquake, flood, dam failure, landslide, and wildfire were indicated in every hazard document.

Table 4-1: Document Review Crosswalk

Hazards	2014 Mendocino County MJHMP	2009 Mendocino County General Plan	2018 California State HMP
Agricultural Pests	■		■
Climate Change		■	■
Dam Failure	■	■	■
Drought	■	■	■
Earthquake	■	■	■
Flood	■	■	■
Insect Hazards	■		
Landslide		■	■
Levee Failure	■*		■
Manmade Hazards		■	■
Pandemic Disease	■		■
Sea-level rise			■
Severe Weather			■
Soil Hazards	■**		
Terrorism & Tech Hazards			■
Tsunami	■	■	■
Volcano			■
Wildfire	■***	■	■

** included as part of dam failure*
*** included naturally occurring asbestos*
**** included urban conflagration*

The crosswalk provided the basis for prioritizing hazards to be profiled, displayed in Table 4-2. The prioritized hazards have detailed hazard profiles in Section 4.5, the Vulnerability Assessment.

Table 4-2: Hazard prioritization

Hazard Type	Explanation
Climate Change	**High priority county-wide, profiled hazard.**
Dam/ Levee failure	**High priority county-wide, profiled hazard.**
Drought	**High priority county-wide, profiled hazard.**
Earthquake/ Geologic Hazards	**High priority county-wide, profiled hazard.**
Flood	**High priority county-wide, profiled hazard.**
Hazardous Material	While hazardous materials can release and impact the County, there are better avenues to address this hazard outside this plan.
High Winds/ Straight Line Winds	**High priority county-wide, profiled as part of Severe Weather.**
Insect Hazards	While hazardous insects exist in Mendocino County, this was not considered a priority and is not profiled in this plan.
Pandemic Disease	**High priority county-wide, profiled hazard.**
Severe Weather, including:	**High priority county-wide for heavy wind and heavy rain.**
Extreme Heat	Not a priority as extreme weather event, discussed as climate change impact.
Hail	Hail events are rare in Mendocino County and not profiled in this plan.
High Wind	**Profiled as part of Severe Weather hazard.**
Heavy Rain	**Profiled as part of Severe Weather hazard.**
Fog	While fog events do occur within Mendocino County, they are rare and are not considered a priority.
Lightning	Not a priority as an extreme weather event; discussed as source of wildfire.
Severe Thunderstorm	Severe thunderstorms were not identified as a priority in this plan.
Winter Storm / Extreme Cold/ Freeze Events	While winter storms are present in Mendocino County, they were not identified as a priority for this plan.
Slope Failure	**High priority county-wide, profiled hazard.**
Soil Hazards	**High priority county-wide, profiled hazard (includes erosion and naturally-occurring asbestos).**
Terrorism/Human Caused Threats	While terrorism is certainly a threat to the County and participating jurisdictions, it is best addressed in other plans as this HMP does not address human-caused threats.
Tornado	Impacts to the County from tornados are extremely unlikely, if any.
Volcanic Activity	Due to distance from volcanoes and the limited chance of an eruption, this hazard was not identified as a priority.
Wildfire	**High priority county-wide, profiled hazard.**

4.1.2 Past Major Hazard Events

One important consideration in identifying and prioritizing hazards is past major hazard events, especially those that triggered federal or state disaster declarations. The MJHMP Planning Committee reviewed and considered past major hazard events in Mendocino County as part of the screening and identification process.

Most available information on major past hazard events comes from federal or state disaster declarations. These declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Additional federal or state disaster funding (or both) is generally available in response to a disaster declaration. State funding assistance is provided when a local government's capacity to respond to the disaster is exceeded. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued, allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and do not include the long-term federal recovery programs that accompany major disaster declarations. Quantity and types of damage are the determining factors.

Mendocino County has received 27 federal disaster declarations[1] since 1953, some of which were statewide, including:

WILDFIRE	**4**	**Wildfires**	FLOOD	**8**	**Floods**
EXTREME WEATHER	**8**	**Severe Weather Events**	DROUGHT	**1**	**Drought**

Severe weather and flooding events are most likely to occur in the winter months, with 25 of the 54 federally-declared disasters occurring in January and February. Wildfires have typically occurred in late summer and fall, with 170 wildfire declarations from July through October. Table 4-3 lists federal disaster declarations in Mendocino County since 1953.

[1] Officially, 28 disasters have been declared, as California was declared as part of Hurricane Katrina evacuation; however, no disaster occurred in California.

Table 4-3: Disaster Declarations in Mendocino County 1953- present

Year	Incident Description	Disaster Number
2020	COVID-19	*EM-3428*
2020	COVID-19 Pandemic	*DR-4482*
2019	Severe Winter Storms, Flooding, Landslides, And Mudslides	*DR-4434*
2019	Severe Winter Storms, Flooding, Landslides, And Mudslides	*DR-4431*
2018	Mendocino Fire Complex	*FM-5262*
2017	Redwood Valley Fire	*FM-5219*
2017	Severe Winter Storms, Flooding, And Mudslides	*DR-4305*
2017	Severe Winter Storms, Flooding, And Mudslides	*DR-4301*
2017	Wildfires	*DR-4344*
2008	Wildfires	*EM-3287*
2006	Severe Rain Storms, Flooding, Mudslides, And Landslides	*DR-1628*
2005	Hurricane Katrina Evacuation (National)	*EM-3248*
1998	Severe Winter Storms and Flooding	*DR-1203*
1997	Severe Rain Storms, Flooding, Mud And Landslides	*DR-1155*
1995	Severe Winter Storms, Flooding, Landslides, Mud Flow	*DR-1046*
1995	Severe Winter Storms, Flooding, Landslides, Mud Flows	*DR-1044*
1994	The El Nino (The Salmon Industry)	*DR-1038*
1993	Severe Winter Storm, Mud & Land Slides, & Flooding	*DR-979*
1991	Severe Freeze	*DR-894*
1986	Severe Rain Storms & Flooding	*DR-758*
1983	Coastal Rain Storms, Floods, Slides & Tornadoes	*DR-677*
1977	Drought	*EM-3023*
1974	Severe Rain Storms & Flooding	*DR-432*
1974	Severe Rain Storms & Flooding	*DR-412*
1970	Severe Rain Storms & Flooding	*DR-283*
1969	Severe Rain Storms & Flooding	*DR-253*
1964	Heavy Rains & Flooding	*DR-183*

Source: FEMA Disaster Database via http://mitigatehazards.com/hazard-mapping/ , accessed 06/30/2020.

Drought declarations may also occur through the United States Department of Agriculture (USDA), as agricultural areas such as Mendocino County can be particularly impacted by drought. A USDA disaster declaration certifies that the affected county has suffered at least a 30-percent loss in one or more crop or livestock areas and provides affected producers with access to low-interest loans and other programs to help mitigate the impact of the drought. Importantly, all counties neighboring those receiving disaster declarations are eligible for the same assistance.

Hazard events occurring outside County boundaries also can directly and indirectly impact Mendocino County. For instance, dam failures and wildfires may occur outside Mendocino County but affect watersheds that drain into the County and result in flooding and other impacts related to watershed health. Power supply also could be interrupted by hazard occurrences outside of the County.

4.1.3 Compounding Hazard Events

This MJHMP examines the vulnerabilities of hazard events in Mendocino County, generally taken individually; however, hazards occur in combination as well. Often another hazard occurs as a secondary hazard, such as an earthquake causing a landslide or tsunami or a wildfire and severe rain events causing debris flow. Other events are compounded by outside factors, such as wildfire evacuations occurring during Public Safety Power Shutoff (PSPS) events. This hazard mitigation plan highlights multiple hazard risks within the hazard profiles by highlighting secondary hazards and, for wildfire in particular, highlighting local compounding conditions that accelerate wildfire impacts such as PSPS. See Section 4.5.10.1.

Of particular concern in this 2020 MJHMP Update is the pairing of a hazard event and need for evacuation or response in light of the ongoing COVID-19 pandemic. Local governments are actively considering response and mitigation needs that can help mitigate the impacts of a multiple-hazard event that include pandemic and another hazard such as flood, earthquake, or wildfire. Many of the problems and mitigation actions explored herein take this emerging issue into consideration. For more on pandemic and its impact on other hazards, see Section 4.5.5.6.

4.2 Hazard Prioritization

The Planning Committee's hazard prioritization process combines historical data, local knowledge, and consensus opinions to produce a matrix that illustrates whether each profiled hazard is an extreme, high, or medium priority. The criteria below were used to evaluate hazards and identify the highest risk hazard in Mendocino County. The results of the prioritization process for Mendocino County are shown in Figure 4-1.

Each participating jurisdiction also completed the hazard prioritization process specifically for the jurisdiction, and this important initial stage informed the rest of the planning process for each jurisdiction. Individual prioritization matrices are available in Volume 2 of this MJHMP.

The following questions and guidance shaped the ranking on the matrices:

Probability

What is the likelihood of a hazard event occurring in a given year?

- **Unlikely-** less than 1% annual probability or occurs rarely in the region or community
- **Possible-** 1%-10% annual probability or could occur. Uncommon in the region or community
- **Likely-** 10%- 100% annual probability or recurrent. Not frequent in the region or community
- **Highly likely-** 100% annual probability or occurs frequently in the region or community

Impact

In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?

- **Minor-** very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.
- **Limited-** minor injuries only. 10%-25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.
- **Critical-** multiple deaths or injuries possible. 25%-50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.
- **Catastrophic-** high number of deaths or injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.

Risk Assessment Matrix Definitions

PROBABILITY RATING

The likelihood of a hazard event occurring within a time period?

PROBABILITY

Highly Likely	**Highly likely** - 100% annual probability. Or Likely to occur every year in your lifetime.
Likely	**Likely** - between 10 & 100% annual probability. Or will occur several times in your lifetime.
Possible	**Possible** - between 1 & 10% annual probability. Or Likely to occur some time in your lifetime.
Unlikely	**Unlikely** - less than 1% annual probability. Or unlikely but possible to occur in your lifetime.

IMPACT RATING

In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs? The impact could be in terms of one hazard event (flooding from a culvert failure) or a large-scale event (multiple rivers flooding) in the same jurisdictional boundary.

IMPACT			
Minor	Limited	Critical	Catastrophic

Minor - very few injuries, if any. Only minor property damage & minimal disruption on quality of life. Temporary shutdown of critical facilities.

Limited - minor injuries only. Approx. 10% or less of property in disaster footprint damaged or destroyed. Complete shutdown of critical facilities for more than one day.

Critical - multiple deaths/injuries possible. Between 25% and 50% of property in disaster footprint is damaged or destroyed. Complete shutdown of critical facilities for more than one week.

Catastrophic - high number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.

To concentrate resources, the jurisdictional planning team will focus on "High" and "Extreme" risk hazards. These hazards have the higher probability and greater impact as it relates to the jurisdictions planning area.

Hazard definitions are included in **Vol. 1** of this plan. Some hazards are discussed as subset hazards— e.g., "Dam Failure" within the "Flood" hazard profile. If a hazard is not present on the risk matrix or are grey in color, the jurisdictional planning team felt the hazard had a minimal footprint within their planning area and was not ranked.

Hazard Information / Legend:

Climate Change impacts will be addressed at the end of each hazard section within the 2020 plan update and as a stand alone section for each jurisdiction...
For County and Municipal governments you will be required to address climate change impacts in the Safety Element of your General Plan. Climate change may change the frequency, duration and intensity of hazards listed above.
Pandemic will be profiled for every jurisdiction.

Mendocino County Risk Matrix

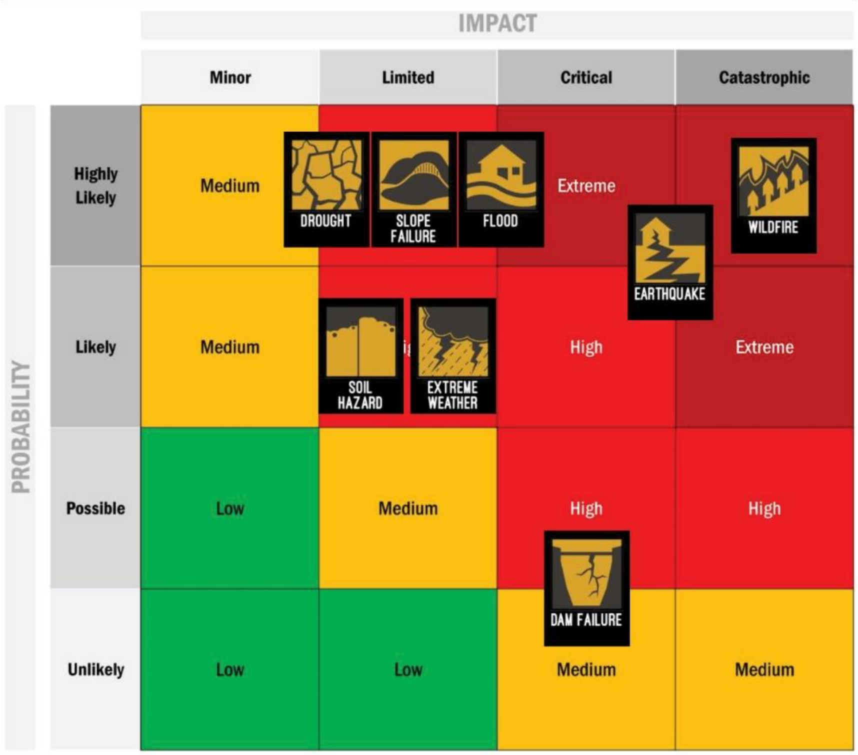


Figure 4-1: Prioritized Hazard Assessment Matrix for Mendocino County

4.3 Mendocino County Geographic and Demographic Profile

The geographic and demographic profile for Mendocino County and planning partners sets the stage for the vulnerabilities assessment. Pairing the vulnerabilities assessment and regional profile can help guide jurisdictions' resources to key populations and geographic areas.

4.3.1 Geography

Mendocino County is located along the coast of Northern California. It is bordered by Humboldt and Trinity counties to the north; Tehama, Glenn, and Lake counties to the East; Sonoma County to the south; and the Pacific Ocean to the west. The county lies 176 miles from San Francisco at its northernmost point. At its southernmost point, the county is 437 miles north of Los Angeles. The county occupies 3,510 square miles (2,246,000 acres) and has 129 miles of coastline. Elevations in the county range from sea level at the Pacific Ocean to 6,954 feet atop Anthony Peak. Mendocino County features subregions characterized by either large tracts of timberland, agriculture, and coastal mountain. (Mendocino County MJHMP, 2014)

The County features beautiful stands of redwoods and Douglas firs which tower down from the Pacific Coast Range. Numerous mountain peaks over 6,000 feet grace the northeastern portion of the county; their peaks retain snow caps until early summer. Much of the forest contains iconic coastal redwoods and sequoias. Oak woodlands are scattered throughout the rolling hills of the county. The county is characterized by steep slopes, with the main ridges oriented north-northwest to south-southeast. Rivers and streams are abundant, some flowing year-round and others drying up in the summer. The Eel River drains to the north and the Russian River to the south. Other rivers drain the west side of the coastal mountains to the ocean, including from south to north: the Gualala River North Fork, Garcia, Navarro, Albion, Big, Noyo, and Ten Mile Rivers. (Mendocino Fire Safe Council, 2019)

Groundwater is a main source for municipal and individual domestic water use in incorporated areas of County outside of the Ukiah Valley. It also contributes significantly to irrigation needs. Groundwater wells throughout the County are used for domestic, commercial, industrial, agricultural, and for fire protection needs. (Mendocino County General Plan, 2009)

Groundwater in the County is sourced from two unique geologic settings, which include inland valleys and mountainous areas. Mountainous areas are underlain by consolidated rocks of the Franciscan Complex. Interior valleys are underlain by thick deposits of valley fill. There are six primary groundwater basins in Mendocino County which include: Round Valley, Little Lake Valley (Willits Valley), Ukiah Valley, Laytonville Valley, Potter Valley, and Anderson Valley. (*Id.*)

Surface water is utilized as well. Water supply in the remainder of the County, primarily unincorporated areas, is generally supplied by onsite methods such as wells or springs. These supply sources are recharged annually by winter precipitation. Van Arsdale Reservoir and Lake Mendocino are two notable surface water storage facilities in the County. Smaller reservoirs and ponds are also prevalent. (*Id.*)

Figure 4-2 displays a geographic overview of Mendocino County.

4.3.2 Climate

Mendocino County's climate is generally mild and can be characterized by moist, cool winters and warm dry summers. Inland temperature extremes range from lows of 5 degrees Fahrenheit to highs over 110 degrees Fahrenheit, while coastal areas experience less extreme temperatures ranging from 20 to 80 degrees Fahrenheit. (Mendocino County MJHMP, 2014) Mendocino County receives precipitation as both rain and snow. The average annual rainfall in Mendocino County ranges from slightly less than 35 inches in the Ukiah area to more than 80 inches near Branscomb. Snowfall is constrained to higher elevations, and most rainfall occurs during storms originating off the coast northwest of the County, which predominate in the winter months. There is very little rainfall during the summer months. (Mendocino County General Plan, 2009)

Figure 4-2: Mendocino County Geographic Overview

4.3.3 Demographics and Vulnerable Populations

Population information directly relates to the impact of hazards and to other community needs such as housing, industry, stores, public facilities and services, and transportation. Knowledge of the composition of the population, how it has changed, and how it may change in the future helps with future decision making.

This overview of regional demographics comes primarily from the United States Census Bureau's five-year estimate period from 2013-2017. The United States Census Bureau estimated Mendocino County's population to be 87,497 for the 2013-2017 5-year estimate period. Respectively, there is a total population of 58,995 for the unincorporated Mendocino County, 7,269 for the City of Fort Bragg, 15,917 for the City of Ukiah, 4,844 for the City of Willits, and 472 for the City of Point Arena. (American Community Survey, 2017)

Important note:

The demographics information contained herein has been post-processed based on the United States Census Bureau's five-year estimate period from 2013-2017 and will not necessarily match other demographics-based regional studies or plans. In order to examine geometries not available in census reports, including unincorporated County areas, a weighted GIS analysis combined and redistributed block groups. Inherently, the margin of error for this data can be high especially in more rural areas.

This section provides a generalized approximation of specific demographics, reported by various planning study areas. It is not meant to provide any definitive information, but merely to suggest larger trends in the region.

4.3.3.1 Introduction to Vulnerable Populations

Importantly, demographics help identify which populations may be particularly vulnerable to hazard events. Some populations are at greater risk because of age, resources, physical abilities, or other factors. Vulnerability in the face of a hazard event is not a fixed characteristic; the same person may be at risk for some hazards but not at risk for others. For example, a low-income family without a car may be at risk for a wildfire or flood if a quick evacuation is necessary but prepared in the event of an earthquake. Some individuals are highly and permanently vulnerable to many hazards, such as the frail elderly, people living with chronic sensory, mobility, or cognitive impairments, and individuals dependent upon assistive devices or complex medical regimens in order to survive. (National Center for Disaster Preparedness, 2020) Vulnerable populations also may be living in hazard-prone areas, compounding their risk.

In the context of all-hazards preparedness and response planning, **at-risk individuals** (often used interchangeably with "**vulnerable populations**") are defined federally as "children, pregnant women, senior citizens, and other individuals who have access or functional needs in the event of a public health emergency." (42 U.S.C. § 2802(b)(4)(B)(2019)) Examples of these populations may include, but are not limited to, individuals with disabilities, individuals who live in institutional settings, individuals from diverse cultures, individuals who have limited English proficiency or are non-English speaking, individuals who are transportation-disadvantaged, individuals experiencing homelessness, individuals who have chronic medical disorders, and individuals who have pharmacological dependency.

Natural resource managers may be able to reduce the vulnerability of certain populations by increasing the adaptive capacity of affected communities. Examples include cost-sharing to reduce fuels, stabilize structures, or implement flood-reducing measures or educational programs offered in English and Spanish and targeted to specific populations. Specifically, planning for vulnerable populations in hazard mitigation can help prioritize resources where they will be the most effective.

This section explores the various demographic and economic circumstances surrounding common vulnerable populations.

4.3.3.2 Income & Housing

Income or wealth is one of the most important factors in natural hazard vulnerability. First, low income populations are less able to afford housing and other infrastructure that can withstand extreme events. , Low income populations typically occupy more poorly-built and inadequately-maintained housing. For example, mobile or modular homes are more susceptible to damage in earthquakes and floods than other types of housing. In urban areas, low income populations often live in older houses and apartment complexes, which are more likely to be made of un-reinforced masonry. This building type is particularly susceptible to damage during earthquakes.

Second, low income populations are less able to purchase resources needed for disaster response. In the United States, individual households are expected to use private resources to prepare for, respond to, and recover from disasters to a large extent. This means that households living in poverty and minorities are disadvantaged when confronting hazards. The more affluent are able to relocate to safer areas or rebuild following a hazard event. Moreover, individuals who do not own cars or who cannot afford gas for their cars will likely decide not to evacuate. (Krause & Reeves, 2017)

Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters. This means that residents below the poverty level have a great deal to lose during an event and are the least prepared to deal with potential losses. Hurricane events such as Harvey, Irma, and Katrina demonstrate that low-income and minority communities are more vulnerable to hazard events, and they struggle to recover the most. (*Id.*)

Figure 4-3 shows the median household income distribution for Mendocino County. The "median" is the value that divides the distribution of household income into two equal parts (e.g., the middle). The median household income in Mendocino County in 2017 (in 2017 dollars) was estimated to be $50,833, compared to $61,372 across the U.S. (United States Census Bureau, 2018)

4.3.3.3 Age

Children and the elderly may be more vulnerable during an extreme hazard event.

Specific planning attention for the elderly is an important consideration, especially given the current aging of the American population. Elderly vulnerability can vary significantly based on health, age, and economic security. However, as a group, the elderly more often lack physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences that can slow recovery. They are more likely to be vision, hearing, or mobility impaired and more likely to experience mental impairment or dementia.

Additionally, elderly persons are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as "critical facilities" by emergency managers because they require extra notice to implement evacuation. Elderly residents living in their own homes may have more difficulty evacuating and could be stranded in dangerous situations.

Lower-income elderly populations are less likely to have access to medical care due to financial hardship and are more likely to need special medical attention, which may not be readily available during natural disasters.

In many cases, both children and the elderly depend on others to care for them during day-to-day life. Very young children and the elderly may be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards. They also may be weaker and less able to survive a hazard event even as children often bounce back from illness faster than older populations.

Finally, both children and the elderly have fewer financial resources and are frequently dependent on others for survival. For these populations to remain resilient before and after a natural hazard event, it may be necessary to assist residents with resources provided by the County, Cities, State, and Federal emergency management agencies and organizations.

Based on 2013-2017 American Community Survey 5-year estimates, 84% of Mendocino County households include elderly individuals. The overall age distribution for Mendocino County is illustrated in Figure 4-4 for the population under 18 and Figure 4-5 for population over 65. Figure 4-5 shows that the highest urban concentrations of people under the age of 18 occur in Point Arena, with a significant rural center near the City of Willits.

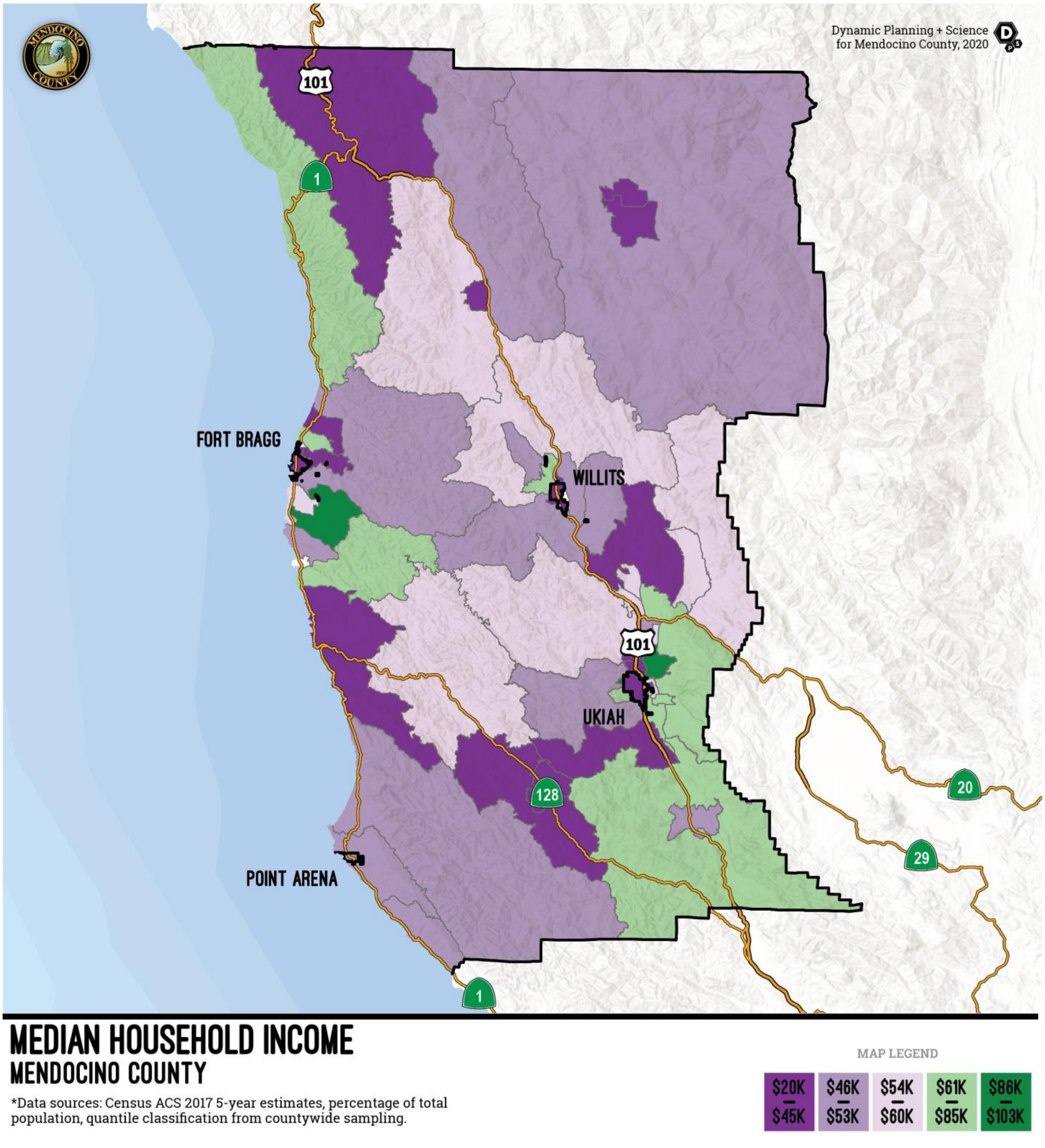
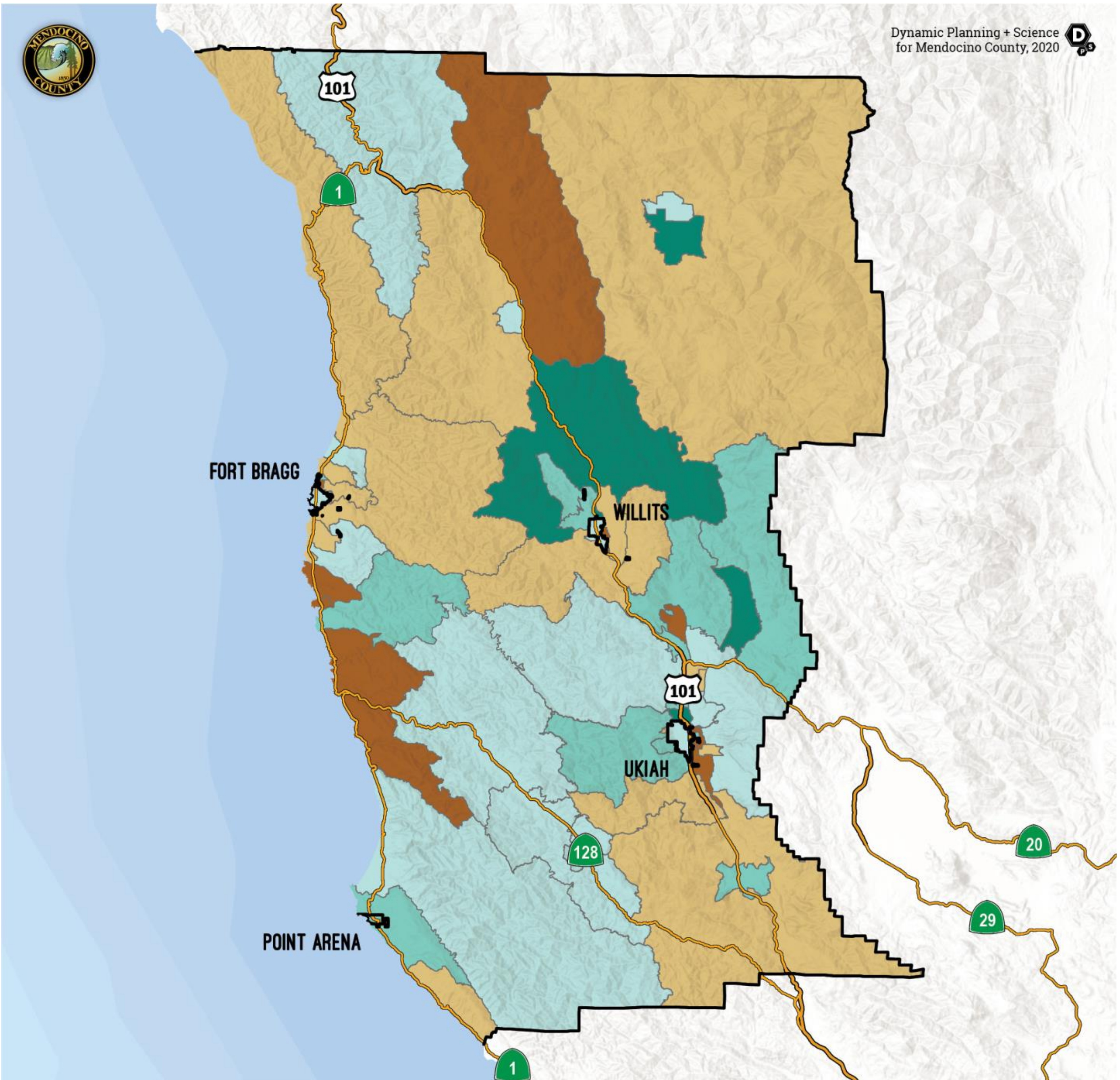


Figure 4-3: Median Household Income Distribution



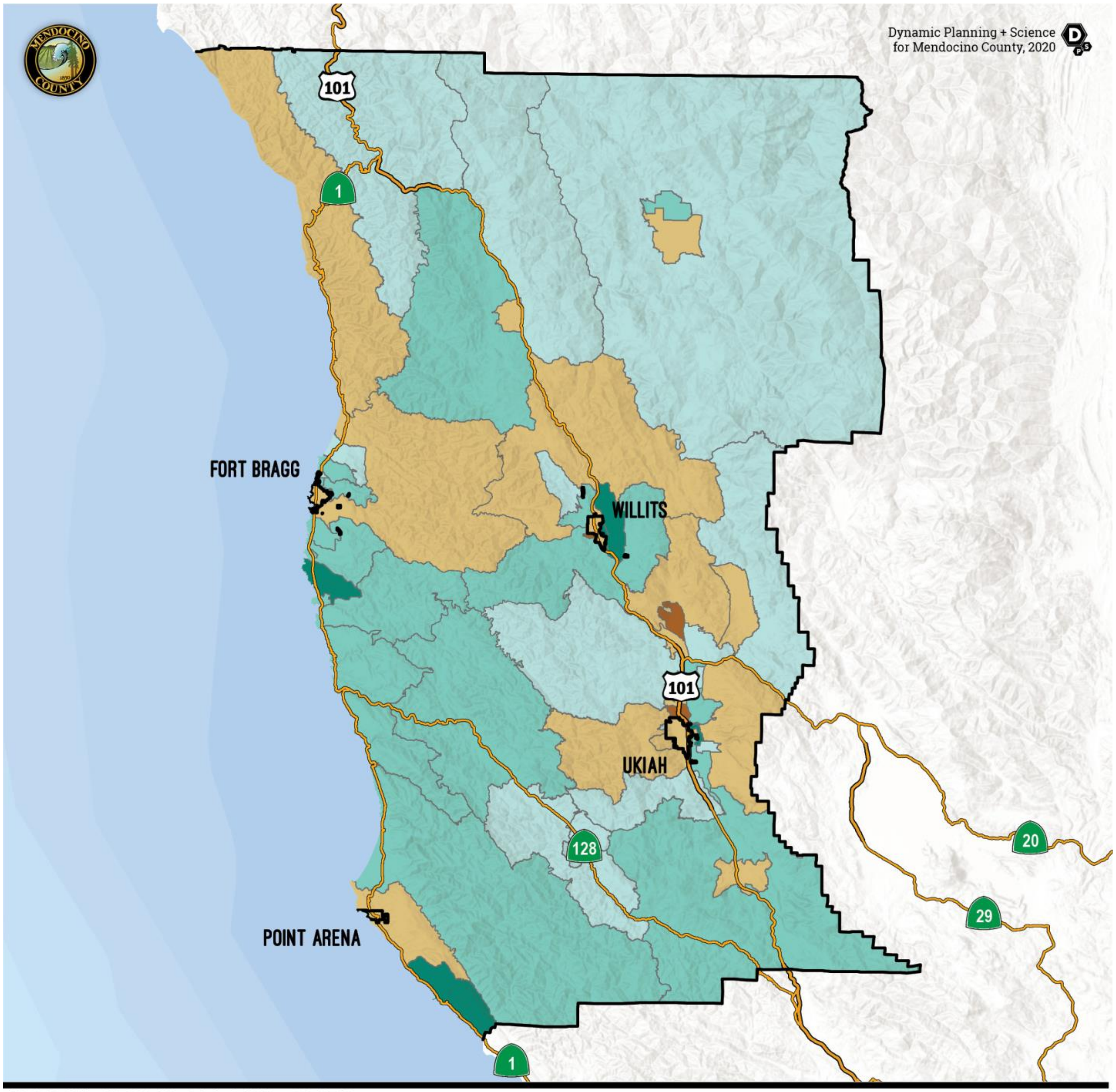
POPULATION UNDER 18
MENDOCINO COUNTY

*Data sources: Census ACS 2017 5-year estimates, percentage of total population, quantile classification from countywide sampling.

MAP LEGEND

10% OR LESS	10.1% – 18%	18.1% – 26%	26.1% – 33%	33.1% OR MORE

Figure 4-4: Population Under Age 18



POPULATION 65 AND OVER
MENDOCINO COUNTY

*Data sources: Census ACS 2017 5-year estimates, percentage of total population, quantile classification from countywide sampling.

MAP LEGEND

10% OR LESS	10.1% — 18%	18.1% — 25%	25.1% — 40%	40% OR MORE

Figure 4-5: Population Over Age 65

4.3.3.4 Race, Ethnicity, and Language

Non-English or limited-English speakers may have difficulty understanding emergency information as a result of language and literacy barriers. Non-white communities in fire-prone areas appear from research to be less able to adapt to a wildfire event. (Levin, Phil; Davies, Ian, 2019) Another study found that Non-white communities lose up to $29,000 on average in personal wealth following events like hurricanes and wildfires. (Mandel, 2018) Since higher proportions of non-white persons live below the poverty line than the majority white population, and low income can compound vulnerability. Farmworkers may be particularly vulnerable during a hazard event, especially those non-English speaking and those living in temporary worker housing. (California Employment Development Department, 2019) (U.S. Dep't of Ag, 2017)

According to the 2013-2017 American Community Survey estimates, at least 16% of total households speak Spanish, with 3% speaking limited English. Figure 4-6 depicts the non-English-speaking language distribution for Mendocino County for 2013-2017.

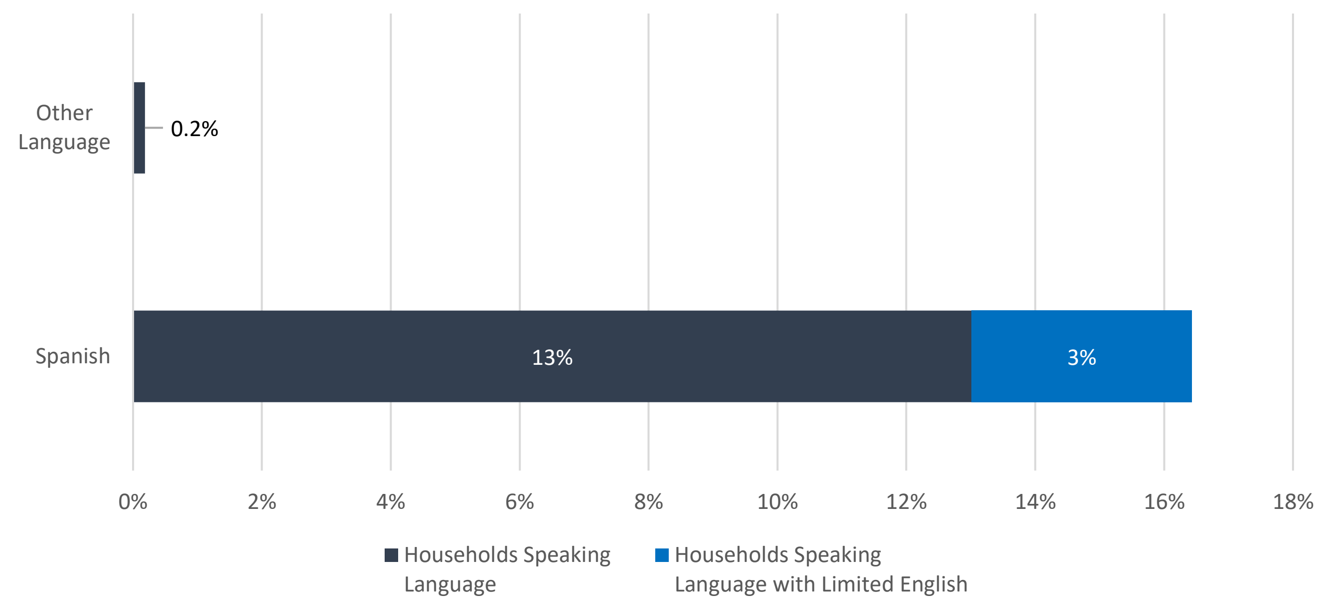


Figure 4-6: Non-English Household Language
Source: 2013-2017 American Community Survey 5-Year Estimates

According to the 2013-2017 American Community Survey estimates, Mendocino County is predominately white, at 87% of the total population. The largest minority population is Hispanic, at 25% of the total county population. Figure 4-7 shows the racial distribution within Mendocino County.

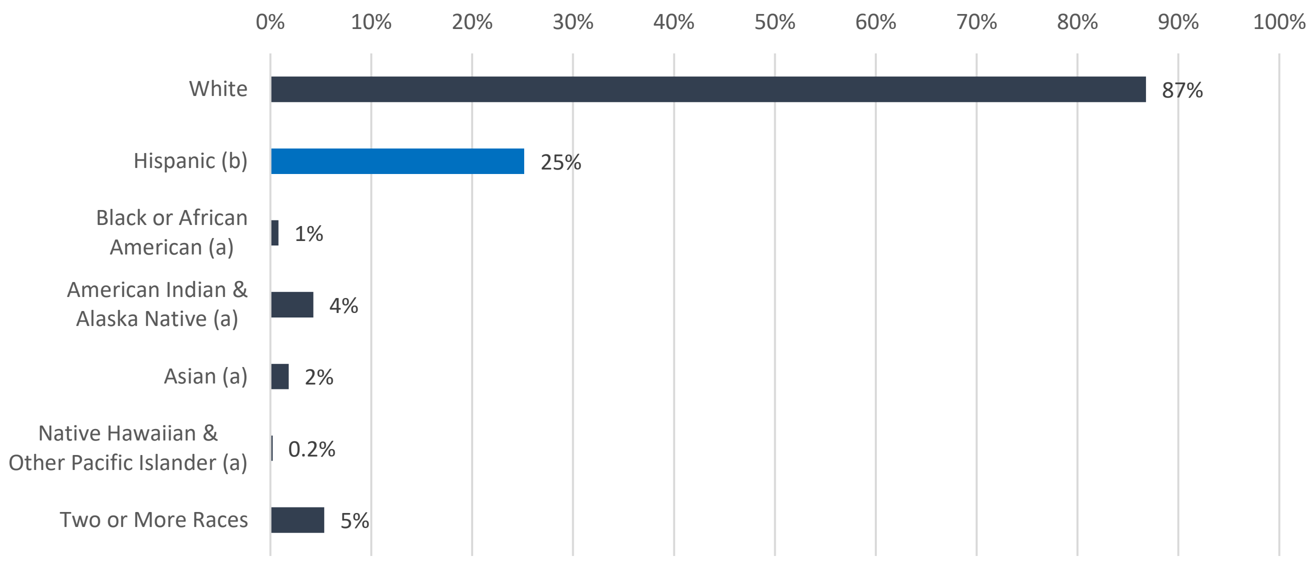


Figure 4-7: Mendocino County Race Distribution in 2013-2017

Source: 2013-2017 American Community Survey 5-Year Estimates
Note: Hispanics may be of any race, so they are included in applicable race categories. This has the effect of influencing the total population percentage. (a) Includes persons reporting only one race. (b) Hispanics may be of any race, so also are included in applicable race categories

4.3.3.5 At-risk Individuals with Access and Functional Needs

Access and functional needs may interfere with the ability to access or receive medical care before, during, or after a disaster or emergency. Irrespective of a specific diagnosis, status, or label, the term "access and functional needs" refers to a broad set of cross-cutting access and function-based needs, generally distinguished into **access-based** or **function-based** needs according to the following:

- **Access-based needs** require that resources are accessible to all individuals, such as social services, accommodations, information, transportation, and medications to maintain health.
- **Function-based needs** refer to restrictions or limitations an individual may have that requires assistance before, during, and after a disaster or public health emergency.

At-risk individuals may have additional needs that must be considered in planning for, responding to, and recovering from a disaster or emergency. A recommended approach for integrating the access and functional needs of these individuals is to consider elements based on the following framework, referred to a CMIST:

- Communication – Individuals who may have limitations that interfere with the receipt of and response to information require information to be provided in an appropriate and accessible format. This can include individuals who are deaf or hard of hearing, individuals who speak American Sign Language, individuals who have limited or no English proficiency, individuals who are blind or have low vision, and individuals who have cognitive or physiological limitations.

- Maintaining Health – Individuals who may require Personal Assistance Services (or personal care assistance) in maintaining their activities of daily living such as eating, dressing, grooming, transferring, and toileting.

- Independence – Includes individuals who function independently if they have their assistive devices, such as consumable medical supplies (diapers, formula, bandages, ostomy supplies, etc.), durable medical equipment (wheelchairs, walkers, scooters, etc.), and/or service animals.

- Services and Support – Includes support for individuals with behavioral health needs, those who have psychiatric conditions (such as dementia, Alzheimer's disease, Schizophrenia, severe mental illness), pregnant women, nursing mothers, infants, and children.

- Transportation – Includes individuals with transportation needs because of age, disability, temporary injury, poverty, addiction, legal restriction, or those who do not have access to a vehicle. This requires coordination to ensure access to mass transit and accessible vehicles such as para-transit. (U.S. Department of Health & Human Services, 2016)

While most individuals with access and functional needs do not have acute medical needs requiring the support of trained medical professionals, many will require assistance to maintain health and minimize preventable medical conditions. These individuals may require more time and assistance during an evacuation. It is estimated that at least 9.7% of the population between the ages of 18 and 64 have some form of disability, and about 8.1% of people over age 65 have some form of disability, as shown in Table 4-4. (United States Census Bureau, 2013-2017) There is overlap between some of these population subsets and carless and transit-dependent populations.

Of the County's total number of households, approximately 6.1% are households with no vehicle available. Vulnerable populations without private transit may be at increased risk during emergencies due to lack of rapid access to medical services and or limited ability to rapidly evacuate an at-risk area. These numbers warrant special attention from planners and emergency managers. Additionally, where cell reception services are limited, individuals may need alternate means of transportation to ensure adequate information communication services. Likewise, in addition to preemptively improving cellular service reliability, disseminating maps which indicate the locations of superior cell reception may aid individuals seeking better information communication access in an emergency.

Table 4-4: Disability Status of Non-Institutionalized Population in Mendocino County in 2013-2017

			Persons with a Disability		
Jurisdiction	**Total Population**	**Persons with a Disability**	**Under 18**	**18-64**	**65+**
Unincorporated Mendocino County	58,995	11,516 (13.2%)	610 (0.7%)	5,766 (6.6%)	5,141 (5.9%)
City of Fort Bragg	7,269	1,547 (1.8%)	124 (0.1%)	867 (1.0%)	556 (0.6%)
City of Ukiah	15,917	2,249 (2.6%)	208 (0.2%)	1,153 (1.3%)	888 (1.0%)
City of Willits	4,844	1,229 (1.4%)	145 (0.2%)	645 (0.7%)	439 (0.5%)
City of Point Arena	472	58 (0.1%)	6 (0.0%)	24 (0.0%)	28 (0.0%)
Total County Area	**87,497**	**16,599 (19.0%)**	**1,093 (1.2%)**	**8,455 (9.7%)**	**7,052 (8.1%)**

Source: 2013-2017 American Community Survey (5 year estimates)
Age ranges are sums of multiple male/female and age range fields

4.3.4 Economy

Timber and agriculture were the mainstays of Mendocino's economy in the 20th century. However, their traditional roles have shifted in notable ways. The region is now known for its beautiful forests and lush vineyards, which attract visitors from around the country and abroad. While timber is still an important part of the economy, tourism and agriculture have become the leading producers. Agriculture has increased as the burgeoning California wine industry has taken off in Mendocino County. Mendocino's agriculture base has changed from historic crops such as pears, apples, prunes, and livestock to the production of premium quality grapes. (Mendocino County MJHMP, 2014)

This shift from the traditional economic base is typified by the growing importance of tourism for the County. The Mendocino County 2018-19 Economic Assessment report records the gross revenue for tourism in the County at $482 million dollars in 2018. (Mendocino County 2018-2019 Economic Assessment, 2019) This is compared to agricultural production, which was recorded at $320.8 million in 2018, and timber, which totaled $132.5 million in the same year. The top leading agricultural commodities now include livestock production (7%), nursery production (1%), vegetable production (1%), field crops (7%), and fruits and nuts (84%). (County of Mendocino Department of Agriculture, 2018)

The labor force in Mendocino County has historically experienced a decrease in size due to a mixture of higher housing costs and an aging population. However, employment has experienced a more recent period of growth. The labor force decreased by 7.5 percent from 2007 to 2016, and employment decreased between 2007 and 2011 before entering a period of slow growth after 2011. There are seasonal changes in employment, with general a trend towards higher employment during the months of June, August, and October. (Mendocino County Economic and Demographic Profile, 2018) Industry employment displays a mixed trend. Mining and logging, manufacturing, and information are all sectors that have experienced a greater than 40% percent decrease in change from 1998-2018. However, education and health services, retail, and leisure and hospitality experienced significant employment growth. (*Id.*)

Mendocino County's economy and workforce are changing. In the past, county residents have counted on seasonal crops, the timber and fishing industries, and tourism for most of their jobs. With the significant decline in natural resource extraction over recent years, the county workforce responded by becoming increasingly more diversified. Large employers are management, business, science, and arts occupations, as well as sales and office occupations. According to the United States Census Bureau, for the 2018 5-year estimates, there were 21,627 jobs in all sectors in Mendocino County. Table 4-5 shows the number of jobs by major sector in the County in 2018.

Table 4-5: Occupation for Full-Time, Year-Round, Civilian-Employed Population 16 Years and Over

Occupation	Total	Percent of total employment (in %)
Full-time, year-round, civilian-employed population 16 years and over	21,627	100
Management, business, science, and arts occupations	7,449	34
Sales and office occupations	4,492	21
Service occupations	3,610	17
Natural resources, construction, and maintenance occupations	3,382	16
Production, transportation, and material moving occupations	2,694	12

Source: United States Census Bureau, American Community Survey, 2018 5-Year Estimates, https://data.census.gov/cedsci/table?g=0500000US06045&tid=ACSST5Y2018.S2402&hidePreview=false&vintage=2018&layer=VT_2018_050_00_PY_D1&cid=DP05_0001E.

4.3.5 Past and Future Trends in Development

Early development patterns in Mendocino County were dispersed, reflecting the County's timber and agricultural resources. Communities and economies focused on the timber industry included Willits, Fort Bragg, Mendocino, Covelo, and Philo. Much of the historical timber industry has been in decline since the 1950s. Timber mills have been replaced by increased acreage dedicated to vineyards, a trend which continues today. (Mendocino County General Plan, 2009) During the 1980s and 1990s, a number of major subdivisions were developed in the Ukiah Valley. The net annual average of parcels created between 1981 and 1989 (142) decreased to 70 per year between 1990 and 2001. Data on building permits issued between 1991 and 2001 show that the greatest commercial development in the County occurred in the Fort Bragg and Ukiah Valley areas, followed by the community of Mendocino and in areas along the South Coast. Between 1991 and 2001 the Ukiah Valley exceeded the industrial valuation of all other areas combined. (*Id.*) Past practices relating to timber production may not always have appreciated the secondary effects of this kind of development. Such effects could have exacerbated natural hazards such as flooding or soil instability.

Past development that most increased the risk of hazards in the County happened many decades and even more than a century ago. The County and other participating jurisdictions are well aware of areas of increased hazard risk from older development.

More recently, development in the last few decades has occurred with minimized hazard risk because of the existing overlay of federal, state, and local regulation. First, the County and its municipal planning partners all adopt general plans (GPs) which serve as blueprints for establishing long-range development policies, as directed with California's General Planning Law. A GP provides a basis for private development proposals and public projects to remain consistent with existing city, regional and state policies. The GP is designed to help the County and participating jurisdictions address issues related to land use, circulation (traffic), housing, open space, conservation, noise, and safety. The Land Use portion of the plan helps guide the County and participating jurisdictions in determining the location of future development(s), to include possible future annexations for municipal jurisdictions. The Safety Element of the GP serves to decrease risk of impact from natural hazards through multiple required elements and subsection most importantly through the health and safety as required by the California Sate Law.

All planning partners reviewed their general plans under the capability assessments undertaken for this hazard mitigation plan. Deficiencies revealed by these reviews are identified as mitigation actions to decrease risks to move beyond past trends.

Moreover, while past development has occurred in hazard areas to some degree, increasing hazard risks, development standards, and performance measures, oftentimes incorporated into specific plans, policy plans, and master plans, are employed to reduce risk. These development standards are continually improving and will continue to strengthen in the future.

General trends in current development and predictions for future development indicate shifts in business size. For instance, between 2007-2017, there was a shift from larger to smaller employers. (Mendocino County 2018-2019 Economic Assessment, 2019) The Mendocino County Tourism Commission 2016-17 Marketing Plan (Marketing Plan) was created by the Commission in order to "establish Mendocino County as a premier destination featuring quaint and charming villages, towering redwood forests and intimate and unique wineries resulting in a high return on investment and increased room nights." The Marketing Plan describes projected economic trends as contingent on low gas prices and surplus consumer funds, which encourage spending on leisure and hospitality. The report includes promising statistics on decreased unemployment rates and increased personal income growth from 2012 through 2017. If this trend continues, it is predicted that tourism will continue to increase and stimulate the economy. This trend is exemplified by an increase of $71 million dollars in visitor spending from 2000 to 2015. (Mendocino County Tourism Commission 2016-2017 Marketing Plan, 2017)

Participating jurisdictions have gone to great lengths to ensure future development within hazard areas is minimized and mitigated to the greatest extent possible. The County's Capabilities Assessment, Section 5.3, and each jurisdiction's capabilities assessment in Volume 2 of this MJHMP explain those proactive steps in greater detail. Buildings are increasingly more resilient to hazards through California's building codes, some of the strongest in the country. Nationally, building codes have continually improved disaster resilience, and since 1990 those great improvements have added approximately 1% to construction costs. (National Institute of Building Sciences, 2019)

4.4 Vulnerability Assessment Methods

This section provides an overview of the methods used in the vulnerability assessments in Section 4.5. Vulnerabilities to each hazard are assessed in a two-step process, as outlined in this section. First, population, critical facilities, and county parcels are inventoried to develop a "lay of the land." Second, the inventories are used to calculate estimated exposure and damage from hazards at various levels of severity. A more detailed explanation of the methodology is included in Appendix A.

The vulnerability assessment utilizes geospatial data along with local knowledge of past events. Geospatial data is essential in determining population and assets exposed to hazards identified in this plan. Geospatial analysis can be conducted if a natural hazard has a spatial footprint that can be analyzed against the locations of people and assets. In Mendocino County, dam failure, flooding, sea-level rise, landslide, soil hazards, earthquake, naturally occurring asbestos, and wildfire have identifiable geographic extents and corresponding spatial information about each hazard.

Figure 4-8 illustrates the data inputs and outputs used to create the vulnerability analyses for each hazard in Section 4.5.

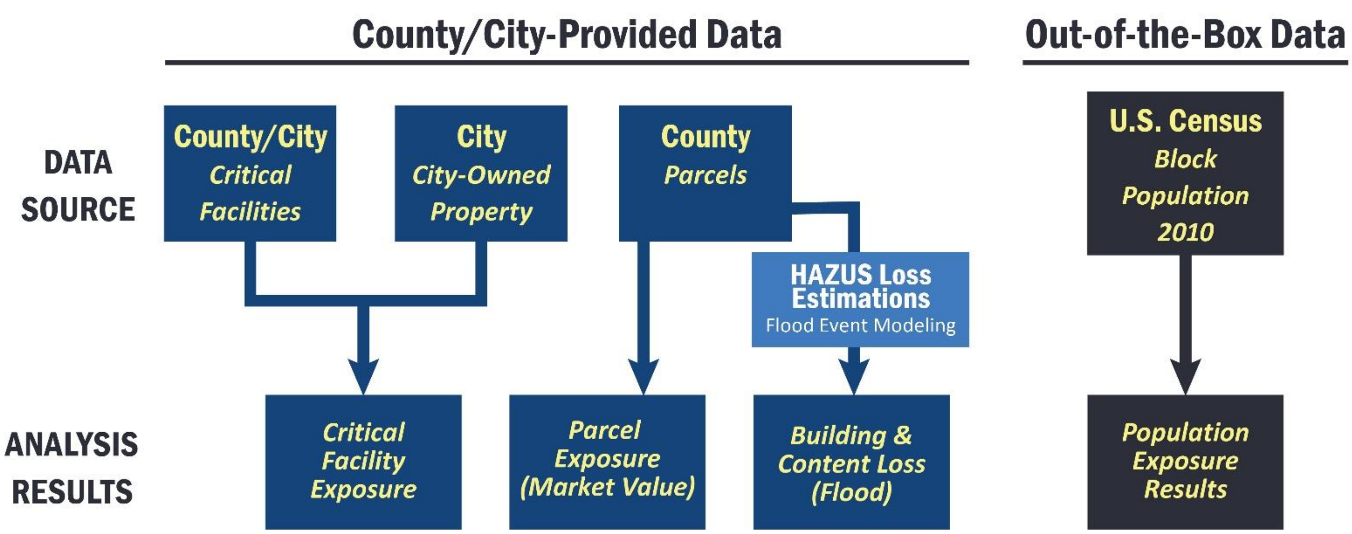


Figure 4-8: Data Source and Method

4.4.1 Population and Asset Inventory

To describe vulnerability for each hazard, it is important to first understand the total population and total assets at risk. Population and asset inventories provide a baseline to measure the vulnerability to people and assets for natural hazard events. Asset inventories can also be used to estimate damages and losses expected during a "worst-case scenario" event for each hazard. The following describes the total population, critical facilities, and parcel inventory inputs.

4.4.1.1 Population

An initial step in producing the hazard-specific vulnerability assessments is to determine the population near each natural hazard. Each natural hazard scenario affects the County residents differently depending on the location of the hazard and the population density of where the hazard event could occur. For hazards that potentially affect the whole county such as earthquake or drought, the vulnerability assessment assumes 87,732 persons or 100% of the County's population is exposed.[2] Vulnerability assessments presented in Section 4.5 summarize the population exposure for each natural hazard if available.

4.4.1.2 Critical Facilities Inventory

Critical facilities are of particular concern when planning to mitigate hazards. A critical facility is a structure or other improvement that, because of its function, size, service area, or uniqueness, has the potential to cause disruption of vital socioeconomic activities if it is destroyed, damaged, or functionally impaired.

Critical facilities inventory data was developed from a combination of datasets, including from county, city, special purpose district, state, federal, and private industry. A critical infrastructure spatial database was developed to translate critical facilities information into georeferenced[3] points and lifelines.

Critical facility points include facilities such as police stations, fire stations, hospitals, elder care facilities, daycare facilities, schools, transportation infrastructure, utilities, and government buildings. **Lifelines** include facilities related to communication, electric power, liquid fuel, natural gas, and transportation routes. A current representation of the critical facility points and lifelines are provided in Figure 4-9. Some critical facility information may have been omitted from this document due to national security purposes. For additional information on included critical facilities, see Appendix A.

Critical facilities and transportation and lifeline data came from a collection of sources, including but not limited to Mendocino County, California Department of Social Services (CDSS), California Energy Commission (CEC), Federal Communications Commission (FCC), Hazus, U.S. Army Corps of Engineers (USACE), FEMA, and National Park Service (NPS). All data sources have a level of accuracy acceptable for planning purposes. Due to the sensitivity of this information, a detailed list of facilities is not provided. The list is on file with each planning partner. The risk assessment for each hazard qualitatively discusses critical facilities with regard to that hazard.

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[2] Population estimates were derived from 2013-2017 Census American Community Survey 5-Year (ACS) information.

[3] To georeference something means to define its existence in physical space. That is, establishing its location in terms of map projections or coordinate systems. The term is used both when establishing the relation between raster or vector images and coordinates, and when determining the spatial location of other geographical features.

4.4.1.3 Parcel Value Inventory

The Mendocino County Assessor's data is essential to developing parcel values exposed to each hazard and includes the current fair market value of at-risk assets. Mendocino County Parcel Value Inventory is summarized in Table 4-6. This table only includes parcels that are located in unincorporated Mendocino County. The Parcel Value Inventory includes the market value,[4] content replacement value, and total assessed value ("total value"), and each hazard profile outlines predicted impacts to this inventory for each hazard's geographic extent. These elements are called out in the table because, in the event of a disaster, the value of the infrastructure or improvements to the land is usually the focus of concern. Generally, the land is not a total loss, and structures can be rebuilt or contents replaced.

"Total market value" as presented in this plan reflect Mendocino County Assessor data including fair market value where available. If no fair market value was available for a given property, the value reflects the assessed improvement value.

"Total content value" was calculated based on the assessor's use codes, translated to occupancy-based multipliers. Each occupancy class prescribes a specific content cost multiplier used to calculate the content cost values shown in the summary and in the hazard profiles in Section 4.5. Occupancy-based content cost multipliers used in this plan reflect those found in the FEMA Hazus-MH 4.2 technical manuals.

Table 4-6: Unincorporated Mendocino County Parcel Counts and Value

	Total Parcels	Total Market Value ($)	Total Content Value ($)	Total Value ($)
Unincorporated County	24,371	$ 4,544,212,021	$ 2,693,943,855	$ 7,238,155,876

Total market value as provided by County Assessor's Office. Content value calculated using content multipliers per Hazus occupancy classes per county land use designation. Total value is the sum of total market value and total content value. Improved Parcels Only.

[4] Market Value includes a long-term asset which indicates the cost of the constructed improvements to land, such as buildings, driveways, walkways, lighting, and parking lots.

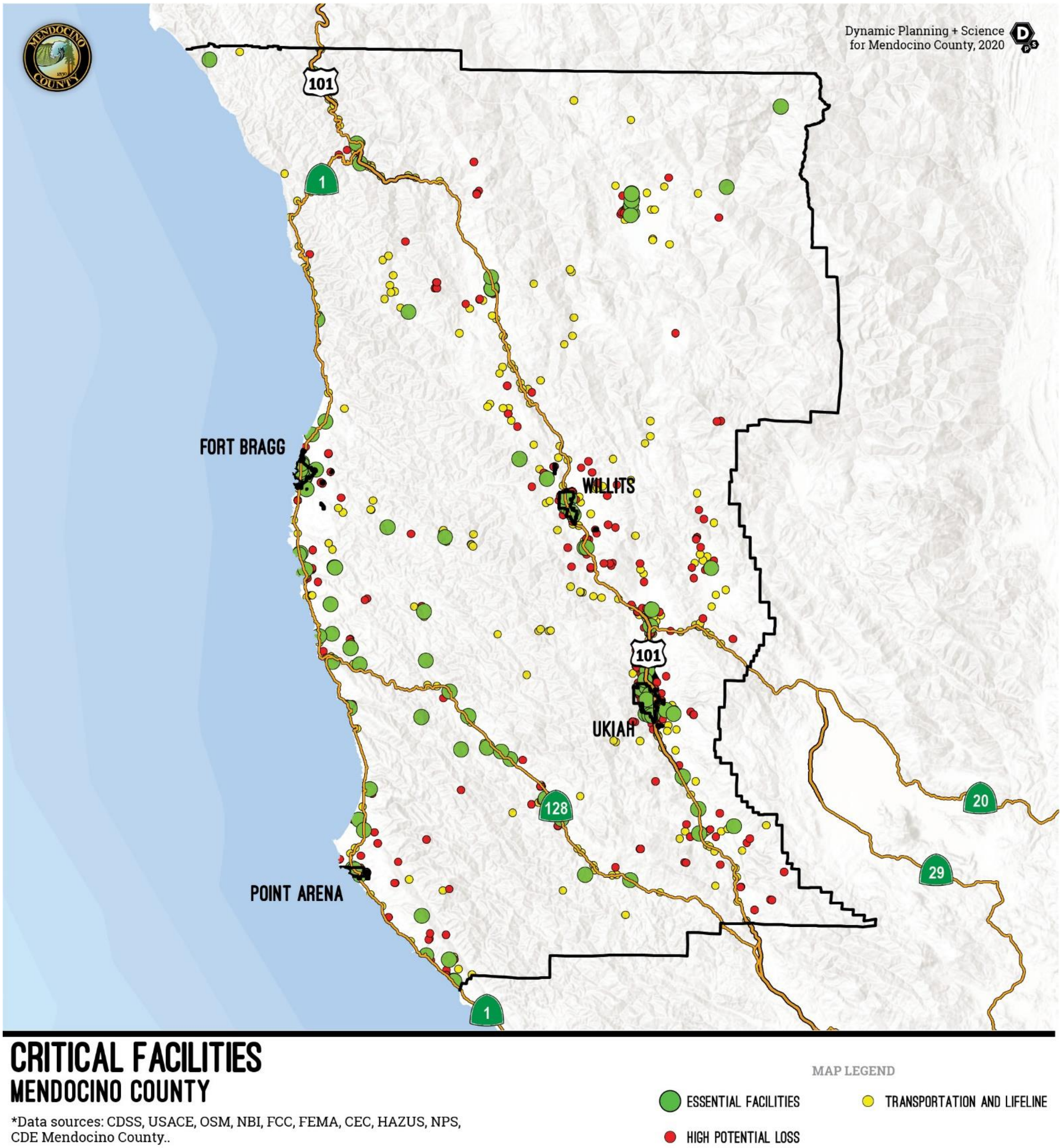


Figure 4-9: Critical Facilities

4.4.2 Hazard Exposure and Damage Estimation

The population and inventory information are used to generate specific exposure and damage estimations based on the severity of specific hazard events. The hazards in Mendocino County which have known geographic extents and corresponding spatial information, and thus have exposure and damage estimations, are:

- earthquake,
- flooding,
- sea-level rise,
- slope failure,
- soil hazards,
- tsunami run-up,
- dam failure, and
- wildfire.

Population and Asset Exposure

"Exposure" of assets and population refers to the total counts of parcels, people, facilities, and assets within the planning area in which a hazard event may occur. A natural hazards overlay was developed to reflect the combination of many known natural hazard spatial footprints. The spatial overlay method enables summarization of building values, parcel counts, population exposure, and critical facility exposure within a hazard's geographic extents. Figure 4-10 illustrates hypothetical flooding exposure. Exposure numbers were generated using Mendocino County Assessor data, address point, and parcel data for replacement and content cost estimates.

Figure 4-10: Hazard Exposure Explanation Graphic

Damage Estimation

For flood and earthquake, detailed damage estimations were conducted through FEMA's Hazus software. Hazus is a nationally applicable, standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. Hazus uses Geographic Information Systems (GIS) technology to estimate the physical, economic, and social impacts of disasters. . The estimated damage and losses provided by the Hazus Software is based upon chosen severity of events and provides the ability to understand possible widescale damage to buildings and facilities.

In the hypothetical geography shown in Figure 4-11, even though both structures are exposed to flooding, it is expected that the structure with a first-floor height below the depth of flooding will receive significantly more damage than the structure with a first-floor height above the expected water depth. For a more detailed explanation of risk assessment methods, see Appendix A.

At-risk populations, critical infrastructure, improved parcels, and loss results for each hazard category are provided in bar chart summary tables in Section 4.5 to evaluate the percentage of assets exposed to different types of hazards. The side-by-side comparison allows planning partners to evaluate the impacts of potential hazards to prioritize hazard mitigation energy and resources.

Figure 4-11: Hazus Damage Estimation Example

4.5 Vulnerability to Specific Hazards

This section introduces prevalent hazards within the unincorporated portions of Mendocino County and analyzes how each may affect populations, property, and critical facilities within the County's jurisdiction. Importantly, the hazard mitigation strategy presented in Section 5 is informed by, and responds to, the particular vulnerabilities outlined in this section. The mitigation strategy provides prescriptions or actions to achieve the greatest reduction of vulnerability based on this section, which results in saved lives, reduced injuries, reduced property damage, and protection for the environment in the event of a natural hazard. Methods for calculating exposure and loss estimates are described in Section 4.4 and Appendix A.

This section provides quantifiable exposures to people and property and damage and loss estimates for the unincorporated portions of the County for the below-prioritized hazards. Participating Jurisdiction Annexes in Volume 2 of this Plan contain jurisdiction-specific vulnerabilities to hazards.

Dam Failure
SECTION 4.5.1

Pandemic
SECTION 4.5.5

Slope Failure
SECTION 4.5.8

Drought
SECTION 4.5.2

Flood
SECTION 4.5.6

Soil Hazards
SECTION 4.5.9

Climate Change
SECTION 4.5.3

Severe Weather
SECTION 4.5.7

Wildfire
SECTION 4.5.10

Earthquake
SECTION 4.5.4

4.5.1 Dam Failure Hazard Profile

Dam failures in the United States typically occur in one of four ways:

- Overtopping of the primary dam structure, which accounts for 34 percent of all dam failures, can occur due to inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors.
- Foundation defects due to differential settlement, slides, slope instability, uplift pressures, and foundation seepage can also cause dam failure. These account for 30 percent of all dam failures.
- Failure due to piping and seepage accounts for 20 percent of all failures. These are caused by internal erosion due to piping and seepage, erosion along hydraulic structures such as spillways, erosion due to animal burrows, and cracks in the dam structure.
- Failure due to problems with conduits and valves, typically caused by the piping of embankment material into conduits through joints or cracks, constitutes 10 percent of all failures. (Federal Emergency Management Agency, 2019)

Many dam failures in the United States have been secondary results of other disasters, such as earthquakes, landslides, extreme storms, massive snowmelt, equipment malfunction, structural damage, foundation failures, and sabotage. Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable by a program of regular inspections. Terrorism and vandalism are serious concerns that all operators of public facilities must plan for; these threats are under continuous review by public safety agencies. (*Id.*)

Lake Mendocino

Lake Mendocino covers 1,922 square acres is a reservoir created by the construction of Coyote Dam, which was built by the U.S. Army Corps of Engineers on the East Fork of the Russian River in 1958. Lake Mendocino water is a combination of imported Eel River water and East Fork Russian River water, and it has a maximum storage capacity of 122,400 acre-feet, with 70,000 acre-feet allocated to water supply. It is located approximately 3 miles northeast of Ukiah in the Coast Range near the headwaters of the Russian River. The dam is 160 feet high and spans a range of 3,500 feet. It provides flood damage reduction, water conservation, and recreation opportunities like hiking, water skiing, and boating, and it is capable of producing up to 3 MW of electricity. (Mendocino County General Plan, 2009)

4.5.1.1 Plans, Policies, and Regulatory Environment

1972 National Dam Safety Act

The potential for catastrophic flooding due to dam failures led to the passage of the 1972 National Dam Safety Act, Pub. Law No. 92-367. The National Dam Safety Program requires a periodic engineering analysis of every major dam in the country. The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect the public lives and property.

FERC Dam Safety Program

The Federal Energy Regulatory Commission (FERC) has the largest dam safety program in the United States. FERC cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. There are 3,036 dams that are part of regulated hydroelectric projects in the FERC program. Two-thirds of these are more than 50 years old. (Federal Energy Regulatory Commission, 2011) As dams age, concern about their safety and integrity grows, so oversight and regular inspection are important. FERC staff inspects hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent consulting engineer, approved by the FERC, must inspect and evaluate projects with dams higher than 10 meters (32.8 feet), or with a total storage capacity of more than 2,000 acre-feet. (*Id.*)

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

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

U.S. Army Corps of Engineers Dam Safety Program

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

California Division of Safety of Dams

California's Division of Safety of Dams, a division of the Department of Water Resources, monitors the dam safety program at the state level. When a new dam is proposed, Division staff inspects the site. The Division reviews dam applications and building plans to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for known geologic conditions. It also inspects construction to ensure that the work is done in accordance with the approved plans. The Division inspects constructed dams on an annual basis to ensure that it is performing as intended and is not developing problems. Roughly a third of these inspections include in-depth instrumentation reviews. The Division periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California. (Cal. Dep't of Water Resources, 2019)

Senate Bill 92: Dam Safety

Senate Bill 92 (2017) provides new requirements focused on dam safety. Specifically, it requires dam owners to submit inundation maps to the Department of Water Resources. After they have been approved, the dam owner must then submit an **Emergency Action Plan (EAP)** to Cal OES. These need to be approved by Cal OES and resubmitted every 10 years. (California Office of Emergency Services, 2020)

Mendocino County General Plan

The Mendocino County 2009 General Plan includes the following policies the Development Element to mitigate the effects of dam failure:

> **Development Element**
>
> **Policy DE-194:** To the maximum extent practical, avoid constructing critical facilities within the designated 100-year flood plain areas or areas potentially subject to inundation by dam failures (or other water impoundment facilities) or seiches.

Permit Requirements for Grading in Mendocino County Code, § 18.70

The Mendocino County Code contains specifications for how construction and material requirements for grading planning purposes are to be designed, as well as what they should include. The plans are required to provide, in part, detailed explanations of all surface and subsurface drainage devices, cribbing, walls, dams, and other protective devices which are to be constructed in tandem to, or as part of, the proposed work in combination with a map depicting the drainage area and the estimated runoff of the area served by any drains.

4.5.1.2 Past Events

There have been several recent occurrences of near dam failure in Mendocino. As the risk assessment for Mendocino County illustrates, the chances of a dam failure are low, but the consequences of such are quite severe.

During a significant winter storm on New Year's Eve 2005-2006, storm runoff was so high that it spilled over the entire crest of the Mendocino 3 Upper Dam, even while the standpipe and filter valves were open.

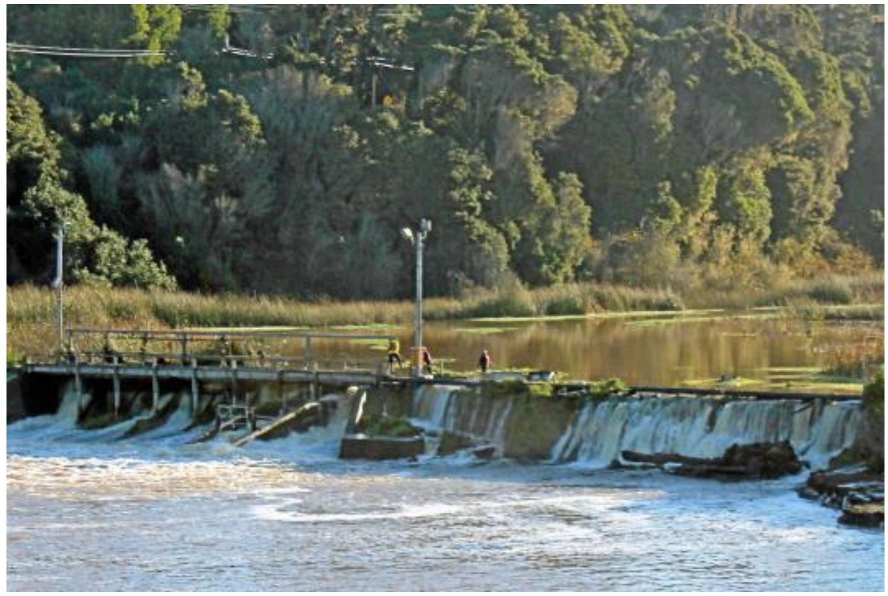


Figure 4-12: Pudding Creek Dam Overflow

Source: Fort Bragg Advocate News https://www.advocate-news.com/2016/12/21/storm-flow-erodes-pudding-creek-dam/

In December of 2016, an atmospheric river brought widespread rainfall to the Northern Coast of California. The Pudding Creek Dam overtopped resulting in damage to the dam and a primary water main for the city of Fort Bragg.

The most memorable recent event concerning dam failure in California was the 2017 collapse of a spillway on the Oroville Dam in Butte County, California. Oroville Dam is the largest facility within the State Water Project in California; the dam stores 3.5 million acre-feet of water, and serves as important flood control for the Feather River. In 2017, after substantial runoff from the Sierra Nevadas, Lake Oroville was full, and the spillway was opened to release extra water downstream.

"Spillways" are dam safety features that allow water to overtop the dam if the reservoir fills too quickly. Spillway overflow events, often referred to as "design failures," result in increased discharges downstream and increased flooding potential.

The force of the release gouged a large crater in the concrete spillway and required the California Department of Water Resources (DWR) to halt water releases via that conduit. The high lake level then created fear that erosion would compromise the integrity of the auxiliary spillway and flood the city of Oroville and surrounding communities. Thousands were evacuated, and eventually, runoff receded without further issue. Ultimately, an independent analysis concluded that poor design and construction and inadequate state oversight contributed to the collapse of the concrete spillway. (Water Education Foundation, 2020)

The Oroville Dam spillway failure triggered an inspection of 93 dam spillways across California through the new Spillway Re-evaluation Program. (Cal. Dep't of Water Resources, 2019)

4.5.1.3 Location

According to California Department of Water Resources (DWR) Division of Safety of Dams (DSOD) and USACE National Inventory of Dams (NID), there are 30 dams in Mendocino County, shown in Table 4-8. Figure 4-13 shows Cal OES and DSOD inundation zones for the dams in Mendocino County. Areas of the County most threatened by dam inundation are those inland areas within the Ukiah Valley.

Dams listed below are classified by FEMA according to their hazard potential. Table 4-7 explains the classifications of low, significant, and high. California DWR Division of Safety of Dams (DSOD) includes a fourth category "Extremely High." Table 4-8 then lists all dams in Mendocino County, including their hazard classification that corresponds with Table 4-7.

Table 4-7: FEMA Hazard Potential Classification

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected	Yes (but not necessary for this classification)
Extremely High	One or more and inundating an area of 1,000+ population	Inundation of facilities/infrastructure, posing significant threat to public safety determined case-by-case by DSOD

Source: Federal Guidelines for Dam Safety- Hazard Potential Classification Systems for Dams, April 2004, DSOD Jurisdictional Dams

Table 4-8: Dams in Mendocino County

DWR ID	NID ID	Dam Name	Owner	Year Built	Hazard Class
No. 1089-0	CA00001	Mendocino Middle	County of Mendocino	1907	S
No. 1089-2	CA00002	Mendocino 3 Upper	County of Mendocino	1929	L
No. 97-102	CA00399	Van Arsdale	Pacific Gas and Electric Company	1955	H
No. 2036-0	CA00406	Morris	City of Willits	1964	H
No. 382-0	CA00560	Ridgewood	Walker Lake Association	1908	H
No. 384-0	CA00561	Mcnab	Fetzer Vineyards	1971	S
No. 387-0	CA00562	Bevans Creek	Private Entity	1965	L
No. 389-0	CA00563	Lake Winawa	Boy Scouts of America San Francisco Bay Area Council	1974	S
No. 1038-0	CA00871	Lake Ada Rose	Brooktrails Township Community Services District	1927	H
No. 1038-3	CA00872	Brooktrails 3 North	Brooktrails Township Community Services District	1999	H

DWR ID	NID ID	Dam Name	Owner	Year Built	Hazard Class
No. 1380-0	CA00972	Mast	Private Entity	1980	L
No. 1381-0	CA00973	Williams Valley	Private Entity	1985	L
No. 1382-0	CA00974	Round Mountain	Round Mountain Cooperative Community, Inc.	Unknown	S
No. 1089-3	CA00975	Chinquapin	County of Mendocino	Unknown	S
No. 274-3	CA00976	Mcguire	Soper-Wheeler Compant	Unknown	L
No. 1387-0	CA00977	Crawford Ranch	McDowell Valley Farming Company, LLC	1915	H
No. 1385-0	CA01118	Cornett	Locavore, LLC	1927	H
No. 2381-0	CA01139	Mill Pond	Georgia-Pacific Corporation	1947	S
No. 2036-2	CA01246	Centennial	City of Willits	1964	H
No. 2382-0	CA01261	Perry Gulch	Perry Gulch Ranch	1970	H
No. 2385-0	CA01262	Jayne'S Lake	Eden Valley Ranch, LLC	1965	L
No. 2388-0	CA01263	Bradford	Fountain Ranch, LLC	1971	S
No. 2383-0	CA01323	Schwindt	Private Entity	1972	H
No. 2380-0	CA01423	Lolonis Vineyards	Lolonis Family Vineyards and Winery, Inc.	1885	L
No. 1306-0	CA01438	Hooper No. 1	Private Entity	1980	L
No. 1307-0	CA01439	Hooper No. 2	Private Entity	1985	H
No. 7000-104	CA01479	Johnson Ranch	Beckstoffer Vineyards	1999	H
No. 7000-132	CA01610	Feliz North Lake	Brutocao Vineyards	Unknown	S
	CA10201	Coyote Valley Dam	CESPN	Unknown	S
No. 3383-0	CA10385	Codding Reservoir	Private Entity	1959	H

Note: Hazard Definitions: L – Low; S – Significant; H – High; H+ – Extremely High

Source: *DWR Jurisdictional Dams & USACE National Inventory of Dams*

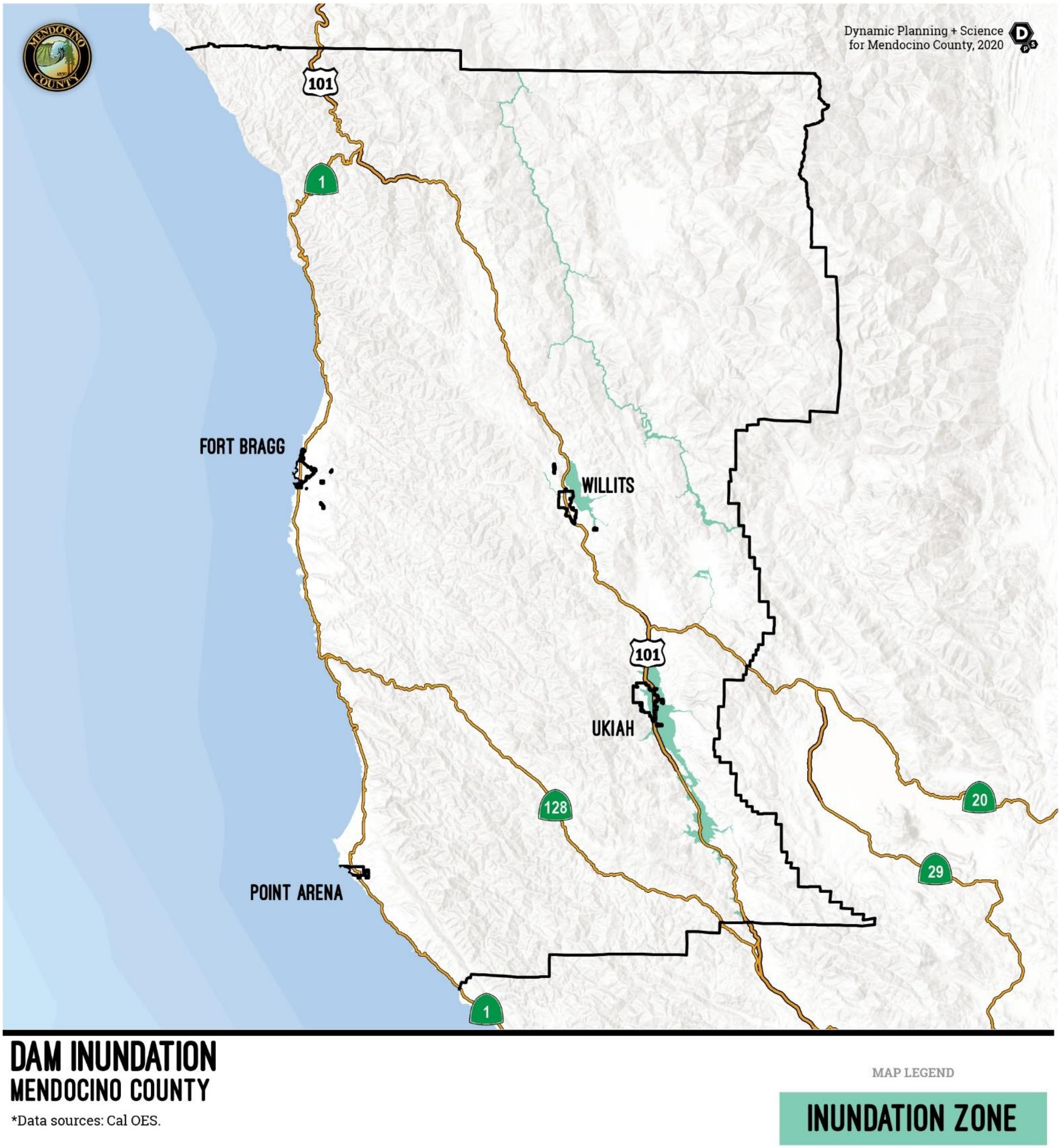


Figure 4-13: Dam Inundation Exposure

4.5.1.4 Severity and Extent

Dam failure can be catastrophic to all life and property downstream. Table 4-8 lists dams in Mendocino County and shows their hazard classification as designated by FEMA and DSOD.

This hazard potential classification system categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests. Improbable loss of life exists where persons are only temporarily in the potential inundation area. For instance, this hazard potential classification system does not contemplate the improbable loss of life of the occasional recreational user of the river and downstream lands, passer-by, or non-overnight outdoor user of downstream lands. In any classification system, all possibilities cannot be defined. High usage areas of any type should be considered appropriately. Judgment and common sense must ultimately be a part of any decision on classification. Further, no allowances for evacuation or other emergency actions by the population should be considered because emergency procedures should not be a substitute for appropriate design, construction, and maintenance of dam structures.

While there are no extremely high hazard dams listed in the County, there are 13 high hazard dams in the County. See Table 4-7 for explanation of these categories.

4.5.1.5 Frequency/ Probability of Future Occurrences

The probability of any type of dam failure is low in today's regulatory and dam safety oversight environment. Dam failure events usually coincide with events such as earthquakes, landslides, and excessive rainfall and snowmelt.

4.5.1.6 Warning Time

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

Starting in 2017, California now requires the development of Emergency Action Plans (EAPs) for high and significant hazard dams. Dams have EAPs in various states of completion as of 2020.

Developing EAPs for all high and significant hazard potential dams for Mendocino County is critical to reducing the risks of loss of life and property damage from dam failures. The EAP contains procedures and information to assist the dam owner in issuing early warning and notification messages to emergency management authorities. The EAP also contains inundation maps to identify the areas subject to flooding in the unlikely event of dam failure.

EAPs are critical in identifying areas downstream from dams requiring warning and evacuation in the event of dam failure. Documented cases have demonstrated that warning and evacuation time for EAPs can dramatically influence the loss of life. Loss of life can vary from 0.02 percent of the persons-at-risk when the warning time is 90 minutes to 50 percent when less than 15 minutes, (Graham, 1988) One USGS report states that the average number of fatalities per dam failure is 19 times greater when there is little to no warning. (U.S. Geological Survey, 1985) Dam breach inundation studies usually assume one of two failure scenarios:

- Flows from a dam failure during "fair weather" or "sunny day" conditions with the reservoir at the normal pool level and receiving normal inflow (usually insignificant). A fair weather failure is generally considered to have the most potential for loss of human life, primarily due to the element of surprise.
- Flows from a dam failure during flood conditions or the inflow design flood. Failure during flood conditions is considered to show the upper limit of inundation and to have less potential for loss of human life because the downstream population is "on alert." The flood conditions scenario is more expensive to analyze due to the additional cost for the necessary watershed and spillway studies.

Inundation mapping shows a continuous "line of inundation" identifying the area potentially at risk in the event of dam failure. It starts at the dam and continues downstream to a point where the breach flood no longer poses a risk to life and property damage, such as a large river or reservoir with the capacity of storing the floodwaters. The need to consider the "domino effect" should be made on a case-by-case basis if the assumed failure of a dam would cause the failure of any downstream dams.

4.5.1.7 Secondary Hazards

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

4.5.1.8 Dam Failure Vulnerability Assessment

The primary danger associated with dam failure is high-velocity flooding downstream of the dam and limited warning times for evacuation. Vulnerability varies by community and depends on the particular dam profile and the nature and extent of the failure. Vulnerable populations are present directly below the dam and may include those incapable of escaping the area within the allowable time frame. This population includes the elderly and young, who may be unable to self-evacuate from the inundation area. Vulnerable populations also include those who would not have adequate warning from a television or radio emergency warning system. Dam inundation zones as provided by the Cal. Division of Water Resources were used in conjunction with the inventory listed in Table 4-8 to identify at-risk populations and loss estimations for dam failure.

Note that DWR dam inundation data is used for the damage estimation, while Cal OES data is used for the exposure analysis and to map the dam inundation zones in Figure 4-13 and Figure 4-15. The DWR inundation data is more recently developed and more detailed than Cal OES inundation zones, which are being updated since SB 92 passed in 2017. The DWR data also includes only those dams rated extremely high, high, or significant risk. DWR data is also the only generally-available data set with a depth grid, as defined by emergency action plan (EAP) submittals from dam owners, as required for Hazus. Therefore, while the population exposure utilizes the Cal OES data set, the damage estimation through Hazus utilizes the narrower DWR data set. Figure 4-14 illustrates a sample difference between inundation areas used in the exposure analysis and the inundation depths used in the damage assessment.

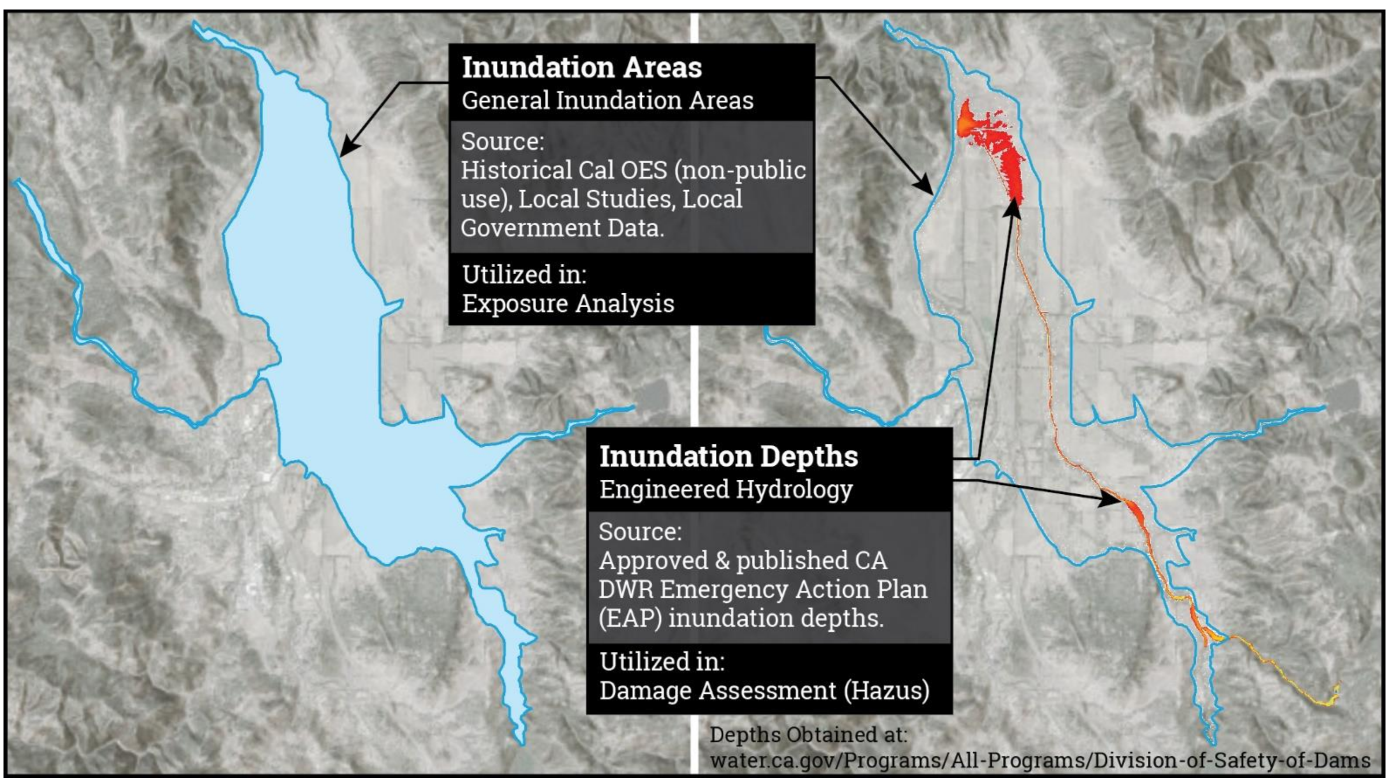


Figure 4-14: Dam Inundation Sample Area Compared to Hazus Depths

4.5.1.8.1 Dam Failure Exposure

Population

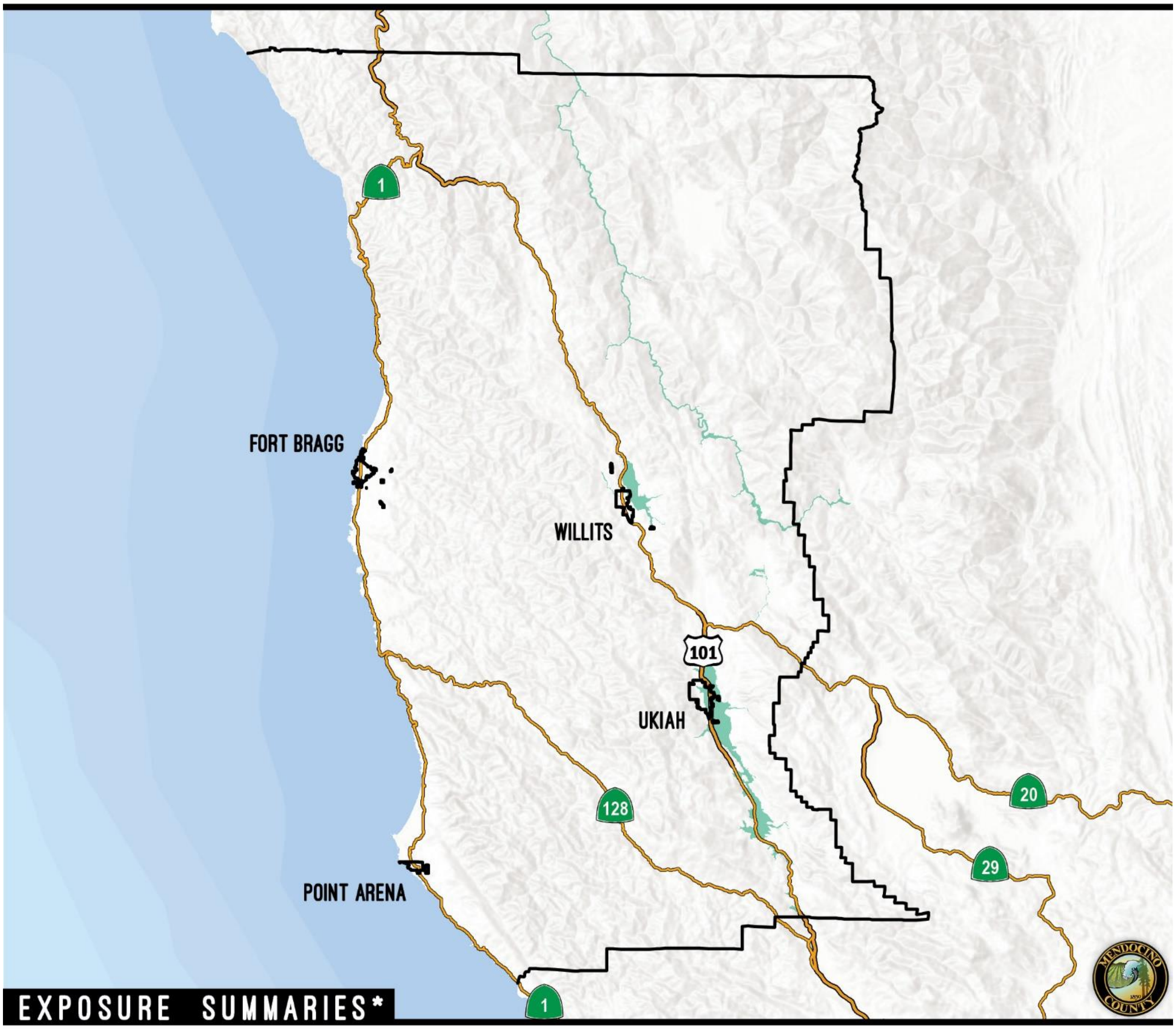
Vulnerable populations are all populations downstream from dam failures that are incapable of escaping the area within the allowable time frame. This population includes the elderly and young who may be unable to get themselves out of the inundation area. The vulnerable population also includes those who would not have adequate warning from a television, radio emergency warning system, have not registered with reverse 911, or do not have cell phones that can receive amber alerts. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living in areas of potential inundation. The entire population in a dam failure inundation zone is exposed to the risk of a dam failure. The estimated population exposed to dam inundation is summarized in Figure 4-15 and Table 4-9.

Property

Vulnerable properties are those closest to the dam inundation area. These properties would experience the largest, most destructive surge of water. Low-lying areas where water would collect are also vulnerable. Transportation routes, discussed below, are also vulnerable to dam inundation and have the potential to be eliminated or compromised, creating isolation issues. Vulnerable populations may not be able to withstand a large water surge. Utilities such as overhead power, cable, and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas. Table 4-10 displays parcel values exposed to dam inundation. Figure 4-15 illustrates the amount of population living in a dam inundation zone according to zone.

DAM INUNDATION EXPOSURE SNAPSHOT

MENDOCINO COUNTY



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA

Count	Exp. Rate**
6,268	11%
Count Includes:	INUNDATION

PARCEL COUNT IN HAZARD AREA

Count	Exp. Rate**
1,659	7%
Count Includes:	INUNDATION

PARCEL VALUE IN HAZARD AREA

	Exp. Rate**
Sum of Improvement Value $429,013,587	9%
Sum of Content Value $348,953,504	13%
Count Includes:	INUNDATION

CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
Essential Facilities	6	8%	INUNDATION
High Potential Loss	72	15%	*Sum of Transportation & Lifeline Linear Mileage*
Transportation & Lifeline	71	21%	448 2%

MAP LEGEND

INUNDATION ZONE

*Exposure summaries include dam inundation boundaries. Hazard data source: CGS, DWR.
**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

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Figure 4-15: Dam Failure Vulnerability Snapshot Map

Table 4-9: Population Exposure to Dam Failure (Unincorporated County)

	Total Population
Unincorporated County	58,995

Dam Inundation Zone	Population Count	% of Total
Bevans Creek (DWR)	35	*0.06%*
Bradford (DWR)	2	*0.00%*
Brooktrails	36	*0.06%*
Chinquapin (DWR)	4	*0.01%*
Crawford Ranch (DWR)	40	*0.07%*
Feliz North Lake (DWR)	13	*0.02%*
Lake Mendocino	5,750	*9.75%*
Mendocino 3 Upper (DWR)	121	*0.21%*
Mendocino Middle (DWR)	27	*0.05%*
Morris/Centennial	322	*0.55%*
Round Mountain	5	*0.01%*
Scott	27	*0.05%*
Scott (DWR)	24	*0.04%*
Scott 2 (DWR)	24	*0.04%*
Scott Spillway (DWR)	16	*0.03%*
Scout Lake	76	*0.13%*
Total*	**6,268**	**10.62%**

*Total population is not equal to sum of all dam inundation zones due to dissolved overlapping inundation areas.

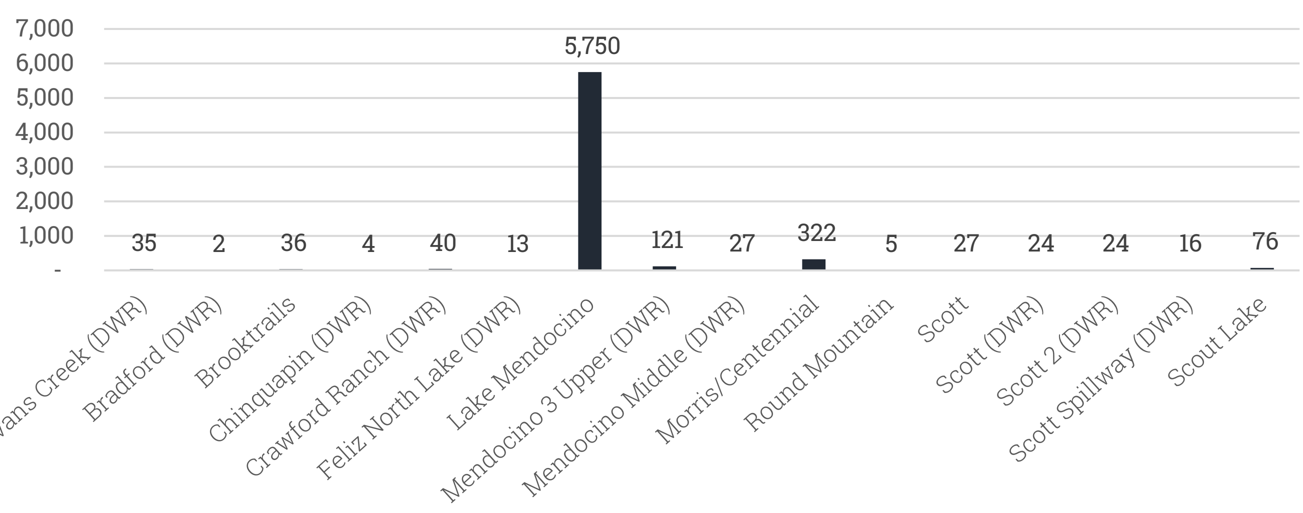


Figure 4-16: Population Exposure to Dam Inundation by Zone

Table 4-10: Parcel Values at Risk from Dam Inundation (Unincorporated County)

	Total Parcels	Total Market Value ($)	Total Content Value ($)	Total Value ($)
Unincorporated County	24,371	$ 4,544,212,021	$2,693,943,855	$ 7,238,155,876

Dam Inundation Zone	Parcel Count	% of Total	Market Value Exposure ($)	Content Value Exposure ($)	Total Exposure ($)	% of Total
Bevans Creek (DWR)	9	0.0%	$ 1,648,185	$ 1,304,651	$2,952,836	0.0%
Bradford (DWR)	1	0.0%	$ 112,977	$112,977	$ 225,954	0.0%
Brooktrails	11	0.0%	$ 1,152,540	$583,414	$ 1,735,954	0.0%
Chinquapin (DWR)	-	0.0%	$ -	$ -	$-	0.0%
Crawford Ranch (DWR)	26	0.1%	$ 1,762,290	$ 1,499,852	$3,262,142	0.0%
Feliz North Lake (DWR)	-	0.0%	$ -	$ -	$-	0.0%
Lake Mendocino	1,463	6.0%	$ 405,933,507	$ 335,185,604	$ 741,119,111	10.2%
Mendocino 3 Upper (DWR)	55	0.2%	$ 6,943,682	$ 4,292,319	$ 11,236,001	0.2%
Mendocino Middle (DWR)	12	0.0%	$1,231,617	$615,809	$1,847,426	0.0%
Morris/Centennial	83	0.3%	$ 8,688,359	$ 5,263,117	$ 13,951,476	0.2%
Round Mountain	-	0.0%	$ -	$ -	$-	0.0%
Scott	59	0.2%	$ 5,707,208	$ 2,952,310	$8,659,518	0.1%
Scott (DWR)	52	0.2%	$ 4,679,480	$ 2,392,991	$7,072,471	0.1%
Scott 2 (DWR)	52	0.2%	$ 4,679,480	$ 2,392,991	$7,072,471	0.1%
Scott Spillway (DWR)	34	0.1%	$3,568,111	$ 1,792,290	$5,360,401	0.1%
Scout Lake	36	0.1%	$ 4,886,613	$ 2,521,276	$ 7,407,889	0.1%
Dam Inundation Area*	**1,659**	**6.8%**	**$ 429,013,587**	**$ 348,953,504**	**$ 777,967,091**	**10.7%**

**Totals are not equal to sum of all dam inundation zones due to dissolved overlapping inundation areas.*

Critical Facilities & Lifelines

Low-lying areas are vulnerable to dam inundation, especially transportation routes. This includes all roads, railroads, and bridges in the flow path of water, which could be eliminated or compromised in a dam inundation event. The most vulnerable critical facilities are those in poor condition that would have difficulty withstanding a large surge of water. Utilities such as overhead power lines and communication lines could also be vulnerable. Loss of these utilities could create additional compounding issues for emergency management officials attempting to conduct evacuation and response actions. Table 4-11 and Table 4-12 summarizes critical infrastructure exposed to dam failure in Mendocino County.

Table 4-11: Critical Infrastructure Points in Dam Inundation Zones (Unincorporated County)

Infrastructure Type	TOTAL FEATURE COUNT	Bevans Creek (DWR)	Bradford (DWR)	Brooktrails	Chinquapin (DWR)	Crawford Ranch (DWR)	Feliz North Lake (DWR)	Lake Mendocino	Mendocino 3 Upper (DWR)	Mendocino Middle (DWR)	Morris/Centennial	Round Mountain	Scott	Scott (DWR)	Scott 2 (DWR)	Scott Spillway (DWR)	Scout Lake
Essential Facility	6	-	-	1	-	-	-	5	-	-	-	-	-	-	-	-	-
EOC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fire Station	6	-	-	1	-	-	-	5	-	-	-	-	-	-	-	-	-
Law Enforcement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Medical Facility	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
High Potential Loss	72	-	-	-	-	-	-	69	-	-	1	-	1	1	1	1	1
Adult Residential Facility	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alternative Education Program	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Animal Control	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Child Care Center	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Communication Tower	3	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
Community Center	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Courthouse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dam	3	-	-	-	-	-	-	1	-	-	-	-	1	1	1	1	1
Detention Center	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fairground	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Family Child Care Home	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Foster Family Agency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Historic Building	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Historic Site	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Library	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Museum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Office	4	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-
Park and Recreation	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-

Infrastructure Type	TOTAL FEATURE COUNT	Bevans Creek (DWR)	Bradford (DWR)	Brooktrails	Chinquapin (DWR)	Crawford Ranch (DWR)	Feliz North Lake (DWR)	Lake Mendocino	Mendocino 3 Upper (DWR)	Mendocino Middle (DWR)	Morris/Centennial	Round Mountain	Scott	Scott (DWR)	Scott 2 (DWR)	Scott Spillway (DWR)	Scout Lake
Power Plant	5	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Real Property Asset*	42	-	-	-	-	-	-	42	-	-	-	-	-	-	-	-	-
Residential Child Care	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Residential Elder Care Facility	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
School	4	-	-	-	-	-	-	3	-	-	1	-	-	-	-	-	-
Shop	3	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
Storage	6	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-
Wastewater Treatment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transportation and Lifeline	71	-	-	2	1	1	-	55	-	-	6	-	7	5	5	1	1
Airport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridge	63	-	-	2	1	1	-	49	-	-	4	-	7	5	5	1	1
Bus Facility	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corp Yard	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
NG Station	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Substation	5	-	-	-	-	-	-	4	-	-	1	-	-	-	-	-	-
Transfer Station	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Hazmat	13	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-	-
Hazmat	13	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-	-
Grand Total	**162**	**-**	**-**	**3**	**1**	**1**	**-**	**142**	**-**	**-**	**7**	**-**	**8**	**6**	**6**	**2**	**2**

**Real Property Assets are digitized insurance rolls for demonstrating value and ownership and may have overlapping points with other categories such as fire stations and law enforcement.*

Table 4-12: Miles of Critical Infrastructure (Linear) in Dam Inundation Zones (Unincorporated County)

Infrastructure Type (linear)	TOTAL DAM EXPOSURE	Bevans Creek (DWR)	Bradford (DWR)	Brooktrails	Chinquapin (DWR)	Crawford Ranch (DWR)	Feliz North Lake (DWR)	Lake Mendocino	Mendocino 3 Upper (DWR)	Mendocino Middle (DWR)	Morris/Centennial	Round Mountain	Scott	Scott (DWR)	Scott 2 (DWR)	Scott Spillway (DWR)	Scout Lake
Levee	1.0	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-
NG Pipeline	12.9	-	-	-	0.0	-	0.0	12.4	-	-	0.5	-	-	-	-	-	-
Railroad	37.5	-	0.1	-	-	-	0.0	23.5	-	-	0.2	-	9.4	8.8	8.8	0.1	-
Street	189.0	0.7	0.4	0.8	0.1	1.6	0.4	149.9	2.1	0.3	7.0	0.2	27.0	20.3	20.3	10.3	2.4
4WD trail	2.8	-	-	-	0.0	-	-	0.0	-	-	0.6	-	2.0	1.7	1.7	0.6	-
4WD trail, major	0.1	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.0	-
Alley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cul-de-sac	0.1	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-
Driveway	15.5	0.1	-	-	0.0	0.2	-	14.1	0.4	0.0	1.0	-	-	-	-	-	0.2
Interstate	14.3	-	-	-	-	-	-	14.3	-	-	-	-	-	-	-	-	-
Local road	94.1	0.5	0.4	0.8	0.0	0.6	0.3	71.1	1.5	0.3	2.0	0.2	17.5	12.9	12.9	8.4	0.9
Local road, major	1.7	-	-	-	-	-	-	0.9	-	-	-	-	0.7	0.7	0.7	0.7	-
Primary highway	17.5	-	0.0	-	-	0.1	0.0	17.5	-	-	0.1	-	-	-	-	-	-
Ramp	4.1	-	-	-	-	-	-	4.1	-	-	-	-	-	-	-	-	-
Road, parking area	0.2	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-
State/county highway	38.6	0.1	0.0	-	0.0	0.7	0.0	27.5	0.3	0.0	3.3	-	6.6	4.9	4.9	0.5	1.3
Thoroughfare, major	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Traffic circle	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walkway	0.1	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-
Transmission Line	11.4	0.1	-	-	0.3	0.3	-	6.7	0.2	0.1	3.8	-	0.2	0.2	0.2	0.1	1.0
Grand Total	**251.8**	**0.8**	**0.6**	**0.8**	**0.4**	**1.9**	**0.4**	**193.4**	**2.3**	**0.4**	**11.5**	**0.2**	**36.6**	**29.3**	**29.3**	**10.5**	**3.4**

4.5.1.8.2 Damage Estimations

Hazus calculates losses to structures from flooding by analyzing the depth of flooding and type of structure. Using historical flood insurance claim data, Hazus estimates the percentage of damage to structures and their contents by applying established damage functions to an inventory. For this analysis, dam inundation depth grids are reported. Damage is indicated by depth and velocity. Return intervals, utilized in the damage estimation for flood, are omitted here due to relevance. This analysis uses data from the Department of Water Resources and has only been conducted for Mendocino County dams for which there are existing inundation studies. Table 4-13 reports damage to parcel and government property loss.

Damage Estimation Improved Parcel and Government Property Loss

Department of Water Resources data were used to estimate the loss potential to residential properties and Government service facilities exposed to dam inundation. Hazus reports the damage potential and loss potential from a given dam failure scenario in four categories: slight damage, moderate damage, extensive damage, and economic loss. Economic loss consists of estimations on the cost of repair and replacement to damaged or destroyed buildings and contents, relocation expenses, capital-related income, wage losses, and rental income losses. The results shown in Table 4-13 summarize improved parcel and government property loss.

Table 4-13: Improved Parcel and Government Property Loss Estimations

Building Type	Building Damage ($)	Building Damage (% of total loss)	Content Damage ($)	Content Damage (% of total loss)	Total Damage ($)	Proportion of Loss (%)
Agriculture	$ 185,640	3.7%	$ 594,892	11.9%	$ 780,532	16%
Commercial	$ 18,007	0.4%	$ 127,347	2.6%	$ 145,354	3%
Education	$ 27,429	0.6%	$ 148,117	3.0%	$ 175,546	4%
Emergency	-	0.0%	-	0.0%	-	0%
Government	-	0.0%	-	0.0%	-	0%
Industrial	$ 746	0.0%	$ 1,050	0.0%	$ 1,796	0%
Religion	-	0.0%	-	0.0%	-	0%
Residential	$2,947,065	59.2%	$ 928,982	18.7%	$3,876,047	78%
Total	**$ 3,178,887**	**64%**	**$1,800,387**	**36%**	**$4,979,275**	

Note: Total Inventory Values
1 - Building Replacement Costs = $6,607,442,042
2 - Content Replacement Costs = $3,951,409,020
3 - Total Value = $10,558,851,062

Damage Estimation for County Owned Property

Hazus 4.2 was used to estimate the loss potential to county facilities exposed to dam failure in the County. Hazus reports the damage potential and loss potential from a given dam failure scenario in four categories: slight damage, moderate damage, extensive damage, and economic loss. Economic loss consists of estimations on the cost of repair and replacement to damaged or destroyed buildings and contents, relocation expenses, capital-related income, wage losses, and rental income losses.

County insurance data was obtained and formatted for use in Hazus for a detailed damage estimation. This dataset has additional information including the number of floors, building value, content value, and construction type that greatly enhances results from the default Hazus database. While the County does have facilities within the dam inundation zone, those facilities do not experience damage in the inundation depths modeled through Hazus.

4.5.1.8.3 Future Trends in Development

Flooding due to a dam failure event is likely to exceed the special flood hazard areas regulated through local floodplain ordinances. The County and planning partners should consider the dam failure hazard when permitting development in mapped dam inundation zones and downstream of high hazard and significant hazard dams in the County. Low hazard dams could become significant or high hazard dams if development occurs below them.

4.5.1.9 Dam Failure Hazard Problem Statements

As part of the mitigation action identification process, the Planning Committee for the County and for each jurisdiction identified issues and weaknesses, also called problem statements, for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool and flood data. Dam failure hazard problem statements are listed in Table 4-14; problem statements for all other planning partners are accessed in Volume 2 of this plan.

Identifying these common issues and weaknesses assists the Planning Committee to understand the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. Projects or actions have been developed to mitigate each problem identified. See Table 5-6 for a full list of mitigation actions and corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 4-14 and Table 5-6.

Table 4-14: Dam Failure Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-DF-MC-56	Dam Failure	Impact	PPRO - Property Protection , PE&A - Public Education & Awareness	**Mendocino County**	The following critical infrastructure is located in a dam inundation zone: 5 substations, 5 power plants, 4 schools, 6 Fire Dept. Facilities, 3 communication towers, and 1 community center	ma-DF-MC-199
ps-DF-MC-57	Dam Failure	Victim	PE&A - Public Education & Awareness	**Mendocino County**	6,024 live within a dam inundation zone in Mendocino County	ma-DF-MC-199

4.5.2 Drought Hazard Profile

California's water resources have been stressed by periodic drought cycles and in some places overuse, creating the need for unprecedented state and local restrictions in water use. Climate change is expected to increase drought and extreme weather. While the duration and severity of drought is always in question, it is certain that California and Mendocino County will continue to be impacted by drought. (California Drought Contingency Plan, 2010)

4.5.2.1 Drought in California

Drought has impacted almost every county in California at one time or another, causing more than $2.6 million in damage. Droughts exceeding three years are relatively rare in northern California, the source of much of the state's water supply. The 1929-1934 drought established the criteria commonly used in designing storage capacity and yield for large northern California reservoirs. The driest single year in California's measured hydrologic history was 1977. (California Department of Water Resources, 2015)

Drought impacts in California are felt first by those most dependent on annual rainfall, including agencies fighting wildfires, ranchers engaged in dryland grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable water source. (*Id.*)

Most of California's precipitation comes from storms moving across the Pacific Ocean. The path followed by the storms is determined by the position of an atmospheric high-pressure belt that normally shifts southward during the winter, allowing low-pressure systems to move into the state. On average, 75 percent of California's annual precipitation occurs between November and March, with 50 percent occurring between December and February. If a persistent Pacific high-pressure zone takes hold over California mid-winter, the water year tends to be dry. (Western Regional Climate Center, 2020)

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

In incorporated areas of Mendocino County, water supply is sourced primarily from groundwater resources. Groundwater wells throughout the County are used for domestic, commercial, industrial, agricultural, and for fire protection needs. (Mendocino County General Plan, 2009)

Groundwater in the County is sourced from two unique geologic settings, which include inland valleys and mountainous areas. Mountainous areas are underlain by consolidated rocks of the Franciscan Complex. Interior valleys are underlain by thick deposits of valley fill. There are six primary groundwater basins in Mendocino County which include: Round Valley, Little Lake Valley (Willits Valley), Ukiah Valley, Laytonville Valley, Potter Valley, and Anderson Valley. (*Id.*)

Some areas of the County rely primarily on surface water supplies. Van Arsdale Reservoir and Lake Mendocino are the two most notable surface water resources in the County. Smaller reservoirs and ponds are also prevalent, and some jurisdictions pull water directly from rivers and streams. (*Id.*)

4.5.2.2 Plans, Policies, and Regulatory Environment

California Sustainable Groundwater Management Act

On September 16, 2014, Governor Brown signed into law a package of bills (SB1168, AB1739 and SB1319) collectively called the Sustainable Groundwater Management Act (SGMA). SGMA requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. Under SGMA, these basins should reach sustainability within 20 years of implementing their sustainability plans. For critically over-drafted basins, that date will be 2040. For the remaining high and medium priority basins, 2042 is the deadline.

Statewide Emergency Water Conservation Regulations

In 2016, the State Water Resources Control Board (Water Board) adjusted emergency water conservation regulations in recognition of the differing water supply conditions and ongoing drought across the state to comply with an Executive Order from the California Governor declaring a drought emergency. Executive Order B-37-16 Making Water Conservation a California Way of Life updates temporary emergency water restrictions and transitions to permanent, long-term improvements in water use by:

- providing for wiser water use
- eliminating water waste
- strengthening local drought resilience
- improving agricultural water use efficiency and drought planning

In April of 2017, a new Executive Order lifted the drought emergency but retained many of the conservation requirements. Most regulations are still in effect with the exception of water supply “stress test” requirements and conservation standards for urban water suppliers. The temporary restrictions established a baseline of the types of benefits that are possible from water conservation requirements. The Executive Orders are found at:
https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/executive_orders.html

California Water Plan

The California Water Plan presents strategic plan elements, including a vision, mission, goals, guiding principles, and recommendations for current water conditions, challenges, and activities. The plan includes future uncertainties and climate change impacts, scenarios for 2050, and a roadmap for improving data and analytical tools needed for integrated water management and sustainability. The California Water Plan was updated most recently in 2018. See: https://water.ca.gov/Programs/California-Water-Plan.

Mendocino County General Plan

The Mendocino County 2009 General Plan includes the following policies the Development Element to mitigate the effects of drought:

Development Element

Policy DE-81: Encourage that landscaping of new residential subdivisions, mobile home parks, and commercial and industrial uses is adequate to enhance the site and reflects the local climate and drought tolerance in the choice of plant materials.

Policy DE-91: Encourage all new developments to include tree-lined streets and/or other vegetative treatments (consistent with other considerations, such as drought tolerance, fire safety and solar access) that enhance the visual or environmental aspects of the development. Promote the introduction of similar elements into existing communities where feasible.

Emergency Water Conservation Rules and Regulations in Mendocino County Code, § 7.10

The Mendocino County Code includes provisions for any future drought emergency declaration within the County. These provisions apply to all water users in order to achieve necessary water conservation goals in the Mendocino County portion of the Russian River drainage. The provisions were initially intended to meet the immediate action necessary to avoid depleting Lake Mendocino storage and to consequently avoid the indirect costs to public health and safety, and economic losses to the County's residents. However, they also apply to future drought emergencies.

The regulations contain three provisions a conservation requirement that all water users within the County reduce their water use by 20%, in addition to all local water suppliers being requested to implement their local water shortage contingency plans, along with reporting and enforcement requirements.

4.5.2.3 Past Events

California experienced massive changes over the course of the twentieth century as evidenced by dramatic population increases and land use conversion. (Cal. Dep't of Water Resources, 2015) The driest single year in California's measured hydrologic history is 1977. This drought period began in November 1975. It first drained the State's reservoirs, which then lead to widespread water shortages in 1977. Additionally, 1976 is on record as the fourth driest year for California. During this period 47 of the 58 California counties declared emergencies.

The most extreme drought conditions in Mendocino County's more recent history were experienced in 1991. This was part of a drought period that for much of California lasted for six years, from 1987 to 1992. By the end of 1991 23 counties had declared local drought emergencies, including Mendocino County. (Mendocino 2014 MJHMP, 2014) Additionally, The California Department of Water Resources has state hydrologic data back to the early 1900s. The hydrologic data show multi-year droughts from 1912 to 1913, 1918 to 1920, 1922 to 1924, 1929-1934, 1976-1977, 1987-1992, 2007-2009, and 2012 to 2016. (Department of Water Resources, 2020)

The most recent major drought in California spanned 2014-2017. With California facing water shortfalls in the driest year in recorded state history, California State Governor Jerry Brown declared a drought state of emergency on January 17, 2014. In the state of emergency declaration, Governor Brown directed state officials to assist farmers and communities that are economically impacted by dry conditions and to ensure the state can respond if Californians face drinking water shortages. The Governor also directed state agencies to use less water and hire more firefighters and initiated a greatly expanded water conservation public awareness campaign. Figure 4-17 shows drought-impacted Lake Mendocino in 2014. On April 17, 2017, Brown issued Executive Order B-40-17, officially ending the drought state of emergency in all California counties except Fresno, Kings, Tulare, and Tuolumne.

The National Drought Monitor provides drought data and maps nationally and on a localized, watershed scale. The National Drought Monitor is the product of eleven agencies, from the NDMC, NOAA and USDA, and is available at http://droughtmonitor.unl.edu/. The National Drought Monitor categorizes the level of drought from D0 through D4, with D4 being the highest "exceptional drought." Table 4-15 depicts drought classifications and impacts from the level of drought occurrence in California.

Figure 4-17: Drought-lowered Lake Mendocino in 2014.
Source: Photo by Rich Pedroncelli, Associated Press

Figure 4-18 shows a time series of the level of drought in Mendocino County from 2000 to 2020 according to the National Drought Monitor as well as the watersheds in Mendocino County. The National Drought Monitor also classifies drought on a watershed scale (according to hydrologic units established by the US Geological Survey). The participating jurisdiction annexes for those jurisdictions that prioritized drought hazards depict the past twenty years of droughts within applicable watersheds.

Table 4-15: Drought Classifications and Impacts for California

Category	Description	Possible Impacts
D0	Abnormally Dry	▪ Soil is dry; irrigation deliver begins early ▪ Dryland crop germination is stunted ▪ Active fire season begins ▪ Winter resort visitation is low; snowpack is minimal
D1	Moderate Drought	▪ Dryland pasture growth is stunted; producers give supplemental feed to cattle ▪ Landscaping and gardens need irrigation earlier; wildlife patters begin to change ▪ Stock ponds and creeks are lower than usual
D2	Severe Drought	▪ Producers increase water efficiency methods and drought-resistant crops; ▪ Grazing land inadequate ▪ Fire season is longer, with high burn intensity, dry fuels, and large fire spatial extent; more fire crews on staff ▪ Lake- and river-based tourism declines; boat ramps close ▪ Trees are stressed; plants increase reproductive mechanisms; wildlife diseases increase ▪ Water temperatures increase; programs to divert water to protect fish begin ▪ River flows decrease; reservoir levels are low and banks are exposed
D3	Extreme Drought	▪ Livestock need expensive supplemental feed, cattle and horses are sold; little pasture remains ▪ Fruit trees bud early; producers begin irrigating in winter ▪ Federal water not adequate to meet irrigation contracts, extracting supplemental groundwater is expensive ▪ Dairy operations close ▪ Fire season lasts year-round; fires occur in typically wet parts of the state; burn bans are implemented ▪ Ski and rafting business is low, mountain communities suffer ▪ Orchard removal and will drilling company business increase; panning for gold increases ▪ Low water levels impede fish migration and cause lower survival rates ▪ Wildlife encroach on developed areas; little native food and water is available for bears, which hibernate less ▪ Water sanitation is a concern, reservoir levels drop significantly, surface water is nearly dry, flows are very low; water theft occurs ▪ Well and aquifer levels decrease; homeowners drill new wells
D4	Exceptional Drought	▪ Fields are left fallow; orchards are removed; vegetable yields are low; honey harvest is small; agricultural unemployment is high, food aid is needed ▪ Fire season is very costly; number of fires and areas burned are extensive ▪ Many recreational activities are affected ▪ Fish rescue and relocation begins; pine beetle infestation occurs; forest mortality is high; wetlands dry up; survival of native plants and animals is low; fewer wildflowers bloom; wildlife death is widespread; algae blooms appear ▪ Poor air quality affects health; greenhouse gas emissions increase as hydropower production decreases; West Nile outbreaks rise ▪ Water shortages are widespread; surface water is depleted; federal irrigation water deliveries are curtailed; water prices are extremely high; wells are dry, more and deeper wells are drilled; water quality is poor

Adapted from U.S. Drought Monitor Drought Classifications and Impacts.
https://droughtmonitor.unl.edu/Data/StateImpacts.aspx

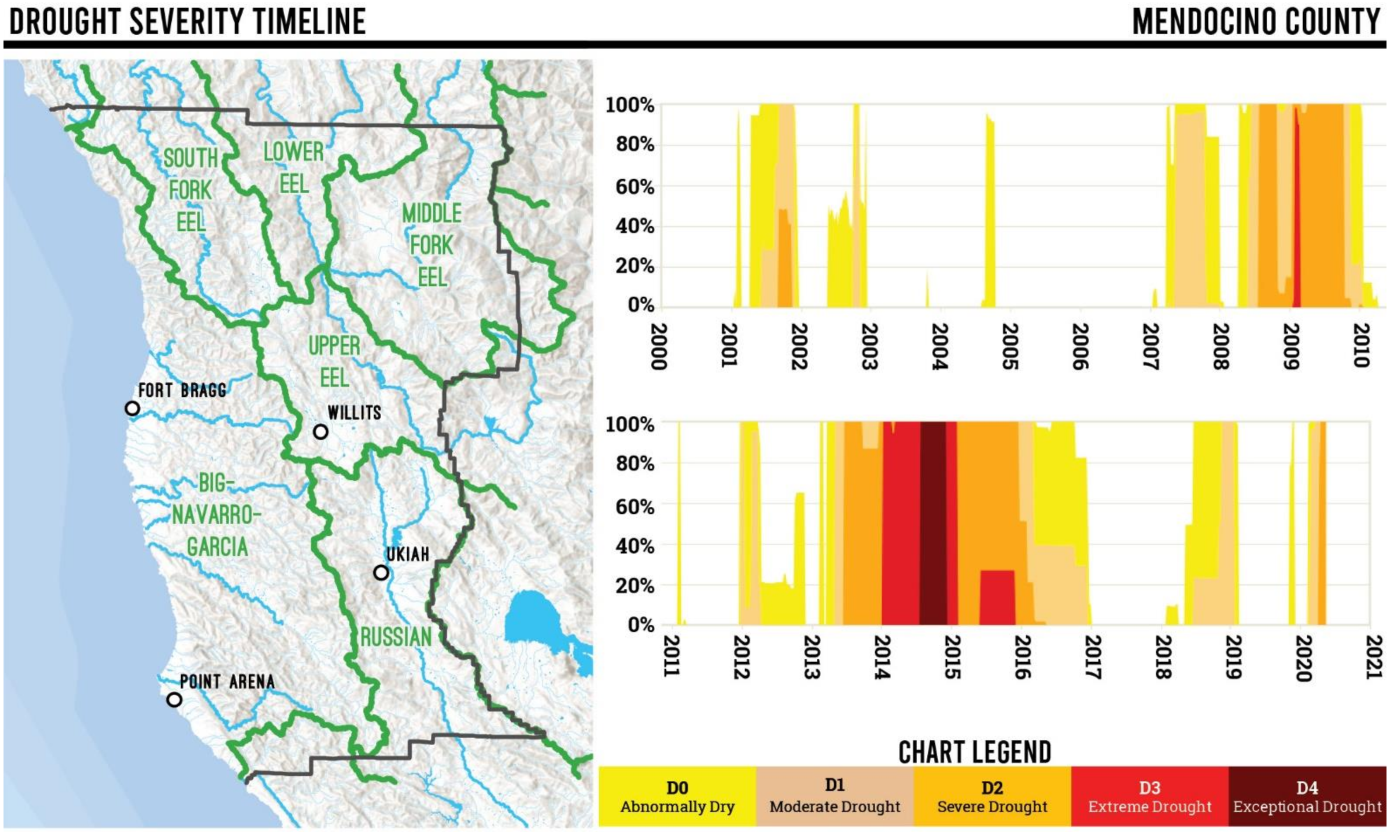


Figure 4-18: Mendocino County Drought Severity Timeline 2000-2021

4.5.2.4 Location

Drought is one of the few hazards with the potential to impact the entire population of Mendocino County directly or indirectly through water restrictions, higher water and food prices, reduced air or water quality, or restricted access to recreational areas. No portion of the County is immune from drought conditions.

Lack of winter snowfall in the mountains can eventually lead to agricultural impacts due to decreased stream flows. Reduced base flows may introduce additional challenges for communities that depend on direct drinking water supplies from rivers and tributaries. Droughts of just a few weeks during critical periods of plant development can have disastrous effects on agriculture production. Reduced reservoir storage from decreased runoff in the mountains can lead to water shortages. Droughts that occur in populated areas may not have direct effects on the residents but may increase the threat of wildfire in the wildland-urban interface areas.

4.5.2.5 Frequency/Probability of Future Occurrences

Predicting the precise probability of future drought depends on comprehensive and reliable data. Cal-Adapt, an authority on climate variance in California, projects an extended period of drought over a 20-year period. (Cal-Adapt, 2020) Empirical studies conducted over the past century have shown that meteorological drought is never the result of a single cause. It is the result of many causes, often synergistic in nature; these include global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast with warm, dry air, resulting in less precipitation.

According to the results of the risk factor exercises for the participating jurisdictions, the probability of drought occurring in Mendocino County is highly likely (100% annual probability). Figure 4-18 provides a time series from the National Drought Monitor that shows Mendocino County has been in some form of drought for much of the period from 2000 to 2020.

4.5.2.6 Severity and Extent

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

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

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

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

Table 4-15 describes the impacts of the various severity levels of drought in California according to the National Drought Monitor classifications.

4.5.2.7 Warning Time

Droughts are climatic patterns that occur over long periods of time. Only generalized warning can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depends on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of weather systems on a global scale. (National Institute of Water and Atmospheric Research, 2016)

4.5.2.8 Secondary 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 duration of the drought extends. The Rush Fire and the Rough Fires are examples of how drought conditions, combined with increased fuel loads, can cause more frequent and intense wildfires. (Syphard, 2019)

4.5.2.9 Climate Change Impacts

The long-term effects of climate change on regional water resources are less known, but globally, water resources are already stressed from a growing population, poor water quality, groundwater overdrafts, and aging urban water infrastructure. Climate change will likely exacerbate many of these stresses.

With a warmer climate, droughts are projected to increase in severity, frequency, and duration. The associated costs from diminished water resources will also be significant. According to the UC Davis Center for Watershed Sciences, water shortages in 2016 were projected to cost the agricultural industry a total of $550 million in direct costs and 1,815 in lost jobs. More frequent extreme events such as droughts could end up being more cause for concern than the long-term change in temperature and precipitation averages. (University of California, Davis Center for Watershed Sciences, 2020) According to California's Fourth Climate Change Assessment, variances in precipitation trends towards shorter winters and prolonged dry seasons in addition to increased frequency of drought, could limit water supplies from more local sources. (Grantham, 2018)

4.5.2.10 Drought Vulnerability Analysis

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

Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists because water is integral to the ability to produce goods and provide services. Drought vulnerability of an activity usually depends on its water demand, how the demand is met, and what water supplies are available to meet the demand. California's 2018 Water Plan indicates that water demand in the state will continue to increase.

4.5.2.10.1 Population

The residents of the county rely on healthy watersheds to provide adequate water for domestic and agricultural purposes. Mendocino County has experienced population growth and is projected to continue growing, with Ukiah being one of the fastest-growing cities in the County. No significant life or health impacts are anticipated as a result of drought within the planning area.

4.5.2.10.2 Property

During drought years, property owners with shallow wells can be impacted by drought with increased demand on groundwater resources. Surface water supplies are often lower, which can reduce available supplies and increase cost. This sometimes encourages growers who historically use surface water to switch to groundwater, which has a permanent impact on those reliant on groundwater.

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

The agricultural sector is particularly susceptible to drought impacts. Agricultural drought impacts are normally felt earliest by those relying on unmanaged water supplies: entities carrying out dryland grazing and non-irrigated crop production, usually grain crops. Impacts on irrigated agriculture depend on the source and nature of the irrigation water supply, whether it be local groundwater, local surface water, or imported surface water, and any water rights or contractual provisions that may be associated with the source. The extent to which producers may mitigate water shortage impacts depends on multiple factors but is heavily influenced by economic considerations. Factors involved in making decisions about mitigating irrigation water shortages include availability and costs of pumping groundwater, price of alternative surface water sources, capital investments associated with maintaining permanent plantings, and status of international crop markets. (California Drought Contingency Plan, 2010)

4.5.2.10.3 Critical Facilities

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

4.5.2.11 Future Trends in Development

The County will face challenges in providing sufficient water supplies in the future due to climate change effects, coupled with an increasing population (i.e., mostly in the incorporated areas) and increasing water demand. While the County has already taken steps towards achieving long-term groundwater sustainability, there is still a possibility that water supply availability may change in the future and will need to be further addressed.

The Russian River Watershed Association of Mendocino County exists to inform and educate the public and water community about water issues in Mendocino County. They are a resource for information on water issues in Mendocino County and provide tips for water conservation.

Each participating jurisdiction has an established General Plan that includes policies directing land use and dealing with issues of water supply and the protection of water resources. These plans provide the capability at the local level to protect future development from the impacts of drought. All participating jurisdictions reviewed their general plans as part of their hazard mitigation capability assessments. Deficiencies identified by these reviews can be identified as mitigation actions to increase the capability to deal with future trends in development.

4.5.2.12 Drought Hazard Problem Statements

As part of the mitigation action identification process, the Planning Committee for the County and for each jurisdiction identified issues and weaknesses, also called problem statements, for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool and flood data. Drought hazard problem statements for the County are listed in Table 4-16; problem statements for all other planning partners are accessed in Volume 2 of this plan.

Identifying these common issues and weaknesses assists the Planning Committee to understand the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. Projects or actions have been developed to mitigate each problem identified. See Table 5-6 for a full list of mitigation actions and corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 4-16 and Table 5-6.

Table 4-16: Drought Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-DR-MC-18	Drought	Impact	PRV - Prevention , PE&A - Public Education & Awareness , NRP - Natural Resource Protection	**Mendocino County**	Groundwater pumping and well construction during drought years can contribute to aquifer overdraft	ma-DR-MC-196, ma-DR-MC-150
ps-DR-MC-19	Drought	Impact	NRP - Natural Resource Protection , SP - Structural Projects	**Mendocino County**	Water wells are risk of running dry in late fall months, especially during drought years	ma-DR-MC-196, ma-DR-MC-150
ps-DR-MC-20	Drought	Threat	PRV - Prevention , NRP - Natural Resource Protection	**Mendocino County**	County buildings and facilities have irrigated landscaping including turf grass	ma-DR-MC-198
ps-DR-MC-21	Drought	Threat	PRV - Prevention , NRP - Natural Resource Protection	**Mendocino County**	There is an opportunity to update the County's land use code to include additional incentives for new development to implement drought tolerant landscaping that requires less water, provides more shade, and lessens the urban heat island effect	ma-DR-MC-197

4.5.3 Climate Change Hazard Profile

Climate change refers to any distinct change in measures of climate lasting for a long period of time, more specifically major changes in temperature, rainfall, snow, or wind patterns. Climate change may be limited to a specific region or may occur across the whole Earth. Climate change may result from:

- Natural factors, such as changes in the sun's energy or slow changes in the Earth's orbit around the sun;
- Natural processes within the climate system, such as changes in ocean circulation, or
- Human activities that change the atmosphere's make-up, and the land surface, such as burning fossil fuels, cutting down forests, planting trees, or building developments in cities and suburbs.

Changes in extreme weather and climate events, such as heatwaves and droughts, are the primary way that most people experience climate change. Human-induced climate change has already increased the number and strength of these extreme events. Over the last 50 years, much of the U.S. has seen increases in prolonged periods of excessively high temperatures, heavy downpours, and in some regions, severe floods, and droughts. (National Climate Assessment, 2014)

The effects of climate change are varied and include extremes in precipitation and temperature. Slower average increases in temperature, precipitation, and sea-level rise can result in compounding impacts such as ocean acidification, increasing insect outbreaks, and shifts in biological patterns, to name a few. (Food and Agriculture Organization of the United Nations, 2014) Table 4-17 is a list of localized climate change impacts relevant to California's northern coastline and the reference to where it is addressed in this MJHMP.

Table 4-17: Climate change-related hazards and cross-references in MJHMP

Climate change hazard	Reference in MJHMP
Agriculture and Forestry Pests and Diseases	Section 4.5.10 (Sudden Oak Death in Wildfire Profile)
Dune and Bluff Erosion	Section 4.5.9 (Soil Hazard Profile)
Drought	Section 4.5.2 (Drought Hazard Profile)
Extreme Heat	Section 4.5.3.5 (Climate Change Severity & Extent)
Fog	Section 4.5.3 (Climate Change Hazard Profile)
Human Hazards	Section 4.5.5 (Pandemic Hazard Profile)
Inland and Shoreline Flooding	Section 4.5.6 (Flood Hazard Profile)
Landslides and Debris Flows	Section 4.5.8 (Slope Hazard Profile)
Sea-level rise	Section 4.5.3 (Sea-level rise)
Severe Weather	Section 4.5.7 (Severe Weather Hazard Profile)
Wildfire	Section 4.5.10 (Wildfire Hazard Profile)

California is already experiencing the impacts of climate change, including prolonged drought, increased coastal flooding and erosion, and tree mortality. The state has also seen increased average temperatures, more extreme heat days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, a decreased summertime fog of 33%, and both snowmelt and rainwater running off sooner in the year. (Cal OES, 2018) Long term trends in fog depict a decline of some 12 to 20% in California from 1900 through 2070. Climate experts suggest that warmer temperatures resulting from climate change create conditions where air fails to reach cool enough temperatures necessary for the production of fog. Warmer temperatures are simultaneously able to evaporate any fog which is able to form. (Grantham, Teodore; University of California, Berkeley, 2018)

The intensity of extreme weather events is also increasing. Extreme weather events and resulting hazards, such as heatwaves, wildfires, droughts, and floods are already being experienced. (United States Geological Survey, n.d.) The vulnerability analysis herein touches on extreme weather impacts from climate change; more detail on extreme weather is included in the County's 2020 Climate Vulnerability Assessment.

Sea-level rise

This climate change hazard profile focuses in large part on sea-level rise, as it has delineated hazard boundaries and quantifiable exposure and damage estimations. Sea-level rise is called out within each subsection of this climate change hazard profile.

Sea-level rise, a direct result of climate change, affects communities in the Northern California Coastal Area. Sea-level rise has the potential to inundate homes, businesses, and infrastructure located near the shorelines, as well as cause erosion of coastal lands over time. The sea level rose during the 20th century, and observations and projections suggest that it will rise at a higher rate during the 21st century. Rising seas increase the risk of coastal flooding, storm surge inundation, coastal erosion and shoreline retreat, and wetland loss. The cities and infrastructure that line many coasts are already vulnerable to damage from storms, which is likely to increase as sea level continues to rise and inundate areas further inland.

This HMP highlights sea-level rise within the climate change section because this hazard has delineated hazard boundaries and quantifiable exposure and damage estimations directly related to climate change.

4.5.3.1 Policies, Plans, and Regulatory Environment

Successful efforts to address the challenges of climate change begin at the local level and include the implementation of environmentally sustainable practices designed to meet present and future energy needs.

California Assembly Bill 2516: Database for Sea-level rise Planning

AB2516 was passed in 2014 and called the Natural Resources Agency, in collaboration with the Ocean Protection Council, to conduct biannual surveys of sea-level rise planning information to catalog California's efforts to prepare for rising sea levels. The resources collected in service to this task include studies, vulnerability assessments, and local coastal programs. The future collection of AB2516 resources will be stored in the Adaption Clearinghouse.

2016 California Green Building Standards

The County has adopted the 2019 California Green Building Standards, also known as CALGreen Code. CALGreen Code establishes regulations for green building, nonresidential and residential buildings. Topics covered in the regulations include planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency and environmental quality. The code also includes voluntary measures for residential, nonresidential and health facilities.

California Sustainable Communities and Climate Protection Act of 2008

The Sustainable Communities and Climate Protection Act of 2008 (Sustainable Communities Act, SB 375, Chapter 728, Statutes of 2008) looks to reduce GHG emissions through coordinated transportation and land use planning with the goal of more sustainable communities. Regional targets are established for GHG emissions reductions from passenger vehicle use by the sustainable communities strategy (SCS) established by each metropolitan planning organization (MPO). The SCS is an integral part of regional transportation plans (RTP) and contains land use, housing, and transportation strategies to meet GHG reductions targets.

2018 California Coastal Commission Sea Level Rise Policy Guidance

The 2018 California Coastal Commission Sea Level Rise Policy Guidance document provides an overview of the best available science on sea level rise for California and recommended methodology for addressing sea level rise in Coastal Commission planning and regulatory actions. It is intended to serve as a multi-purpose resource for a variety of audiences and includes a high level of detail on many subjects.

2018 California's Fourth Climate Change Assessment

California's Fourth Climate Change Assessment promotes actionable science that serves the growing needs of state and local-level decision-makers from a diverse number of sectors. The Fourth Assessment provides information in a number of ways. Regional reports summarize climate impacts and adaptation needs around the state, at a resolution useful for local decision-makers. Statewide impacts are summarized in the Statewide Summary Report, as well as reports on Tribal and Indigenous Communities, Climate Justice, and California's Ocean and Coast. The Technical Reports are the foundation of the Fourth Assessment and include climate projections and analyses of expected impacts in various sectors across the state.

2020 California Adaptation Planning Guide (APG)

California has been taking action to address climate change for over 20 years, focusing on both greenhouse gas emissions reduction and adaptation. The California Adaptation Planning Guide (APG) provides guidance and support for communities addressing the unavoidable consequences of climate change. The 2020 APG presents an updated, step-by-step process that communities can use to plan for climate change.

California Senate Bill 379: General Plan Safety Element and Climate Adaption

California SB 379 requires all cities and counties to include climate adaptation and resiliency strategies in the Safety Elements of their General Plans upon the next revision beginning January 1, 2017. The bill requires the climate adaptation update to include a set of goals, policies, and objectives for their communities based on the vulnerability assessment, as well as implementation measures, including the conservation and implementation of natural infrastructure that may be used in adaptation projects.

California Senate Bill 1000: General Plan Safety and Environmental Justice Elements

Senate Bill 1000 requires local governments to include an Environmental Justice element in General Plans. SB 1000 has four basic requirements, whether those requirements are combined into a single environmental justice element or distributed throughout other existing elements, including:

- identifying disadvantaged communities,
- incorporating policies to reduce the environmental health impacts that adversely affect residents in disadvantaged communities,
- incorporating policies to include residents of disadvantaged communities in decision-making processes, and
- incorporating policies that prioritize improvements and projects in disadvantaged communities.

Mendocino County 2020 Climate Vulnerability Assessment.

In tandem with this 2020 HMP Update, the County's 2020 Climate Vulnerability Assessment was developed to determine how climate change will likely affect the County's population and assets. The Assessment provides detailed analysis of how a range of climate impacts can harm people, physical structures, and other community assets throughout Mendocino County and will enable these jurisdictions to identify and take action to address dangerous conditions from climate change hazards before they develop or become more intense and frequent. This HMP Vulnerability Assessment does not supersede, but rather compliments, the County's 2020 Climate Vulnerability Assessment.

Mendocino County General Plan

The 2009 Mendocino County General Plan Resource Management Element includes guidance for local efforts at climate change mitigation and adaptation, focused both on policies that guide the County in combating climate change through measures like greenhouse gas reductions as well as policies that encourage adaptation to future climate changes. Examples include:

- Reduce vehicle travel by focusing new developing around existing community areas. (Policy RM-44)

- Require the incorporation of energy conservation and renewable energy sources for public, residential, educational, institutional, commercial, and industrial facilities and uses. (Policy RM-53)

The County is currently developing a 2020 Safety Element and will incorporate this 2020 MJHMP Update and the 2020 Climate Vulnerability Assessment.

4.5.3.2 Past Events

Climate change has never been directly responsible for any declared disasters. Past flooding, wildfire, levee failure, and drought disasters may have been exacerbated by climate change, but it is difficult to make direct connections to individual disasters. In addition, unlike earthquake and floods that occur over a finite time period, climate change is an on-going hazard, and many communities are already experiencing the effects. Other effects may not be seriously experienced for decades or may be avoided altogether by mitigation actions taken today.

Sea-level Rise

Historic records from the San Francisco tidal gage, CA Station ID: 9414290, show that the sea level in the San Francisco Bay has risen eight inches from 1897 to 2006. Similarly, water level measurements from the tidal gage at Port Chicago, CA Station ID: 9415144, show an increase in mean sea level of 2.08 millimeters a year, which is equivalent to a change of 8.6 inches in 100 years.

4.5.3.3 Location

The effects of climate change are not limited by geographical borders. Mendocino County, the State of California, the United States, and the rest of the world are all at risk of climate change. As such, the entire County is at risk to the effects of climate change.

Sea-level Rise

Sea-level rise varies greatly depending on a number of factors, and the pacific coast of Mendocino County may not see as great an impact of sea-level rise as other regions nationally or globally. Globally, sea level is rising primarily because global temperatures are rising, causing ocean water to expand and land ice to melt. However, sea-level rise varies from place to place. Sea-level rise along the Pacific coast depends on the global mean sea-level rise and also on regional factors such as ocean and atmospheric circulation patterns in the northern Pacific Ocean, gravitational and deformational effects of land ice mass changes, and tectonics along the coast. The impacts of sea-level rise in areas with elevated cliffs are also ameliorated to some degree. In California, cliffs and bluffs made of sedimentary rocks typically erode at rates of 15 to 30 centimeters per year. The comparative importance of these factors determines whether local sea level is higher or lower than the global mean, and how fast it is changing, which has enormous implications for coastal planning. (National Research Council, 2012)

Sea-level rise within the Western Pacific is different than the global average. In some places within the Western Pacific, sea-level rise has been greater than 10 mm per year. In other places, such as in the Eastern Pacific, sea-level rise has been much less. The differences in rate and region are primarily associated with multi-decadal fluctuations which are associated with the Pacific Decadal Oscillation (PDO), which has appeared to switch phases in the last couple of years. A PDO phase switch could signal the start of higher amounts of relative sea-level rise along the U.S. West Coast within the coming decades. This is a trend similar to the higher relative sea-level rise rates which have occurred in this region during portions of the last century. (NOAA, 2017)

Sea level rise will primarily affect the coastal regions and municipalities. Volume 1 herein described sea-level rise, while annexes for Fort Bragg and Point Arena include problem statements and mitigation actions related to sea-level rise. The unincorporated areas of the County do not have significant critical facility or population vulnerabilities to sea-level rise except through secondary impacts like coastal erosion, included in Section 4.5.8.

4.5.3.4 Frequency/ Probability of Future Occurrences

Climate change is one of the few natural hazards where the probability of occurrence is influenced by human action. In addition, unlike earthquake and floods that occur over a finite time period, climate change is an ongoing hazard.

Temperature related impacts are the most likely near-term climate change exposure facing the County and should be addressed and prioritized in future adaptation planning efforts. While sea-level rise has a high certainty rating and is already occurring, its onset is not expected to occur until closer to the end of the century in terms of changes in areas already vulnerable to flooding or causing permanent inundation in tidally-influenced areas of the County. (National Oceanic and Atmospheric Administration, n.d.)

California's Fourth Climate Change Assessment from 2018, delineated how climate change may impact and exacerbate natural hazards in the future, including wildfires, extreme heat, floods, drought, and levee failure:

- Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in Mendocino County and the rest of California, which are likely to increase the risk of mortality and morbidity due to heat-related illness and exacerbation of existing chronic health conditions. Those most at risk and vulnerable to climate-related illness are the elderly, individuals with chronic conditions such as heart and lung disease, diabetes, and mental illnesses, infants, the socially or economically disadvantaged, and those who work outdoors.
- Higher temperatures will melt the Sierra snowpack earlier and drive the snowline higher, resulting in less snowpack to supply water to California users.
- Droughts are likely to become more frequent and persistent in the 21st century.
- Intense rainfall events, periodically ones with larger than historical runoff, will continue to affect California with more frequent and/or more extensive flooding.

- Storms and snowmelt may coincide and produce higher winter runoff from the landward side, while accelerating sea-level rise will produce higher storm surges during coastal storms. (California's Fourth Climate Change Assessment, 2018)

Warmer weather, reduced snowpack, and earlier snowmelt can be expected to increase wildfire through fuel hazards and ignition risks. These changes can also increase plant moisture stress and insect populations, both of which affect forest health and reduce forest resilience to wildfires. An increase in wildfire intensity and extent will increase public safety risks, property damage, fire suppression and emergency response costs to government, watershed and water quality impacts, vegetation conversions, and habitat fragmentation.

Sea-level Rise

NOAA sea level rise scenario planning helps reveal the range of possible sea-level rise in Mendocino County. There are six representative scenarios for global mean sea level rise, influenced by what are called Representative Concentration Pathways (RCPs). These six scenarios range from a low of .3-meter global mean sea level rise to the highest 2.5-meter global mean sea level rise. NOAA utilizes three RCPs, each representing potential underlying socioeconomic conditions and technological considerations that influence the six scenarios. These include a low-end range (RCP 2.6), which projects strong measures, a moderate (RCP 4.5) range, which requires stabilizing mitigation measures through 2050, and a high-end (RCP 8.5), which maintains a fossil fuel-intensive, business as usual emission scenario. The six scenarios and three RCPs are depicted in Table 4-18, which indicates the probability of exceeding global mean sea level rise for each scenario by 2100.

Mapping in this HMP uses the moderate range RCP 4.5, as this mapping looks at projected sea level rise outcomes in the later half of the century with an adaptive lens. *See* (OPR Planning and Investing for a Resilient California, p. 19) Note that the County's 2020 Climate Vulnerability Analysis utilizes RCP 8.5.

The exposure and damage estimations for sea-level rise for Mendocino County are discussed further in the Vulnerability Assessment, Section 4.5.3.8.

Table 4-18: Probability of Exceeding Global Mean Sea-level rise (Median Value) Scenarios in 2100

GMSL rise Scenario	RCP 2.6	RCP 4.5	RCP 8.5
Low (0.3 m)	94%	98%	100%
Intermediate-Low (0.5 m)	49%	73%	96%
Intermediate (1.0 m)	2%	3%	17%
Intermediate-High (1.5 m)	0.4%	0.5%	1.3%
High (2.0 m)	0.1%	0.1%	0.3%
Extreme (2.5 m)	0.05%	0.05%	0.1%

Source: National Oceanic and Atmospheric Administration (based upon Kopp et al. 2014).

4.5.3.5 Severity and Extent

Climate change severity and extent in Mendocino County is varied and can generally be categorized into several key effects. These effects are identified in the North Coast Region[5] Report from California's Fourth Climate Change Assessment (2018). General climate change impacts for this North Coast Region include:

- Predicted annual maximum temperatures are increasing by 5-9°F by the end of the 21st century. See Figure 4-22 and Figure 4-23 to compare current annual maximum temperatures with predicted for Mendocino County.
- Annual precipitation is likely to be delivered in more intense storms, with shorter wet seasons and prolonged dry seasons. Less precipitation will fall as snow with increased temperatures.
- An "average" rainfall year will become less common with a higher occurrence of extreme wet and dry years.
- Increased extreme weather events will increase the severity and extent of flooding.
- Streamflows in the summer dry season are predicted to decline, and peak flows in the wetter winter months are likely to increase.
- Sea-level rise, while not significantly impacts the whole of the Mendocino County coastline, is predicted to impact key areas such as Arena Cove in Point Arena.
- Wildfires will continue, with projections for a longer wildfire season, increased frequency, and expansion of the area susceptible to fire. (Grantham, 2018)
- Frost occurrences may become longer and more frequent. In February 2018, for example, grape growers prepared for extended frost threat, while coping with a lack of rainfall during what are typically the wettest months of the year. As climate change continues, bud break or the appearance of shoots that will eventually yield grapes will begin sooner, leaving the delicate new growth exposed to the hazards of frost and rain for a longer stretch of the growing season. (Lutz, 2018)

These impacts are predicted to significantly impact communities through habitat loss, including cold-water fish species such as salmon, increased flood and landslide risks to critical infrastructure, increased public health risks from wildfire, floods, heatwaves, and disease vectors. (*Id.*)

Note: Mapping in this HMP uses the moderate range RCP 4.5, as HMP mapping depicts projected sea-level rise and temperature increases in the later half of the century with an adaptive lens. See (OPR Planning and Investing for a Resilient California, p. 19) ***Note that the County's 2020 Climate Vulnerability Analysis utilizes RCP 8.5.***

Sea-level Rise

Generally, some level of sea-level rise is projected for the whole coastline of Mendocino County. The severity and extent of sea-level rise depends greatly on the future pathways for emission levels and how far into the future the analysis looks. Figure 4-19 shows predicted sea-level rise in Mendocino County based on the moderate RCP 4.5 emission level. *See Section 4.5.3.4 for an overview of frequency and probability of occurrence, which plays directly into the severity and extent of sea-level rise.*

[5] The North Coast Region for California's Fourth Climate Change Assessment includes Mendocino, Humboldt, Del Norte, Lake, Trinity and Siskiyou Counties.

Current Departures from Average for Temperature and Precipitation

Parts of Mendocino County are already experiencing departures from historic average temperatures and historic average amounts of precipitation. See Figure 4-20 (temperature departure from average) and Figure 4-21 (precipitation departure from average). Southeastern portions of the county, including the City of Ukiah, are experiencing the most significant departures from normal currently.

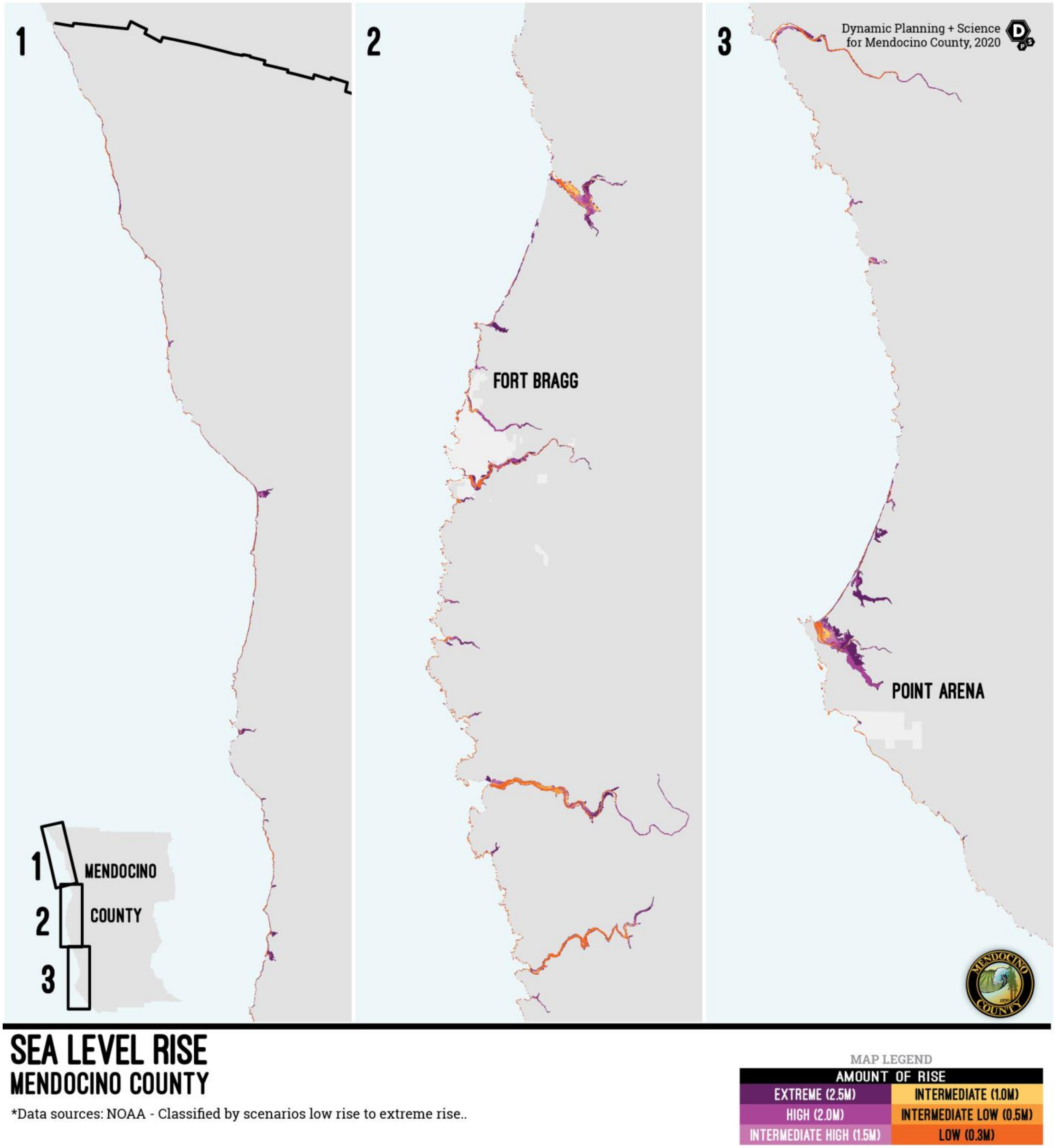


Figure 4-19: Sea-level Rise Potential

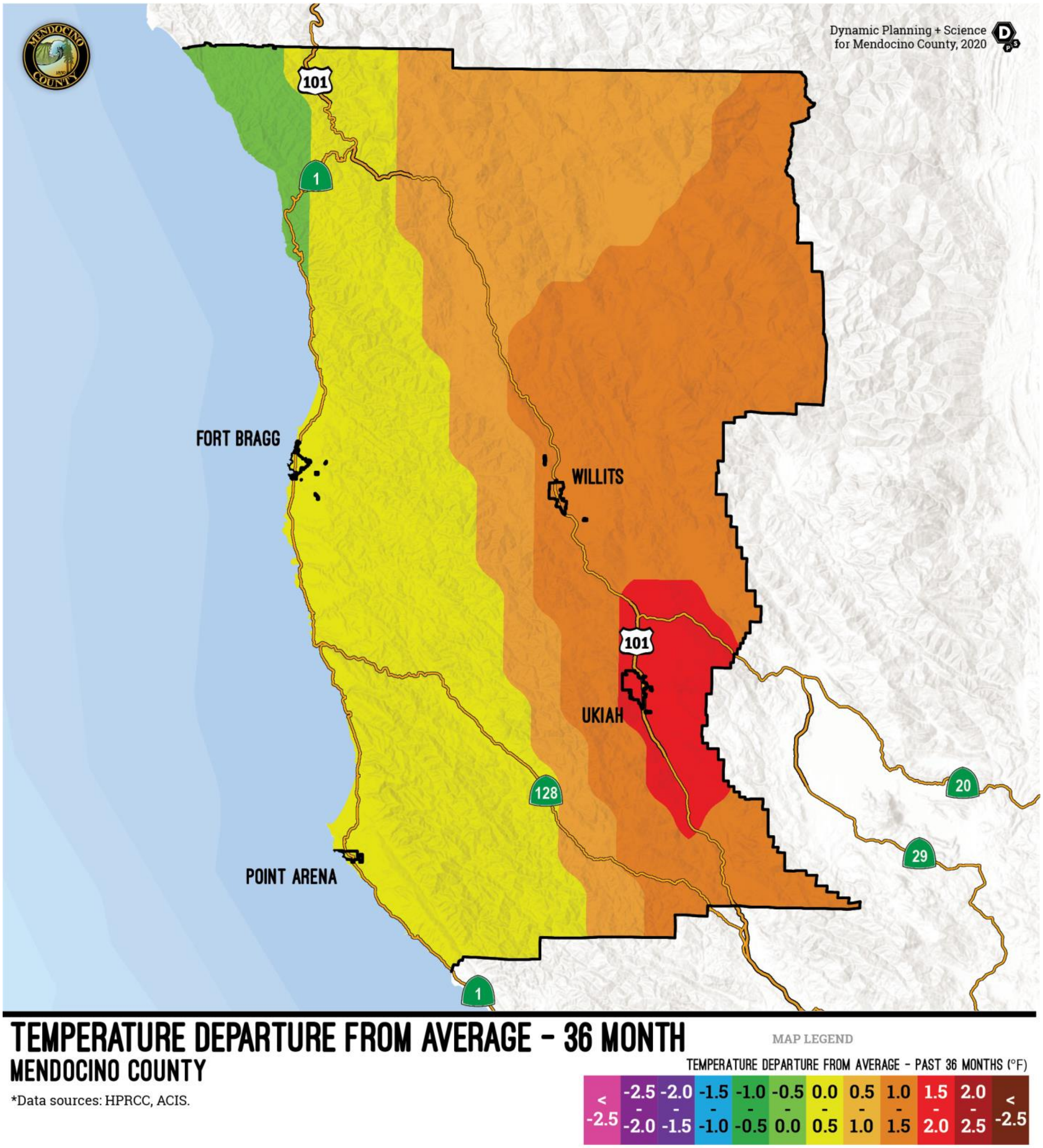


Figure 4-20: Temperature Departure From Average – 36 Month

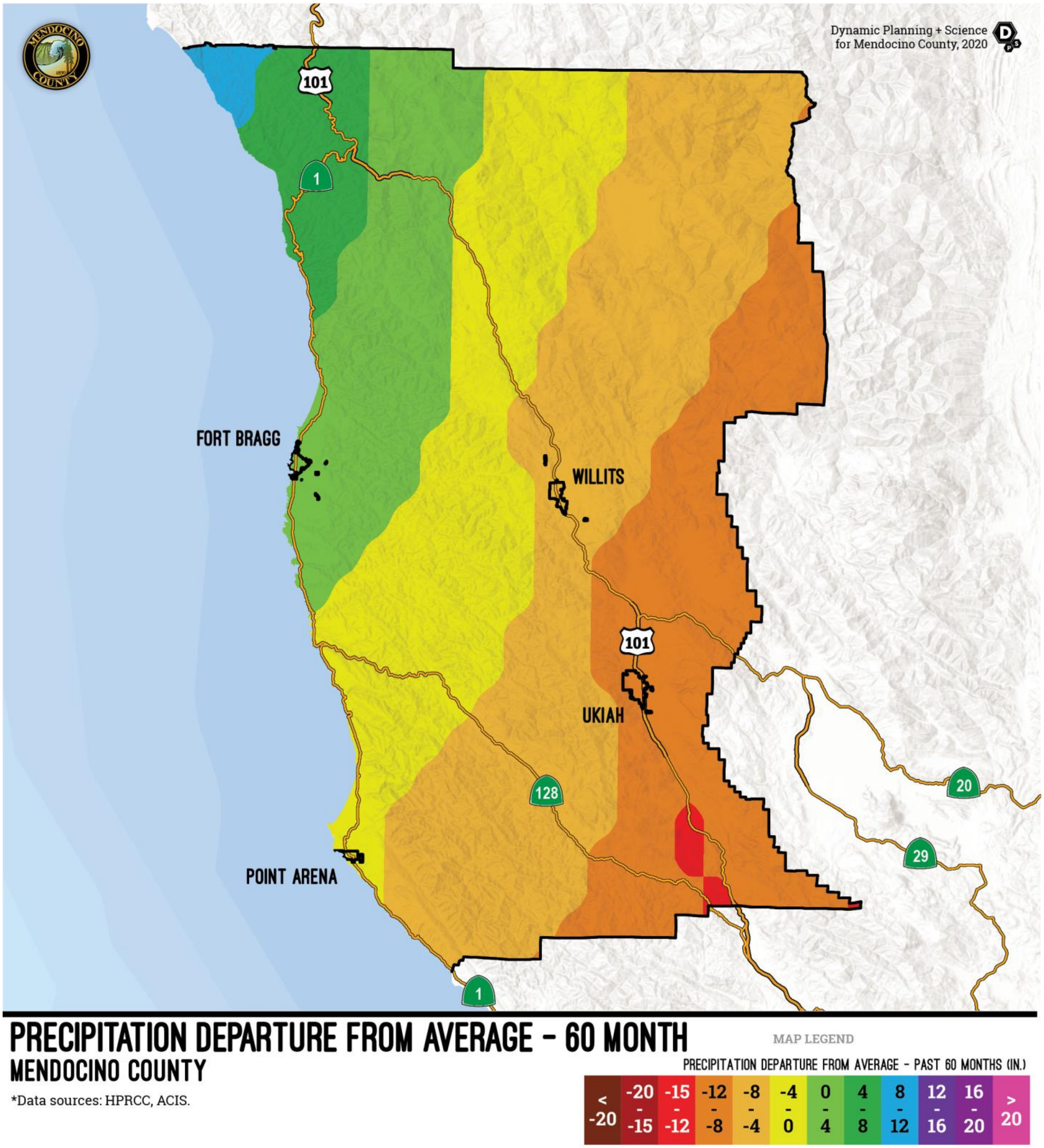


Figure 4-21: Precipitation Departure From Average – 60 Month

Average Maximum Temperature Increases

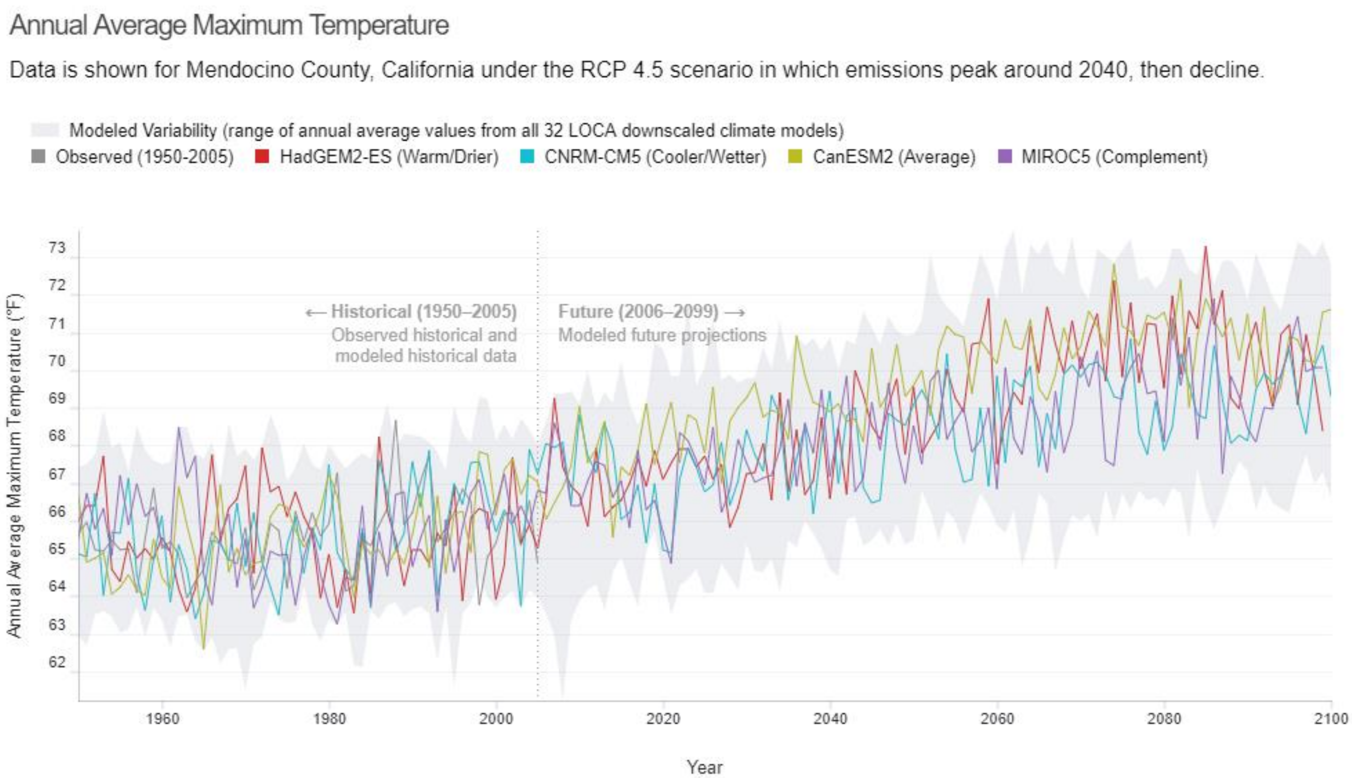
Overall temperatures are projected to rise by 5-9°F by the end of this century. Table 4-19shows annual averages of observed and projected Maximum Temperature values for the Mendocino County Climate Region under the RCP 4.5 emissions scenario. These projections differ depending on the time of year and the type of measurement (highs vs. lows), all of which have different potential effects to the County's ecosystem health, agricultural production, water use and availability, and energy demand.

Figure 4-22 and Figure 4-23 compare current average maximum annual temperatures for Mendocino County (Figure 4-22) and predicted annual maximum temperatures utilizing moderate emissions scenarios from RCP 4.5 (Figure 4-23).

Figure 4-23 depicts average maximum temperature increases throughout Mendocino County starting in 2006 compared to 2099. There are four models which are depicted here. HadGEM2-ES has been termed the "warm/dry model," and is weighted in rank closest to 1 across all metrics and RCPs. CanESM2 is the average model, which has a weighted rank closest to the average value across all metrics and RCPs. This is the model utilized throughout this document for climate change projections. The "cool and wet model" is CNRM-CMC5 and has a weighted rank closest to 10. MIROC5 gives a more comprehensive range of the 10 California global climate model results. (Scripps Institution of Oceanography , 2018). See *Section 4.5.3.4* for a description of RCP.

Table 4-19: Maximum Temperatures in the Mendocino County Climate Region (RCP 4.5)

Source: cal-adapt.org



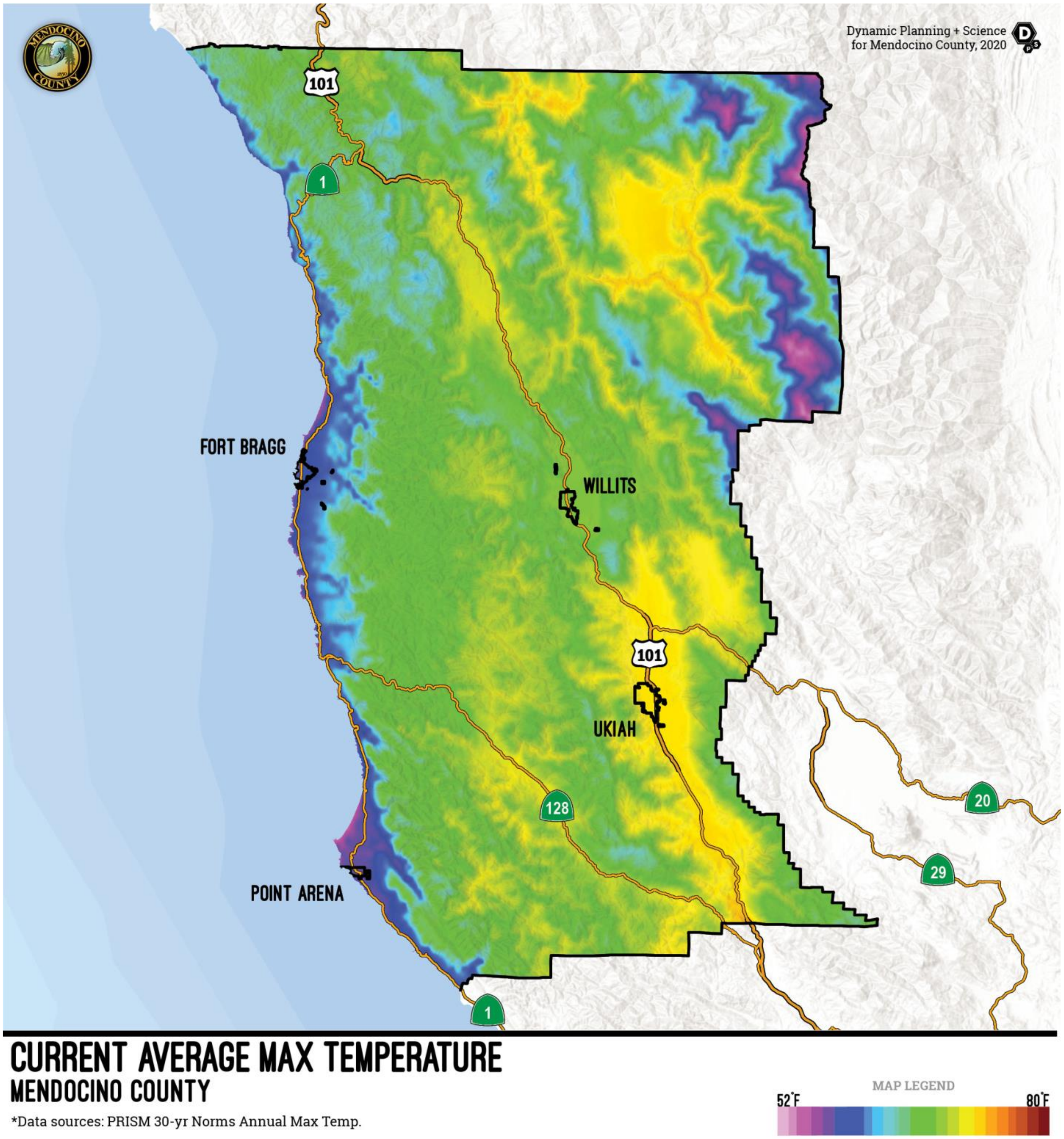


Figure 4-22: Current Average Max Temperature

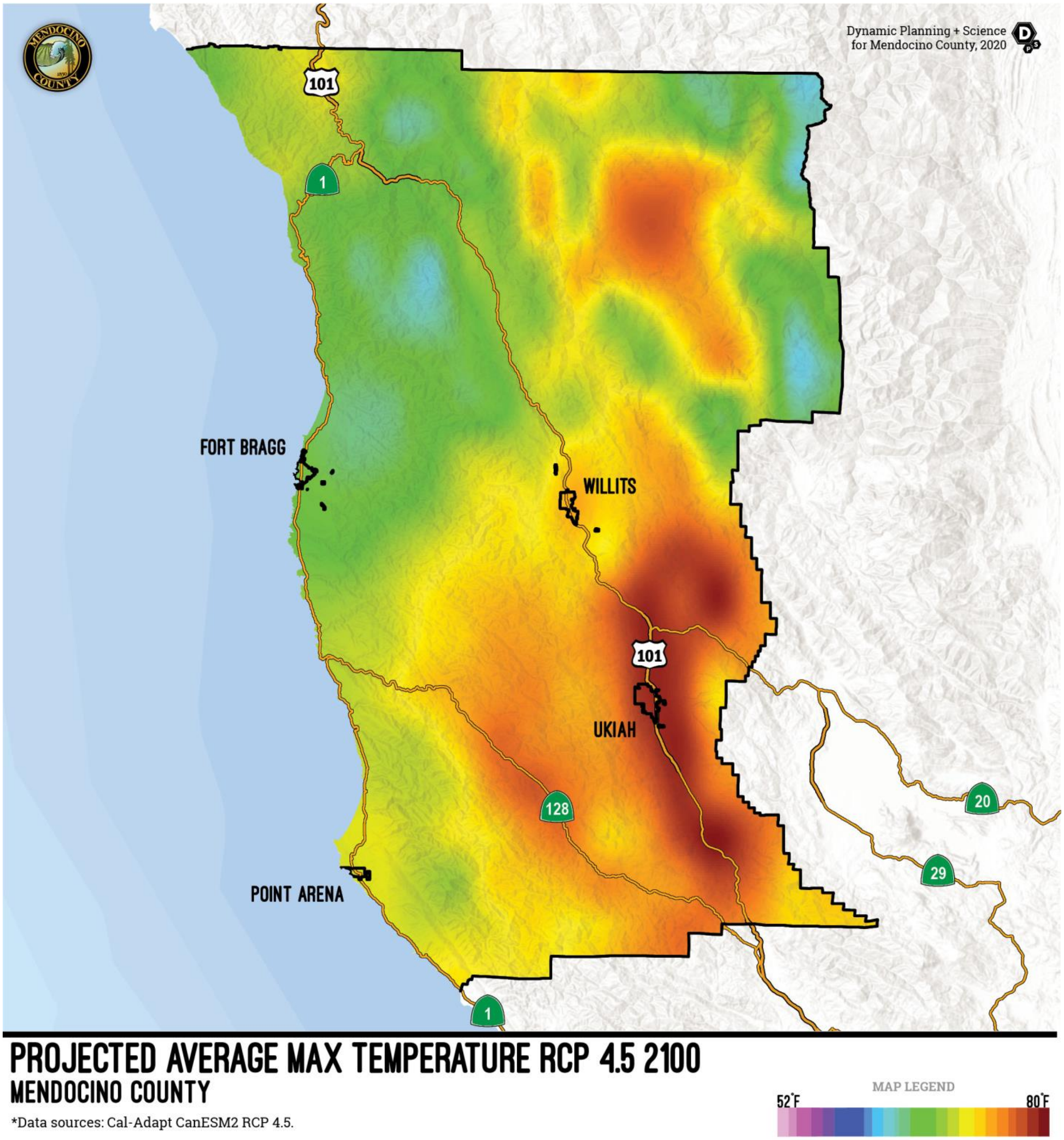


Figure 4-23: Projected Average Max Temperature RCP 4.5 2100

4.5.3.6 Warning Time

As this section as described, many existing hazards could be intensified as a result of climate change, decreasing warning times and exacerbating impacts. Warning times are discussed under the various other hazards. Other climate change impacts are more long-term; scientists have a high confidence in predicting the rise in global temperatures and have reached a consensus on the future impacts of climate change and the time frame in which they will occur.

Sea-level rise will occur slowly over time and increase impacts of other hazards profiled in the HMP such as coastal and bluff erosion and the potential impact of tsunamis.

4.5.3.7 Secondary Hazards

Secondary hazards of climate change include flood, severe weather, drought, wildfire, sea-level rise, extreme heat, and heavy rain events. Climate change will increase the frequency at which extreme weather events occur. Secondary hazards of climate change that will have the greatest impact on Mendocino County include flood, drought, and severe weather. Many of these impacts are discussed in other hazard profiles.

4.5.3.8 Vulnerability Assessment

This section outlines vulnerabilities of Mendocino County to impacts from climate change and focuses on sea-level rise in particular, as many of the other impacts are secondary, outlined in other hazard profiles within this document, and further explained and analyzed in the County's 2020 Climate Vulnerability Assessment. Sea-level rise also has delineated hazard boundaries and quantifiable exposure and damage estimations. This HMP Vulnerability Assessment summarizes population, including vulnerable populations in a more general context, property, and critical facilities within known hazard areas.

The County's 2020 Climate Vulnerability Assessment was developed to determine how climate change will likely affect the County's population and assets. The Assessment provides detailed analysis of how a range of climate impacts can harm people, physical structures, and other community assets throughout Mendocino County and will enable these jurisdictions to identify and take action to address dangerous conditions from climate change hazards before they develop or become more intense and frequent. This HMP Vulnerability Assessment does not supersede, but rather compliments, the County's 2020 Climate Vulnerability Assessment.

4.5.3.8.1 Population

The total number of County-wide households containing individuals aged 65 and older is approximately 84%. Approximately 25% of the population is Hispanic or Latino origin. Consequently, the County's projected climate change exposures have the potential to leave sensitive populations in the County especially vulnerable to increased risk. (American Community Survey, 2017)

Higher frequency of extreme heat conditions can cause serious public health impacts, increasing the risk of conditions directly related to heat such as heat stroke and dehydration. Older adults, particularly seniors, are more likely to experience respiratory and/or cardiovascular health complications than younger individuals. Approximately 36,043 residents of the County are elderly. These are populations are more likely to live alone with limited mobility. These conditions create the potential to exacerbate health risks associated with extreme heat. (*Id.*)

The majority of the County's large agricultural job base is of Hispanic origin. Heat stress can seriously affect those working outside, by reducing overall productivity and in extreme exposures could lead to illness, disability, or death. The portion of the County's Hispanic population that is low-income and that speaks primarily Spanish are especially vulnerable and would be impacted by a flood event associated with sea-level rise. Renters are also more vulnerable, as they are less likely to reinforce buildings and buy insurance because the decision to make major home improvements typically lies with the property owner. Additionally, disaster recovery services target homeowners; renters may not receive as much outreach.

As sea levels rise, the area and the number of people at risk because of flooding will also rise. Factors that increase vulnerability to the adverse impacts of flood events associated with sea-level rise include access to preparedness information, transportation, healthcare, and insurance. Key demographics associated with these vulnerabilities include income, race, linguistic isolation (i.e., non-English speaking), and residential tenure (CEC 2012:8). Language ability is an important factor in assessing vulnerability as emergency response crews may be unable to communicate with non-English speakers. The estimated population exposed to sea-level rise is summarized in Table 4-20.

The County has recently developed a Climate Vulnerability Assessment in conjunction with this HMP which delineates between vulnerable populations and critically vulnerable populations. Vulnerable populations include children, households in poverty, immigrants and refugees, outdoor workers, persons experiencing homelessness, overcrowded households, tribal communities, isolated communities, people with health issues or disabilities, people with limited English proficiency, people without access to lifelines, senior citizens, senior citizens who live alone, and undocumented people. (Mendocino Climate Vulnerability Assessment, 2020)

Critically vulnerable populations are defined as a subset of vulnerable populations that face high or severe vulnerability because of one or more climate-related hazard. They include households living in poverty, people experiencing homelessness, immigrants and undocumented peoples, and isolated communities or tribal communities. These populations are vulnerable to inland flooding, severe weather, extreme heat, wildfire and associated smoke. People in isolated communities and or tribal communities might not have access to critical goods and services. Isolated communities in coastal areas such as Gualala, Manchester, Casper, and Westport are exceedingly vulnerable to losing access to critical goods and services if Highway 1 is damaged or destroyed by dune and bluff erosion, landslides, inland flooding, shoreline flooding, or sea level rise. This might impact the supply of goods, accessibility of services, emergency medical response, and regional tourism necessary for sustaining local economies. (*Id.*)

4.5.3.8.2 Property

The Mendocino coastline is vulnerable to sea-level rise to a limited extent. Approximately 1 percent of the general population would be at risk of exposure and critical infrastructure such as transportation and lifeline could be impacted by up to a percentage as well. See Figure 4-25 for an exposure summary.

Climate change could significantly impact the agricultural and wine industries, which are large drivers of the County's economy. Specifically, the agricultural industry, which was recorded at $166.7 million in 2017, could be especially impacted as climate variability interferes with crop production. (Mendocino County 2018-2019 Economic Assessment, 2019) Increases in temperature and changes in precipitation and soil moisture could impact the growth of wine grapes by causing late or irregular blooming and affecting yields.

The increased likelihood of extreme floods could lead to the destruction of crops, erosion of topsoil, and deposits of debris and sediment on croplands. Conversely, as average temperatures increase with climate change, agricultural demand for water could intensify under extreme heat conditions, under which water evaporates faster, and plants need more water to move through their circulatory systems to stay cool. More specifically, attempts to maintain wine grape productivity and quality in the face of warming may be associated with increased water use for irrigation, a change to different varietals of grapes, and to cool grapes through misting or sprinkling. As noted earlier, increased average temperatures and changes in timing and amounts of precipitation could affect local aquifer recharge for groundwater supplies in the future, which could in turn affect water supplies for agricultural uses.

Table 4-20: Population Exposure to Sea-level rise (Unincorporated County)

	Total Population	
Unincorporated County	58,995	
Sea Level Rise (Feet)	**Population Count**	**% of Total**
Low Rise (0.3m)	123	*0.21%*
Intermediate-Low Rise (0.5m)	136	*0.23%*
Intermediate Rise (1.0m)	148	*0.25%*
Intermediate-High Rise (1.5m)	190	*0.32%*
High Rise (2.0m)	323	*0.55%*
Extreme Rise (2.5m)	423	*0.72%*

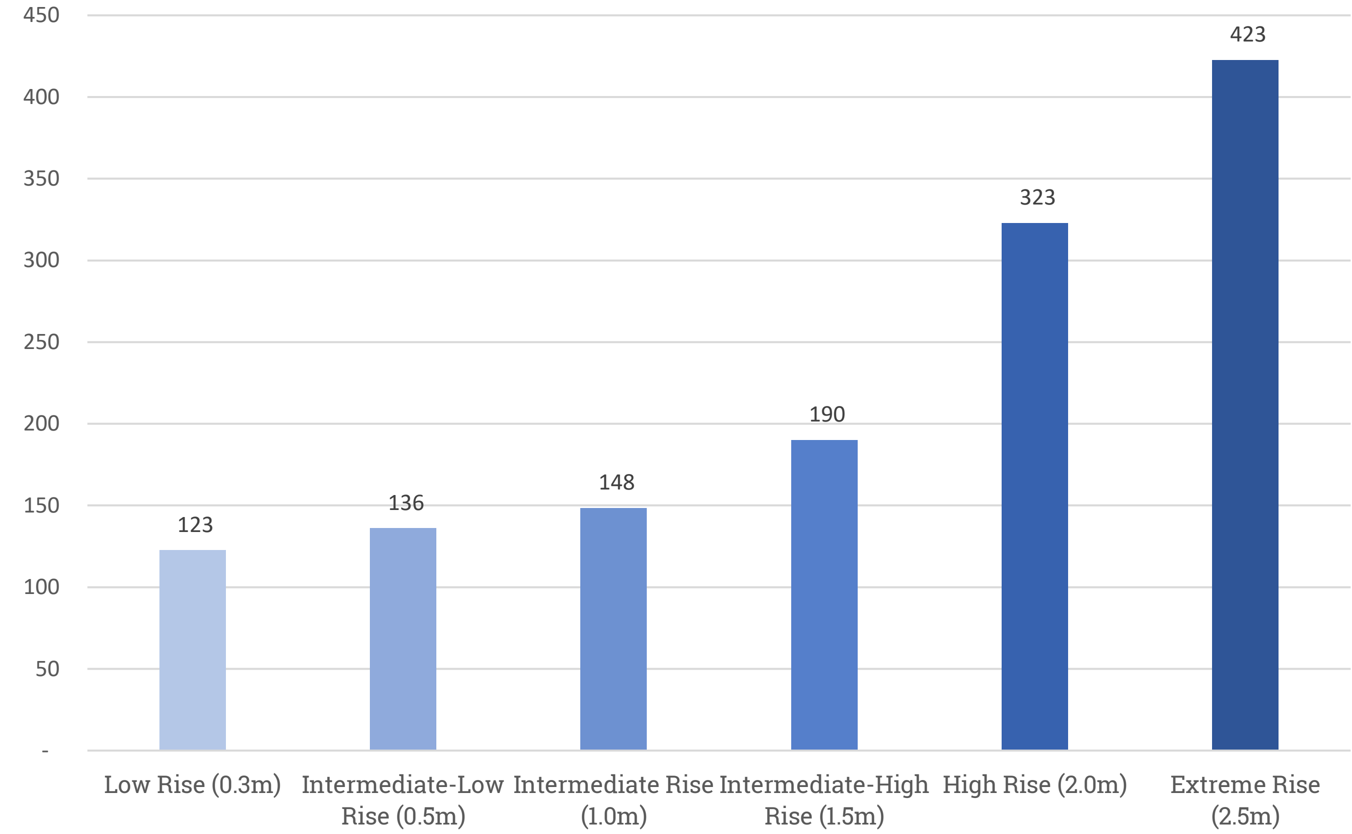
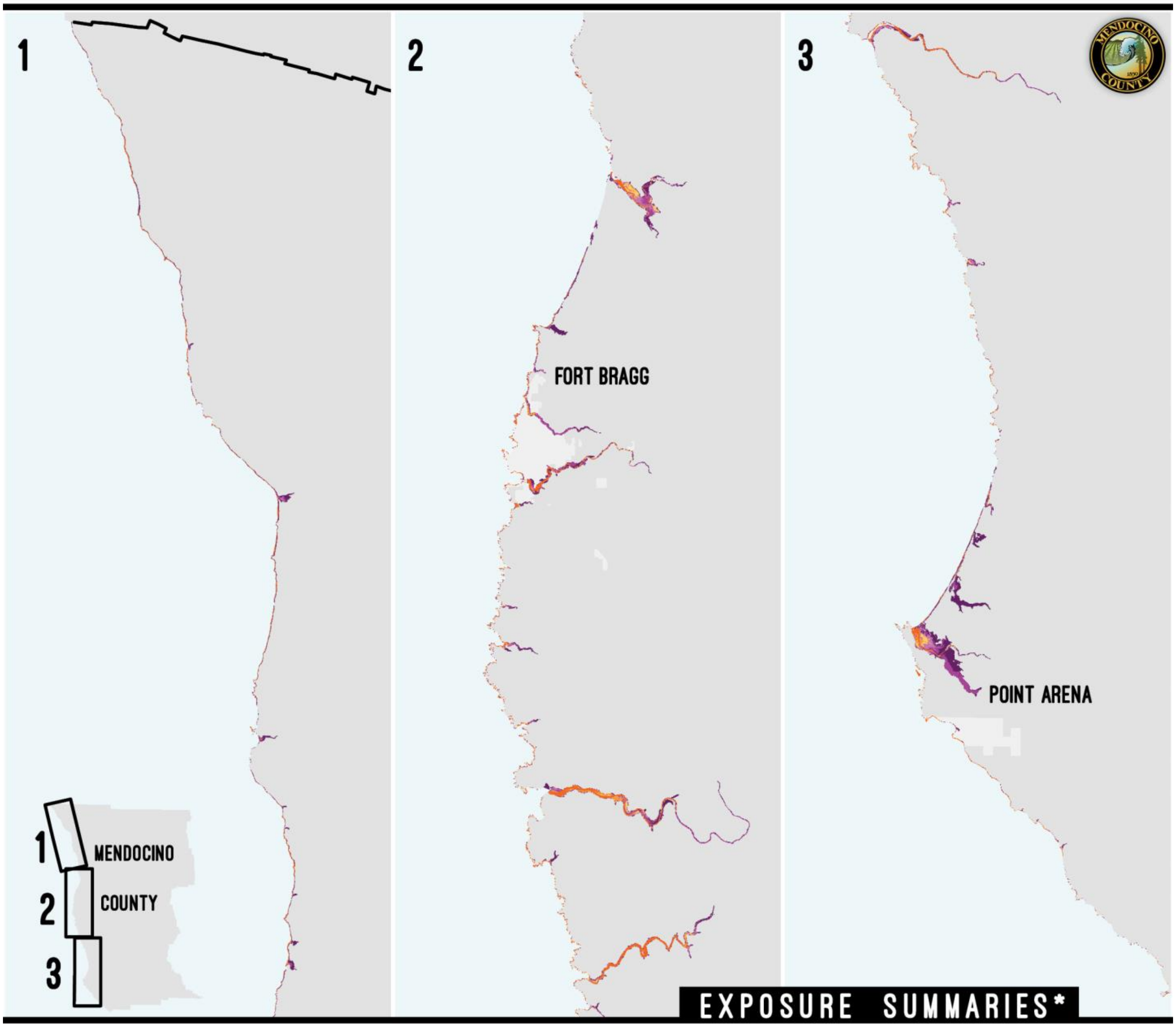


Figure 4-24: Population Exposure to Sea-level rise (Unincorporated County)

SEA LEVEL RISE — MENDOCINO COUNTY



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA

Count	Exp. Rate**
423	1%

Count Includes: L + + + + E

PARCEL COUNT IN HAZARD AREA

Count	Exp. Rate**
45	0%

Count Includes: L + + + + E

PARCEL VALUE IN HAZARD AREA

	Value	Exp. Rate**
Sum of Improvement Value	$11,766,672	0%
Sum of Content Value	$11,546,374	0%

Count Includes: L + + + + E

CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
Essential Facilities	0	0%	L + + + + E
High Potential Loss	2	0%	*Sum of Transportation & Lifeline Linear Mileage*
Transportation & Lifeline	5	1%	23 0%

MAP LEGEND

AMOUNT OF RISE	
EXTREME (2.5M)	INTERMEDIATE (1.0M)
HIGH (2.0M)	INTERMEDIATE LOW (0.5M)
INTERMEDIATE HIGH (1.5)	LOW (0.3M)

*Exposure summaries include all sea level rise impact areas. Hazard data source: NOAA - Classified by scenarios low rise to extreme rise.
**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

Dynamic Planning + Science for Mendocino County, 2020

Figure 4-25: Sea-level rise Vulnerability and Exposure Snapshot

4.5.3.8.3 Critical Facilities

Some critical infrastructure (i.e., roads, hospitals, schools, emergency facilities, and properties) are at increased risk of coastal flooding in the County. For example, the Fort Bragg Intake Pump Station could become vulnerable to a 100-year flood event with 1.4 meters (m) of sea-level rise. Small sections of Highway 1 could also be completed obstructed (e.g. north of Point Arena from the delta of the Garcia River).

Critical facilities are summarized in the snapshot of sea-level rise in Figure 4-25. Table 4-21 and Table 4-22 summarize critical infrastructure exposed to sea-level rise in Mendocino.

Table 4-21: Critical Infrastructure Points in Sea-level rise Regions (Unincorporated County)

Critical Infrastructure - Sea-level rise						
Infrastructure Type	Low Rise	Intermediate-Low Rise	Intermediate Rise	Intermediate-High Rise	High Rise	Extreme Rise
Essential Facility	-	-	-	-	-	-
EOC	-	-	-	-	-	-
Fire Station	-	-	-	-	-	-
Law Enforcement	-	-	-	-	-	-
Medical Facility	-	-	-	-	-	-
High Potential Loss	-	-	-	-	2	2
Adult Residential Facility	-	-	-	-	-	-
Alternative Education Program	-	-	-	-	-	-
Animal Control	-	-	-	-	-	-
Child Care Center	-	-	-	-	-	-
Communication Tower	-	-	-	-	-	-
Community Center	-	-	-	-	-	-
Courthouse	-	-	-	-	-	-
Dam	-	-	-	-	-	-
Detention Center	-	-	-	-	-	-
Fairground	-	-	-	-	-	-
Family Child Care Home	-	-	-	-	-	-
Foster Family Agency	-	-	-	-	-	-
Historic Building	-	-	-	-	1	1
Historic Site	-	-	-	-	-	-
Library	-	-	-	-	-	-
Museum	-	-	-	-	-	-
Office	-	-	-	-	-	-
Park and Recreation	-	-	-	-	-	-
Power Plant	-	-	-	-	-	-
Real Property Asset*	-	-	-	-	1	1
Residential Child Care	-	-	-	-	-	-
Residential Elder Care Facility	-	-	-	-	-	-
School	-	-	-	-	-	-
Shop	-	-	-	-	-	-
Storage	-	-	-	-	-	-
Wastewater Treatment	-	-	-	-	-	-
Transportation and Lifeline	-	-	1	1	4	5

Critical Infrastructure - Sea-level rise						
Infrastructure Type	Low Rise	Intermediate-Low Rise	Intermediate Rise	Intermediate-High Rise	High Rise	Extreme Rise
Airport	-	-	-	-	-	-
Bridge	-	-	1	1	4	5
Bus Facility	-	-	-	-	-	-
Corp Yard	-	-	-	-	-	-
NG Station	-	-	-	-	-	-
Substation	-	-	-	-	-	-
Transfer Station	-	-	-	-	-	-
Hazmat	-	-	-	-	-	-
Hazmat	-	-	-	-	-	-
Grand Total	**-**	**-**	**1**	**1**	**6**	**7**

**Real Property Assets are digitized insurance rolls for demonstrating value and ownership and may have overlapping points with other categories such as fire stations and law enforcement.*
-Sea-level rise Risk is cumulative

Table 4-22: Miles of Critical Infrastructure (Linear) in Sea-level rise Regions (Unincorporated County)

Lifelines (miles) - Sea-level rise						
Infrastructure Type (Linear)	Low Rise	Intermediate-Low Rise	Intermediate Rise	Intermediate-High Rise	High Rise	Extreme Rise
Levee	-	-	-	-	-	-
NG Pipeline	-	-	-	-	-	-
Railroad	0.0	0.0	0.0	0.0	0.1	0.4
Street	0.3	0.4	0.6	1.6	4.4	10.2
4WD trail	0.0	0.0	0.0	0.3	0.8	2.0
4WD trail, major	-	-	-	-	-	-
Alley	-	-	-	-	-	-
Cul-de-sac	-	-	-	-	-	-
Driveway	-	-	-	-	0.0	0.3
Interstate	-	-	-	-	-	-
Local road	0.0	0.1	0.2	0.8	2.8	6.2
Local road, major	-	-	-	-	0.0	0.0
Primary highway	0.2	0.3	0.4	0.5	0.9	1.5
Ramp	-	-	-	-	-	-
Road, parking area	-	-	-	-	-	-
State/county highway	-	-	-	-	-	0.1
Thoroughfare, major	-	-	-	-	-	-
Traffic circle	-	-	-	-	-	-
Walkway	-	-	-	-	-	-
Transmission Line	0.3	0.3	0.4	0.5	0.7	0.8
Grand Total	**0.6**	**0.7**	**1.0**	**2.2**	**5.1**	**11.4**

4.5.3.9 Future Trends in Development

The County is committed to continuing efforts to address and reduce existing climate-related risks and future impacts on a holistic and programmatic level. With several ordinances and programs that cover a range of climate exposures and related impacts, the County is well equipped to handle current issues of extreme heat events and water supply issues but could still likely face increasing challenges as projected changes occur.

The County has practices and organizations in place that help address future issues of sustainability and climate adaptation. The County has a County Climate Action Advisory Committee, which has proposed a resolution for the County to endorse a county-wide declaration of a climate emergency. The County is finding ways to change behaviors and practices now. The County has also adopted the Green Building Standards Code, which exemplifies the actionable steps that the County is taking in order to set a precedent for reduced energy use, building with more sustainable materials, and employing better water conservation tactics. Likewise, the County has recently developed a Climate Vulnerability Assessment Report in conjunction with this HMP. The intent of the Report is to protect the County from any current and projected hazardous conditions associated with Climate Change. The focus of the Report is on the health and safety of all County residents; this also includes maintaining a healthy economy for the County which is both diverse and strong. The Report profiles each jurisdiction in the County, including its local economy, and it tailors an adaptation planning method to include potential impacts to residents and the economies that they depend on such as tourism. Further, the Report also provides an assessment of building assets that support economic activities such as retail and tourism. (Mendocino Climate Vulnerability Assessment, 2020)

The County also joined Sonoma Clean Energy (SCE), which allows users to purchase more renewable energy options, as part of a progressive assembly bill called Community Choice Aggregation. Beginning in June of 2017, all homes, and businesses (except the City of Ukiah, which has its own energy provider) began receiving the power agency's default service, which runs on approximately 50% renewable power. (Sonoma Clean Power, 2020) (Clean Power Exchange, 2017) These efforts, however, need to be expanded and applied on a much larger scale, along with mitigation actions identified in this Plan, to address future changes attributed to climate change.

4.5.3.10 Climate Change Hazard Problem Statements

As part of the mitigation action identification process, each participating jurisdiction's Planning Committee identified issues and/or weaknesses (aka problem statements) for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool and historic flood data. Climate change hazard problem statements are listed in Table 4-23.

Identifying these common issues and weaknesses assists the Planning Committee in understand the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. Projects or actions have been developed to mitigate each problem identified. See Table 5-6 for a full list of mitigation actions and corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 4-23 and Table 5-6.

Table 4-23: Climate Change Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-CC-MC-58	Climate Change	Impact	PE&A - Public Education & Awareness	**Mendocino County**	A warmer climate will have an impact on agriculture industries requiring research to better understand future impacts	ma-CC-MC-221
ps-CC-MC-59	Climate Change	Threat	PE&A - Public Education & Awareness	**Mendocino County**	Climate change will exacerbate the effects of other hazards including wildfire, drought, flood, and extreme weather	ma-AH-MC-134
ps-CC-MC-60	Climate Change	Threat	PE&A - Public Education & Awareness , NRP - Natural Resource Protection	**Mendocino County**	Increased average temperatures along with changes in precipitation could affect groundwater supplies in the County	ma-DR-MC-197

4.5.4 Earthquake Hazard Profile

Earthquake is the sudden shaking of the ground caused by the passage of seismic waves through Earth's rocks. Seismic waves are produced when some form of energy stored in Earth's crust is suddenly released, usually when masses of rock straining against one another suddenly fracture and "slip." Earthquakes associated with this type of energy release are called tectonic earthquakes. The energy also can be released by elastic strain, gravity, chemical reactions, or even the motion of massive bodies. Earthquakes occur most often along geologic *faults*, narrow zones where rock masses move in relation to one another. (United States Geological Survey, n.d.)

Earthquakes have different properties depending on the type of fault that causes them. See Figure 4-26. The usual fault model has a "strike" (that is, the direction from north taken by a horizontal line in the fault plane) and a "dip" (the angle from the horizontal shown by the steepest slope in the fault). The lower wall of an inclined fault is called the footwall. Lying over the footwall is the hanging wall. When rock masses slip past each other parallel to the strike, the movement is known as strike-slip faulting. Movement parallel to the dip is called dip-slip faulting. In dip-slip faults, if the hanging-wall block moves downward relative to the footwall block, it is called "normal" faulting; the opposite motion, with the hanging wall moving upward relative to the footwall, produces reverse or thrust faulting. (*Id.*)

As a fault rupture progresses along or up the fault, rock masses are flung in opposite directions and thus spring back to a position where there is less strain. (*Id.*)

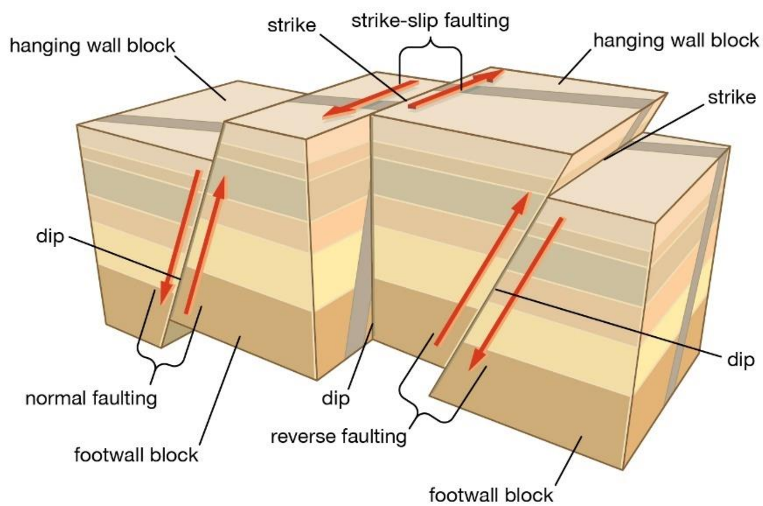


Figure 4-26: Earthquake Faulting

Soil Liquefaction

Soil liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Soil liquefaction and related phenomena have been responsible for tremendous amounts of damage in historical earthquakes around the world. Soil liquefaction occurs when seismic waves pass through saturated granular soil, distorting its granular structure, and causing some of the pore spaces between granules to collapse. Pore-water pressure may also increase sufficiently to cause the soil to behave like a fluid for a brief period and cause deformations. Saturated or partially-saturated soil substantially loses strength and stiffness in response to an applied stress such as shaking during an earthquake or other sudden change in stress condition. The phenomenon is most often observed in saturated, loose, low-density or uncompacted, sandy soils. Loose sand tends to compress when a load is applied. Dense sands, by contrast, tend to expand in volume or 'dilate'. If the soil is saturated by water, which often occurs when soil is below the water table or sea level, then water fills the pore spaces between soil grains. (United States Geological Survey, n.d.)

Artificial induction

Earthquakes are sometimes caused by human activities, including the injection of fluids into deep wells, pumping of groundwater, the excavation of mines, and the filling of large reservoirs. In fluid injection, the slip is thought to be induced by premature release of elastic strain, as in the case of tectonic earthquakes, after fault surfaces are lubricated by the liquid. (United States Geological Survey, n.d.)

Earthquake Classifications

Earthquakes are typically classified either 1) by the amount of energy released, measured as *magnitude*; or 2) by the impact on people and structures, measured as *intensity*. (United States Geological Survey, n.d.)

Magnitude

The most common method for measuring earthquakes is magnitude, which measures the strength of earthquakes. While the majority of scientists generally use the **Moment Magnitude (Mw) Scale** to measure earthquake magnitude, the **Richter (M) Scale** is the most universally-known measurement. The magnitude of an earthquake is related to the total area of the fault that ruptured, as well as the amount of offset (displacement) across the fault. As shown in Table 4-24, there are seven earthquake magnitude classes on the Mw scale, ranging from great to micro. A magnitude class of great can cause tremendous damage to infrastructure, compared to a micro class, which results in minor damage to infrastructure. (*Id.*)

Earthquake Magnitude Classes (Mw)		
Magnitude Class	**Magnitude Range (M = Magnitude)**	**Description**
Great	M > 8	Tremendous damage
Major	7 <= M < 7.9	Widespread heavy damage
Strong	6 <= M < 6.9	Severe damage
Moderate	5 <= M < 5.9	Considerable damage
Light	4 <= M < 4.9	Moderate damage
Minor	3 <= M < 3.9	Rarely causes damage.
Micro	M < 3	Minor damage

Table 4-24: Moment Magnitude Scale

Intensity

The effects of an earthquake in a particular location are measured by intensity. Earthquake intensity decreases with increasing distance from the epicenter of the earthquake. The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects experienced at that place. (United States Geological Survey)

The **lower** numbers of the intensity scale generally deal with the manner in which the earthquake is felt by people. The **higher** numbers of the scale are based on observed structural damage. Structural engineers usually contribute information for assigning intensity values of VIII or above. Table 4-25 is an abbreviated description of the levels of Modified Mercalli Intensity. (*Id.*)

Table 4-25: Modified Mercalli Intensity Level Descriptions

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations are similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Similar to aheavy truck striking a building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone, many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: USGS, Abridged from The Severity of an Earthquake, USGS General Interest Publication 1989-288-913

Ground Motion

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

Maps of PGA values form the basis of seismic zone maps that are included in building codes such as the International Building Code. Building codes that include seismic provisions specify the horizontal force due to lateral acceleration that a building should be able to withstand during an earthquake. PGA values are directly related to these lateral forces that could damage "short period structures" such as single-family dwellings. Longer-period response components determine the lateral forces that damage larger structures with longer natural periods such as apartment buildings, factories, high-rises, bridges. Table 4-26 lists the damage potential and perceived shaking by PGA factors, compared to the Mercalli scale. (USGS)

Table 4-26: Modified Mercalli Scale and Peak Ground Acceleration

		Potential Structure Damage		Estimated PGA
Modified Mercalli Scale	Perceived Shaking	Resistant Buildings	Vulnerable Buildings	(%g)
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%

Note: PGA measured in percent of g, where g is the acceleration of gravity

Sources: USGS, 2008; USGS, 2010

4.5.4.1 Plans, Policies, and Regulatory Environment

Alquist-Priolo Earthquake Fault Zoning Act and Seismic Hazards Mapping Act (1972)

The 1971 San Fernando Earthquake resulted in the destruction of numerous structures built across its path. This led to passage of the **Alquist-Priolo Earthquake Fault Zoning Act** in 1972. This Act prohibits the construction of buildings for human occupancy across active faults in the State of California. Similarly, extensive damage caused by ground failures during the 1989 Loma Prieta Earthquake focused attention on decreasing the impacts of landslides and liquefaction. This led to the creation of the **Seismic Hazards Mapping Act**, which increases construction standards at locations where ground failures are probable during earthquakes. Figure 4-27 displays these zones of required investigation in Mendocino County.

2019 California Building Standards Code

The 2019 California Building Code, adopted by Mendocino County in December 2019, includes materials requirements, construction methods, and maintenance standards for earthquake protection and resiliency.

Mendocino County General Plan

The 2009 Mendocino County General Plan includes the following goals and policies in the Development Element to mitigate the effects of earthquakes:

Development Element

Goal DE-24 (Safety): To reduce, to the extent possible, the risk and exposure of life, property and the environment to hazardous conditions and events such as earthquakes, landslides, wildfires, floods, inundation, energy emergencies, and toxic releases.

Policy DE-233: Require that structures for human habitation and occupancy, including residential, commercial and industrial uses, incorporate engineering and design measures which reduce risk to life in areas subject to excessive ground shaking and liquefaction during an earthquake.

Action Item DE-233.1: Continue to administer the Alquist-Priolo Earthquake Fault Zoning Act which defines and mitigates impacts relating to surface fault-rupture hazards.

Action Item DE-233.2: Implement the Seismic Hazards Mapping Act when maps become available for Mendocino County (Public Resources Code, Division 2, Chapter 7.8).

Action Item DE-233.3: Require geologic, seismic, and/or soil engineering reports in areas of known or potential geologic hazards prior to final approval of discretionary permits.

Action Item DE-233.4: Revise County codes to state that geologic, seismic, and soils reports must be prepared by the qualified professionals specified by law.

Policy DE-234: Prohibit structures necessary for public safety or emergency services in areas subject to ground shaking and subsequent failure unless the public benefit outweighs the use of reasonably feasible alternate sites.

Minimum Provisions for Public Notice and Structural Seismic Resistance in Mendocino County Code, § 18.30

The Mendocino County Code establishes minimum standards for public notice and structural seismic resistance as provided in the State Historical Building Code. Public notice standards require that building owners or agents post a notice in a conspicuous area in or on the building. The notice is an earthquake warning which must state that the building contains unreinforced masonry walls, and that they do not comply with building code requirements for earthquake resistant design and may be unsafe in an earthquake.

4.5.4.2 Past Events

A number of significant (more than 4.5 M) earthquakes have occurred in and near Mendocino County over the last sixteen years. *See* Table 4-27 for earthquake events 4.5 magnitude or higher since 2004. Two adjacent areas, in particular, located in the region between Healdsburg and Ukiah experienced earthquakes of 5.0 and 5.1, respectively, during 2016. The August 2016 earthquake resulted in minimal damage to homes in the area. This area is known for experiencing an earthquake every 15 years on average. The December 2016 earthquake had an epicenter just 24 miles from Ukiah. (KTLA Local News, 2016)

Table 4-27: Earthquakes in or near Mendocino County 4.5 Magnitude or Greater Since 2004

Date	Location	Magnitude (M)
2/18/2004	Northern California	4.6
05/12/2006	Northern California	4.7
10/20/2006	Northern California	4.6
4/18/2007	Northern California	4.8
9/25/2012	Northern California	4.5
1/12/2014	6km Northwest of the Geysers, Ca	4.5
8/10/2016	20km Northeast of Upper Lake, Ca	5.1
12/14/2016	8km Northwest of the Geysers, Ca	5.0

Source: USGS

4.5.4.3 Location

The Alquist-Priolo Act established earthquake fault zones in California. These Alquist-Priolo Earthquake Fault Zones encompass surface traces of active faults that have a potential for future surface fault rupture and are mapped as estimated fault locations across California. These zones require future investigation to determine the location of the fault.

These zones have been established by the State Geologist and indicate an active fault within the zone. The fault may pose a risk to existing or future structures from a surface fault rupture. The major faults include the San Andreas (North Coast) fault system running north and south through the County, the Maacama[6] fault zone which extends north to south through most of the County, and the Barlett Springs fault which extends southward from the north of Arcata towards Lake Berryessa. Figure 4-27 shows the location of fault zones as well as the underlying quaternary faults near the County. (Mendocino 2014 MJHMP, 2014)

4.5.4.4 Frequency/ Probability of Future Occurrences

This plan utilizes two mapping tools for understanding the frequency and probability of an earthquake occurring at different faults in and around Mendocino County: 1) the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3)(see Figure 4-28) and the Earthquake Shaking Potential based on the USGS National Seismic Hazard Model (see Figure 4-29). Both mapping tools are described in more detail below.

Importantly, these probabilistic maps were used to determine the earthquake scenario used for the vulnerability analysis. This plan focuses on the North San Andreas North Coast and the Maacama scenarios because they are the scenarios with the highest likelihood of severe shaking and of producing a magnitude 6.7 earthquake within the next 30 years. See Figure 4-30 for an overview map of the scenario and Section 4.5.4.4.3 for further explanation on why this scenario was chosen.

According to the California State Hazard Mitigation Plan, earthquakes large enough to cause moderate damage to structures—those of 5.5 Magnitude (M.) or larger—occur three to four times a year statewide. Strong earthquakes of 6 to 6.9 M. strike on an average of once every two to three years. Major earthquakes of 7 to 7.9 M. occur in California about once every 10 years.

[6] This MJHMP utilizes fault terminology from the US Geological Survey, and the spelling of the Maacama fault is different from the spelling of Mayacama in other features throughout the region. See https://earthquake.usgs.gov/cfusion/qfault/show_report_AB_archive.cfm?fault_id=30&section_id=a.

Figure 4-27: Zones of Required Investigation

Quaternary faults, as illustrated in red in Figure 4-27, are those active faults that have been recognized at the surface and which have evidence of movement in the past 1.6 million years - the duration of the Quaternary Period.

4.5.4.4.1 30-Year Earthquake Probability (UCERF3)

Probability of earthquake events is based on the approximate location of earthquake faults within and outside the Mendocino County region. The Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3)[7] is a comprehensive model of earthquake occurrence for California. It represents the best available science for authoritative estimates of the magnitude, location, and likelihood of potentially damaging earthquakes in California. According to UCERF3 and as shown in Figure 4-28, the San Andreas fault has a 10% to 100% probability of occurrence within 30 years, the highest probability affecting the County. The most recent earthquake to happen in the Mendocino area was a 5.0 earthquake, which happened in 2016, approximately 8 km northwest of Geysers, California. (*Id.*)

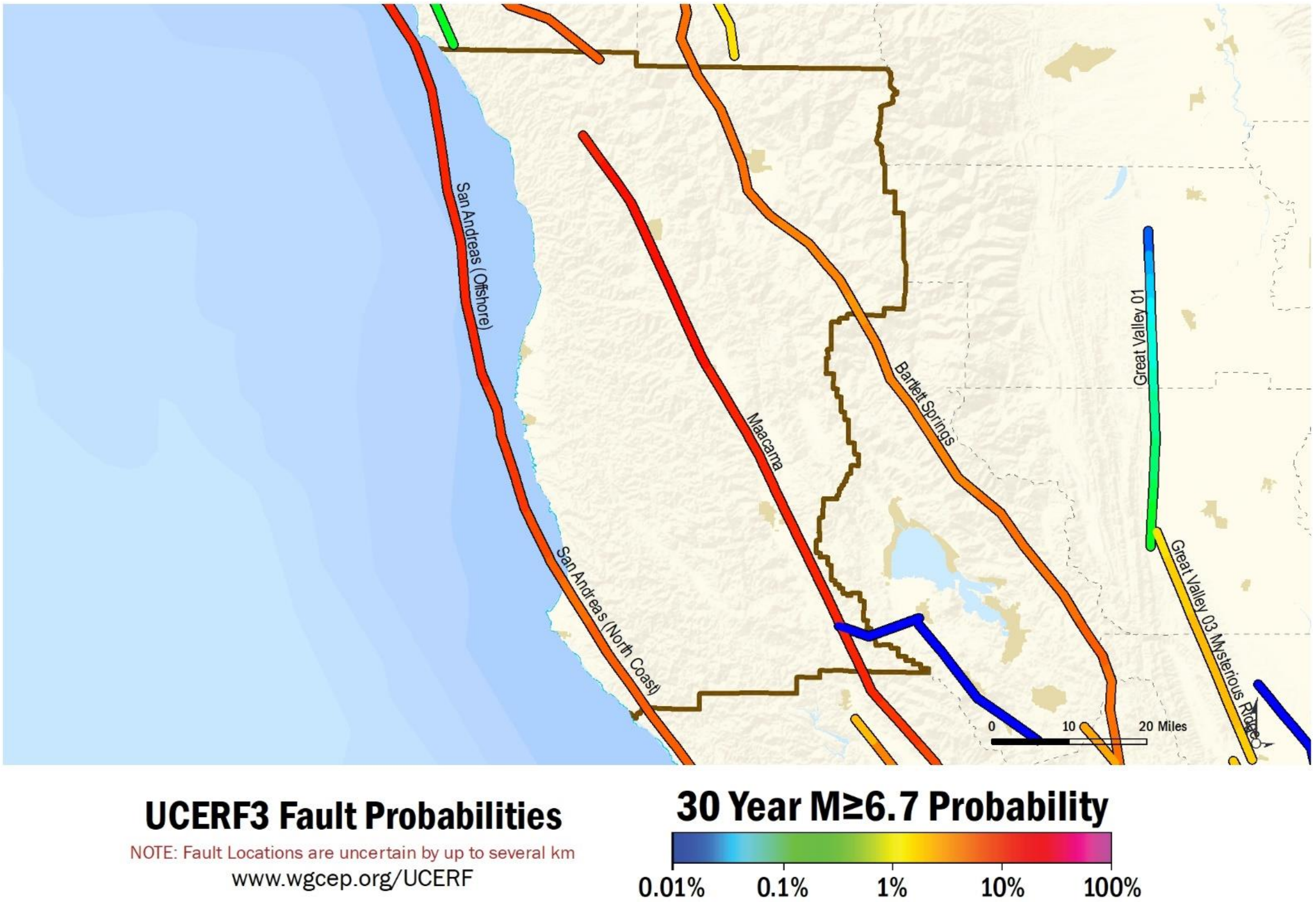


Figure 4-28: Fault Probability Map for Mendocino County

[7] Quaternary faults are those active faults that have been recognized at the surface and which have evidence of movement in the past 1.6 million years - the duration of the Quaternary Period.

4.5.4.4.2 Earthquake Shaking Potential

The Earthquake Shaking Potential Map, Figure 4-29, shows potential seismic shaking from anticipated future earthquakes. It is probabilistic in the sense that the analysis takes into consideration the uncertainties in the size and location of earthquakes and the resulting ground motions that can affect a particular site. (CGS, 2020) It is also useful in understanding the probability of severe shaking in different locations throughout the County, as discussed in Section 4.5.4.5.

The map is expressed in terms of the probability of exceeding a certain ground motion. The map shows a 2% probability of exceeding one second of ground motion in 50 years. Earthquake shaking potential in California is calculated based on the USGS National Seismic Hazard Model and in partnership with California Geological Survey (CGS). Earthquake shaking potential also considers historic earthquakes, slip rates on major faults, deformation throughout the region, and the potential for amplification of seismic waves by near-surface geologic materials. (CGS, 2020)

The map depicts a range of lower hazard to higher hazard probability, where higher hazard areas are those regions near major, active faults that will on average experience stronger earthquake shaking more frequently. This intense shaking can damage even strong, modern buildings. Lower hazard areas are those regions that are distant from known, active faults that will experience lower levels of shaking less frequently. In most earthquakes, only weaker, masonry buildings would be damaged. However, very infrequent earthquakes could still cause strong shaking in those locations. (D. Branum, 2016)

The shaking potential is calculated as the level of ground motion that has a 2% chance of being exceeded in 50 years, which is the same as the level of ground-shaking with about a 2500-year average repeat time. Relatively long-period (1.0 second) earthquake shaking is shown. Long-period shaking affects tall, relatively flexible buildings, but also correlates well with overall earthquake damage. Although the greatest hazard is in areas of highest intensity as shown in Figure 4-29, no region is immune from potential earthquake damage. (*Id.*)

The potential for earthquake ground shaking, as defined by the U.S. National Seismic Hazard Model, is used by engineers to design buildings for larger ground motions than what we think will occur during a 50-year interval, which will make buildings safer than if they were only designed for the ground motions that we expect to occur in the next 50 years. (USGS, 2020)

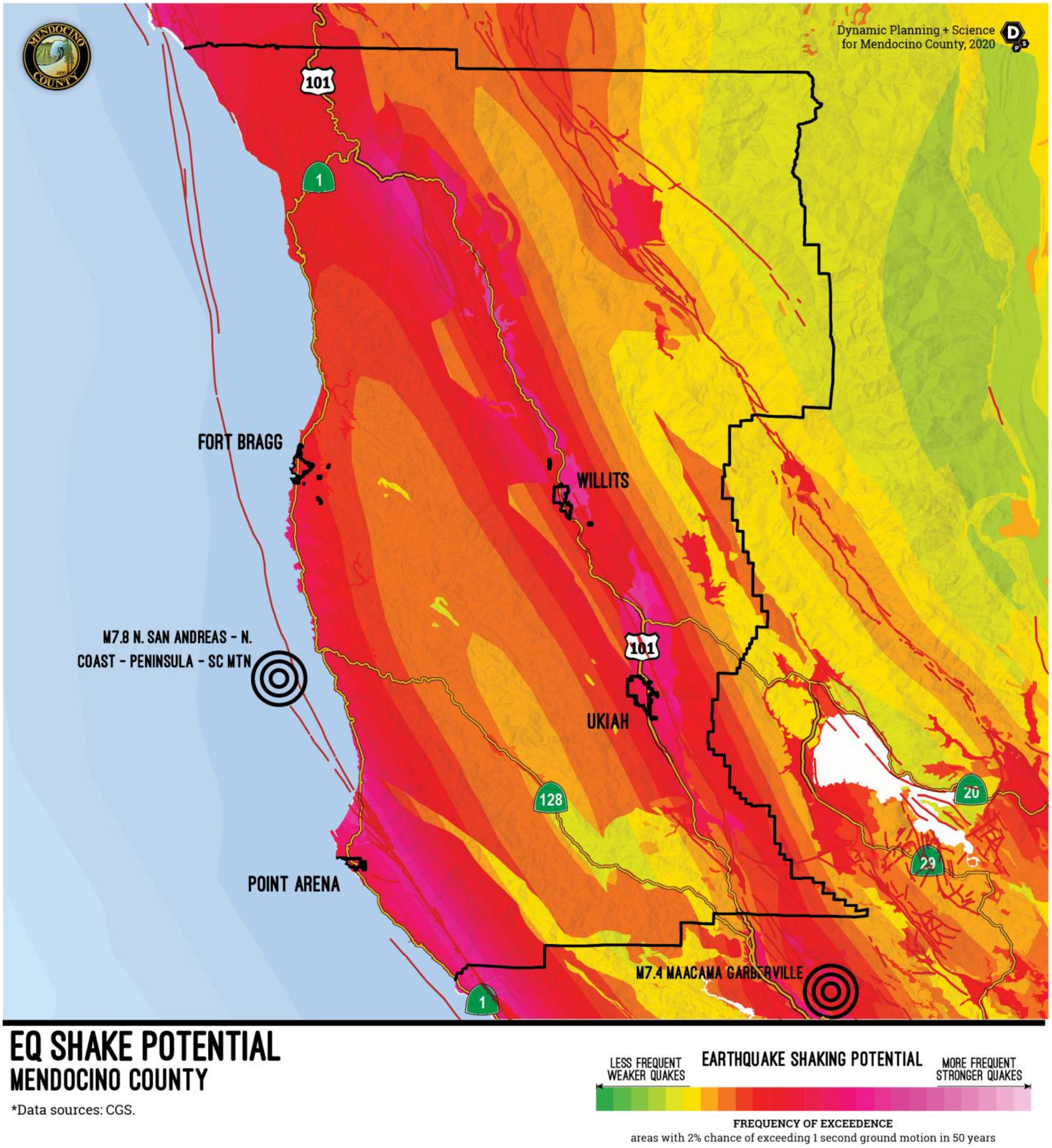


Figure 4-29: Earthquake Shaking Potential

4.5.4.4.3 N. San Andreas and Maacama Garberville Earthquake Scenarios

The North San Andreas and the Maacama Garberville earthquake scenarios were chosen from a range of regional, scenario-based shakemaps available from USGS for the vulnerability analysis. The shakemap data consist of peak ground velocity, peak ground acceleration, peak spectral accelerations in an earthquake scenario. The San Andreas fault has the near highest probability of an earthquake greater than 7.8 M. within Mendocino County, with a greater than 10% annual probability. The Maacama Garberville fault also has a greater than 10% annual probability. See Figure 4-28 for these probabilities. Likewise, the most significant shaking potential depicted in the ShakeMap in Figure 4-29 centers around the San Andreas and Maacama Garberville fault systems, the epicenter of which is shown on the same. The 7.4 M Maacama is shown in Figure 4-30 and the 7.8 M North San Andreas fault scenarios is shown in Figure 4-31.

Section 4.5.4.8.1 analyzes the County's exposure to these scenarios and Section 4.5.4.8.2 details damage estimation to residential properties and County facilities for these scenarios.

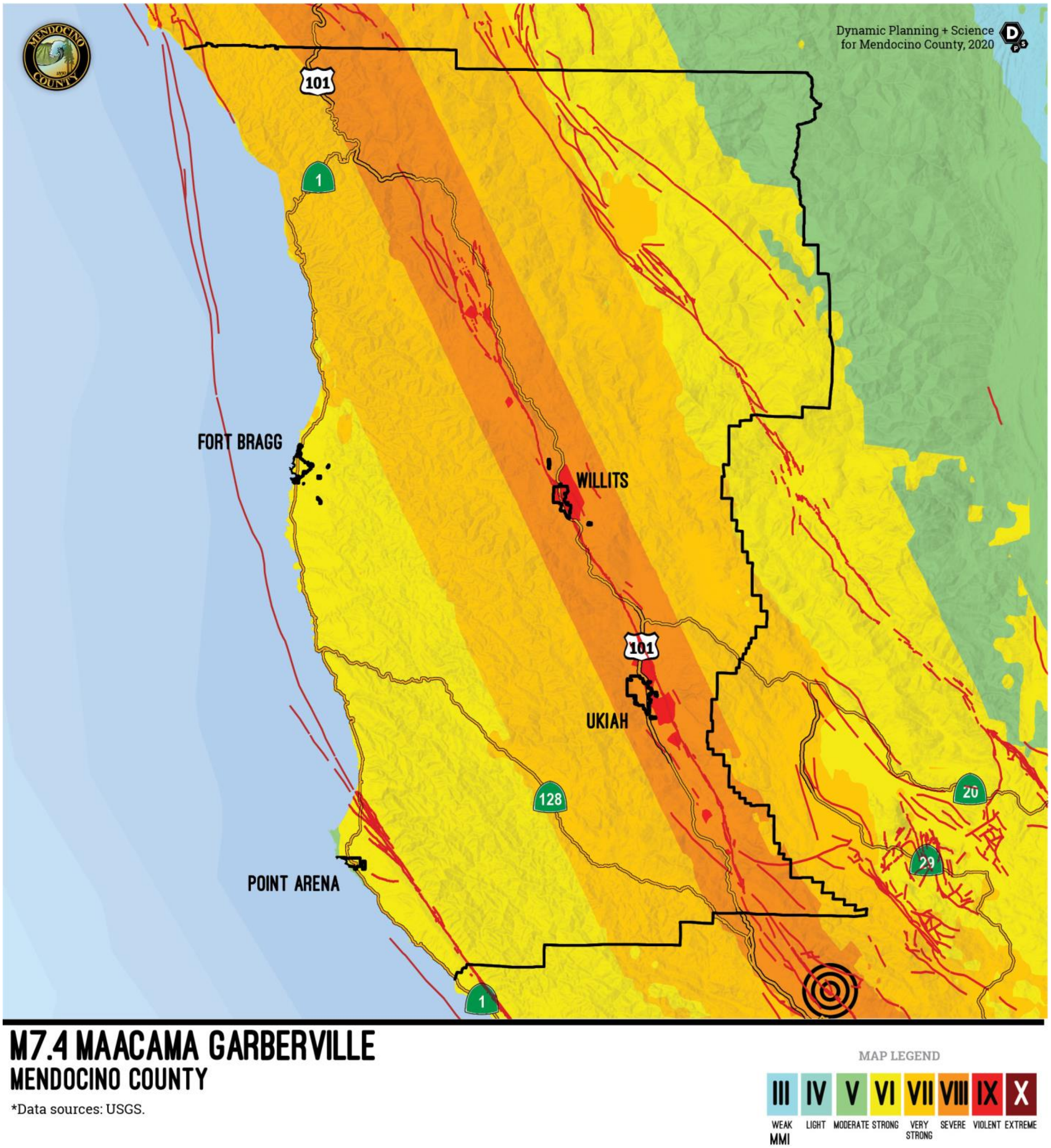


Figure 4-30: M7.4 Maacama Garberville

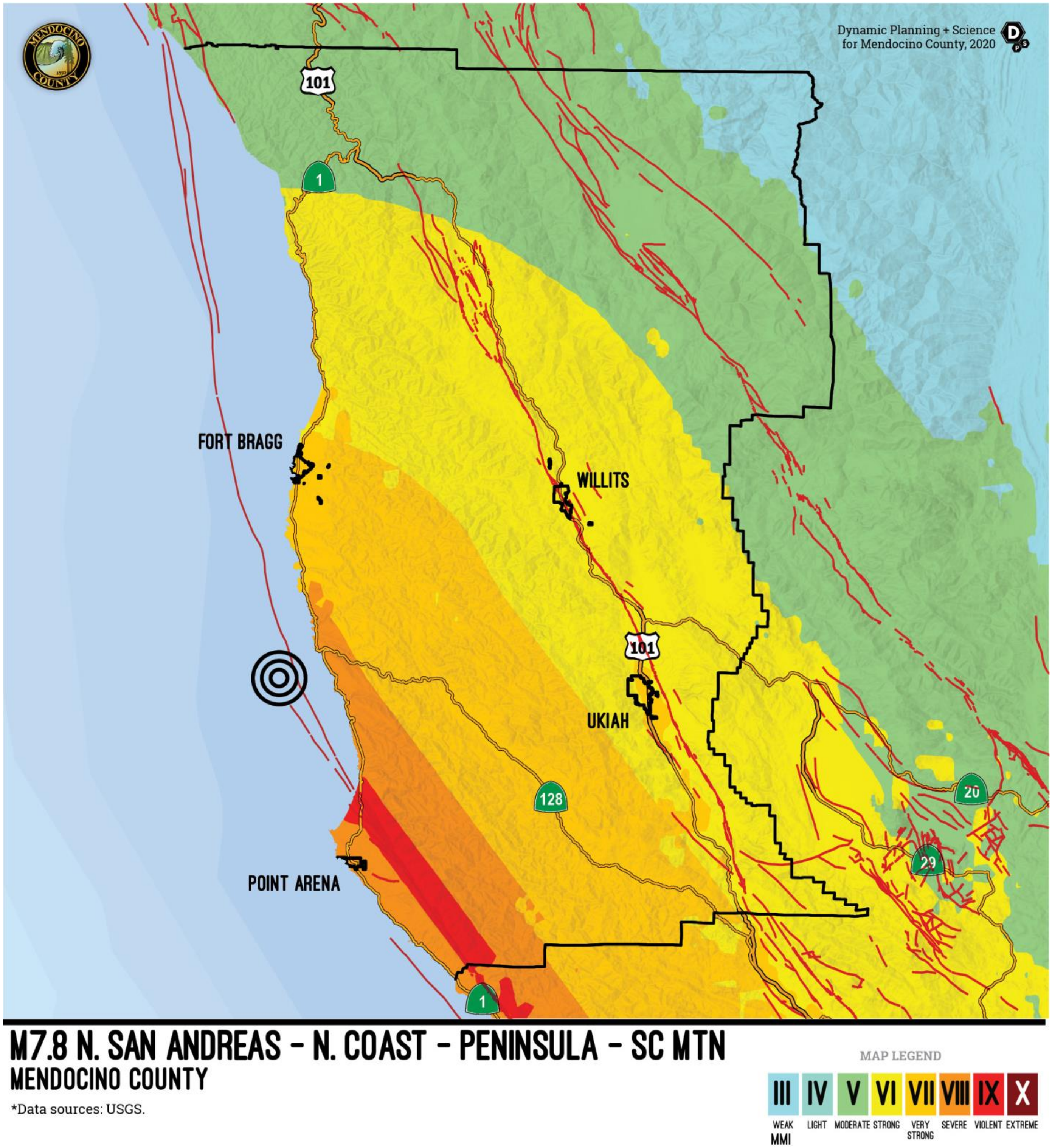


Figure 4-31: M7.8 N. San Andreas -N. Coast – Peninsula – SC MTN

4.5.4.5 Severity and Extent

As we know from past events, even a "moderate" earthquake occurring in or near the Mendocino County region could result in deaths, casualties, property and environmental damage, and disruption of normal services and activities. The severity of the event could be aggravated by collateral emergencies such as fires, hazardous material spills, utility disruptions, landslides, transportation emergencies, and the possible failure of the Mendocino County dams.

Neither the occurrence of an earthquake nor the severity can be predicted. Instead, scientists can only calculate the probability that a significant earthquake will occur in a specific area within a certain number of years.

The probabilistic Earthquake Shake Potential Map, Figure 4-29, illustrates the areas of the County most likely to experience an earthquake exceeding one second of ground motion in 50 years, which aids in understanding locations in Mendocino County with the greatest probability of experiencing a severe earthquake. The greatest probability of a severe earthquake focuses on the North San Andreas fault and the Maacama Garberville fault. This is merely a probability, as the same map also illustrates that most of the County is susceptible to moderate-to-severe earthquakes depending on the location, intensity, and magnitude of the earthquake.

4.5.4.6 Warning Time

There is currently no reliable way to predict the day or month that an earthquake will occur at any given location. Research is being done with warning systems that use the low energy waves that precede major earthquakes. Seconds and minutes of advance warning can allow people and systems to take actions to protect life and property from destructive shaking. Even a few seconds of warning can enable protective actions specific to various sectors of the population, such as:

- **Public:** Citizens, including schoolchildren, drop, cover, and hold on; turn off stoves, safely stop vehicles.
- **Businesses:** Personnel move to safe locations, automated systems ensure elevator doors open, production lines are shut down, sensitive equipment is placed in a safe mode.
- **Medical services:** Surgeons, dentists, and others stop delicate procedures.
- **Emergency responders:** Open firehouse doors, personnel prepare and prioritize response decisions.
- **Power infrastructure:** Protect power stations and grid facilities from strong shaking.

4.5.4.7 Secondary Hazards

Earthquakes can create tsunamis which have the potential to affect the coastline and coastal delta areas of Mendocino County. Other hazards that can occur from earthquakes, such as dam failure or wildfires, are profiled in other parts of this plan.

Tsunamis

Tsunamis are typically caused by earthquakes generated in subduction zones, areas where ocean plates are forced down into the mantle by plate tectonic forces. This creates an enormous friction between the plates and eventuates in an accumulated seismic energy which is released in the form of a tsunami when the plates spring back into unrestrained positions. The Mendocino County region marks the start of the Cascadia subduction zone.

The actual height of a tsunami wave in open water is generally only 1 to 3 feet and can often be unnoticeable to people aboard ships. The energy of a tsunami passes through the entire water column to the seabed, unlike surface waves, which typically reach only down to a depth of 30 feet or so. The tsunami wave travels across the ocean at speeds up to 700 miles per hour. As the tsunami enters shallower water near coastal shorelines, it slows to about 20 to 30 miles per hour. As it nears the coast, the wave can increase to a height of 90 feet or more as it approaches the coastline and compresses. (National Oceanic and Atmospheric Administration, 2018)

Tsunamis can result in severe property damages and loss of life. They can also disrupt emergency services and transportation routes. (Geology.com, 2020)

Past Events

A number of significant tsunamis have impacted Mendocino County over the last 124 years. Table 4-28 depicts tsunami events with recorded wave height locations in Mendocino County.

Date	Source Location	Source Type	Recorded Wave Height Location	Max. Run-up (Feet)
6/15/1896	Sanriku, Japan	8.3 M Earthquake	Mendocino, CA	3.28
4/18/1906	N. California, USA	7.9 M Earthquake	Navarro River, CA	-
4/1/1946	Unimak Island, AK, USA	8.6 M Earthquake	Caspar Beach, CA	-
4/1/1946	Unimak Island, AK, USA	8.6 M Earthquake	Navarro River, CA	-
4/1/1946	Unimak Island, AK, USA	8.6 M Earthquake	Noyo, CA	4.92
4/1/1946	Unimak Island, AK, USA	8.6 M Earthquake	Arena Cove, CA	7.87
3/9/1957	Andreanof Islands, AK, USA	8.6 M Earthquake	Noyo Harbor, CA	-
5/22/1960	Southern Chile, Chile	9.5 M Earthquake	Gualala River, CA	2.00
5/22/1960	Southern Chile, Chile	9.5 M Earthquake	Noyo Harbor, CA	3.28
5/22/1960	Southern Chile, Chile	9.5 M Earthquake	Shelter Cove, CA	2.00
3/28/1964	Prince William Sound, AK, USA	9.2 M Earthquake	Albion River, CA	4.43
3/28/1964	Prince William Sound, AK, USA	9.2 M Earthquake	Arena Cove, CA	5.91

Date	Source Location	Source Type	Recorded Wave Height Location	Max. Run-up (Feet)
3/28/1964	Prince William Sound, AK, USA	9.2 M Earthquake	Caspar, CA	-
3/28/1964	Prince William Sound, AK, USA	9.2 M Earthquake	Russian Gulch Park, CA	5.58
3/28/1964	Prince William Sound, AK, USA	9.2 M Earthquake	Van Damme State Park, CA	4.27
3/28/1964	Prince William Sound, AK, USA	9.2 M Earthquake	Point Arena, CA	6.07
3/28/1964	Prince William Sound, AK, USA	9.2 M Earthquake	Fort Bragg, CA	12.47
3/28/1964	Prince William Sound, AK, USA	9.2 M Earthquake	Noyo, CA	6.56
4/25/1992	Cape Mendocino, N. California, USA	7.2 M Earthquake	Arena Cove, CA	0.39
10/4/1994	S. Kuril Islands, Russia	8.3 M Earthquake	Arena Cove, CA	0.46
7/30/1995	Northern Chile, Chile	8 M Earthquake	Arena Cove, CA	0.23
12/3/1995	S. Kuril Islands, Russia	7.9 M Earthquake	Arena Cove, CA	0.13
2/17/1996	Irian Jaya, Indonesia	8.2 M Earthquake	Arena Cove, CA	0.30
6/10/1996	Andreanof Islands, AK, USA	7.9 M Earthquake	Arena Cove, CA	0.20
6/23/2001	S. Peru, Peru	8.4 M Earthquake	Arena Cove, CA	0.26
9/25/2003	Hokkaido Island, Japan	8.3 M Earthquake	Point Arena, CA	0.07
12/26/2004	Off W. Coast OF Sumatra, Indonesia	9.1 M Earthquake	Arena Cove, CA	0.62
6/15/2005	N. California, USA	7.2 M Earthquake	Arena Cove, CA	0.10
5/3/2006	Tonga, Tonga	8 M Earthquake	Point Arena, CA	0.26
11/15/2006	S. Kuril Islands, Russia	8.3 M Earthquake	Arena Cove, CA	2.00
1/13/2007	S. Kuril Islands, Russia	8.1 M Earthquake	Arena Cove, CA	0.82
8/15/2007	S. Peru, Peru	8 M Earthquake	Arena Cove, CA	0.13
1/3/2009	Near North Coast, Indonesia	7.6 M Earthquake	Arena Cove, CA	0.16
1/15/2009	Kamchatka, Russia	7.4 M Earthquake	Arena Cove, CA	0.13
9/29/2009	Samoa Islands, Samoa	8.1 M Earthquake	Arena Cove, CA	1.44
10/7/2009	Vanuatu Islands, Vanuatu	7.6 M Earthquake	Arena Cove, CA	0.13
2/27/2010	Central Chile, Chile	8.8 M Earthquake	Arena Cove, CA	1.28
3/11/2011	Honshu Island, Japan	9.1 M Earthquake	Arena Cove, CA	5.71
3/11/2011	Honshu Island, Japan	9.1 M Earthquake	Point Arena, CA	5.71
3/11/2011	Honshu Island, Japan	9.1 M Earthquake	Noyo River Harbor, CA	3.28
3/11/2011	Honshu Island, Japan	9.1 M Earthquake	Albion, CA	2.62
3/11/2011	Honshu Island, Japan	9.1 M Earthquake	Dolphin Isle Marina, Noyo River, CA	2.62
7/6/2011	Kermadec Islands, New Zealand	7.6 M Earthquake	Arena Cove, CA	0.20
10/28/2012	British Columbia, Canada	7.7 M Earthquake	Arena Cove, CA	1.15
9/16/2015	Central Chile, Chile	8.3 M Earthquake	Arena Cove, CA	0.56
1/23/2018	Kodiak Island, AK, USA	7.9 M Earthquake	Arena Cove, CA	0.49

Table 4-28: Historic Mendocino County Tsunami Events, 1896-2018
Source: NCEI/WDS Global Historical Tsunami Database

Location

A 10-foot wave run-up would affect the entire coastal area of Mendocino County. Specifically, the low-lying coastal areas and riverine valleys for the Navarro, Albion, Noyo, Garcia, and Ten Mile rivers would be inundated by run-up. Wave run-up would not reach the town of Manchester but would inundate Noyo Harbor. (California Department of Conservation, 2019)

Extent and Severity

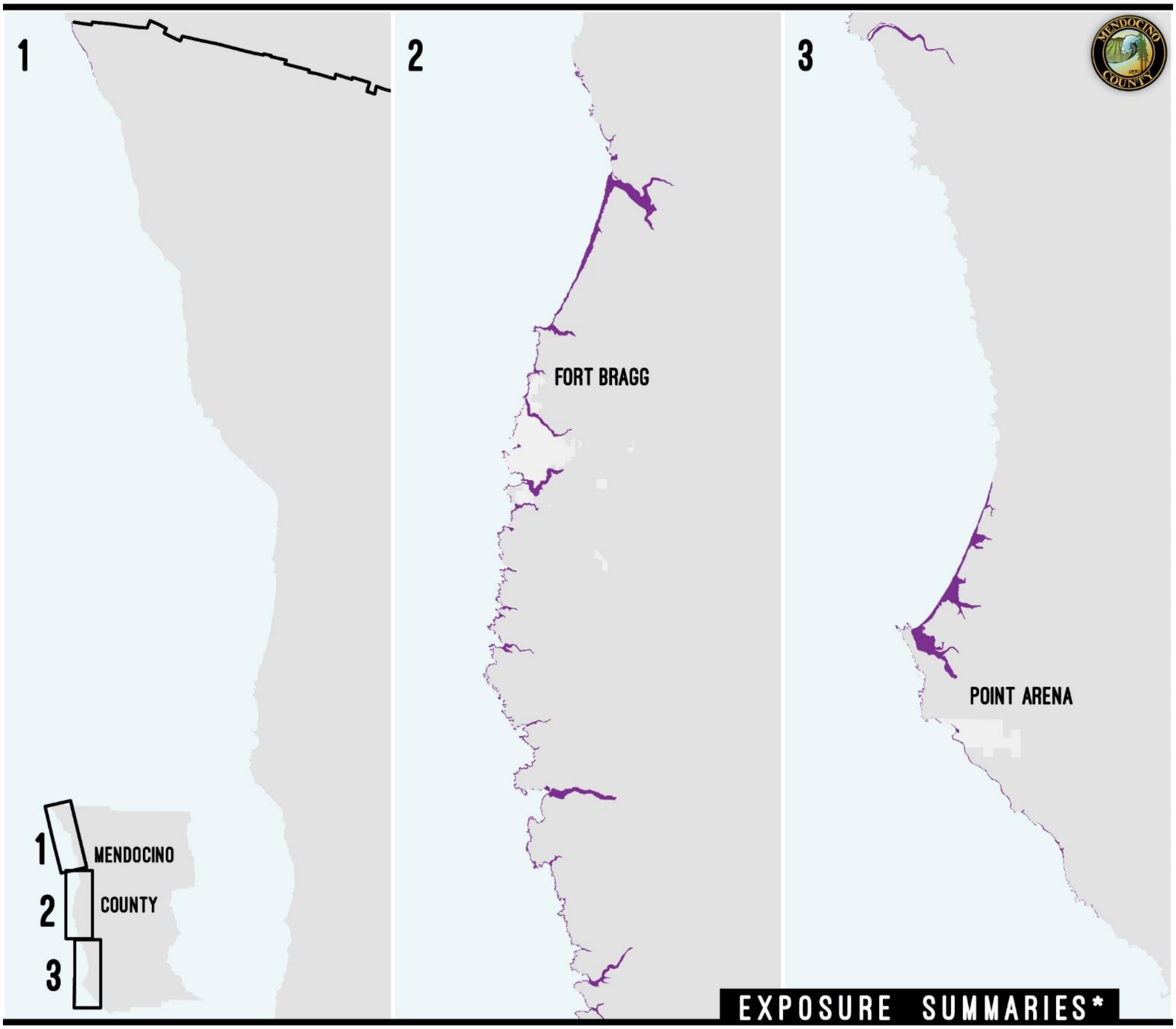
A tsunami will affect beaches that are open to the ocean. However, they also impact bay mouths, tidal flats, and the shores of large coastal rivers. Tsunami waves can also diffract around landmasses. Because tsunamis are not symmetrical, the waves may be much stronger in one direction than another, depending on the nature of the source and the surrounding geography. Tsunamis do propagate outward from their source, which means that coasts in the shadow of affected land masses are usually fairly safe. (*Id.*)

The extent of a tsunami is a factor of the following conditions:

- Distance of shoreline from the tsunami generating event
- Magnitude of the earthquake causing the event; duration and period of waves
- Run-up elevations
- Tidal level at time of occurrence
- Location along shore and direction of shore in respect to propagated waves
- Topography of the seabed

As depicted by Mendocino's tsunami history, the majority of tsunami events only lead to a wave run-up of one 1 foot or less; however, wave run-ups can also reach over 12 feet in height. Figure 4-32 displays potential tsunami run-up areas for Mendocino County.

TSUNAMI RUN-UP AREA SNAPSHOT — **MENDOCINO COUNTY**



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA

Count	Exp. Rate**
264	0%

Count Includes: TSUNAMI

PARCEL COUNT IN HAZARD AREA

Count	Exp. Rate**
52	0%

Count Includes: TSUNAMI

PARCEL VALUE IN HAZARD AREA

	Exp. Rate**
Sum of Improvement Value $17,276,416	0%
Sum of Content Value $14,053,136	1%

Count Includes: TSUNAMI

CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:	
Essential Facilities	0	0%	TSUNAMI	
High Potential Loss	1	0%	Sum of Transportation & Lifeline Linear Mileage	
Transportation & Lifeline	6	2%	17	0%

MAP LEGEND

TSUNAMI RUN-UP

*Exposure summaries include tsunami run-up inundation areas. Hazard data source: CGS.

**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

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Figure 4-32: Tsunami Run-up Area

Warning Time

Over time, tsunami warning systems have become more sophisticated. Tsunami Warning Centers utilize observation systems, which include seismic and water-level networks around the world in order to aid in determining when and where to issue tsunami messages. Generally, if an earthquake is over 6.5 M and is occurring 0 and 5 kilometers in depth below the seafloor, a tsunami warning will be issued. This kind of warning can go out within 3 to 5 minutes of the undersea earthquake and gives an early indication of its potential to cause a tsunami with significant impacts. (National Tsunami Warning Center, 2020) (ABC Science, 2019)

4.5.4.8 Earthquake Vulnerability Analysis

Earthquakes are a considerable threat to life and property in Mendocino County. A moderate to severe seismic incident on any fault zone in close proximity to the County is expected to cause:

- Extensive property damage, particularly to pre-1930's unreinforced masonry structures,
- Possible fatalities and injuries,
- Damage to water and sewage systems,
- Disruption of communications systems,
- Broken gas mains and petroleum pipelines,
- Disruption to Electrical Utility Lines,
- Disruption of transportation arteries, and
- Competing requests for regional aid resources.

Community needs would quickly exceed the response capability of the County's emergency management organization, requiring mutual assistance from volunteer and private agencies, the Governor's Office of Emergency Services, and the Federal Emergency Support Functions.

In an earthquake, the primary consideration is saving lives. Time and effort must also be given to providing for people's mental health by reuniting families, providing shelter to the displaced persons, and restoring basic needs and services. A major effort will be needed to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and temporary housing for affected citizens.

After an earthquake, there will be a loss of income both in private and public sectors. Individuals can lose wages due to businesses inability to function because of damaged goods or facilities. Due to business losses, Mendocino County and the cities in the planning area will lose revenue. Economic recovery from even a minor earthquake is critical.

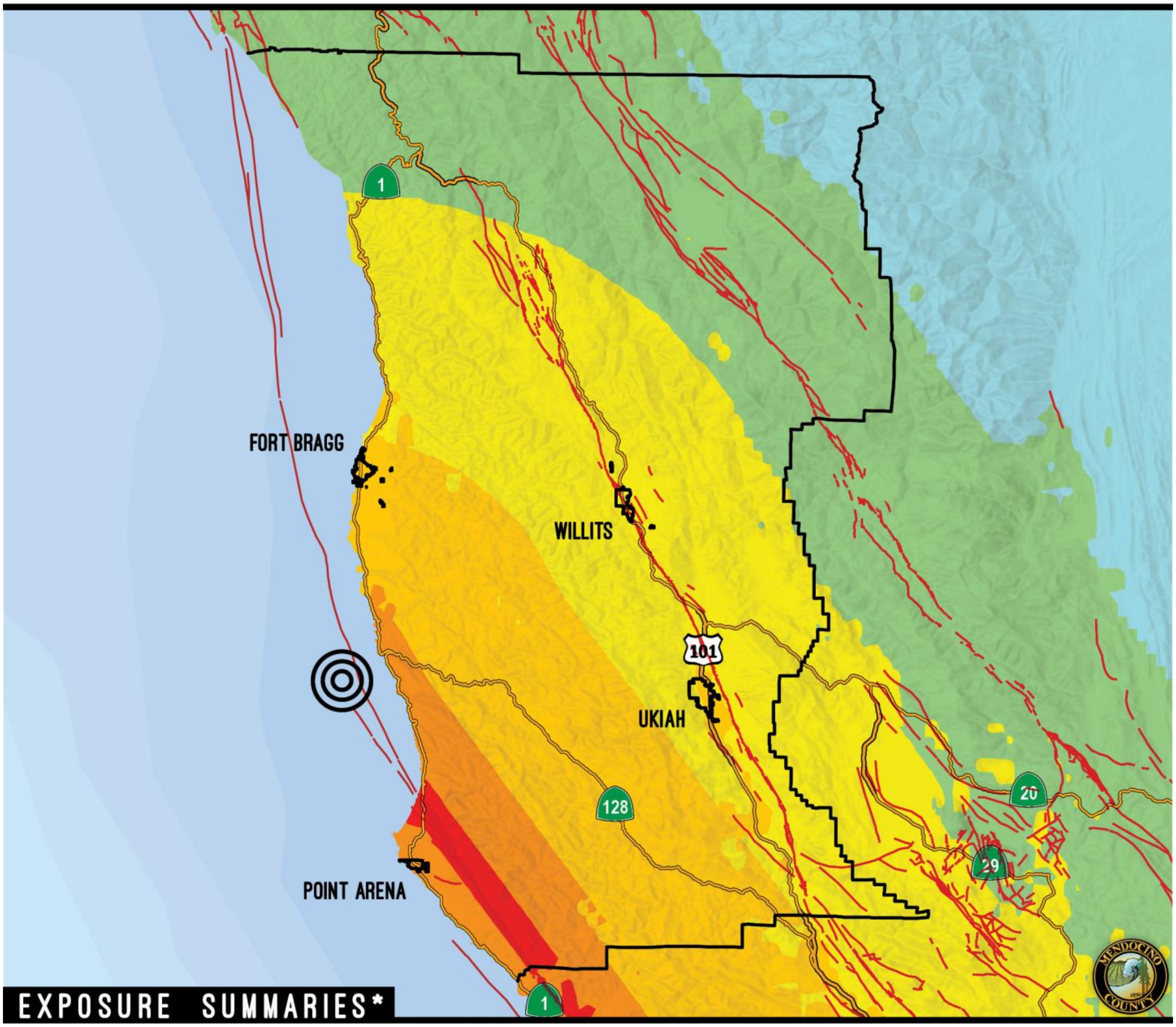
4.5.4.8.1 Earthquake Exposure

The exposure analysis for Mendocino County centers on an earthquake scenario produced from the North San Andreas and Maacama Garberville faultlines. As discussed in Section 4.5.4.4, these scenarios present the highest probability for a severe earthquake and severe shaking in Mendocino County.

An exposure analysis was conducted to develop earthquake vulnerability data throughout Mendocino County using the methods outlined in Section 4.4. To develop earthquake exposure data for the County, asset inventories for people, property, and critical facilities were superimposed with earthquake shaking intensity data from the USGS. Figure 4-33 and Figure 4-34 depict the exposure summaries for both fault lines. Both summaries demonstrate that a majority of the population would be exposed. The North San Andreas predicts a 94% population exposure, and the Maacama Garberville scenario predicts a 100% exposure for the County's population.

M7.8 N. SAN ANDREAS - N. COAST - PENINSULA - SC MTN SNAPSHOT

MENDOCINO COUNTY



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA	
Count	Exp. Rate**
55,319	94%
Count Includes: S + + + E	

PARCEL COUNT IN HAZARD AREA	
Count	Exp. Rate**
22,376	92%
Count Includes: S + + + E	

PARCEL VALUE IN HAZARD AREA	
Sum of Improvement Value	Exp. Rate**
$4,367,628,069	96%
Sum of Content Value	
$2,587,544,399	96%
Count Includes:	S + + + E

CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA			
Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
Essential Facilities	64	83%	S + + + E
High Potential Loss	430	91%	Sum of Transportation & Lifeline Linear Mileage
Transportation & Lifeline	292	85%	13,559 73%

MAP LEGEND

III	IV	V	VI	VII	VIII	IX	X
WEAK	LIGHT	MODERATE	STRONG	VERY STRONG	SEVERE	VIOLENT	EXTREME

MMI

*Exposure summaries include violent, severe, very strong and strong shake zones.
Hazard data source: USGS.
**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

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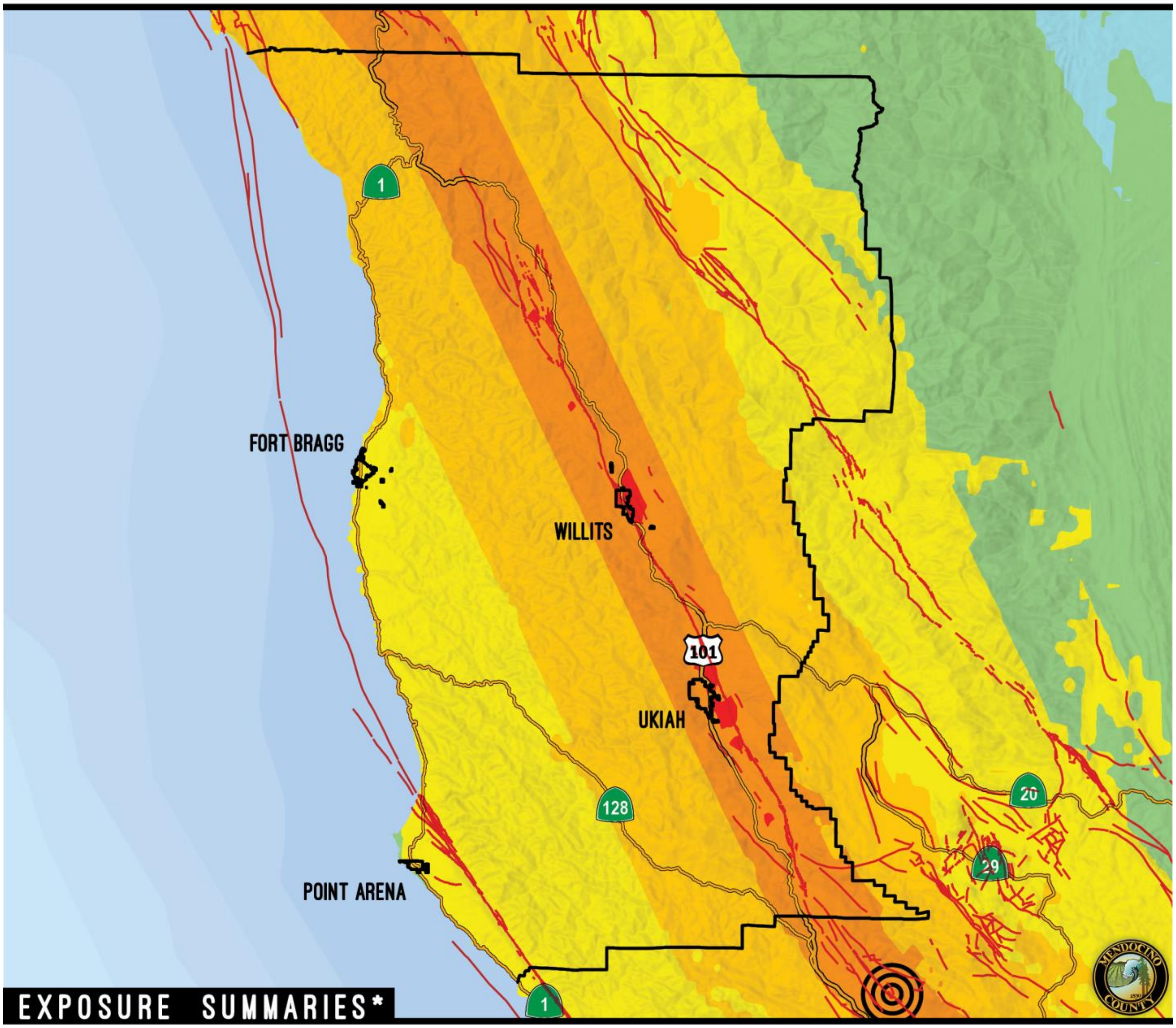
Figure 4-33: N. San Andreas Mojave N. Exposure and Snapshot Map

M7.4 MAACAMA GARBERVILLE SNAPSHOT **MENDOCINO COUNTY**



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA

Count	Exp. Rate**
58,870	100%

Count Includes: S + + + E

PARCEL COUNT IN HAZARD AREA

Count	Exp. Rate**
24,357	100%

Count Includes: S + + + E

PARCEL VALUE IN HAZARD AREA

	Exp. Rate**
Sum of Improvement Value $4,542,077,319	100%
Sum of Content Value $2,692,625,869	100%

Count Includes: S + + + E

CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
Essential Facilities	76	99%	S + + + E
High Potential Loss	472	100%	*Sum of Transportation & Lifeline Linear Mileage*
Transportation & Lifeline	343	100%	18,122 98%

MAP LEGEND

III	IV	V	VI	VII	VIII	IX	X
WEAK	LIGHT	MODERATE	STRONG	VERY STRONG	SEVERE	VIOLENT	EXTREME

MMI

*Exposure summaries include violent, severe, very strong and strong shake zones.
Hazard data source: USGS.
**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

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Figure 4-34: Maacama Garberville Exposure and Snapshot Map

Population

Table 4-29 and Table 4-30 summarize population exposure results for the Maacama Garberville Scenario. Table 4-31 and Table 4-32 summarize population exposure results for the North San Andreas; North Coast plus Peninsula and Santa Cruz Mountain scenario. The entire population of Mendocino County is potentially exposed to direct and indirect impacts from earthquakes. The degree of exposure depends on many factors, including the age and construction type of dwellings, the soil types on which their homes are constructed, and proximity to fault location. Whether directly or indirectly impacted, the entire population will have to deal with the consequences of earthquakes to some degree. Business interruption could keep people from working, road closures could isolate populations, and loss of functions of utilities could impact populations that suffered no direct damage from an event itself.

Table 4-29: Population Exposure to M7.4 Maacama Garberville Scenario (Unincorporated County)

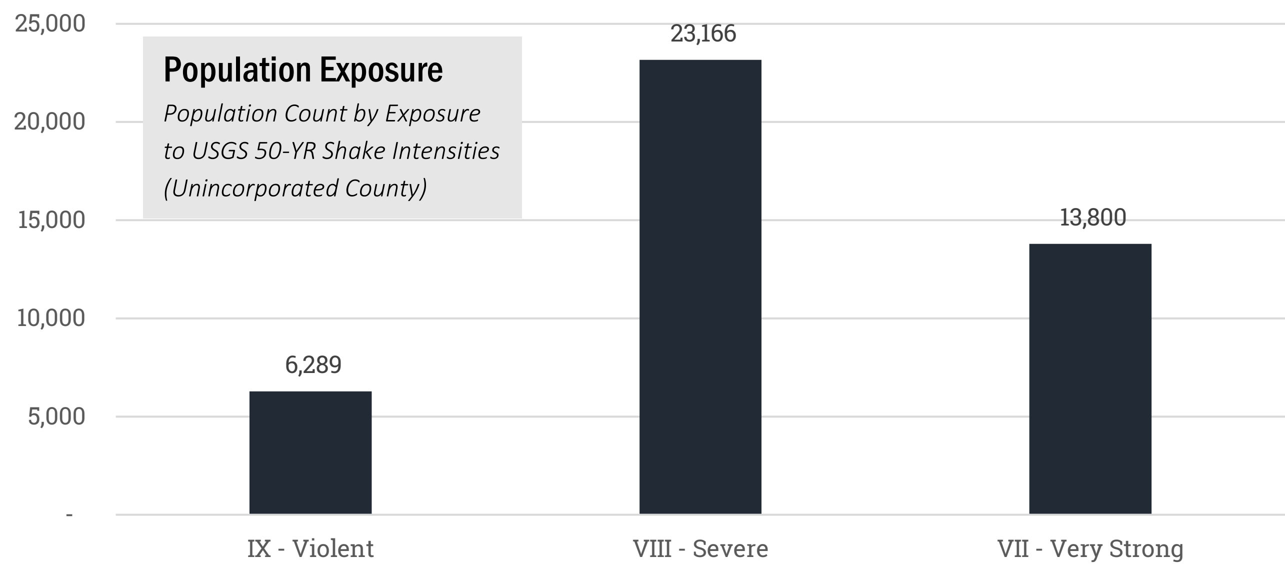

Table 4-30: Population Exposure to M7.4 Maacama Garberville Scenario (Unincorporated County)

	Total Population
Unincorporated County	58,995

Shake Severity Zone	Population Count	% of Total
IX - Violent	6,289	10.66%
VIII - Severe	23,166	39.27%
VII - Very Strong	13,800	23.39%
Total	**43,256**	**73.32%**

Table 4-31: Population Exposure to M7.8 Scenario (Unincorporated County)

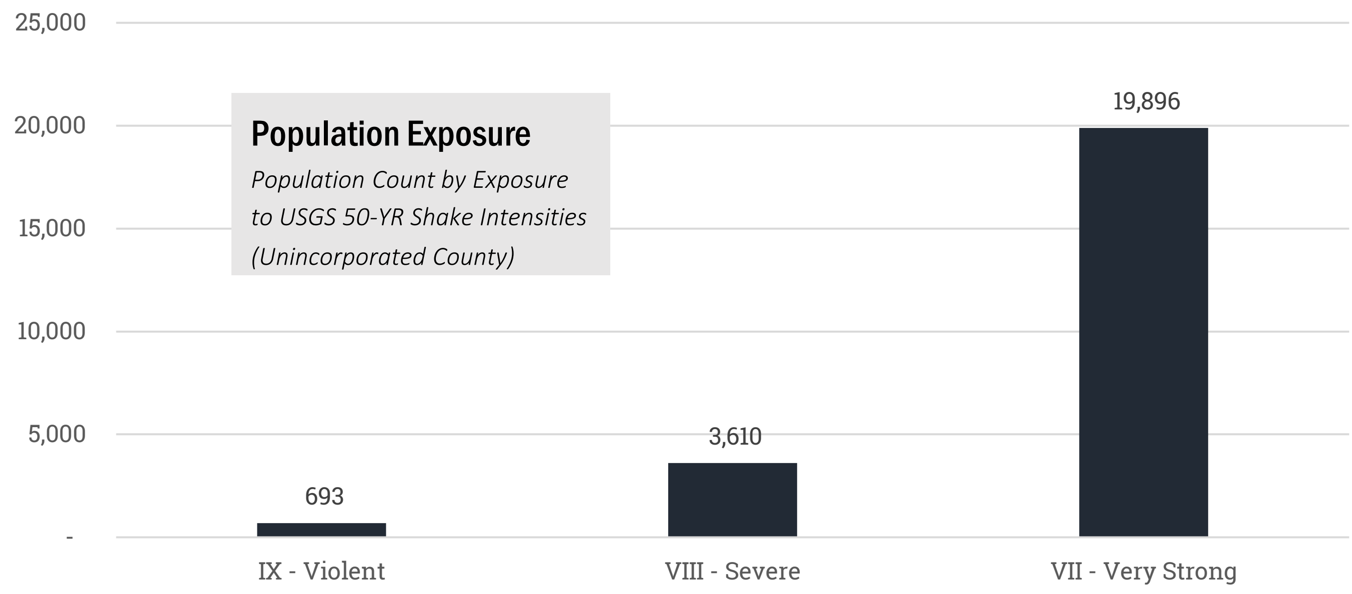

Table 4-32: Population Exposure to M7.8 Scenario (Unincorporated County)

	Total Population
Unincorporated County	58,995

Shake Severity Zone	Population Count	% of Total
IX - Violent	693	1.18%
VIII - Severe	3,610	6.12%
VII - Very Strong	19,896	33.72%
Total	**24,199**	**41.02%**

Property and Building Ages

The vulnerability of buildings and structures to an earthquake depends on determining two important factors:

(1) the year in which seismic codes were initially adopted and enforced by the jurisdiction having authority, and
(2) the year in which seismic codes were improved and enforced.

These are known as *benchmark years*, marking significant milestones in California Building Code requirements that directly affect the structural integrity of development in California.

The County adheres to the 2019 California Building Code. Table 4-33 provides a listing of code improvements. Benchmark years are indicated in bold. For reference, Table 4-34 provides the definitions of building types.

Table 4-33: Seismic Benchmark Years

Code Edition	Effective Date	Building Type
(2019 CBC)	January 1, 2020	
(2016 CBC)	January 1, 2017	
(2013 CBC)	January 1, 2014	N/A
(2012 IBC)		
(2010 CBC)	January 1, 2011	N/A
(2009 IBC)		
(2007 CBC)	January 1, 2008	N/A
(2006 IBC)		
(2001 CBC)	November 1, 2002	N/A
(1997 UBC)		
(1998 CBC)	**July 1, 1999**	**W1a, S2, S2a, RM1, PC1, PC1a**
(1997 UBC)		
(1994 UBC)	**January 7, 1996**	**S1, S1a, C1, C2, C2a, RM2**
(1991 UBC)	**November 29, 1992**	**URM**
(1988 UBC)	**April 29, 1990**	**S2 & S2a**
(1985 UBC)	November 8, 1987	N/A
(1982 UBC)	December 9, 1984	N/A
(1979 UBC)	June 21, 1981	N/A
(1976 UBC)	**November 1, 1977**	**W1 and W2**
(1973 UBC)	April 13, 1975	N/A
(1970 UBC)	August 29, 1971	N/A
(1967 UBC)	July 12, 1968	N/A
(1964 UBC)	July 1, 1965	N/A
(1961 UBC)	August 17, 1962	N/A
(1958 UBC)	October 1, 1958	N/A

Code Edition	Effective Date	Building Type
(1955 UBC)	January 1, 1956	N/A
(1955 UBC)	January 1, 1956	N/A
(1946 UBC)	June 18, 1948	N/A
(1943 UBC)	July 13, 1944	N/A
(1940 UBC)	April 4, 1941	N/A
(1937 UBC)	September 10, 1937	N/A
(1930 UBC)	March 20, 1933	N/A

Source: ASCE 41-13. County Building Dept.

Table 4-34: Definitions of FEMA Building Types

FEMA Building Type	Definition
W1	Wood Light Frame
W1A	Wood Light Frame (multi-unit residence)
W2	Wood Frame (commercial and industrial)
S1	Steel Moment Frames
S2	Steel-braced Frames
S3	Steel Light Frames
S4	Steel Frames with concrete shear walls
S5	Steel Frames with infill masonry walls
C1	Concrete Moment Frames
C3	Concrete Frames with infill masonry shear walls
C2	Concrete Shear Walls
PC1	Tilt-Up Concrete shear walls
PC2	Precast Concrete Frames with shear walls
RM1	Reinforced Masonry Walls with flexible diaphragms
RM2	Reinforced Masonry Walls with stiff diaphragms
URM	Unreinforced Masonry Bearing Walls

Soft-Story Buildings

A soft-story building is a multi-story building with one or more floors that are "soft" due to structural design. If a building has a floor that is 70-percent less stiff than the floor above it, it is considered a soft-story building. These floors can be especially dangerous in earthquakes because they cannot cope with the lateral forces caused by the swaying of the building during a quake. As a result, the soft story may fail, causing what is known as a *soft-story collapse*. Soft stories are typically associated with retail spaces and parking garages, often on the lower stories of a building. A soft-story collapse can cause the rest of the building to collapse as well, causing serious structural damage that may render the structure totally unusable.

Soft-story collapse is one of the leading causes of earthquake damage to private residences. The level of vulnerability due to this type of construction within the planning area is not currently known. This type of data should be generated to support future earthquake risk assessments.

Property Value Exposure

An inventory of current market values and the content value was completed using County Assessor's parcel data. GIS was used to create centroids, or points, to represent the center of each parcel polygon, assumed to be the location of the structure for analysis purposes. The centroids were then superimposed with the USGS probabilistic shaking severity zones to determine the at-risk structures. Table 4-35 shows the count of at-risk parcels and their associated building and content exposure values to the Maacama Garberville earthquake scenario. Table 4-36 shows the count of at-risk parcels and their associated building and content exposure values to the North San Andreas; North Coast plus Peninsula and Santa Cruz Mountain earthquake scenario.

Table 4-35: Parcel Exposure to M7.4 Maacama Garberville (Unincorporated County)

	Total Parcels	Total Market Value ($)	Total Content Value ($)	Total Value ($)
Unincorporated County	24,371	$ 4,544,212,021	$ 2,693,943,855	$7,238,155,876

Shake Severity Zone	Improved Res. Parcel Count	% of Total	Market Value Exposure ($)	Content Value Exposure ($)	Total Exposure ($)	% of Total
IX - Violent	1,280	5.3%	$ 299,510,200	$ 238,821,339	$538,331,539	7.4%
VIII - Severe	10,156	41.7%	$ 1,824,307,690	$ 1,089,521,704	$ 2,913,829,394	40.3%
VII - Very Strong	3,822	15.7%	$ 535,094,583	$ 336,891,900	$ 871,986,483	12.0%
Total	**15,258**	**62.6%**	**$ 2,658,912,473**	**$ 1,665,234,943**	**$4,324,147,416**	**59.7%**

Table 4-36: Parcel Exposure to M7.8 N. San Andreas (Unincorporated County)

	Total Parcels	Total Market Value ($)	Total Content Value ($)	Total Value ($)
Unincorporated County	24,371	$ 4,544,212,021	$ 2,693,943,855	$7,238,155,876

Shake Severity Zone	Improved Res. Parcel Count	% of Total	Market Value Exposure ($)	Content Value Exposure ($)	Total Exposure ($)	% of Total
IX - Violent	353	1.4%	$ 62,223,252	$ 34,102,276	$ 96,325,528	1.3%
VIII - Severe	2,530	10.4%	$ 571,731,829	$ 306,473,656	$ 878,205,485	12.1%
VII - Very Strong	8,149	33.4%	$ 1,742,225,915	$ 1,066,985,670	$ 2,809,211,585	38.8%
Total	**11,032**	**45.3%**	**$ 2,376,180,996**	**$ 1,407,561,602**	**$ 3,783,742,598**	**52.3%**

Critical Facilities and Infrastructure

Earthquakes pose numerous risks to critical facilities and infrastructure. Seismic risks, or losses, that are likely to result from exposure to seismic hazards include:

- Utility outages,
- Economic losses for repair and replacement of critical facilities, roads, buildings, etc.,
- Indirect economic losses such as income lost during downtime resulting from damage public infrastructure, and
- Roads or railroads that are blocked or damaged can prevent access throughout the area and can isolate residents and emergency service providers needing to reach vulnerable populations or to make repairs.

Linear utilities and transportation routes are vulnerable to rupture and damage during and after a significant earthquake event. The cascading impact of a single failure can have effects across multiple systems and utility sectors. Degrading infrastructure systems and future large earthquakes with epicenters close to critical regional infrastructure could result in system outages that last weeks for the most reliable systems, and multiple months for others. Additionally, earthquakes may cause the loss of function of cellular phone sites, or cell towers, which can limit emergency services such as tracking and evacuation.

All critical facilities in Mendocino County are exposed to the earthquake hazard. Table 4-37 and Table 4-38 list the number of each type of facility in the Violent, Severe, and Very Severe MMI severity zones within the County, described in Table 4-25.

Table 4-37: Critical Facility Exposure to M7.4 Scenario (Unincorporated County)

Critical Infrastructure - M7.4 Maacama Garberville			
Infrastructure Type	IX - Violent	VIII - Severe	VII - Very Strong
Essential Facility	3	20	20
EOC	-	1	-
Fire Station	3	14	14
Law Enforcement	-	3	2
Medical Facility	-	2	4
High Potential Loss	55	186	113
Adult Residential Facility	2	2	-
Alternative Education Program	-	-	-
Animal Control	-	-	-
Child Care Center	1	7	6
Communication Tower	2	42	18
Community Center	-	2	3
Courthouse	-	-	-
Dam	-	22	3
Detention Center	-	-	-
Fairground	-	-	1
Family Child Care Home	-	-	1
Foster Family Agency	-	-	-
Historic Building	-	1	3
Historic Site	-	1	-
Library	-	-	1
Museum	-	-	-
Office	5	-	2
Park and Recreation	-	4	2
Power Plant	4	2	4
Real Property Asset*	25	71	41
Residential Child Care	-	-	-
Residential Elder Care Facility	-	2	-
School	8	29	27
Shop	2	1	-
Storage	6	-	-
Wastewater Treatment	-	-	1
Transportation and Lifeline	33	135	104
Airport	-	-	2
Bridge	28	127	94
Bus Facility	-	-	-
Corp Yard	1	1	2
NG Station	1	-	-
Substation	3	5	3
Transfer Station	-	2	3
Hazmat	13	-	-
Hazmat	13	-	-
Grand Total	**104**	**341**	**237**

**Real Property Assets are digitized insurance rolls for demonstrating value and ownership and may have overlapping points with other categories such as fire stations and law enforcement.*

Table 4-38: Critical Facility Exposure to M7.8 Scenario (Unincorporated County)

Critical Infrastructure - M7.8 N. San Andreas - N. Coast - Peninsula - SC Mtn.			
Infrastructure Type	IX - Violent	VIII - Severe	VII - Very Strong
Essential Facility	3	9	33
EOC	-	-	1
Fire Station	2	8	26
Law Enforcement	-	1	1
Medical Facility	1	-	5
High Potential Loss	9	34	203
Adult Residential Facility	-	-	-
Alternative Education Program	-	-	-
Animal Control	-	-	-
Child Care Center	-	1	8
Communication Tower	3	10	23
Community Center	-	-	2
Courthouse	-	-	-
Dam	-	-	4
Detention Center	-	-	-
Fairground	-	-	1
Family Child Care Home	-	1	-
Foster Family Agency	-	-	-
Historic Building	3	4	2
Historic Site	-	-	-
Library	-	-	-
Museum	-	-	-
Office	-	-	1
Park and Recreation	-	1	2
Power Plant	-	-	4
Real Property Asset*	1	9	114
Residential Child Care	-	-	-
Residential Elder Care Facility	-	4	1
School	2	4	29
Shop	-	-	1
Storage	-	-	10
Wastewater Treatment	-	-	1
Transportation and Lifeline	6	18	106
Airport	-	2	1
Bridge	4	13	95
Bus Facility	-	1	-
Corp Yard	-	-	1
NG Station	-	-	1
Substation	1	2	4
Transfer Station	1	-	4
Hazmat	-	-	1
Hazmat	-	-	1
Grand Total	**18**	**61**	**343**

**Real Property Assets are digitized insurance rolls for demonstrating value and ownership and may have overlapping points with other categories such as fire stations and law enforcement.*

HazMat Fixed Facilities

Earthquakes can produce hazardous materials (HazMat) threats at extremely high levels. Depending on the year of build and construction of each facility containing HazMat, the earthquake-initiated hazardous material release (EIHR) potential will vary. HazMat contained within masonry or concrete structures built before certain benchmark years may be particularly vulnerable.

Utilities

Linear utilities and transportation infrastructure would likely suffer considerable damage in the event of an earthquake. Due to the amount of infrastructure and sensitivity of utility data, linear utilities are difficult to analyze without further investigating individual system components. Table 4-39 and Table 4-40 provide the best available linear utility data; it should be assumed that these systems are exposed to breakage and failure.

Table 4-39: Lifeline Exposure Maacama Garberville Scenario (Unincorporated County)

Lifelines (miles) - M7.4 Maacama Garberville			
Infrastructure Type (Linear)	IX - Violent	VIII - Severe	VII - Very Strong
Levee	0.3	0.9	0.6
NG Pipeline	5.2	40.3	-
Railroad	8.8	71.9	49.8
Street	104.7	1,624.3	2,441.7
4WD trail	3.7	199.2	525.6
4WD trail, major	-	7.0	11.2
Alley	-	-	-
Cul-de-sac	0.0	0.4	0.2
Driveway	9.1	68.6	95.1
Interstate	6.2	48.6	1.1
Local road	62.8	1,004.6	1,499.7
Local road, major	0.7	27.3	42.9
Primary highway	4.4	102.7	66.9
Ramp	1.6	9.4	1.2
Road, parking area	0.3	0.7	-
State/county highway	15.8	154.2	197.3
Thoroughfare, major	-	1.3	0.5
Traffic circle	-	0.0	-
Walkway	0.0	0.1	-
Transmission Line	19.5	157.7	75.9
Grand Total	**138.5**	**1,895.0**	**2,568.0**

Table 4-40: Lifeline Exposure M7.8 Scenario (Unincorporated County)

Lifelines (miles) - M7.8 N. San Andreas - N. Coast - Peninsula - SC Mtn.			
Infrastructure Type (Linear)	IX - Violent	VIII - Severe	VII - Very Strong
Levee	-	-	1.0
NG Pipeline	-	-	17.2
Railroad	-	-	26.1
Street	127.8	517.3	1,576.7
4WD trail	0.2	71.2	296.9
4WD trail, major	-	-	5.7
Alley	-	-	-
Cul-de-sac	-	-	0.4
Driveway	11.1	17.6	39.7
Interstate	-	-	13.9
Local road	100.2	312.3	947.6
Local road, major	1.0	10.8	22.2
Primary highway	4.8	42.9	70.5
Ramp	-	-	4.5
Road, parking area	-	-	0.3
State/county highway	10.4	59.1	172.1
Thoroughfare, major	-	3.3	2.8
Traffic circle	-	-	-
Walkway	-	-	0.1
Transmission Line	9.4	38.7	63.1
Grand Total	**137.2**	**556.0**	**1,684.0**

Water Supply Utilities

Mendocino water supply is sourced primarily from groundwater resources. Van Arsdale Reservoir and Lake Mendocino are the two most notable surface water resources in the County and smaller reservoirs and ponds are prevalent as well. Groundwater is the primary source for municipal and individual domestic water use, outside of the Ukiah Valley. It also contributes significantly to irrigation needs. Groundwater wells throughout the County are used for domestic, commercial, industrial, agricultural, and for fire protection needs. (Mendocino County General Plan, 2009)

Natural Gas Utilities

Several common characteristics of earthquakes and their impacts on natural gas safety are:

- Earthquake ground shaking will generally lead to substantially more instances of building damage than fire ignitions.
- Ground motions that are sufficient enough to damage buildings are the most likely to impact utility and customer gas systems and create a potential for gas-related fire ignitions.
- The number of post-earthquake fire ignitions related to natural gas can be expected to be 20% to 50% of the total post-earthquake fire ignitions.
- The consequences of post-earthquake fire ignitions for residential gas customers are largely financial. A fire ignition only becomes a life safety concern when inhabitants are unable to exit the building following earthquakes. Experience in past earthquakes indicates that egress from earthquake-damaged single-family homes is generally possible because of the limited structure height, low numbers of occupants, and multiple direct escape paths through doors and windows.
- The potential life safety dangers from post-earthquake fires are considerably more serious in seismically vulnerable apartment or condominium buildings since they provide a greater chance for damaging the structure and trapping the occupants. (Occupational Safety and Health Administration, n.d.)

Pacific Gas and Electric (PG&E), the County's natural gas and electricity utility, is responsible for designing, constructing, maintaining, and operating the natural gas system safely and efficiently. This includes all the facilities used in the delivery of gas to any customer up to and including the point of delivery to the customers' gas piping system.

Gas customers and Mendocino County residents are responsible for using gas safely on their property and within their buildings and other facilities. Customers meet this responsibility by maintaining their gas appliances in good working condition, assuring that only qualified individuals are engaged to modify or maintain their gas service and facility piping, and knowing what to do before and after earthquakes to maintain the safe operation of their natural gas service.

The following conditions, when combined, pose the greatest risk for post-earthquake fire damage:

1. Buildings are unoccupied and individuals are not present to mitigate damage to gas systems or control small fires.
2. High building density or dense, fire-prone vegetation.
3. High wind and low humidity weather conditions.
4. Damage to water systems that severely limits firefighting capabilities.

5. Reduced responsiveness of firefighting resulting from impaired communications, numerous requests for assistance, direct damage to fire stations, restricted access because of traffic congestion and damaged roadways, and delays in mutual aid from neighboring fire districts. (United States Fire Administration, 2020)

Telecommunication

Telecommunication systems will be affected by a system failure, overloads, loss of electrical power, and possible failure of some alternate power systems. Immediately following an event, numerous failures will occur, compounded by system use overloads. This will likely disable up to 80% of the telephone system for one day. County UHF/VHF and microwave radio systems are expected to operate at 40% effectiveness the first 12 hours following an earthquake, increase to 50% for the second 12 hours, then begin to slowly decline to approximately 40% within 36 hours. (City and County of San Francisco Hazard Mitigation Plan, 2014)

Microwave systems will likely be 30% or less effective following a major earthquake. Damage to natural gas facilities serving the Mendocino County communities will consist primarily of isolated breaks in major transmission lines. Breaks in mains and individual service connections within the distribution system will be significant, particularly near the fault zones. These many leaks pose a fire threat in these susceptible areas of intense ground shaking and/or poor ground near the shoreline. Breaks in the system will affect large portions of the County, and restoration of natural gas service could be significantly delayed. (*Id.*)

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Public Schools

The Field Act was enacted on April 10, 1933, one month after the Long Beach Earthquake in which many schools were destroyed or suffered major damage. Public school construction has been governed by the Field Act since 1933 and enforced by the Division of the State Architect. In any community, public schools constructed under the Field Act after 1978 are likely to be among the safest buildings in which to experience a major earthquake. The Field Act requires:

- School building construction plans to be prepared by qualified California licensed structural engineers and architects.
- Designs and plans to be checked by the Division of the State Architect (DSA) for compliance with the Field Act before a contract for construction can be awarded.
- Qualified inspectors, independent of the contractors and hired by the school districts, to continuously inspect construction and verify full compliance with plans.

- The responsible architects and/or structural engineers to observe the construction periodically and prepare changes to plans (if needed) subject to approval by DSA.
- Architects, engineers, inspectors and contractors to file reports, under penalty of perjury, to verify compliance of the construction with the approved plans emphasizing the importance of testing and inspections to achieve seismically safe construction. Any person who violates the provisions or makes any false statement in any verification report or affidavit required pursuant to the Act is guilty of a felony. (Seismic Safety Commission, 2009)

Private schools are not subject to the Field Act and fall solely under the jurisdiction of the local building departments and their requirements. Private schools are covered under the Private Schools Building Act of 1986, with the legislative intent that children attending private schools be afforded life safety protection similar to that of children attending public schools. (*Id.*)

In the late 1960s regulations were put in place to have pre-Field Act (1933) buildings retrofitted, removed from school use or demolished. (Cal. Edu. Code § 15516, Appendix X, 1968) The Field Act also prohibits the use of unreinforced masonry buildings as school buildings. Seismic building standards, in general, were greatly strengthened after significant damage to buildings was observed, especially in the 1971 San Fernando earthquake. The Field Act regulations in place since 1978 are considered adequate for most public school buildings in most cases. (*Id.*)

Transportation

Earthquake events can significantly impact bridges and overpasses, which often provide the only access to some neighborhoods. Since soft soil regions generally follow floodplain boundaries, bridges that cross watercourses are considered vulnerable.

United States 101 (US 101) travels from Los Angeles to the northwest portion of Washington State, crossing the County of Mendocino. It is an important route which serves interregional and interstate traffic. US 101 could become impassable after an earthquake event, which could isolate portions of the County until road crews were able to complete road restoration. Two other routes, State Route 1 and State Route 20, serve as arteries within the County, albeit in a more limited capacity. State Route 1 extends from Southern California to US 101 in Leggett, and it primarily serves local coastal communities. State Route 20 extends from State Route 1 at Fort Bragg to US 101 in the City of Willits. It continues eastwards into Lake County. It is an important route for connecting US 101 with Interstate 5, both of which are major interstate highway routes. Table 4-39 shows transportation infrastructure exposed to shake severity zones in the event of the N. San Andreas earthquake scenario. (Mendocino County General Plan, 2009)

4.5.4.8.2 Earthquake Damage Estimation

Hazus Earthquake damage data were generated using a Level 2 Hazus 4.2 analysis. Hazus is a FEMA software product that uses a GIS to analyze multiple factors influencing earthquake damage estimates including peak ground velocity (PGV), peak ground acceleration (PGA) and soil of a given scenario and geographic area. Once the location and size of a hypothetical earthquake is identified, Hazus software estimates the intensity of the ground shaking, the number of buildings damaged, the number of casualties, the damage to transportation systems and utilities, the number of people displaced from their homes, and the estimated cost of repair and clean up.

The parcel data defined in Section 4.3 was imported into Hazus as User Defined Facilities (UDF) serving as the basis for replacement and content cost as well as associated damage estimation and loss. The scenarios used for the Mendocino County Hazus analysis was the M 7.4 Maacama Garberville and M 7.8 N. San Andreas – N. Coast – Peninsula – SC Mtn.

Building damageoutputs from Hazus are categorized into slight, moderate, and extensive damage. Ranges of damage are used to provide the user with an understanding of the building's physical condition. Table 4-41 provides a physical description of each damage state.

County assessor data does not include detailed information for tax-exempt structures, such as federal and local government buildings. These data were added through the development of GIS data by utilizing insurance schedule tables for each municipality's insured assets.

While there are several limitations to the FEMA Hazus earthquake models, it does allow for potential loss estimation for each building construction category. Countywide loss estimation results are summarized by building category type in Table 4-44 for the N San Andreas 7.7 magnitude earthquake scenario. It is important to understand that the Hazus loss estimation values for earthquakes are categorized in exceedance values. From reviewing Table 4-44, one can infer the probability of structures exceeding extensive damage is relatively low. However, if damage were to occur, the economic loss is averaged and summarized for each building type defined in the software.

Important to note: Loss estimation is the worst-case scenario. Loss estimation does not include damage to transportation routes, infrastructure, and other public and private utilities located throughout the County. An important concept in loss data is the "probability" of damage to exceed a certain degree. It is unlikely that buildings in County would receive "extensive" damage from earthquake shaking.

Table 4-41: Hazus Building Damage Descriptions

Damage State	Damage Description
Slight	Small plaster cracks at corners of door and window openings and wall/ceiling intersections; small cracks in masonry chimneys and masonry veneers. Small cracks are assumed to be visible with a maximum width of less than 1/8 inch (cracks wider than 1/8 inch are referred to as "large" cracks).
Moderate	Large plaster or gypsum-board cracks at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys.
Extensive	Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates and/or slippage of structure over foundations.
Complete	Structure may have large permanent lateral displacement or be in imminent danger of collapse due to cripple wall failure or failure of the lateral load resisting system; some structures may slip and fall off the foundation; large foundation cracks. Three percent of the total area of buildings with Complete damage is expected to be collapsed, on average.

Damage Estimation Improved Parcel and Government Property Loss

Hazus 4.2 was used to estimate the loss potential to residential properties and Government service facilities exposed to both the M 7.4 Maacama Garberville and M 7.8 N. San Andreas – N. Coast – Peninsula – SC Mtn. earthquake scenarios. Hazus reports the damage potential and loss potential from a given earthquake scenario in four categories: slight damage, moderate damage, extensive damage, and economic loss. Economic loss consists of estimations on the cost of repair and replacement to damaged or destroyed buildings and contents, relocation expenses, capital-related income, wage losses, and rental income losses. The results shown in Table 4-42 and Table 4-43 summarize improved parcels and government property loss.

Table 4-42: Loss Estimations for M 7.4 Scenario

Building Type	Average of Potential Damage to Exceed "Slight" (%)	Average of Potential Damage to Exceed "Moderate" (%)	Average of Potential Damage to Exceed "Extensive" (%)	Average Economic Loss for Each Building Category ($)	Sum of Economic Loss ($)	Proportion of Loss (%)
Agriculture	70%	53%	24%	$ 72,736	$ 90,774,429	16%
Commercial	46%	32%	13%	$ 92,145	$ 61,276,096	11%
Education	61%	47%	24%	$ 162,067	$ 4,699,938	1%
Emergency	31%	11%	2%	$ 0	$ 0	0%
Government	30%	12%	3%	$ 35,446	$ 35,481,146	6%
Industrial	70%	56%	28%	$ 242,182	$ 62,482,877	11%
Religion	34%	13%	2%	$ 16,882	$ 962,290	0%
Residential	36%	13%	3%	$ 13,837	$294,529,747	54%
Total					**$550,206,524**	

Note: Total Inventory Values
1 - Building Replacement Costs = $6,607,442,042
2 - Content Replacement Costs = $3,951,409,020
3 - Total Value = $10,558,851,062

Table 4-43: Loss Estimations for M 7.8 Scenario

Building Type	Average of Potential Damage to Exceed "Slight" (%)	Average of Potential Damage to Exceed "Moderate" (%)	Average of Potential Damage to Exceed "Extensive" (%)	Average Economic Loss for Each Building Category ($)	Sum of Economic Loss ($)	Proportion of Loss (%)
Agriculture	26%	13%	2%	$ 16,740	$ 20,891,812	11%
Commercial	29%	16%	5%	$ 2,477	$ 21,597,118	11%
Education	32%	17%	4%	$ 49,065	$ 1,422,879	1%
Emergency	4%	1%	0%	$ 0	$ 0	0%
Government	18%	6%	1%	$ 12,070	$ 12,082,134	6%
Industrial	29%	15%	4%	$ 42,090	$ 10,859,277	6%
Religion	12%	3%	0%	$ 3,810	$ 221,012	0%
Residential	16%	4%	1%	$ 5810	$ 123,665,602	65%
Total					**$190,739,836**	

Note: Total Inventory Values
1 - Building Replacement Costs = $6,607,442,042
2 - Content Replacement Costs = $3,951,409,020
3 - Total Value = $10,558,851,062

Damage Estimation for County Owned Property

Hazus 4.2 was used to estimate the loss potential to county facilities exposed to both the Maacama M 7.4 Garberville and M 7.8 N. San Andreas – N. Coast – Peninsula – SC Mtn. earthquake scenarios. Hazus reports the damage potential and loss potential from a given earthquake scenario in four categories: slight damage, moderate damage, extensive damage, and economic loss. Economic loss consists of estimations on the cost of repair and replacement to damaged or destroyed buildings and contents, relocation expenses, capital-related income, wage losses, and rental income losses.

County insurance data was obtained and formatted for use in Hazus for a detailed damage estimation. This dataset has additional information including number of floors, building value, content value, and construction type that greatly enhances results from default Hazus database.

The results shown in Table 4-44 and Table 4-45 summarize essential facility and high potential loss facilities with county insurance holding data.

Table 4-44: Loss Estimations for M 7.4 Maacama Garberville Scenario

		Site Value			Probability Damage Exceeds				
Building/ Site Name	**# Bldg.**	**Structure**	**Content**	**Total**	**Slight**	**Moderate**	**Extensive**	**Economic Loss**	**Loss Pct.**
Administration	3	$11,963,350	$7,257,925	$19,221,275	*60%*	*14%*	*1%*	$1,235,502	*6%*
County Administration Office	1	$11,567,360	$7,085,361	$18,652,721	*57%*	*14%*	*1%*	$1,192,826	*6%*
Modular Office	1	$85,378	$22,094	$107,472	*62%*	*14%*	*1%*	$9,201	*9%*
Storage Building	1	$310,612	$150,470	$461,082	*62%*	*14%*	*1%*	$33,475	*7%*
Agricultural	2	$4,432,589	$2,647,120	$7,079,709	*76%*	*45%*	*16%*	$803,605	*11%*
Enviromental Health Building	1	$3,488,557	$2,306,252	$5,794,809	*57%*	*14%*	*1%*	$359,740	*6%*
Office Building	1	$944,032	$340,868	$1,284,900	*94%*	*77%*	*32%*	$443,865	*35%*
Airport	4	$852,073	$83,647	$935,720	*17%*	*4%*	*0%*	$15,558	*2%*
Airport Hangar	2	$385,991	$16,358	$402,349	*15%*	*3%*	*0%*	$10,706	*3%*
Airport/Radio Equipment	1	$12,002	$41,800	$53,802	*33%*	*10%*	*1%*	$802	*1%*
Terminal/Off./Frame Han-	1	$454,080	$25,489	$479,569	*6%*	*1%*	*0%*	$4,050	*1%*
Animal Control	1	$2,138,393	$15,856	$2,154,249	*51%*	*11%*	*1%*	$184,073	*9%*
Animal Control	1	$2,138,393	$15,856	$2,154,249	*51%*	*11%*	*1%*	$184,073	*9%*
Communications	3	$3	$53,583	$53,586	*61%*	*43%*	*16%*	$1	*0%*
Radio Tower Repeater	1	$1	$17,861	$17,862	*17%*	*7%*	*1%*	$0	*0%*
Repeater Site - Cahto Mountain	1	$1	$17,861	$17,862	*86%*	*66%*	*27%*	$0	*0%*

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Repeater Site - Spanish Mountain (Clevland)	1	$1	$17,861	$17,862	*79%*	*57%*	*20%*	$0	*0%*
Community Building	8	$4,756,473	$346,600	$5,103,073	*36%*	*20%*	*10%*	$807,549	*16%*
Community Building	1	$1,279,469	$74,263	$1,353,732	*12%*	*1%*	*0%*	$18,706	*1%*
Justice Court/City Hall	1	$703,567	$57,810	$761,377	*5%*	*0%*	*0%*	$4,390	*1%*
Radio Tower Repeater	1	$1	$11,906	$11,907	*14%*	*2%*	*0%*	$0	*0%*
Veteran's Memorial Building	5	$2,773,436	$202,621	$2,976,057	*52%*	*31%*	*16%*	$784,452	*26%*
County Building	28	$6,302,236	$1,973,177	$8,275,413	*55%*	*32%*	*12%*	$2,418,333	*29%*
Administration Building	1	$1,331,670	$309,423	$1,641,093	*95%*	*77%*	*30%*	$612,342	*37%*
Dot Storage	1	$1	$3,746	$3,747	*69%*	*28%*	*3%*	$0	*0%*
Equipment Building	2	$99,778	$74,534	$174,312	*20%*	*7%*	*1%*	$4,623	*3%*
Equipment Building 2	1	$46,331	$1	$46,332	*11%*	*2%*	*0%*	$813	*2%*
Equipment Storage	1	$53,399	$9,534	$62,933	*7%*	*1%*	*0%*	$504	*1%*
Flammable Liquids Building	1	$4,272	$10,137	$14,409	*90%*	*81%*	*52%*	$2,445	*17%*
General Services Building	1	$1,785,363	$525,860	$2,311,223	*84%*	*56%*	*14%*	$552,713	*24%*
Main Building	1	$377,116	$148,499	$525,615	*12%*	*2%*	*0%*	$7,082	*1%*
Modular Break Room	1	$165,510	$1	$165,511	*66%*	*17%*	*1%*	$20,070	*12%*
Modular Office	1	$37,000	$13,367	$50,367	*65%*	*16%*	*1%*	$4,396	*9%*
Oil Shed	1	$5,131	$4,906	$10,037	*7%*	*1%*	*0%*	$48	*0%*
Parts Storage	1	$103,958	$8,309	$112,267	*80%*	*44%*	*11%*	$26,882	*24%*
Shop Building	5	$640,493	$263,440	$903,933	*51%*	*28%*	*8%*	$135,118	*15%*
Storage Building	2	$291,225	$22,793	$314,018	*78%*	*46%*	*16%*	$132,932	*42%*
Storage Facility	1	$1	$5,458	$5,459	*69%*	*28%*	*3%*	$0	*0%*
Storage Shed	3	$88,584	$124,018	$212,602	*52%*	*26%*	*6%*	$28,966	*14%*
Storage Unit	1	$1	$1,785	$1,786	*97%*	*88%*	*54%*	$1	*0%*
Tire Shed	1	$4,666	$399	$5,065	*20%*	*5%*	*0%*	$163	*3%*

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Vehicle Service Building	1	$1,054,828	$385,273	$1,440,101	99%	97%	82%	$856,236	59%
Veterans Service Office	1	$212,909	$61,694	$274,603	61%	25%	4%	$32,999	12%
Courthouse	2	$15,892,732	$2,018,005	$17,910,737	90%	83%	55%	$10,837,475	61%
Courthouse	1	$14,396,012	$1,540,043	$15,936,055	95%	91%	68%	$10,095,491	63%
Courthouse Annex	1	$1,496,720	$477,962	$1,974,682	85%	74%	42%	$741,984	38%
Detention Facility	10	$24,932,751	$2,181,951	$27,114,702	59%	29%	10%	$3,810,260	14%
Administration Building	1	$2,433,079	$338,258	$2,771,337	51%	11%	1%	$207,809	7%
Adult Detention Facility	1	$8,110,655	$347,942	$8,458,597	48%	20%	3%	$973,441	12%
Adult Detention(Maximum Security)	1	$6,074,661	$925,893	$7,000,554	48%	20%	3%	$729,081	10%
Classroom/Training Building	1	$1,545,431	$97,508	$1,642,939	51%	11%	1%	$131,995	8%
Juvenile Hall Admin	1	$537,980	$38,873	$576,853	65%	28%	5%	$91,037	16%
Juvenile Hall Classroom	1	$429,856	$49,112	$478,968	48%	20%	2%	$49,906	10%
Juvenile Hall Dorm	1	$1,958,563	$125,134	$2,083,697	86%	76%	40%	$965,963	46%
Juvenile Hall Kitchen,	1	$616,890	$55,533	$672,423	86%	76%	40%	$304,250	45%
Juvenile Hall/Violent Hall	1	$2,147,001	$53,717	$2,200,718	48%	20%	3%	$257,683	12%
Kitchen/Laundry Building	1	$1,078,635	$149,981	$1,228,616	56%	11%	1%	$99,094	8%
Emergency Operations	5	$1,612,688	$2,126,084	$3,738,772	63%	41%	15%	$576,664	15%
Dispatch Center	1	$1	$1,165,446	$1,165,447	48%	20%	3%	$0	0%
I.D. & Evidence	1	$1	$148,499	$148,500	85%	74%	42%	$0	0%
Sheriff	1	$1	$4,459	$4,460	14%	2%	0%	$0	0%
Sheriff Admin/Probation	1	$1,612,684	$647,091	$2,259,775	90%	63%	17%	$576,664	26%
Sheriff Commet	1	$1	$160,589	$160,590	78%	47%	10%	$0	0%
Fair Grounds	29	$6,664,751	$29	$6,664,780	31%	14%	4%	$741,830	11%
Administration Building	1	$287,175	$1	$287,176	19%	4%	0%	$8,785	3%

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Agric.Bldg./Exhibit Hall .Bldg	1	$1,522,765	$1	$1,522,766	*56%*	*37%*	*11%*	$324,714	*21%*
Arts & Crafts Bldg.	1	$606,837	$1	$606,838	*25%*	*4%*	*0%*	$23,479	*4%*
Auditorium	1	$603,767	$1	$603,768	*25%*	*4%*	*0%*	$23,360	*4%*
Commercial Bldg./Exhibit Hall	1	$724,276	$1	$724,277	*22%*	*11%*	*2%*	$47,071	*6%*
Dinning Hall	1	$218,838	$1	$218,839	*18%*	*3%*	*0%*	$6,495	*3%*
Dormitory	1	$96,274	$1	$96,275	*19%*	*4%*	*0%*	$2,945	*3%*
Field Bleachers 1	1	$26,408	$1	$26,409	*56%*	*37%*	*11%*	$5,631	*21%*
Field Bleachers 2	1	$11,825	$1	$11,826	*56%*	*37%*	*11%*	$2,522	*21%*
Grandstand	1	$402,829	$1	$402,830	*25%*	*4%*	*0%*	$15,585	*4%*
Hog Barn	1	$241,535	$1	$241,536	*54%*	*35%*	*10%*	$48,834	*20%*
Jr. Barn 1	1	$98,120	$1	$98,121	*18%*	*3%*	*0%*	$2,912	*3%*
Jr. Barn 2	1	$98,120	$1	$98,121	*18%*	*3%*	*0%*	$2,912	*3%*
Judging Booth	1	$4,667	$1	$4,668	*19%*	*4%*	*0%*	$143	*3%*
Lamb Palace	1	$241,032	$1	$241,033	*54%*	*35%*	*10%*	$48,732	*20%*
Marvin Barn	1	$88,318	$1	$88,319	*54%*	*35%*	*10%*	$17,856	*20%*
Open Barn	1	$496,968	$1	$496,969	*54%*	*35%*	*10%*	$100,477	*20%*
Pumphouse	2	$24,863	$2	$24,865	*20%*	*7%*	*1%*	$1,390	*6%*
Restroom	3	$500,585	$3	$500,588	*20%*	*6%*	*1%*	$20,669	*4%*
Restrooms	1	$123,766	$1	$123,767	*19%*	*4%*	*0%*	$3,786	*3%*
Shop Building	1	$76,778	$1	$76,779	*18%*	*3%*	*0%*	$2,279	*3%*
Shop Storage Shed	1	$1,345	$1	$1,346	*18%*	*3%*	*0%*	$40	*3%*
Show Barn	1	$144,048	$1	$144,049	*54%*	*35%*	*10%*	$29,124	*20%*
Show Barn Bleachers	1	$7,918	$1	$7,919	*56%*	*37%*	*11%*	$1,688	*21%*
Ticket Office	1	$5,825	$1	$5,826	*15%*	*1%*	*0%*	$99	*2%*
Wood Bleachers	1	$9,869	$1	$9,870	*19%*	*4%*	*0%*	$302	*3%*
Health Services	11	$11,047,323	$3,976,707	$15,024,030	*25%*	*5%*	*0%*	$1,012,478	*7%*
County Health Building	1	$661,359	$259,209	$920,568	*12%*	*2%*	*0%*	$12,420	*1%*
Hhsa	1	$1	$300,722	$300,723	*8%*	*0%*	*0%*	$0	*0%*
Mental Health	1	$1	$29,766	$29,767	*10%*	*1%*	*0%*	$0	*0%*
Mental Health Annex	1	$534,584	$118,823	$653,407	*62%*	*14%*	*1%*	$57,612	*9%*
Mental Health Office	1	$509,591	$1	$509,592	*9%*	*0%*	*0%*	$4,887	*1%*
Modular Building	1	$1	$44,184	$44,185	*9%*	*0%*	*0%*	$0	*0%*

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Office	1	$223,369	$1	$223,370	*9%*	*0%*	*0%*	$2,142	*1%*
Public Health Center	1	$8,411,295	$3,143,292	$11,554,587	*46%*	*18%*	*2%*	$917,925	*8%*
Public Health Storage	1	$106,394	$54,993	$161,387	*54%*	*10%*	*0%*	$9,175	*6%*
Social Services	1	$567,393	$1	$567,394	*9%*	*0%*	*0%*	$5,441	*1%*
Storage Building	1	$33,335	$25,715	$59,050	*54%*	*10%*	*0%*	$2,875	*5%*
Library	5	$7,488,326	$10,613,038	$18,101,364	*33%*	*21%*	*9%*	$1,701,767	*9%*
Covelo Library	1	$1,116,120	$1,062,466	$2,178,586	*4%*	*0%*	*0%*	$4,576	*0%*
Fort Bragg Library	1	$1,211,737	$2,655,032	$3,866,769	*8%*	*0%*	*0%*	$10,954	*0%*
Point Arena Library	1	$757,965	$805,729	$1,563,694	*9%*	*4%*	*0%*	$15,804	*1%*
Ukiah Library	1	$2,895,989	$3,404,642	$6,300,631	*85%*	*74%*	*42%*	$1,435,658	*23%*
Willits Library	1	$1,506,515	$2,685,169	$4,191,684	*58%*	*27%*	*4%*	$234,775	*6%*
Miscellaneous	13	$1,077,145	$402,688	$1,479,833	*60%*	*41%*	*19%*	$431,102	*29%*
Buildings & Grounds Building	1	$476,209	$61,315	$537,524	*94%*	*77%*	*32%*	$223,904	*42%*
Office	3	$10,878	$2,229	$13,107	*9%*	*0%*	*0%*	$99	*1%*
Offices	1	$1	$37,125	$37,126	*76%*	*39%*	*9%*	$0	*0%*
Old Justice Court	1	$126,835	$11,964	$138,799	*16%*	*3%*	*0%*	$3,227	*2%*
Recycling Facility	1	$186,474	$9,521	$195,995	*92%*	*76%*	*37%*	$89,474	*46%*
Shop Building	1	$95,649	$9,935	$105,584	*97%*	*93%*	*71%*	$68,957	*65%*
Site Office	1	$4,691	$743	$5,434	*24%*	*2%*	*0%*	$142	*3%*
Values Formerly Reported - Replacement Cost	2	$2	$2	$4	*95%*	*82%*	*43%*	$1	*26%*
Vehicle Value Scheduled At Location 100	1	$1	$221,200	$221,201	*79%*	*41%*	*6%*	$0	*0%*
Willits Action Group	1	$176,405	$48,654	$225,059	*79%*	*44%*	*11%*	$45,297	*20%*
Museum	5	$5,621,348	$1,468,329	$7,089,677	*86%*	*59%*	*19%*	$2,573,284	*36%*
Artifact Storage	1	$1	$498,860	$498,861	*88%*	*62%*	*18%*	$0	*0%*
Exhibit Building	1	$1	$29,047	$29,048	*63%*	*17%*	*1%*	$0	*0%*
Museum	2	$5,621,345	$337,918	$5,959,263	*95%*	*76%*	*29%*	$2,573,283	*43%*
Restoration Building	1	$1	$602,504	$602,505	*88%*	*62%*	*18%*	$0	*0%*
Park	10	$609,229	$120,014	$729,243	*31%*	*8%*	*1%*	$41,295	*6%*

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Community Building	1	$79,443	$22,278	$101,721	5%	0%	0%	$454	0%
Picnic Shelter	2	$251,704	$14,585	$266,289	55%	11%	0%	$22,246	8%
Restroom	6	$278,081	$8,904	$286,985	28%	10%	1%	$18,595	6%
Shed	1	$1	$74,247	$74,248	25%	2%	0%	$0	0%
Social Services	33	$21,074,994	$5,049,159	$26,124,153	65%	39%	17%	$2,743,332	11%
Child Support Office	1	$997,071	$590,909	$1,587,980	85%	74%	42%	$494,288	31%
Childrens Office	1	$1	$101,304	$101,305	58%	19%	2%	$0	0%
Family Center	1	$1	$37,125	$37,126	61%	25%	4%	$0	0%
Family Recources	1	$1	$8,191	$8,192	9%	1%	0%	$0	0%
Fort Bragg Justice Center	1	$2,606,077	$376,334	$2,982,411	8%	0%	0%	$23,611	1%
Hopsital Office	1	$1	$9,223	$9,224	58%	19%	2%	$0	0%
Human Resources	1	$510,036	$118,823	$628,859	73%	37%	8%	$110,147	18%
Justice Center	1	$3,470,062	$191,464	$3,661,526	63%	17%	1%	$416,754	11%
Maintenance Garage	1	$306,960	$77,530	$384,490	7%	1%	0%	$3,137	1%
Office	1	$425,391	$236,211	$661,602	88%	59%	21%	$151,737	23%
Public Health	1	$1,459,003	$361,143	$1,820,146	63%	17%	1%	$175,226	10%
Social Services Building	1	$2,643,876	$447,975	$3,091,851	50%	21%	3%	$323,531	10%
Social Services Gain Unit	1	$1	$301,167	$301,168	60%	15%	1%	$0	0%
Social Services Modular Office	1	$316,760	$120,357	$437,117	58%	12%	1%	$30,691	7%
Social Services Office	1	$6,198,465	$1,486,033	$7,684,498	50%	21%	3%	$758,506	10%
Social Services Storage	7	$7	$19,064	$19,071	88%	71%	35%	$3	0%
Storage	5	$5	$52,707	$52,712	69%	52%	26%	$2	0%
Storage Shed	1	$1,913	$1	$1,914	9%	0%	0%	$18	1%
Storage Unit	2	$2	$6,688	$6,690	92%	77%	38%	$1	0%
Storage-Ergo	1	$1	$1,126	$1,127	61%	21%	2%	$0	0%
Wellness & Eap	1	$102,111	$24,255	$126,366	62%	14%	1%	$11,005	9%
Wisc Social Services	1	$2,037,249	$481,529	$2,518,778	63%	17%	1%	$244,674	10%
Grand Total	**172**	**$126,466,404**	**$40,333,912**	**$166,800,316**	**50%**	**28%**	**11%**	**$29,934,106**	**18%**

Table 4-45: Loss Estimations for M 7.8 N. San Andreas Scenario

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Administration	**3**	**$11,963,350**	**$7,257,925**	**$19,221,275**	***8%***	***0%***	***0%***	**$101,033**	***1%***
County Administration Office	1	$11,567,360	$7,085,361	$18,652,721	*7%*	*0%*	*0%*	$97,513	*1%*
Modular Office	1	$85,378	$22,094	$107,472	*8%*	*0%*	*0%*	$759	*1%*
Storage Building	1	$310,612	$150,470	$461,082	*8%*	*0%*	*0%*	$2,761	*1%*
Agricultural	**2**	**$4,432,589**	**$2,647,120**	**$7,079,709**	***20%***	***4%***	***0%***	**$83,152**	***1%***
Enviromental Health Building	1	$3,488,557	$2,306,252	$5,794,809	*7%*	*0%*	*0%*	$29,409	*1%*
Office Building	1	$944,032	$340,868	$1,284,900	*33%*	*8%*	*0%*	$53,744	*4%*
Airport	**4**	**$852,073**	**$83,647**	**$935,720**	***27%***	***8%***	***1%***	**$51,649**	***6%***
Airport Hangar	2	$385,991	$16,358	$402,349	*39%*	*12%*	*1%*	$33,684	*8%*
Airport/Radio Equipment	1	$12,002	$41,800	$53,802	*8%*	*1%*	*0%*	$148	*0%*
Terminal/Off./Frame Han-	1	$454,080	$25,489	$479,569	*21%*	*6%*	*0%*	$17,818	*4%*
Animal Control	**1**	**$2,138,393**	**$15,856**	**$2,154,249**	***8%***	***0%***	***0%***	**$19,374**	***1%***
Animal Control	1	$2,138,393	$15,856	$2,154,249	*8%*	*0%*	*0%*	$19,374	*1%*
Communications	**3**	**$3**	**$53,583**	**$53,586**	***38%***	***23%***	***7%***	**$0**	***0%***
Radio Tower Repeater	1	$1	$17,861	$17,862	*78%*	*55%*	*19%*	$0	*0%*
Repeater Site - Cahto Mountain	1	$1	$17,861	$17,862	*13%*	*5%*	*0%*	$0	*0%*
Repeater Site - Spanish Mountain (Clevland)	1	$1	$17,861	$17,862	*24%*	*10%*	*1%*	$0	*0%*
Community Building	**8**	**$4,756,473**	**$346,600**	**$5,103,073**	***18%***	***5%***	***1%***	**$181,757**	***4%***
Community Building	1	$1,279,469	$74,263	$1,353,732	*2%*	*0%*	*0%*	$2,316	*0%*
Justice Court/City Hall	1	$703,567	$57,810	$761,377	*48%*	*13%*	*1%*	$64,116	*8%*
Radio Tower Repeater	1	$1	$11,906	$11,907	*2%*	*0%*	*0%*	$0	*0%*
Veteran'S Memorial Building	5	$2,773,436	$202,621	$2,976,057	*18%*	*6%*	*1%*	$115,326	*4%*
County Building	**28**	**$6,302,236**	**$1,973,177**	**$8,275,413**	***25%***	***11%***	***4%***	**$343,757**	***4%***

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Administration Building	1	$1,331,670	$309,423	$1,641,093	*11%*	*1%*	*0%*	$18,950	*1%*
Dot Storage	1	$1	$3,746	$3,747	*8%*	*1%*	*0%*	$0	*0%*
Equipment Building	2	$99,778	$74,534	$174,312	*59%*	*47%*	*32%*	$40,083	*23%*
Equipment Building 2	1	$46,331	$1	$46,332	*13%*	*2%*	*0%*	$963	*2%*
Equipment Storage	1	$53,399	$9,534	$62,933	*59%*	*23%*	*4%*	$7,673	*12%*
Flammable Liquids Building	1	$4,272	$10,137	$14,409	*10%*	*4%*	*1%*	$106	*1%*
General Services Building	1	$1,785,363	$525,860	$2,311,223	*23%*	*6%*	*0%*	$76,521	*3%*
Main Building	1	$377,116	$148,499	$525,615	*14%*	*2%*	*0%*	$8,462	*2%*
Modular Break Room	1	$165,510	$1	$165,511	*6%*	*0%*	*0%*	$1,006	*1%*
Modular Office	1	$37,000	$13,367	$50,367	*6%*	*0%*	*0%*	$225	*0%*
Oil Shed	1	$5,131	$4,906	$10,037	*59%*	*23%*	*4%*	$737	*7%*
Parts Storage	1	$103,958	$8,309	$112,267	*9%*	*1%*	*0%*	$1,291	*1%*
Shop Building	5	$640,493	$263,440	$903,933	*27%*	*15%*	*6%*	$49,955	*6%*
Storage Building	2	$291,225	$22,793	$314,018	*20%*	*4%*	*0%*	$16,050	*5%*
Storage Facility	1	$1	$5,458	$5,459	*8%*	*1%*	*0%*	$0	*0%*
Storage Shed	3	$88,584	$124,018	$212,602	*28%*	*9%*	*1%*	$2,689	*1%*
Storage Unit	1	$1	$1,785	$1,786	*24%*	*10%*	*1%*	$0	*0%*
Tire Shed	1	$4,666	$399	$5,065	*21%*	*5%*	*0%*	$179	*4%*
Vehicle Service Building	1	$1,054,828	$385,273	$1,440,101	*35%*	*19%*	*4%*	$115,451	*8%*
Veterans Service Office	1	$212,909	$61,694	$274,603	*11%*	*2%*	*0%*	$3,417	*1%*
Courthouse	2	$15,892,732	$2,018,005	$17,910,737	*40%*	*28%*	*9%*	$4,232,412	*24%*
Courthouse	1	$14,396,012	$1,540,043	$15,936,055	*66%*	*50%*	*18%*	$4,177,003	*26%*
Courthouse Annex	1	$1,496,720	$477,962	$1,974,682	*14%*	*6%*	*1%*	$55,409	*3%*
Detention Facility	10	$24,932,751	$2,181,951	$27,114,702	*12%*	*4%*	*0%*	$452,526	*2%*
Administration Building	1	$2,433,079	$338,258	$2,771,337	*7%*	*0%*	*0%*	$20,511	*1%*
Adult Detention Facility	1	$8,110,655	$347,942	$8,458,597	*7%*	*1%*	*0%*	$85,649	*1%*
Adult Detention(Maximum Security)	1	$6,074,661	$925,893	$7,000,554	*7%*	*1%*	*0%*	$64,148	*1%*

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Classroom/Training Building	1	$1,545,431	$97,508	$1,642,939	7%	0%	0%	$13,028	1%
Juvenile Hall Admin	1	$537,980	$38,873	$576,853	11%	2%	0%	$9,189	2%
Juvenile Hall Classroom	1	$429,856	$49,112	$478,968	6%	1%	0%	$4,036	1%
Juvenile Hall Dorm	1	$1,958,563	$125,134	$2,083,697	32%	16%	2%	$170,121	8%
Juvenile Hall Kitchen,	1	$616,890	$55,533	$672,423	32%	16%	2%	$53,583	8%
Juvenile Hall/Violent Hall	1	$2,147,001	$53,717	$2,200,718	7%	1%	0%	$22,672	1%
Kitchen/Laundry Building	1	$1,078,635	$149,981	$1,228,616	8%	0%	0%	$9,589	1%
Emergency Operations	5	$1,612,688	$2,126,084	$3,738,772	13%	3%	0%	$41,091	1%
Dispatch Center	1	$1	$1,165,446	$1,165,447	7%	1%	0%	$0	0%
I.D. & Evidence	1	$1	$148,499	$148,500	14%	6%	1%	$0	0%
Sheriff	1	$1	$4,459	$4,460	2%	0%	0%	$0	0%
Sheriff Admin/Probation	1	$1,612,684	$647,091	$2,259,775	18%	2%	0%	$41,091	2%
Sheriff Commet	1	$1	$160,589	$160,590	23%	6%	0%	$0	0%
Fair Grounds	29	$6,664,751	$29	$6,664,780	41%	24%	9%	$1,329,828	20%
Administration Building	1	$287,175	$1	$287,176	19%	4%	0%	$8,782	3%
Agric.Bldg./Exhibit Hall .Bldg	1	$1,522,765	$1	$1,522,766	79%	63%	28%	$586,143	38%
Arts & Crafts Bldg.	1	$606,837	$1	$606,838	42%	11%	1%	$48,080	8%
Auditorium	1	$603,767	$1	$603,768	42%	11%	1%	$47,836	8%
Commercial Bldg./Exhibit Hall	1	$724,276	$1	$724,277	31%	17%	4%	$71,327	10%
Dinning Hall	1	$218,838	$1	$218,839	19%	4%	0%	$6,692	3%
Dormitory	1	$96,274	$1	$96,275	19%	4%	0%	$2,944	3%
Field Bleachers 1	1	$26,408	$1	$26,409	79%	63%	28%	$10,165	38%
Field Bleachers 2	1	$11,825	$1	$11,826	79%	63%	28%	$4,552	38%
Grandstand	1	$402,829	$1	$402,830	42%	11%	1%	$31,916	8%
Hog Barn	1	$241,535	$1	$241,536	79%	63%	28%	$92,972	38%
Jr. Barn 1	1	$98,120	$1	$98,121	19%	4%	0%	$3,001	3%
Jr. Barn 2	1	$98,120	$1	$98,121	19%	4%	0%	$3,001	3%

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Judging Booth	1	$4,667	$1	$4,668	19%	4%	0%	$143	3%
Lamb Palace	1	$241,032	$1	$241,033	79%	63%	28%	$92,778	38%
Marvin Barn	1	$88,318	$1	$88,319	79%	63%	28%	$33,995	38%
Open Barn	1	$496,968	$1	$496,969	79%	63%	28%	$191,293	38%
Pumphouse	2	$24,863	$2	$24,865	25%	11%	2%	$2,102	8%
Restroom	3	$500,585	$3	$500,588	23%	8%	1%	$27,035	5%
Restrooms	1	$123,766	$1	$123,767	19%	4%	0%	$3,785	3%
Shop Building	1	$76,778	$1	$76,779	19%	4%	0%	$2,348	3%
Shop Storage Shed	1	$1,345	$1	$1,346	19%	4%	0%	$41	3%
Show Barn	1	$144,048	$1	$144,049	79%	63%	28%	$55,447	38%
Show Barn Bleachers	1	$7,918	$1	$7,919	79%	63%	28%	$3,048	38%
Ticket Office	1	$5,825	$1	$5,826	15%	1%	0%	$103	2%
Wood Bleachers	1	$9,869	$1	$9,870	19%	4%	0%	$302	3%
Health Services	11	$11,047,323	$3,976,707	$15,024,030	10%	1%	0%	$112,862	1%
County Health Building	1	$661,359	$259,209	$920,568	15%	3%	0%	$15,813	2%
Hhsa	1	$1	$300,722	$300,723	10%	1%	0%	$0	0%
Mental Health	1	$1	$29,766	$29,767	13%	1%	0%	$0	0%
Mental Health Annex	1	$534,584	$118,823	$653,407	8%	0%	0%	$4,752	1%
Mental Health Office	1	$509,591	$1	$509,592	12%	1%	0%	$6,874	1%
Modular Building	1	$1	$44,184	$44,185	12%	1%	0%	$0	0%
Office	1	$223,369	$1	$223,370	12%	1%	0%	$3,013	1%
Public Health Center	1	$8,411,295	$3,143,292	$11,554,587	6%	1%	0%	$73,599	1%
Public Health Storage	1	$106,394	$54,993	$161,387	7%	0%	0%	$880	1%
Social Services	1	$567,393	$1	$567,394	12%	1%	0%	$7,654	1%
Storage Building	1	$33,335	$25,715	$59,050	7%	0%	0%	$276	0%
Library	5	$7,488,326	$10,613,038	$18,101,364	23%	16%	8%	$494,678	3%
Covelo Library	1	$1,116,120	$1,062,466	$2,178,586	0%	0%	0%	$257	0%
Fort Bragg Library	1	$1,211,737	$2,655,032	$3,866,769	10%	1%	0%	$15,098	0%
Point Arena Library	1	$757,965	$805,729	$1,563,694	84%	72%	40%	$360,981	23%
Ukiah Library	1	$2,895,989	$3,404,642	$6,300,631	14%	6%	1%	$107,210	2%
Willits Library	1	$1,506,515	$2,685,169	$4,191,684	5%	1%	0%	$11,133	0%
Miscellaneous	13	$1,077,145	$402,688	$1,479,833	18%	5%	0%	$47,513	3%

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Buildings & Grounds Building	1	$476,209	$61,315	$537,524	33%	8%	0%	$27,111	5%
Office	3	$10,878	$2,229	$13,107	20%	1%	0%	$251	2%
Offices	1	$1	$37,125	$37,126	11%	2%	0%	$0	0%
Old Justice Court	1	$126,835	$11,964	$138,799	4%	0%	0%	$599	0%
Recycling Facility	1	$186,474	$9,521	$195,995	26%	11%	2%	$12,386	6%
Shop Building	1	$95,649	$9,935	$105,584	19%	8%	1%	$4,669	4%
Site Office	1	$4,691	$743	$5,434	4%	0%	0%	$23	0%
Values Formerly Reported - Replacement Cost	2	$2	$2	$4	26%	11%	1%	$0	3%
Vehicle Value Scheduled At Location 100	1	$1	$221,200	$221,201	10%	2%	0%	$0	0%
Willits Action Group	1	$176,405	$48,654	$225,059	10%	1%	0%	$2,475	1%
Museum	5	$5,621,348	$1,468,329	$7,089,677	14%	3%	0%	$97,755	1%
Artifact Storage	1	$1	$498,860	$498,861	20%	5%	0%	$0	0%
Exhibit Building	1	$1	$29,047	$29,048	6%	0%	0%	$0	0%
Museum	2	$5,621,345	$337,918	$5,959,263	13%	1%	0%	$97,755	2%
Restoration Building	1	$1	$602,504	$602,505	20%	5%	0%	$0	0%
Park	10	$609,229	$120,014	$729,243	18%	3%	0%	$15,756	2%
Community Building	1	$79,443	$22,278	$101,721	58%	12%	1%	$7,737	8%
Picnic Shelter	2	$251,704	$14,585	$266,289	6%	0%	0%	$1,772	1%
Restroom	6	$278,081	$8,904	$286,985	17%	3%	0%	$6,248	2%
Shed	1	$1	$74,247	$74,248	11%	1%	0%	$0	0%
Social Services	33	$21,074,994	$5,049,159	$26,124,153	14%	4%	0%	$222,146	1%
Child Support Office	1	$997,071	$590,909	$1,587,980	14%	6%	1%	$36,912	2%
Childrens Office	1	$1	$101,304	$101,305	9%	1%	0%	$0	0%
Family Center	1	$1	$37,125	$37,126	11%	2%	0%	$0	0%
Family Recources	1	$1	$8,191	$8,192	12%	1%	0%	$0	0%
Fort Bragg Justice Center	1	$2,606,077	$376,334	$2,982,411	10%	1%	0%	$32,472	1%
Hopsital Office	1	$1	$9,223	$9,224	9%	1%	0%	$0	0%
Human Resources	1	$510,036	$118,823	$628,859	11%	2%	0%	$8,711	1%

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total	Probability Damage Exceeds: Slight	Probability Damage Exceeds: Moderate	Probability Damage Exceeds: Extensive	Economic Loss	Loss Pct.
Justice Center	1	$3,470,062	$191,464	$3,661,526	6%	0%	0%	$23,007	1%
Maintenance Garage	1	$306,960	$77,530	$384,490	9%	2%	0%	$4,405	1%
Office	1	$425,391	$236,211	$661,602	16%	3%	0%	$11,690	2%
Public Health	1	$1,459,003	$361,143	$1,820,146	6%	0%	0%	$9,673	1%
Social Services Building	1	$2,643,876	$447,975	$3,091,851	6%	1%	0%	$23,980	1%
Social Services Gain Unit	1	$1	$301,167	$301,168	7%	0%	0%	$0	0%
Social Services Modular Office	1	$316,760	$120,357	$437,117	7%	0%	0%	$2,620	1%
Social Services Office	1	$6,198,465	$1,486,033	$7,684,498	6%	1%	0%	$54,237	1%
Social Services Storage	7	$7	$19,064	$19,071	21%	9%	1%	$0	0%
Storage	5	$5	$52,707	$52,712	17%	6%	1%	$0	0%
Storage Shed	1	$1,913	$1	$1,914	12%	1%	0%	$25	1%
Storage Unit	2	$2	$6,688	$6,690	24%	11%	1%	$0	0%
Storage-Ergo	1	$1	$1,126	$1,127	9%	1%	0%	$0	0%
Wellness & Eap	1	$102,111	$24,255	$126,366	8%	0%	0%	$908	1%
Wisc Social Services	1	$2,037,249	$481,529	$2,518,778	6%	0%	0%	$13,507	1%
Grand Total	**172**	**$126,466,404**	**$40,333,912**	**$166,800,316**	**22%**	**9%**	**3%**	**$7,827,291**	**5%**

4.5.4.9 Future Trends in Development

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

4.5.4.10 Earthquake Hazard Problem Statements:

As part of the mitigation action identification process, the Planning Committee for the County and for each jurisdiction identified issues and weaknesses, also called problem statements, for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool and flood data. Earthquake problem statements for all planning partners are listed in Table 4-46; problem statements for all other planning partners are accessed in Volume 2 of this plan.

Identifying these common issues and weaknesses assists the Planning Committee in understanding the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. See Table 5-6 for a full list of mitigation actions and the corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 4-46 and Table 5-6.

Table 4-46 Earthquake Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-EQ-MC-33	Earthquake	Impact	PPRO - Property Protection , SP - Structural Projects	**Mendocino County**	Older construction and particularly unreinforced masonry (URM) buildings within the County will pose hazards during earthquakes.	ma-EQ-MC-200, ma-EQ-MC-201, ma-EQ-MC-202
ps-EQ-MC-34	Earthquake	Impact	PPRO - Property Protection , SP - Structural Projects	**Mendocino County**	Historic buildings can be more susceptible to ground shaking since many of these buildings have weakened with age and were built before the use of building codes.	ma-EQ-MC-201, ma-EQ-MC-202
ps-EQ-MC-35	Earthquake	Impact	PPRO - Property Protection , SP - Structural Projects	**Mendocino County**	County facilities do not have seismic shut-off valves to prevent gas links in a seismic event	ma-EQ-MC-203

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-EQ-MC-36	Earthquake	Impact	PPRO - Property Protection , SP - Structural Projects	**Mendocino County**	The following County bridges have been identified as highest priority for retrofit or replacement by the County: Eureka Hill Road - Seismic Retrofit, Seismic Retrofit of Bridge over Garcia River; Sherwood Road, Replace Bridge over Rowes Creek; Lambert Lane, Replace Bridge over Robinson Creek; Hill Road Bridge, Replace Bridge over Mill Creek; North State Street, Replace Bridge over Ackerman Creek; Philo Greenwood Road, Rehabilitate Bridge over Navarro River; Briceland Road, Replace Bridge over Mattole River; Powerhouse Road, Replace Bridge over Williams Creek; Wilderness Lodge Road, Replace Bridge over Dutch Charlie Creek; Fort Bragg Sherwood Road, Replace Bridge over Sherwood Creek; Reynolds Highway, Replace Bridge over Outlet Creek; Camp 1 Ten-Mile Road, Rehabilitate Bridge and Approaches over South Fork Ten Mile River; Windy Hollow Road & Bridge, Construct Bridge and Approaches over the Garcia River; Mountain View Road, Replace Bridge over Rancheria Creek; Hearst Willits Road, Replace Bridge over Eel River; Usal Road, Replace Bridge over Usal Creek; Navarro Ridge Road, Replace Bridge over Hay Creek; Gualala Road, Replace Bridge over Gualala River; Canyon Road, Replace Bridge over Berry Creek; Hearst Willits, Replace Bridge over Tomki Creek; Guntley Ranch Road, Replace Bridge over Cold Creek	ma-EQ-MC-201, ma-EQ-MC-127
ps-EQ-MC-37	Earthquake	Impact	PPRO - Property Protection , PE&A - Public Education & Awareness , SP - Structural Projects	**Mendocino County**	The following critical infrastructure is located in a violent shake zone for the Maacama Garberville On Shore Scenario: 2 communication towers, DOT vehicle service building and DOT sign shop, 1 child care center, 2 adult residential facilities, 3 substations, and 3 Fire Department facilities, and one natural gas station	ma-EQ-MC-200, ma-EQ-MC-201
ps-EQ-MC-38	Earthquake	Victim	PE&A - Public Education & Awareness	**Mendocino County**	Approximately 6,145 people live in a violent shake zone for the Maacama Garberville on shore EQ scenario	ma-EQ-MC-200, ma-AH-MC-134

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-EQ-MC-39	Earthquake	Victim	PE&A - Public Education & Awareness	**Mendocino County**	Approximately 677 people live within in a violent shake zone for the N. Coast – Peninsula – SC Mtn off shore EQ scenario	ma-EQ-MC-200, ma-AH-MC-134
ps-EQ-MC-40	Earthquake	Impact	PRV - Prevention , PPRO - Property Protection , PE&A - Public Education & Awareness , SP - Structural Projects	**Mendocino County**	Buildings permitted as "class k" structures under the building code are at high risk from a seismic event	ma-AH-MC-134, ma-AH-MC-205
ps-EQ-MC-41	Earthquake	Impact	PPRO - Property Protection , PE&A - Public Education & Awareness , SP - Structural Projects	**Mendocino County**	The following critical infrastructure located in a violent shake zone for the N. Coast – Peninsula – SC Mtn Eq scenario: 4 County bridges, 3 historic buildings, 3 communication towers, 2 Fire Dept. facilities, 2 schools, 1 transfer station, 1 law enforcement facility, and 1 substation	ma-EQ-MC-200

4.5.5 Pandemic Disease Hazard Profile

The U.S. Center for Disease Control defines a disease outbreak as the occurrence of more cases of disease than normally expected within a specific place or group of people over a given period of time. An ***epidemic*** is a localized outbreak that spreads rapidly and affects many people or animals in a community. A ***pandemic*** is an epidemic that occurs worldwide or over an exceptionally large area and affects a large number of people or animals.

Pandemics are profiled here in accordance with their mitigation measures, which focus on physical parameters for mitigation rather than operational parameters focused on response efforts.

Pandemics are hazards which have sustained durations. Although the daily impacts may be low, cumulative impacts are likely to be overwhelming for both the health system and the community. During a moderate pandemic, Mendocino County could see a sustained increase in intensive care unit admissions, in emergency department admissions, in patients needing to be placed in respiratory isolation, and in deaths. The capacity to provide medical care, including basic emergency medical system (EMS) response, hospital emergency department services, and isolation rooms, will be reduced. At the same time, a higher than usual absenteeism rate for all employees is expected.

The following are the most prevalent types of pandemic diseases in the planning area:

Coronavirus

Coronavirus is a large family of viruses that cause illness ranging from the common cold to more severe diseases such as the Middle East Respiratory Syndrome and Severe Acute Respiratory Syndrome. The Novel Coronavirus, or COVID-19, is a new strain of these viruses which has not been previously identified in humans. The virus is spread easily between people. It is believed to spread primarily through close contact from person-to-person.. It can be contracted through respiratory droplets produced from the cough, sneeze, or vocalization of an infected person. Evidence suggests that it spreads more efficiently than influenza, but not as easily as the measles. (World Health Organization, 2020) COVID-19, short for "coronavirus disease 2019," the most recent (and still active in 2020) pandemic declared by the World Health Organization, is discussed in more detail herein.

Influenzas

The flu can cause mild to severe illness, and at times can lead to death. Anyone can get sick with the flu, but some people are at a higher risk of flu-related complications if they get sick. This includes older and younger people and people with certain chronic medical conditions.

West Nile Virus

West Nile virus is a mosquito-borne disease that is common in Africa, west Asia, the Middle East, and more recently, North America. Human infection with West Nile virus may result in serious illness. Experts believe West Nile virus is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall.

Hepatitis C

Hepatitis C is a liver disease caused by the Hepatitis C virus, which is found in the blood of persons who have this disease. Hepatitis C virus is spread by contact with the blood of an infected person.

Lyme Disease

Lyme disease is an infectious disease caused by a bacterium known as a spirochete. People get Lyme disease when a tick infected with the Lyme disease bacterium attaches and feeds on them. Lyme disease was first recognized in the northeastern United States in the 1970s. Lyme disease has been reported from many areas of the country, including California.

Typical Lyme disease symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migrans. If left untreated, the infection can spread to joints, the heart, and the nervous system. (CDC, 2020)

Measles

Measles, also called rubeola, is a childhood infection caused by a virus. Once quite common, now measles can almost always be prevented with a vaccine. Measles can be serious and even fatal for small children. While death rates have been falling worldwide as more children receive the measles vaccine, the disease still kills more than 100,000 people a year, most under the age of 5.

As a result of high vaccination rates in general, measles hasn't been widespread in the United States for more than a decade. The United States averaged about 60 cases of measles a year from 2000 to 2010, but the average number of cases jumped to 205 a year in recent years. Most of these cases originate outside the country and occurred in people who were unvaccinated or who didn't know whether or not they had been vaccinated.

Rabies

Rabies is a viral infection transmitted in the saliva of infected mammals. Common modes of rabies virus transmissions are through bites and contact with the saliva of an infected host. Other various routes of transmission include contamination of mucous membranes, aerosol transmission, and corneal transplantations. Any penetration of the skin by teeth, regardless of location, represents a potential risk of rabies transmission. The rabies virus infects the central nervous system, causing encephalopathy and, ultimately, death.

4.5.5.1 Policies, Plans, and Regulatory Environment

United States Department of Health and Human Services

The U.S. Department of Health and Human Services has statutory responsibility for preventing the introduction, transmission, and spread of communicable diseases in the United States

The Center for Disease Control and Prevention (CDC) is housed within the Department of Health and Human Services and is responsible for controlling the introduction and spread of infectious diseases. The CDC's roles include:

- instituting public education and awareness related to disease spread and prevention,
- studying and tracking transmission rates, treatment options, and vaccines,
- maintaining active surveillance of diseases through investigation and data collection, analysis, and distribution,
- developing and implementing operational programs and guidance relating to environmental health problems,
- conducting research aimed at developing and testing effective disease prevention, control, and health,
- implementing a program to sustain a strong national workforce in disease prevention and control, and conducts a national program for improving the performance of clinical laboratories. (CDC, 2020)

The Division of Global Migration and Quarantine works to control disease transmission internationally through the operation of Quarantine Stations at ports of entry, establishment of standards for medical examination of persons destined for the United States, and administration of interstate and foreign quarantine regulations, which govern the international and interstate movement of persons, animals, and cargo.

California Department of Public Health

The California Department of Public Health (CDHP) is responsible for protecting public health within the state of California. The CDPH is comprised of public health professions, researchers, scientists, doctors, nurses, and other staff members who aid in implementing the organizations programs and services. The essential functions of the CDHP are comprehensive in scope and include infectious disease control and prevention, food safety, environmental health, laboratory services, patient safety, emergency preparedness, chronic disease prevention and health promotion, family health, health equity and vital records and statistics.

Mendocino County Health and Human Services Agency

The mission of the Mendocino County Health and Human Services Agency is to ensure the support and empowerment of families and individuals to live healthy, safe, and sustainable lives in healthy environments, through advocacy, services. The Agency provides public, environmental, and mental health services, including public outreach, response, and data collection during the current COVID-19 outbreak.

4.5.5.2 Past Events

There have been six pandemics since 1900. The previous pandemics occurred in 1918-1920, 1957-1958, 1968-1969, 1977-1978, 2009-2010, and 2019-present. The 1918-1920 Pandemic, commonly referred to as the Spanish Flu, was unusually severe and had an extensive mortality rate. It is estimated that the 1918 Pandemic killed as much as one percent of the world's population, or 40,000,000 people worldwide, including more than 500,000 in the United States. The H1N1 Pandemic occurred in 2009 and resulted in 482,000 laboratory-confirmed cases and 6,071 deaths. (Centers for Disease Control and Prevention, 2019)

Coronavirus disease 2019 (COVID-19) is an ongoing pandemic. It was first detected in Wuhan China in late December of 2019, and it was later declared a Public Health Emergency of International Concern on 30 January 2020. COVID-19 is ongoing as of September 2020 and has resulted in more than 31 million globally-confirmed cases, and more than 900,000 deaths as of September 2020. (Johns Hopkins University of Medicine, 2020) The pandemic has also led to a severe global economic recession and financial and corporate sector distress. It is currently unclear how long or how severe this pandemic and related contraction in economic activity will be.

Table 4-47 lists the number of overall COVID-19 cases in Mendocino as of September, 2020. It also lists deaths reported, the number of people currently hospitalized (including in intensive care units), and the number of people who have been released from isolation. Table 4-48 represents the number of select cases of communicable diseases which have occurred per year in Mendocino. This table prioritizes pandemic diseases for which there are existing data for Mendocino County. Cases of Lyme disease and Influenza are the highest of the five categories.

Table 4-47 COVID-19 Mendocino County Case Data as of September, 2020

Overall Cases	Active Confirmed Cases	Deaths Reported	Hospitalized Currently	Hospitalized - Intensive Care Unit	Released from Isolation
887	91	18	5	2	778

Source: County of Mendocino, COVID-19 Case Data

Table 4-48 Mendocino County Selected Communicable Disease Cases 2011-2018

Infectious Disease	2011	2012	2013	2014	2015	2016	2017	2018
Lyme Disease	3	3	1	2	0	1	2	0
Animal Rabies	0	1	0	0	2	2	0	0
Measles	3	0	1	0	0	0	1	0
West Nile Virus	0	0	0	1	2	0	0	0
Infectious Disease	**2013-2014**		**2014-2015**		**2015-2016**		**2016-2017**	**2017-2018**
Influenza*	4		0		0		1	2

*Includes both fatal and non-fatal laboratory-confirmed influenza in persons <65 years of age reported to the California Department of Public Health. These data were recorded biennially in order to accurately reflect the following seasonal influenza periods: 2013–2014: September 29, 2013–September 27, 2014; 2014–2015: September 28, 2014–October 3, 2015; 2015–2016: October 4, 2015–October 2, 2016; 2016–2017: October 3, 2016–September 30, 2017; 2017–2018: October 1, 2017–September 29, 2018

Sources: California Department of Public Health, IDB Yearly Summaries of Selected Communicable Diseases in California, 2011-2018;
California Department of Public Health, Vaccine-Preventable Disease Summaries; and
California West Nile Virus Website, 2011-2018 WNV Incidence Reports.

4.5.5.3 Location

The entire planning area is susceptible to the human health hazards discussed in this profile. Some hazards such as West Nile virus can have a geographic presence within the planning area. Others such as COVID-19 may be transported into the County, through residents and visitors who travel extensively. As of June 2020, a total of 25,474 COVID-19 tests have been administered and 887 cases have been detected. Mendocino County Public Health has been working closely with local health care providers, with the California Department of Public Health, and with the CDC to closely monitor the virus. (County of Mendocino, 2020)

4.5.5.4 Frequency/ Probability of Future Occurrences

While the probability of a major infectious disease outbreak is relatively low, it can have catastrophic social and economic consequences. Past history indicates a major infectious disease outbreak occurs about once every 10 years (a 1 in 10 years chance of occurring - 1/10 = 10 percent). (Mendocino 2014 MJHMP, 2014)

Influenza: According to the CDC, influenza has a predictable pattern and a near certainty of occurrence. CDC estimated that approximately 5 to 20 percent of the population contracts the seasonal flu. With the introduction of influenza vaccination, influenza occurrences are likely to remain below those reported during the particularly-high 2009 to 2010 influenza season. (Center for Disease Control and Prevention, 2020)

COVID-19: A report released by the World Health Organization and the China Joint Commission found that transmission rates of COVID-19 vary based on location. In general, between 1% and 5% of people in contact with a confirmed case of the virus subsequently, become a laboratory-confirmed case of COVID-19. (World Health Organization-China Joint Mission, 2020)

West Nile virus: In California, mosquitoes are monitored and controlled primarily to reduce cases of West Nile Virus, malaria, encephalitis, dog heartworm, and sensitivity to bites. Human mosquito-borne diseases, including West Nile Virus, have declined significantly in California since the creation of mosquito and vector control agencies.

Lyme disease: There have been 16 confirmed cases of Lyme disease in Mendocino County between 2009-2018. (Dept of Public Health, Cal., 2020) Cases are expected to continue to develop, and instances may increase with warming temperatures due to climate change.

The frequency and probability of other diseases discussed in this profile are unpredictable and contingent on factors such as public awareness, treatment options, and vaccination rates.

4.5.5.5 Severity and Extent

A communicable disease can affect many people, causing mild illness, hospitalization, or in rare cases, death. Predicting severity and extent for communicable disease transmission can be difficult and is predicted by modeling scenarios based on a number of factors.

There have been approximately 15,204 COVID-19 related fatalities in California as of September, 2020. (California Department of Public Health, 2020) Globally, there have been 967,164 confirmed deaths, as of September, 2020, according to the World Health Organization. (World Health Organization, 2020)

The CDC and the Office of the Assistant Secretary for Preparedness and Response developed five COVID-19 Pandemic Planning Scenarios that attempt to predict transmission rates. These scenarios are based on data received by the CDC prior to June 2020. Scenarios 1 through 4 are based on parameter values that represent the lower and upper bounds of disease severity and viral transmissibility (moderate to very high). Scenario 5 represents the current best estimate about viral transmission and disease severity in the United States. (Centers for Disease Control and Prevention, 2020)

The current best estimate for viral transmissibility is 2.5 persons. Viral transmissibility is the average number of people that one person with COVID-19 is likely to infect in a population without any immunity. Table 40 depicts the viral transmissibility rate values for each of the five planning scenarios (row 1). The Table also lists an Infection Fatality Ratio for each scenario (row 2). The Infection Fatality Ration is the number of individuals who die from the disease among all infected individuals (both symptomatic and asymptomatic). Rows 3-5 estimate the percentage of infections that will bear various characteristics. CDC makes clear that the scenarios are intended to aid in public health preparedness and planning; they are not predictions or estimates of the expected impact of COVID-19. The CDC will update and augment these values as more is learned about the epidemiology of COVID-19. (Centers for Disease Control and Prevention, 2020)

Table 4-49 Parameter Values Contingent on Five COVID-19 Pandemic Planning Scenarios

Parameter	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5: Current Best Estimate
Viral Transmissibility Rate	2.0	2.0	4.0	4.0	2.5
Infection Fatality Ratio, Overall	0.005	0.005	0.008	0.008	0.0065
Percent of Infections that are Asymptomatic	10%	70%	10%	70%	40%
Infectiousness of Asymptomatic Individuals Relative to Symptomatic	25%	100%	25%	100%	75%
Percentage of Transmission Occurring Prior to Symptom Onset	35%	70%	35%	70%	50%

Source: Centers for Disease Control and Prevention, COVID-19 Pandemic Planning Scenarios (2020)

4.5.5.6 Secondary Hazards

Human health hazards are not like natural hazards such as earthquakes, floods, or fires that have measurable secondary impacts. This is due primarily to the fact that human health hazards do not impact general building stock or critical facilities and infrastructure as other hazards do. The largest secondary impact caused by human health hazards would be economical. Large outbreaks of any human health hazard could reduce the workforce significantly for long periods of time while the infected population recovers from the impacts of the disease. Hospitals and health care providers could be overwhelmed.

Moreover, as the 2019-2020 COVID-19 outbreak is revealing, a pandemic can add significant challenges to ongoing hazard mitigation efforts, not to mention confusing and complicating response efforts for other natural hazard events. In 2020, the U.S. Forest Service suspended controlled burns scheduled in the spring due to the coronavirus pandemic. (Groom, 2020) Seattle has shuttered community centers designated as refuges from wildfire smoke, and the City has yet to establish what air-quality criteria might trigger the opening of any smoke shelters. (Hu, 2020) Furthermore, many populations vulnerable to COVID-19 are also most vulnerable to the effects of smoke inhalation. (*Id.*) FEMA released guidance on COVID-19 wildfire response in June of 2020. (U.S. Fire Administration, 2020) This is an emerging issue, and developments and guidance changes. Mitigating the impacts of the pandemic, in many instances, means mitigating the impact of a pandemic to other hazards that could occur simultaneously.

4.5.5.7 Pandemic Disease Vulnerability Assessment

4.5.5.7.1 Population

All citizens in the Mendocino County planning area could be susceptible to the human health hazards discussed in this profile. Additional pandemics or outbreaks of a communicable disease could have devastating effects on the population. The introduction of a disease such as the plague or influenza could rapidly impact those most at-risk (children, the elderly, and those already affected by health issues).

4.5.5.7.2 Property

None of the health hazards addressed in this profile are considered to have any measurable impact on the built environment in the planning area.

4.5.5.7.3 Critical Facilities and Infrastructure

None of the health hazards addressed in this profile are considered to have any measurable impact on critical facilities in the planning area. However, healthcare facilities (and veterinary clinics) are prepared for pandemic disease hazards. Emergency management planning incorporates all disciplines responding to an event, (fire agencies, law enforcement, first responder ground and air ambulance agencies, public health, mental and spiritual health). Planning includes identifying shelters, alternate treatment facilities, isolation capacity, and methods to immediately expand physical and human resources.

4.5.5.8 Future Trends in Development

The economic impact of a human health hazard could be localized to a single population or could be significant, depending on the number of cases and available resources to care for those affected. Other financial impacts are absorbed or managed by the organization affected. For example, healthcare facilities and veterinary offices train their personnel at their own cost. When more people visit Mendocino County or move into the area, the impacts from and the potential for a pandemic outbreak rises. Urban areas, in particular, will become more vulnerable as density increases and illnesses or contamination spread more rapidly.

4.5.5.9 Pandemic Disease Hazard Problem Statements

As part of the mitigation action identification process, each participating jurisdiction's Planning Committee identified issues and/or weaknesses (aka problem statements) for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool. Pandemic disease hazard problem statements are listed in Table 4-50.

Identifying these common issues and weaknesses assists the Planning Committee in understand the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. Projects or actions have been developed to mitigate each problem identified. See Table 5-6 for a full list of mitigation actions and corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing Table 4-50 and Table 5-6.

Table 4-50 Pandemic Disease Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-PN-MC-61	Pandemic	Victim	PE&A - Public Education & Awareness	**Mendocino County**	COVID-19 exists has a threat to the entire population of Mendocino County	ma-PN-MC-223, ma-PN-MC-224, ma-PN-MC-222
ps-PN-MC-114	Pandemic	Victim	ES - Emergency Services , SP - Structural Projects	**Mendocino County**	Need for additional sheltering locations in event of pandemic social distancing needs paired with another hazard event (flood, wildfire, earthquake)	ma-PN-MC-224
ps-PN-MC-115	Pandemic	Victim	SP - Structural Projects	**Mendocino County**	Critical facilities may not have adequate fresh air/ ventilation to be appropriate for essential work during pandemic.	ma-PN-MC-223, ma-PN-MC-222

4.5.6 Flood Hazard Profile

Flooding is one of the three primary hazards in California, along with earthquake and wildfire, and represents the second most destructive source of hazard, vulnerability, and risk statewide. (Cal OES, 2018) Flooding is a priority hazard for Mendocino County as well.

Connections between a river and its floodplain are most apparent during and after major flood events. A **floodplain** is the area adjacent to a river, creek, or lake that becomes inundated during a flood. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined in a canyon. These areas form a complex physical and biological system that supports a variety of natural resources and provides natural flood and erosion control. When a river is separated from its floodplain with levees and other flood control facilities, its natural, built-in benefits can be lost, altered, or significantly reduced. (FEMA, 2020)

There are five types of flood events that might occur within the Mendocino County area: riverine, flash, urban stormwater, coastal flooding, and dam failure. Regardless of the type, the cause is primarily the result of severe weather and excessive rainfall, either in the flood area or upstream reach. (The National Severe Storms Laboratory, 2020)

Riverine flooding occurs when a watercourse exceeds its 'bank-full' capacity and is the most common type of flood event. Riverine flooding occurs as a result of prolonged rainfall that is combined with saturated soils from previous rain events, or combined with snowmelt, and is characterized by high peak flows of moderate duration and by a large volume of runoff. Riverine flooding occurs in river systems whose tributaries drain large geographic areas and can include many watersheds and sub-watersheds. The duration of riverine floods varies from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, soil moisture content, channel capacity, seasonal variation in vegetation, snow depth, and water-resistance of the surface due to urbanization. (*Id.*)

In Mendocino County, riverine flooding can occur anytime during the period from November through April. Flooding is more severe when antecedent rainfall has resulted in saturated ground conditions.

The term "flash flood" describes localized floods of great volume and short duration, generally in less than four hours. In contrast to riverine flooding, this type of flood usually results from a heavy rainfall in a relatively small drainage area. Precipitation of this sort usually occurs in the spring and summer. (*Id.*)

Urbanization may increase peak flow runoff as well as the total volume of stormwater runoff from a site. The increase is dependent upon the type of soil and its topography in relation to the proposed development. Comparison of the peak flow and volume impacts to the watershed should be analyzed whenever development is proposed to assure that any increases are accommodated. (USGS, 2016)

Flooding may be a secondary impact from an earthquake, and may cause failure of dams, canal banks, or where landslides block drainage channels, streams, and/or rivers. *See Section 4.5.3 for the Earthquake Hazard Profile.*

Dam failures also often result in flash flooding. Dam failures are discussed separately in this plan. *See Section 4.5.1.*

Floodplain Definitions

100-YR Floodplain

The boundaries of the 100 year (100-YR) floodplain coincide with an annual risk of 1% and are a FEMA study product consisting of both floodway and flood fringe.

500-YR Floodplain

The boundaries of the floodplain coincide with an annual risk of 0.2% and are a FEMA study product. The 500-YR floodplain includes the 100-YR.

Floodway

This includes the channel of the tributary and the land adjacent to it. This zone needs to remain free from obstruction so the 100-YR floodplain can be conveyed downstream.

Flood Fringe

This is the remaining portion of the 100-YR floodplain, excluding the floodway. This zone can be obstructed or developed if criteria are met.

Special Flood Hazard Area (SFHA)

An area having special flood, mudflow, or flood-related erosion hazards and shown on a Flood Insurance Rate Map (FIRM). The SFHA is the area where the National Flood Insurance Program's (NFIP) floodplain management regulations must be enforced.

Floodplain Ecosystems

Floodplains can support ecosystems that are rich in quantity and diversity of plant and animal species. A floodplain can contain 100 or even 1,000 times as many species as a river. Wetting of the floodplain soil releases an immediate surge of nutrients left over from the last flood and resulting from the rapid decomposition of organic matter that had accumulated. Microscopic organisms thrive, and larger species enter a rapid breeding cycle. Opportunistic feeders, particularly birds, move in to take advantage. The production of nutrients peaks and falls away quickly; however, the surge of new growth endures for some time. This makes floodplains particularly valuable for agriculture. Species growing in floodplains are markedly different from those that grow outside floodplains. For instance, trees in floodplains and riparian areas tend to be very tolerant of root disturbance and very quick-growing compared to non-riparian trees.

Floodplains that are undisturbed or have been restored to a natural state provide many benefits to both human and natural systems. In their natural vegetative state, undisturbed floodplains provide the following benefits:

- Slow the rate at which incoming surface runoff reaches the main body of water, slowing down the impact of flood events.
- Maintain water quality by allowing surface runoff to drop sediment into the natural soil, preventing it from depositing in streams and rivers.
- Recharge groundwater. The slowing of runoff allows additional time for the runoff to recharge existing groundwater aquifers.
- Provide habitat for large and diverse populations of plants and animals.

Floodplains are often compromised by human development. Because they border water bodies, floodplains have historically been popular sites to establish settlements. Human activities tend to concentrate on floodplains because water is readily available, the land is fertile and suitable for farming, transportation by water is easily accessible, and the land is flatter and easier to develop.

But human activity in floodplains frequently interferes with the natural function of floodplains. It can affect the distribution and timing of drainage, thereby increasing flood problems. Human development can create local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream's capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event. Human activities can interface effectively with a floodplain as long as steps are taken to mitigate the activities' adverse impacts on floodplain functions.

4.5.6.1 Plans, Policies, and Regulatory Environment

National Flood Insurance Program (NFIP)

The NFIP makes federally-backed flood insurance available to homeowners, renters, and business owners in participating communities. Mendocino County and the cities of Fort Bragg, Ukiah, Willits, and Point Arena participate in NFIP.

For most participating communities, FEMA has prepared a detailed Flood Insurance Study (FIS). The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood (the 100-year flood) and the 0.2-percent annual chance flood (the 500-year flood).

Base-flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principal tool for identifying the extent and location of the flood hazard. FIRMs also designate and display the floodway, which is the channel of the river or stream and adjacent land that must remain free from obstruction so that the 100-year flood can be conveyed downstream. FIRMs are the most detailed and consistent data source available, and for many communities, they represent the minimum area of oversight under their floodplain management program. The most recent countywide FIRM was completed on November 14th, 2017, and is a digital flood insurance rate map (DFIRM).

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

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

Structures permitted or built in the County before December 31, 1974, are called "pre-FIRM" structures, and structures built afterward are called "post-FIRM." Post-FIRM properties are eligible for reduced flood insurance rates. Such structures are less vulnerable to flooding since they were constructed after regulations and codes were adopted to decrease vulnerability. Pre-FIRM properties are more vulnerable to flooding because they do not meet code or are located in hazardous areas. The insurance rate is different for the two types of structures.

Compliance is monitored by FEMA regional staff and by the California Department of Water Resources under a contract with FEMA. Maintaining compliance under the NFIP is an important component of flood risk reduction. All planning partners that participate in the NFIP have identified initiatives to maintain their compliance and good standing.

Community Rating System (CRS)

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions that meet the three goals of the CRS: 1) reduce flood losses, 2) facilitate accurate insurance rating, and 3) promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent according to the community's classification. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. Class 10 communities are those that do not participate in the CRS; they receive no discount. The CRS classes for local communities are based on 18 creditable activities related to public information, mapping and regulations, flood damage reduction, and flood preparedness.

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 66 percent of the NFIP's policy base are communities in the CRS. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks. Table 4-51 lists NFIP and CRS statistics for the County.

Table 4-51: Flood Insurance Statistics for Mendocino County

NFIP and CRS Status & Information	
Mendocino County	
NFIP Status	Participating since 06/01/83
CRS Class	Not Participating
Policies in Force	280
Policies in SFHA	192
Policies in non-SFHA	88
Total Claims Paid	107
Paid Losses	$3,236,007
Repetitive Loss Properties	7
Severe Repetitive Loss Properties	1
Repetitive Loss Payment by NFIP on Building	$320,723
Repetitive Loss Payment by NFIP on Contents	$44,535

Note: The Privacy Act of 1974 (5 U.S.C. 522a) restricts the release of certain types of data to the public. Flood insurance policy and claims data are included in the list of restricted information. FEMA can only release such data to state and local governments, and only if the data are used for floodplain management, mitigation, or research purposes. Therefore, this plan does not identify the repetitive loss properties or include claims data for any individual property.

Cobey-Alquist Floodplain Management Act

The Cobey-Alquist Floodplain Management Act of 1965 provided state-level guidance and review of floodplain management, including the review of floodplain management plans, establishment of floodplain management regulations, and the use of designated floodways. The California Department of Water Resources (DWR) adopts regulations, maintains a statewide flood management data collection and planning program, manages a statewide grant program, and helps coordinate emergency flood response operations.

Russian River Integrated Coastal Watershed Management Plan (RRICWMP)

The RRICWMP is a watershed-specific planning document created for application to the Russian River. The plan identifies key management goals and objectives which include the enhancement of watershed processes and the improvement of land use; the protection and enhancement of hydrologic function and water supply; the protection of water quality; the protection of native biodiversity and ecosystems; the development and maintenance of public stewardship; and the engagement with scientific, and technical assessment and planning.

Mendocino County General Plan

The 2009 Mendocino County General Plan includes the following goals, and policies in the Development and Resource Management Elements to mitigate the effects of flood:

Development Element

Goal DE-17 (Drainage): To protect residents and businesses from hazards caused by flooding.

Goal DE-18 (Flooding/Inundation): To protect life and property while also protecting and managing natural drainage ways, floodplains and flood retention basins.

Goal DE-19 (Flooding/Inundation): To maintain flood carrying capacity in harmony with environmental, recreational, and open space objectives.

Policy DE-192: Encourage compatible uses of flood plain land, such as agriculture, forestry, and recreation.

Policy DE-193: Emphasize land use compatibility and onsite floodwater retention to prevent or manage flooding.

Policy DE-194: To the maximum extent practical, avoid constructing critical facilities within the designated 100-year flood plain areas or areas potentially subject to inundation by dam failures (or other water impoundment facilities) or seiches.

Policy DE-195: Development in the designated 100-year flood plain areas shall be consistent with all applicable federal regulations with regard to flooding.

Policy DE-196: Continue participation in the Federal Emergency Management Agency's National Flood Insurance Program.

Policy DE-199: Development in floodplains will not be allowed unless mitigation measures are incorporated into the project that protect against the contribution to downstream or upstream flooding.

Policy DE-200: Work with local, state, and federal agencies to fund and implement site-specific flood hazard planning, forecasting, and flood proofing measures.

Resource Management Element

Policy RM-3: Work cooperatively with property owners, agencies, and organizations to develop and support programs that maintain the integrity of stream systems for flood control, aquatic habitat, and water supply.

Policy RM-3: Stream restoration and maintenance programs shall conserve riparian vegetation and the floodwater carrying capacity of river and stream channels.

Methods of Reducing Flood Losses and Floodway Provisions in Mendocino County Code, § 22.17

The Mendocino County Code contains methods and provisions designed to reduce flood loss for the protection of property and loss of life, including restricting uses which result in or exacerbate water or erosion hazards or which cause damaging increases in erosion or flood heights or velocities. Any development vulnerable to flooding must include best practices for flood resiliency at the time of initial construction. This includes special attention to the management of altered natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters; the management of filling, grading, dredging, and other development which may increase flood damage; and the prevention and regulation of the construction of flood barriers which will unnaturally divert floodwaters or which might increase flood hazards in alternate areas. The Code prohibits encroachments, which include fill, new construction, substantial improvement, and other new development unless certified by a registered professional engineer and approved by the County.

4.5.6.2 Major Flood Events

Table 4-52 shows the flood events that took place in Mendocino County since the year 2000 that caused either property or crop damage. (NOAA, 2020)

Table 4-52: Mendocino County Flood Events Since 2000

Date	Flood Type	Property Damage Value ($)	Crop Damage Value ($)
1/2/2002	Flood	0	0
12/14/2002	Flood	0	0
12/14/2002	Flood	0	0
12/16/2002	Flood	0	0
12/16/2002	Flood	0	0
12/16/2002	Flood	0	0
12/20/2002	Flood	0	0
12/28/2002	Flood	0	0
12/28/2002	Flood	0	0
12/31/2002	Flood	0	0
12/31/2002	Flood	0	0
12/31/2002	Flood	0	0
12/29/2005	Flood	30,0000	0
12/29/2005	Flood	42,200,000	8,000,000
12/15/2016	Flood	1,500,000	0
12/15/2016	Flood	0	0
12/15/2016	Flood	0	0
12/15/2016	Flood	0	0
4/5/2018	Flood	0	0
1/16/2019	Flood	0	0
1/16/2019	Flood	0	0
1/16/2019	Flood	0	0
2/26/2019	Flood	0	0
2/27/2019	Flood	0	0
2/27/2019	Flood	0	0
2/27/2019	Flood	0	0

Source: NOAA Storm Events Database

4.5.6.3 Location

Mendocino County, due to its varied geography and climate, has a significant number of potential flood sources. Figure 4-36 displays FEMA flood zones within Mendocino County. More detailed views of FEMA flood zones are available for planning partners through the Risk Assessment Mapping Platform (RAMP) on http://mitigatehazards.com/mendocino-county/ramp/.

In Mendocino County, riverine floodplains are diverse in nature. At times they might be confined to steep channels in the valleys of mountainous and hilly regions, and at other times they might be expansive, flat areas in plains and coastal regions. The amount of water in the floodplain is determined by the size and topography of the contributing watershed, the regional and local climate, and land use characteristics. The flooding, which occurs in steep, mountainous areas is usually confined, strikes with less warning time, and has a short duration. Conversely, larger rivers typically have longer, more predictable flooding sequences and broad floodplains. (Mendocino County MJHMP, 2014)

There are two basic flood types which most often occur in Mendocino County. The first is riverine flooding, also known as overbank flooding, which is due to excessive rainfall. The second is coastal flooding, which is due to wave run-up. Riverine floodplains range from narrow, confined channels in the steep valleys of mountainous and hilly regions to wide, flat areas in plains and coastal regions. The amount of water in the floodplain is a function of the size and topography of the contributing watershed, the regional and local climate, and land use characteristics. Flooding in steep, mountainous areas is usually confined, strikes with less warning time, and has a short duration. Larger rivers typically have longer, more predictable flooding sequences and broad floodplains. (*Id.*)

Localized flooding may sometimes occur outside of recognized drainage channels or delineated floodplains due to a combination of locally heavy precipitation, increased surface runoff, and inadequate facilities for drainage and stormwater conveyance. Such events most typically occur in flat areas and in urbanized areas with extensive impermeable surfaces. Local drainage may result in "nuisance flooding," in which streets or parking lots are temporarily closed and minor property damage occurs. (Mendocino 2014 MJHMP, 2014) Major localized flood areas include lands adjoining waterways, such as the Russian River and its tributaries in the south Ukiah and Hopland areas, and low-lying lands east of Willits. Highway 128 between Philo and Navarro is regularly closed due to flooding caused by winter storms. (Mendocino County General Plan, 2009)

Flooding in Coastal areas of Mendocino County is typically caused by wave run-up. Pacific Ocean storms in the months of November through February in combination with high tides and strong winds can cause significant wave run-up. In addition to intense offshore storms, coastal flooding from the Pacific Ocean can also be attributed to seismic sea-waves or tsunamis which can occur throughout the year. As a result, coastal flooding can be exacerbated by the physical characteristics of the continental shelf and shoreline. (*Id.*)

Figure 4-35 displays the six primary HUC8 watersheds [8] in Mendocino County. The County can be broadly divided into three watersheds which include the Coastal, Eel, and Russian river basins. The Coastal system consists of a multitude of relatively short streams flowing west to the Pacific Ocean. Ten Mile, Noyo, Big, Albion, Navarro, Garcia, and Gualala rivers compose the Major stream systems located in the Coastal watershed.

The interior county is drained by the two larger drainage systems – the Eel River and Russian River systems. The Eel River system drains the northern interior, while the Russian River system drains the southern interior. These watersheds overlap with other counties. It is only portions of these interior watersheds which lie within the county. The Eel River watershed is shared with Humboldt, Lake, and Trinity counties, while the Russian River watershed includes significant portions of Sonoma County.

Figure 4-35: HUC8 Watershed Map

Surface runoff in each basin is derived almost entirely from rainfall, although snow does fall in the mountains located in the eastern portion of the Eel River watershed Streamflow responds directly to the rainfall pattern; high stream flows will drop quickly without sustaining rainfall. (Mendocino County General Plan, 2009)

[8] HUC is a Hydrologic Unit Code, a term used by the US Geological Survey to delineate watersheds based on surface hydrologic features. HUC8 is an eight-digit code delineating subbains of watersheds. For more information, see https://nas.er.usgs.gov/hucs.aspx.

Valley Flood Sources

One of the largest valleys within Mendocino County is Ukiah Valley. The Russian River carved the Valley, which ranges from 600 feet at Calpella to 7,500 feet wide, south of Ukiah near Plant Road. Typically, the river flows through a portion of the channel, which it carved through the center of the Valley. The river may sometimes overtop its banks during moderately severe storms. The area subject to flooding during more severe storms, or one-hundred-year storm events, is much more extensive. The primary areas subject to flooding from a one-hundred-year storm (which has a one percent chance of occurring in any given year) can reach as far west as U.S. 101 in several portions of the Ukiah Valley Area Plan area. To the north, portions of The Forks area and the communities of Calpella and Talmage are located within the one-hundred-year floodplain. (Ukiah Valley Area Plan, 2010)

When the flow from the Russian River exceeds the confines of its banks, the probability of flooding along its tributaries increases. Orr Creek, Doolin Creek, Gibson Creek, and Robinson Creek each have the potential to inundate significant portions of residential areas near the channel centerline. Mill Creek and Sulphur Creek have a record of flooding an area nearly one thousand feet wide through the Talmage and the Vichy Springs Road areas. Flood risk also increases with additional paving and development. Pavement, in particular, creates compacted and impermeable surfaces, preventing natural percolation of water into the water table and increasing runoff. (*Id.*)

Rainfall and Coastal Flood Sources

The general cause of major floods in Mendocino County is due to extended periods of winter rainfall, which are produced by winter storms from the Pacific Ocean. Years with strong El Niños are often associated with significant flood events. Historical records from 1911 through 2006 indicate that flooding, landslides, embankment failures, and high winds occurred in portions of Mendocino County every ten to twenty years at a minimum, and often more frequently (1912, 1937, 1955, 1964-66, 1974, 1978, 1983, 1986, 1995, 1997, 1998, 2005-2006). Most floodplains are located in relatively undeveloped areas; however, there are infrastructure and other nonresidential and residential developments, which are susceptible to flooding and are situated in at-risk locations. (Mendocino County General Plan, 2009) Highway 101, a state highway under the jurisdiction of the California Department of Transportation, floods regularly and experiences regular slope failure occurrences that shut down the highway. This leads to emergency and evacuation concerns for coastal populations.

Table 4-37 displays major FEMA flood zones as well as the associated population center locations.

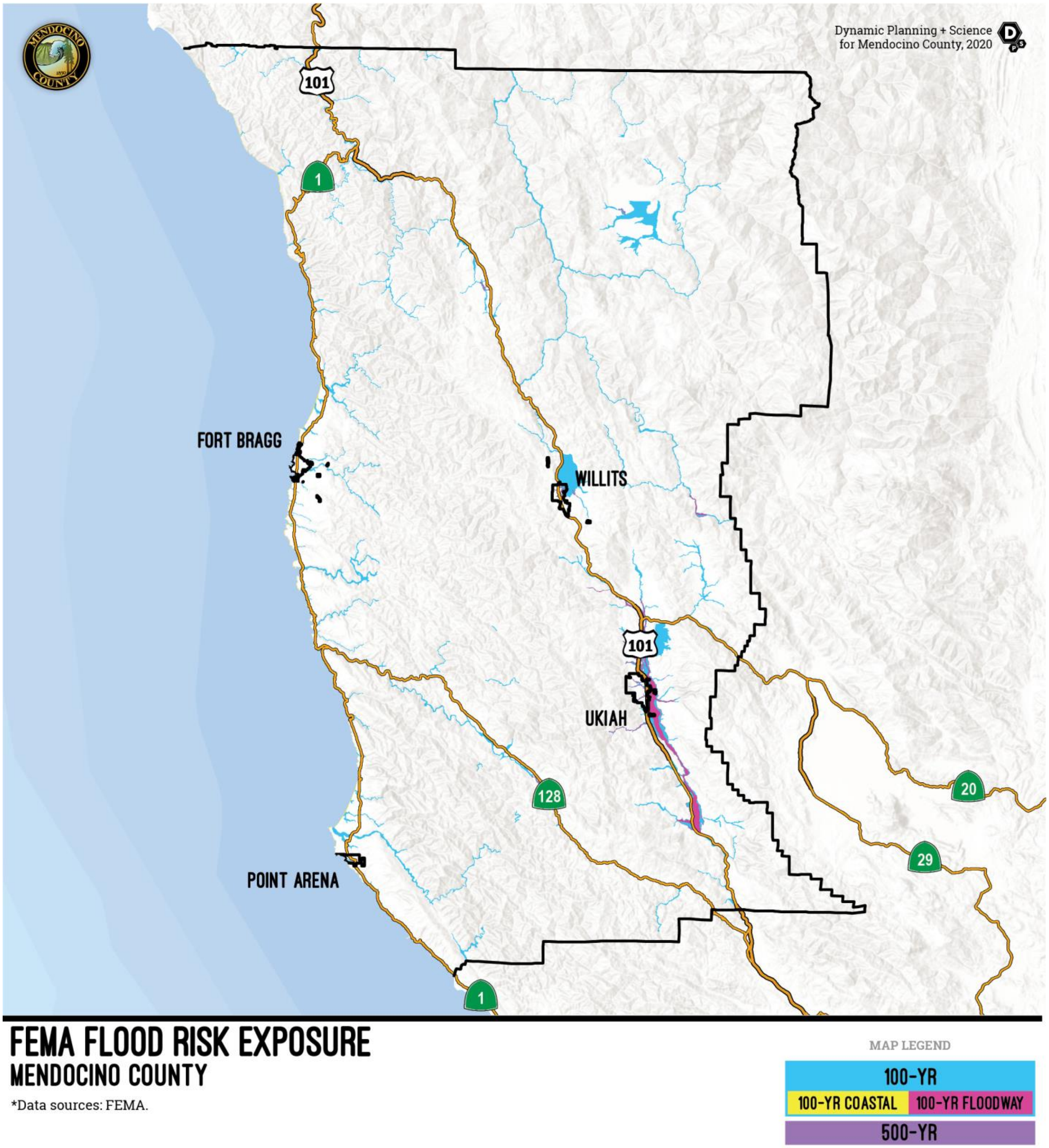


Figure 4-36: FEMA Flood Risk Exposure

4.5.6.3.1 Flood Awareness Zones

Flood Awareness Zones have been developed by California DWR to map areas of additional flood threat throughout the state. The intent of the Awareness Floodplain Mapping project is to identify all pertinent flood hazard areas for areas that are not mapped under the Federal Agency Management Agency's (FEMA) National Flood Insurance Program (NFIP) and to provide the community and residents an additional tool in understanding potential flood hazards currently not mapped as a regulated floodplain. The awareness maps identify the 100-YR flood hazard areas using approximate assessment procedures. These floodplains are shown simply as flood-prone areas without specific depths and other flood hazard data.

4.5.6.4 Measuring Frequency and Severity

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

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

4.5.6.5 Frequency/ Probability of Future Occurrences

Mendocino County will experience flooding in the future, with the probability of flooding in Mendocino County between 10 and 100% annually. The majority of the floods in Mendocino County have occurred from winter-through-spring rainfall, but several have been the result of heavy rain events during July, August, and September. The Pacific high is known to cause increased intensity in weather patterns. As it moves southwards, it encourages storm formation across the state, producing widespread rain at low elevations and snow at high elevations. It is responsible for occasional heavy rains that are known to cause serious flooding. The semi-permanent high-pressure area of the north Pacific Ocean is also responsible for storms, causing heavy rains and widespread flooding during winter months. (Western Regional Climate Center, 2020)

Flooding in California is often associated with the El Nino weather phenomenon. El Nino is a term originally used to describe the appearance of warm (surface) water from time to time in the eastern equatorial Pacific region along the coasts of Peru and Ecuador. This ocean warming can strongly affect weather patterns all over the world. El Nino events are often associated with above-normal precipitation in the southwestern United States. El Niños often occur during the Christmas season. La Niña is the opposite or "cold phase" of the El Niño cycle. Current understanding suggests that El Niño has a return period of four to five years. When an El Niño event occurs, it often lasts from 12 to 18 months. (National Oceanic and Atmospheric Administration , 2020) Based on previous occurrences, Mendocino County can expect a severe flood event to occur every 3 – 4 years, and in particular, during strong El Niño years (every 7 – 8 years). (Mendocino County Multi Hazard Mitigation Plan, 2008)

4.5.6.6 Severity and Extent

The main factors affecting flood damage are water depth and velocity. Deeper and faster flood flows can cause more damage. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high velocity flows and transporting debris and sediment. Flood severity is often evaluated by examining peak discharges; Table 4-53 lists peak flows used by FEMA to map Mendocino County floodplains.

Table 4-53: Summary of Discharges in Mendocino County

	Drainage sq. Miles	Peak Discharge (cubic feet/second)			
Flooding Source/Location		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Ackerman Creek					
At Confluence with Russian River	20.6	3,190	4,800	5,370	7,000
At Orrs Springs Road	19.0	3,060	4,700	5,320	6,600
Anderson Creek					
At the Confluence with Con Creek	35.4	5,230	8,060	9,140	11,800

Flooding Source/Location	Drainage sq. Miles	Peak Discharge (cubic feet/second)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Upstream of the Confluence with Robinson Creek	24.0	3,670	5,730	6,520	8,460
Upstream of the Confluence with Donelly Creek	21.7	3,360	5,240	5,970	7,750
At State Highway 253	14.3	2,280	3,630	4,150	5,460
Broaddus Creek					
Above the Confluence with Haeh/Baechtel Creek	7.9	1,380	2,260	2,620	3,530
Davis Creek					
At Hearst-Willits Road	14.8	2,200	3,710	4,360	6,040
Doolin Creek					
At Confluence with Russian River	7.2	1,040	1,650	1,880	2,460
Above the confluence with Gibson Creek	4.3	660	1,060	1,200	1,570
Above the confluence with Mendocino Creek	3.0	480	770	880	1,150
Above the confluence with Tributary near State Street	2.1	383	627	721	957
East Fork Russian River					
0.3 miles downstream of Centerville Road	29.1	4,050	6,050	6,810	8,640
Eel River					
At the confluence with Hale Creek	35.3	41,000	70,000	82,500	11,200
Feliz Creek					
At the confluence with Russian River	43.3	5,990	8,230	9,160	11,470
At Old Hopland-Yorkville Road	31.1	4,550	6,290	7,040	8,940
Forsythe Creek					
At the confluence with Russian River	49.7	6,940	10,500	11,900	15,200
Upstream of the confluence with Seward Creek	34.6	5,120	7,900	8,960	11,600
Upstream of the confluence with Bakers Creek	32.5	4,810	7,460	8,480	11,000
Upstream of the confluence with Mill Creek (at Redwood Valley)	18.7	3,070	4,790	5,450	7,060
Gibson Creek					
At the confluence with Doolin Creek	2.9	466	748	854	1,120
At West Standley Street	1.5	266	459	538	743
Haehl/Baechtel					

Flooding Source/Location	Drainage sq. Miles	Peak Discharge (cubic feet/second)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Creek					
At the downstream City of Willits corporate limits[1]	33.6	3,520	7,940	9,240	12,600
Above Broaddus Creek Low Flow Confluence[2]	23.9	2,450	5,800	6,740	9,160
Above Broaddus Creek 2-percent-annual chance flow confluence[3]	16.0	2,450	4,070	6,740	9,160
Above Haehl Creek low flow confluence[4]	10.1	1,680	4,070	4,730	6,420
Above Haehl Creek 0.2-percent-annual chance Flow confluence[5]	9.9	1,680	2,790	3,250	4,410
At the upstream Limit of Study	8.1	1,410	2,380	2,780	3,810
Hensley Creek					
At the confluence with Russian River	7.6	1,290	1,970	2,210	2,790
2.1 miles upstream of U.S. Highway 101	3.7	661	1,070	1,230	1,630
Mill Creek (near Talmage)					
At the confluence with Russian River	18.0	2,210	3,320	3,790	4,490
Above the confluence with McClure Creek	10.1	1,260	2,000	2,290	3,000
Above confluence with North Fork Mill Creek	4.4	610	990	1,140	1,520
Mill Creek (at Willits)					
At the downstream City of Willits corporate limits	9.7	1,620	2,730	3,190	4,380
North Fork Mill Creek					
At the confluence with Mill Creek	5.3	730	1,210	1,410	1,910
Noyo River					
At U.S. Highway 1	114.0	17,740	31,085	38,000	57,367
Orrs Creek					
At the confluence with Russian River	10.2	1,570	2,460	2,790	3,610
At Low Gap Park	7.9	1,350	2,190	2,530	3,360
Robinson Creek					
At the confluence with Russian River	26.7	3,930	5,890	6,590	8,280
Upstream of the confluence with Unnamed Tributary near State Highway 253 Crossing	20.5	3,240	5,020	5,680	7,310
1.4 miles upstream of State Highway 253	16.3	2,620	4,150	4,720	6,210
2.2 miles upstream of State Highway 253	10.2	1,770	2,810	3,220	4,210
Russian River					
At U.S. Highway 101 bridge south of Hopland	437	36,900	53,100	59,900	75,800
Upstream of the confluence with Feliz Creek	391	32,700	47,100	53,000	67,100

Flooding Source/Location	Drainage sq. Miles	Peak Discharge (cubic feet/second)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
At USGS gaging station near Hopland (No. 11462500)	362	30,000	43,100	48,600	61,400
Downstream of the confluence with Robinson Creek	317	26,100	37,500	42,100	53,800
Upstream of the confluence with Robinson Creek	291	23,100	33,300	37,300	46,800
Upstream of the confluence with Doolin and Mill Creek (near Talmage)	261	19,600	28,300	31,700	39,700
Upstream of the confluence with Orrs Creek	249	18,200	26,300	29,400	36,900
Downstream of the confluence with Ackerman Creek	235	16,500	23,900	26,800	33,600
Upstream of the confluence with Ackerman Creek	215	15,800	21,500	23,700	29,100
Upstream of the confluence with Hensley Creek	207	14,800	21,100	22,200	27,200
At USGS gaging station near Ukiah (No. 11461000)	99.7	14,400	19,700	21,700	26,800
Upstream of the confluence with Your Creek	87.0	12,700	17,300	19,200	23,600
Upstream of the confluence with Forsythe Creek	35.0	5,310	7,620	8,480	10,600
At upstream Limit of Detailed Study	27.1	4,480	6,400	7,120	8,900
Sulphur Creek					
At Vicky Springs Road	5.5	950	1,380	1,600	2,130
Tenmile Creek					
0.2 mil downstream of Branscomb Road	20.9	3,440	5,850	6,900	9,620
Town Creek					
At the confluence with Grist Creek	11.3	1,300	2,280	2,720	3,890
York Creek					
At the confluence with Russian River	12.0	1,920	2,920	3,290	4,170
2.1 miles upstream of U.S. Highway 101	8.0	1,270	2,080	2,410	3,220

***** Data not available**

[1] Includes Mill Creek (near Willits Drainage Area and Contributing Flows), except for Mill Creek 10% Annual Chance Peak Discharge
[2] Includes Broaddus Creek Drainage Area and Contributing Flows, except for Broaddus Creek 10% Annual Chance Peak Discharge
[3] 1,750 feet upstream of Broaddus Creek Low Flow Confluence, does not include Broaddus Creek 10% or 2% Annual Chance Peak Discharges
[4] Does not include Haehl Creek 10% Annual Chance Peak Discharge
[5] 880 feet upstream of Haehl Creek Low Flow Confluence, does not include Haehl Creek Peak Discharges

Source: Table 10 Summary of Discharges from FEMA FIS Text, 2017

4.5.6.7 Warning Time

The type and rate of flooding experienced in Mendocino County varies. In general, warning times for floods can be between 24 and 48 hours to prepare communities to reduce flood damages Seasonal notification for flooding can enhance awareness for citizens at risk, and, when communicated effectively, advance notification can reach target audiences on a large scale.

4.5.6.7.1 DWR Awareness Zones Notification

The Flood Risk Notification Program (FRN Program) is part of DWR's FloodSAFE California Initiative. The program's key goal is to increase flood risk awareness by effectively communicating that risk to individual property owners, the public, and local, state, and federal agencies. This includes encouraging people to understand the levee system that protects them; be prepared and aware of their flood risk; and take appropriate actions before, during, and after flooding to protect themselves, minimize damage to their property or personal possessions, and facilitate recovery.

To achieve this goal, the FRN Program:

- sends out an annual notice to property owners whose property is at risk of flooding,
- maintains accurate Levee Flood Protection Zone (LFPZ) maps [9] and an associated parcel information database,
- provides people with useful ways to assess risk and reduce flood loss,
- establishes outreach and educational projects with public involvement,
- expands its interactive Flood Risk Notification website, and
- collaborates with federal agencies, local agencies, and communities.

In September of 2010, DWR provided the first annual written notice of flood risks to each landowner whose property is protected by State Plan of Flood Control (SPFC) levees and is within an LFPZ. The notice informs recipients of their property's potential flood risks and potential sources of flooding and offers flood emergency planning and preparedness tips. It encourages recipients to take preventative actions such as purchasing flood insurance, elevating or "floodproofing" their buildings, and preventing blockage of channels, drains, and ditches.

[9] These maps are different from Federal Emergency Management Agency regulatory maps.

4.5.6.8 Secondary Hazards

The most problematic secondary hazard for flooding is bank erosion, which in some cases can be more harmful than actual flooding. Flooding is also responsible for landslides when high flows over-saturate soils on steep slopes and cause them to fail. Hazardous materials spills are a secondary hazard of flooding if storage tanks rupture and spill into streams or storm sewers. (Department of Environmental Conservation, 2020)

Wildland fires within a watershed can exacerbate flood hazards by virtue of increased rate and volume of runoff and attendant erosion and sediment discharge. (USGS, 2020)

4.5.6.9 Climate Change Impacts

The effects of climate change are varied and include warmer and more varied weather patterns, melting ice caps, and poor air quality, for example. As a result, climate change will likely worsen a number of natural hazards, including flooding. Climate change will shift rainfall patterns, making heavy rains more frequent in many areas. An increase in heavy rain events will lead to more flooding, including flash floods that happen suddenly as a result of heavy rain and localized flooding, which involves the pooling of water in low-lying areas. Heavy rain events can inundate and overwhelm stormwater drainage systems resulting in localized flooding where pooling of water can cause significant damage to buildings. Overwhelmed stormwater drainage facilities also create hazardous conditions on roadways where water pools in low lying areas creating dangerous driving conditions. (US EPA, 2020)

4.5.6.10 Flood Vulnerability Analysis

Both an exposure analysis and Hazus loss estimation analysis were conducted to develop the flood vulnerability analysis for Mendocino County. Flood exposure numbers were generated using the inventories outlined in 4.5.6.10.1 County inventories were overlaid with FEMA delineated flood plains to determine exposure. These risk assessment exposure analysis values do not include Hazus -generated results.

Hazus flood vulnerability data was generated using a Level 2 Hazus 4.2 analysis. Hazus is a FEMA software product that uses a GIS to analyze 100-year depth grids derived from FEMA 100-year "A" zones with Base Flood Elevations (BFE) to estimate loss. Parcel data defined in 4.5.6.10.1 was imported into Hazus as User Defined Facilities (UDF) and serves as the basis for replacement and content cost estimations as well as associated loss. Where flood vulnerability is mentioned absent of Hazus, exposure analysis figures are used. Figure 4-38 displays a snapshot of flood exposure and damage estimation in Unincorporated Mendocino County.

4.5.6.10.1 Flood Exposure

The tables and graphs in this section detail the populations, properties, and infrastructure exposed to flooding in Unincorporated Mendocino County. Flood exposure is categorized by exposure to different flood hazard zones, including the floodway, flood fringe, 100-year floodplain, and 500-year floodplain. The tables and graphs also include a category of the 100-year total, which is a combined total of floodway, flood fringe, and 100-year floodplain categories. The 500-year sans 100-year category includes only the 500-year floodplain, and the 500-year total includes all of the categories combined. Refer to section 4.5.6 for floodplain definitions to better understand these flood hazard areas.

Population

Population counts of those living in the floodplain were generated by analyzing County assessor and parcel data that intersect with the 100-YR and 500-year floodplains identified on FIRMs. Using GIS, U.S. Census Bureau information was used to intersect the floodplain, and an estimate of population was calculated by weighting the population within each census block and track with the percentage of the flood risk area. Using this approach, Table 4-54 and Figure 4-37 display the results of this analysis showing how much of the population of Unincorporated Mendocino County is exposed to flood hazard zones.

Figure 4-37: Population Exposure to Flood (Unincorporated County)

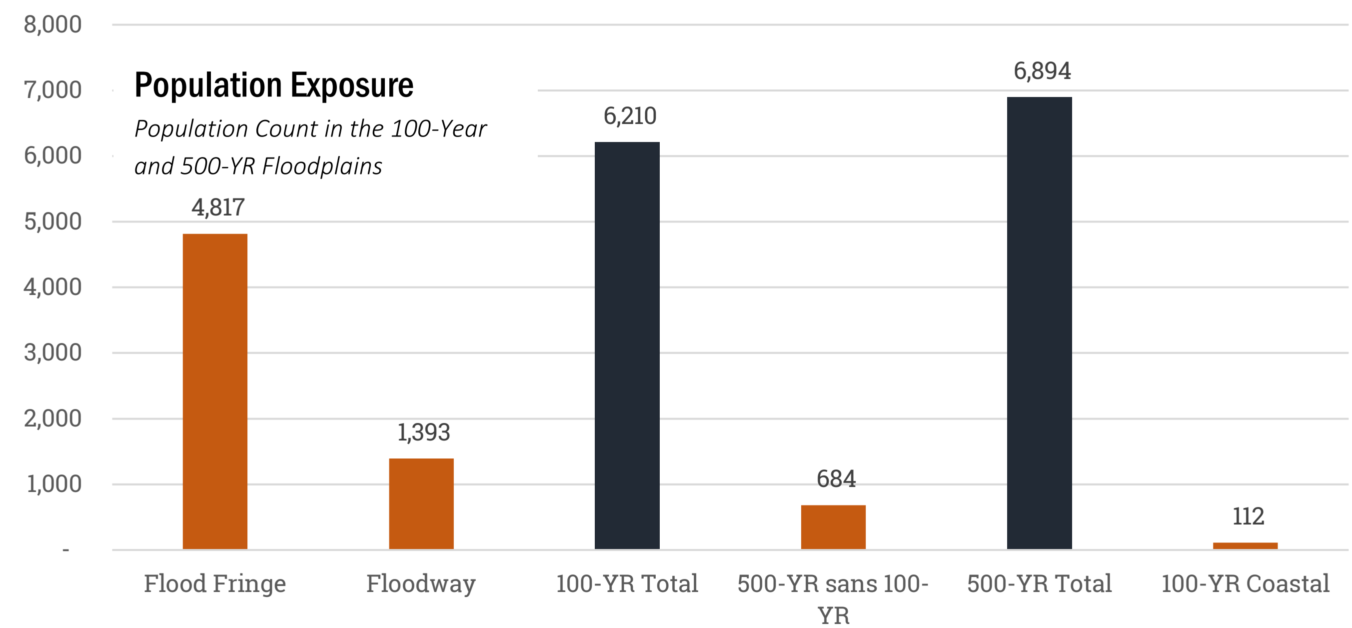
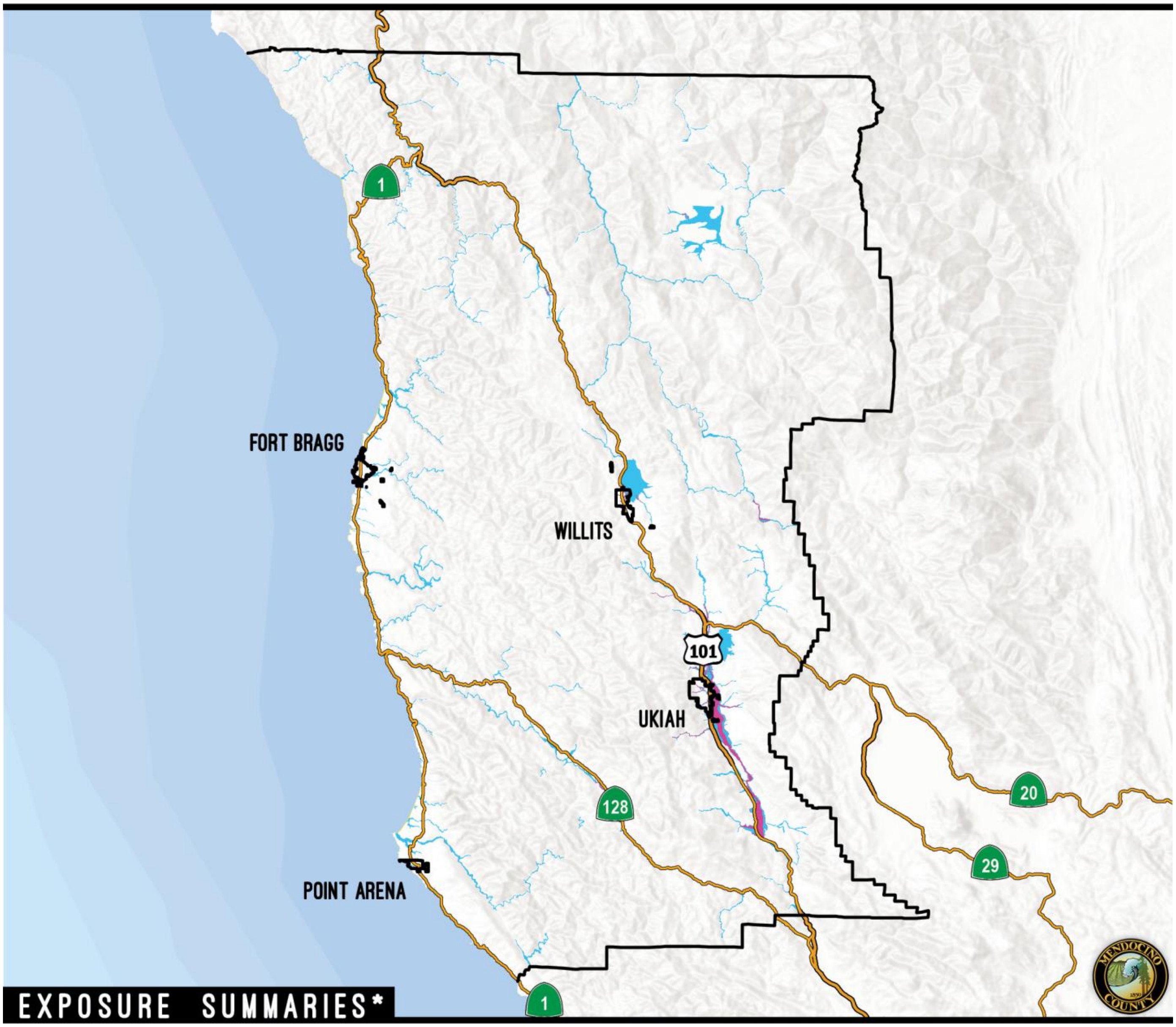


Table 4-54: Summary Population Exposure to Flood (Unincorporated County)

	Total Population
Unincorporated County	58,995

Flood Hazard Zone	Population Count	% of Total
Flood Fringe	4,817	*8.16%*
Floodway	1,393	*2.36%*
100-YR Total	6,210	*10.53%*
500-YR sans 100-YR	684	*1.16%*
500-YR Total	6,894	*11.69%*
100-YR Coastal	112	*0.19%*

FEMA FLOOD RISK EXPOSURE SNAPSHOT **MENDOCINO COUNTY**



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA

Count	Exp. Rate**
7,005	12%

Count Includes: 100 + + 500

PARCEL COUNT IN HAZARD AREA

Count	Exp. Rate**
1,236	5%

Count Includes: 100 + + 500

PARCEL VALUE IN HAZARD AREA

	Exp. Rate**
Sum of Improvement Value $275,508,413	6%
Sum of Content Value $223,710,644	8%

Count Includes: 100 + + 500

CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
Essential Facilities	4	5%	100 + + 500
High Potential Loss	33	7%	*Sum of Transportation & Lifeline Linear Mileage*
Transportation & Lifeline	125	36%	614 3%

MAP LEGEND

- 100-YR
- 100-YR COASTAL
- 100-YR FLOODWAY
- 500-YR

*Exposure summaries include 100YR, 500YR and 100YR Coastal Zones. Hazard data source: FEMA.
**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

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Figure 4-38: FEMA Flood Risk Exposure and Snapshot Map

Structures and Parcel Value

Table 4-55 summarizes parcels in Unincorporated Mendocino County that are exposed to flood hazard areas. The beginning of Section 4.5.6 includes definitions of the various flood hazard areas.

Table 4-55: Parcels Exposed to NFIP Flood Zones (Unincorporated County)

	Total Parcels	Total Market Value ($)	Total Content Value ($)	Total Value ($)
Unincorporated County	24,371	$4,544,212,021	$ 2,693,943,855	$7,238,155,876

Flood Hazard Zone	Parcel Count	% of Total	Market Value Exposure ($)	Content Value Exposure ($)	Total Exposure ($)	% of Total
Flood Fringe	896	*3.7%*	$ 177,485,381	$ 134,638,286	$ 312,123,667	*4.3%*
Floodway	160	*0.7%*	$ 28,994,524	$ 24,936,926	$ 53,931,450	*0.7%*
100-YR Total	**1,056**	**4.3%**	**$ 206,479,905**	**$ 159,575,211**	**$ 366,055,116**	**5.1%**
500-YR sans 100-YR	178	*0.7%*	$ 67,600,174	$ 63,421,266	$ 131,021,440	*1.8%*
500-YR Total	**1,234**	**5.1%**	**$ 274,080,079**	**$ 222,996,477**	**$ 497,076,556**	**6.9%**
100-YR Coastal	2	*0.0%*	$ 1,428,334	$ 714,167	$ 2,142,501	*0.0%*

Note: The table above does not display loss estimation results; the table exhibits total value at risk based upon the hazard overlay and Mendocino County Assessor data.

Critical Facilities and Infrastructure

Table 4-56 summarizes the critical facilities and infrastructure located in the flood fringe, floodway, and 100-year and 500-year floodplains of Mendocino County.

Table 4-56: Critical Facility Points in the Floodplain

Infrastructure Type	Flood Fringe	Floodway	100-YR Total	500-YR sans 100-YR	500-YR Total	100-YR Coastal
Essential Facility	4	-	4	-	4	-
EOC	-	-	-	-	-	-
Fire Station	4	-	4	-	4	-
Law Enforcement	-	-	-	-	-	-
Medical Facility	-	-	-	-	-	-
High Potential Loss	21	3	24	9	33	-
Adult Residential Facility	-	-	-	-	-	-
Alternative Education Program	-	-	-	-	-	-
Animal Control	-	-	-	-	-	-
Child Care Center	-	-	-	-	-	-
Communication Tower	-	1	1	1	2	-
Community Center	-	-	-	-	-	-
Courthouse	-	-	-	-	-	-
Dam	3	1	4	-	4	-

Infrastructure Type	Flood Fringe	Floodway	100-YR Total	500-YR sans 100-YR	500-YR Total	100-YR Coastal
Detention Center	-	-	-	-	-	-
Fairground	-	-	-	-	-	-
Family Child Care Home	-	-	-	-	-	-
Foster Family Agency	-	-	-	-	-	-
Historic Building	2	-	2	-	2	-
Historic Site	-	-	-	-	-	-
Library	-	-	-	-	-	-
Museum	-	-	-	-	-	-
Office	1	-	1	-	1	-
Park and Recreation	-	1	1	-	1	-
Power Plant	4	-	4	-	4	-
Real Property Asset*	8	-	8	6	14	-
Residential Child Care	-	-	-	-	-	-
Residential Elder Care Facility	1	-	1	-	1	-
School	2	-	2	1	3	-
Shop	-	-	-	1	1	-
Storage	-	-	-	-	-	-
Wastewater Treatment	-	-	-	-	-	-
Transportation and Lifeline	105	11	116	8	124	1
Airport	-	-	-	-	-	-
Bridge	103	10	113	5	118	1
Bus Facility	-	-	-	-	-	-
Corp Yard	-	1	1	-	1	-
NG Station	-	-	-	1	1	-
Substation	2	-	2	1	3	-
Transfer Station	-	-	-	1	1	-
Hazmat	8	-	8	-	8	-
Hazmat	8	-	8	-	8	-
Grand Total	**138**	**14**	**152**	**17**	**169**	**1**

**Real Property Assets are digitized insurance rolls for demonstrating value and ownership and may have overlapping points with other categories such as fire stations and law enforcement.*

Linear Utilities

It is important to determine who may be at risk if infrastructure is damaged by flooding. Roads or railroads that are blocked or damaged can isolate residents and can prevent access throughout the county, including for emergency service providers needing to get to vulnerable populations or to make repairs. Bridges washed out or blocked by floods or debris also can cause isolation. Water and sewer systems can be flooded or backed up, causing health problems. Underground utilities can be damaged. Levees can fail or be overtopped, inundating the land that they protect. Table 4-57 shows critical facilities (linear) in the floodplain.

Table 4-57: Lifelines in the Floodplain (Unincorporated County)

Lifelines (miles) - Flood Risk Exposure						
Infrastructure Type (linear)	Flood Fringe	Floodway	100-YR Total	500-YR sans 100-YR	500-YR Total	100-YR Coastal
Levee	0.5	0.4	1.0	0.2	1.2	-
NG Pipeline	6.4	0.3	6.7	1.3	8.0	-
Railroad	36.9	1.2	38.0	4.8	42.8	-
Street	215.1	19.1	234.3	14.4	248.6	1.5
4WD trail	22.7	0.0	22.7	-	22.7	0.8
4WD trail, major	0.1	-	0.1	-	0.1	-
Alley	-	-	-	-	-	-
Cul-de-sac	0.1	-	0.1	-	0.1	-
Driveway	8.2	6.0	14.2	0.6	14.9	-
Interstate	1.9	0.2	2.1	1.3	3.4	-
Local road	129.7	9.8	139.4	9.2	148.6	0.3
Local road, major	2.5	0.0	2.5	0.2	2.6	-
Primary highway	23.0	0.4	23.4	0.7	24.1	0.3
Ramp	0.3	-	0.3	0.0	0.4	-
Road, parking area	-	-	-	0.1	0.1	-
State/county highway	26.7	2.7	29.4	2.3	31.6	0.1
Thoroughfare, major	-	-	-	-	-	-
Traffic circle	-	-	-	-	-	-
Walkway	-	-	-	-	-	-
Transmission Line	16.1	2.8	19.0	1.0	20.0	-
Grand Total	**275.1**	**23.9**	**298.9**	**21.6**	**320.6**	**1.5**

Roads

Mendocino County Department of Transportation maintains a list of roads throughout the County to avoid during a flood event. This list can be viewed at the following link: https://www.mendocinocounty.org/government/transportation/road-closures.

Water and Sewer Infrastructure

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

4.5.6.10.2 Flood Damage Estimation

Hazus calculates losses to structures from flooding by analyzing the depth of flooding and type of structure. Using historical flood insurance claim data, Hazus estimates the percentage of damage to structures and their contents by applying established damage functions to an inventory. For this analysis, all non-vacant parcels with current market values were used instead of the default inventory data provided with Hazus. Table 4-58 and Figure 4-39 shows the 100-year flood loss estimation (based on depth) in NFIP flood zones by occupancy type. Figure 4-40 and Table 4-60 shows the 500-year flood loss estimation (based on depth) in NFIP flood zones by occupancy type.

The County's insurance data was obtained and formatted for use in Hazus for a detailed damage estimation of County-owned facilities. This combined government dataset has additional information, including the number of floors, building value, content value, and construction type that greatly enhances Hazus results. Table 4-59 displays damage estimation for County facilities located in the 100-year flood zone.

Damage Estimation for 100 yr. Floodplain

Table 4-58 and Figure 4-39 display damage estimation summaries for the 100-year floodplain in Unincorporated Mendocino County by improved parcel and government property loss.

Table 4-58: 100 YR Flood Damage Estimation by Occupancy Type

Building Type	Building Damage ($)	Building Damage (% of total loss)	Content Damage ($)	Content Damage (% of total loss)	Total Damage ($)	Proportion of Loss (%)
Agriculture	$ 9,209,882	11.1%	$ 20,644,722	24.8%	$ 29,854,604	36%
Commercial	$ 1,025,460	1.2%	$ 3,196,381	3.8%	$ 4,221,840	5%
Education	$ 32,827	0.0%	$ 177,925	0.2%	$ 210,752	0%
Emergency	-	0.0%	-	0.0%	-	0%
Government	$ 783,569	0.9%	$ 3,099,593	3.7%	$ 3,883,162	5%
Industrial	$ 1,335,091	1.6%	$ 3,360,636	4.0%	$ 4,695,727	6%
Religion	$ 40,529	0.0%	$ 307,588	0.4%	$ 348,117	0%
Residential	$30,217,642	36.4%	$ 9,668,199	11.6%	$ 39,885,841	48%
Total	**$42,644,999**	**51%**	**$ 40,455,044**	**49%**	**$ 83,100,044**	

Note: Total Inventory Values
1 - Building Replacement Costs = $6,607,442,042
2 - Content Replacement Costs = $3,951,409,020
3 - Total Value = $10,558,851,062

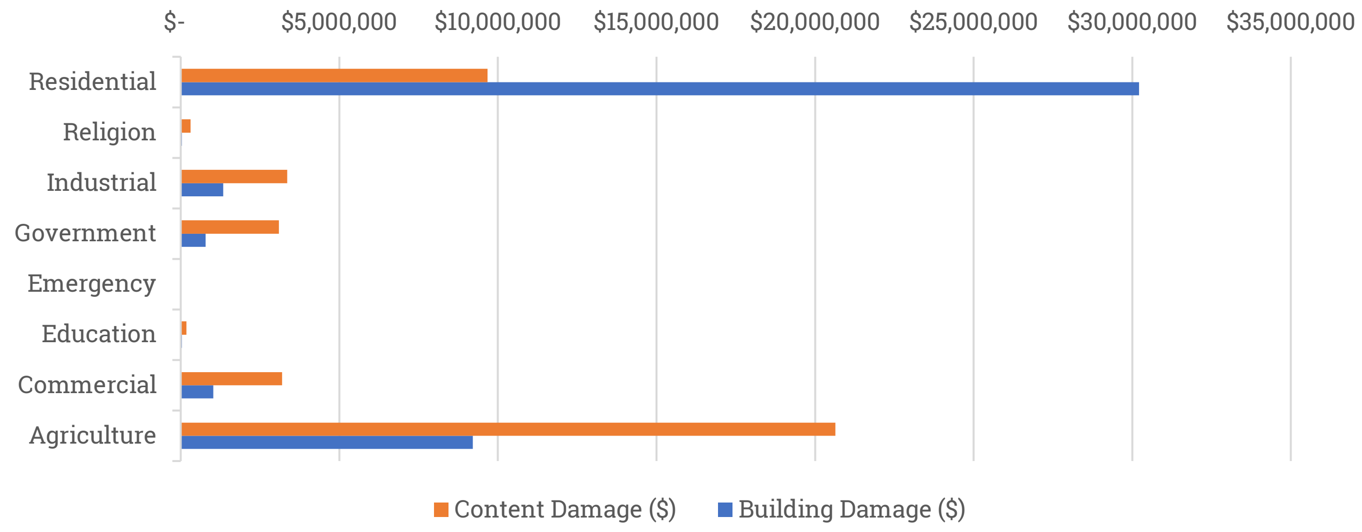


Figure 4-39: 100-YR Flood Damage Estimation by Occupancy

Table 4-59 displays damage estimation for County facilities located in the 100-year flood zone.

Table 4-59: 100 YR Flood Damage Estimation of County Facilities

		Value		Damage Pct.		Estimated Losses (USD)			
Row Labels	Count	Structure	Content	Structure	Content	Structure	Content	Total	Loss Pct. of Value
Headlands State Park	**1**	**$1**	**$25,000**	**70%**	**100%**	**$1**	**$25,000**	**$25,001**	**100%**
The Carriage House	1	$1	$25,000	70%	100%	$1	$25,000	$25,001	100%
Willits Library	**1**	**$1,506,515**	**$2,685,169**	**0%**	**0%**	**$0**	**$0**	**$0**	**0%**
Grand Total	**2**	**$1,506,516**	**$2,710,169**	**35%**	**50%**	**$1**	**$25,000**	**$25,001**	**1%**

Damage Estimation for 500 yr. Floodplain

Table 4-60 displays the damage estimation for the 500 yr. floodplain in Unincorporated Mendocino County by improved parcel. There is no damage estimated to County-owned facilities in the 500-year floodplain.

Table 4-60: Damage Estimation Summary for 500 yr. Floodplain

Building Type	Building Damage ($)	Building Damage (% of total loss)	Content Damage ($)	Content Damage (% of total loss)	Total Damage ($)	Proportion of Loss (%)
Agriculture	834	0.0	481,052	10.9	481,886	11
Commercial	2,188	0.0	159,610	3.6	161,798	4
Education	-	0.0	-	0.0	-	0
Emergency	-	0.0	-	0.0	-	0
Government	-	0.0	-	0.0	-	0
Industrial	118,289	2.7	235,819	5.4	354,107	8
Religion	-	0.0	-	0.0	-	0
Residential	2,582,496	58.6	823,651	18.7	3,406,146	77
Total	**2,703,806**	**61**	**1,700,132**	**39**	**4,403,938**	

Note: Total Inventory Values
1 - Building Replacement Costs = $6,607,442,042
2 - Content Replacement Costs = $3,951,409,020
3 - Total Value = $10,558,851,062

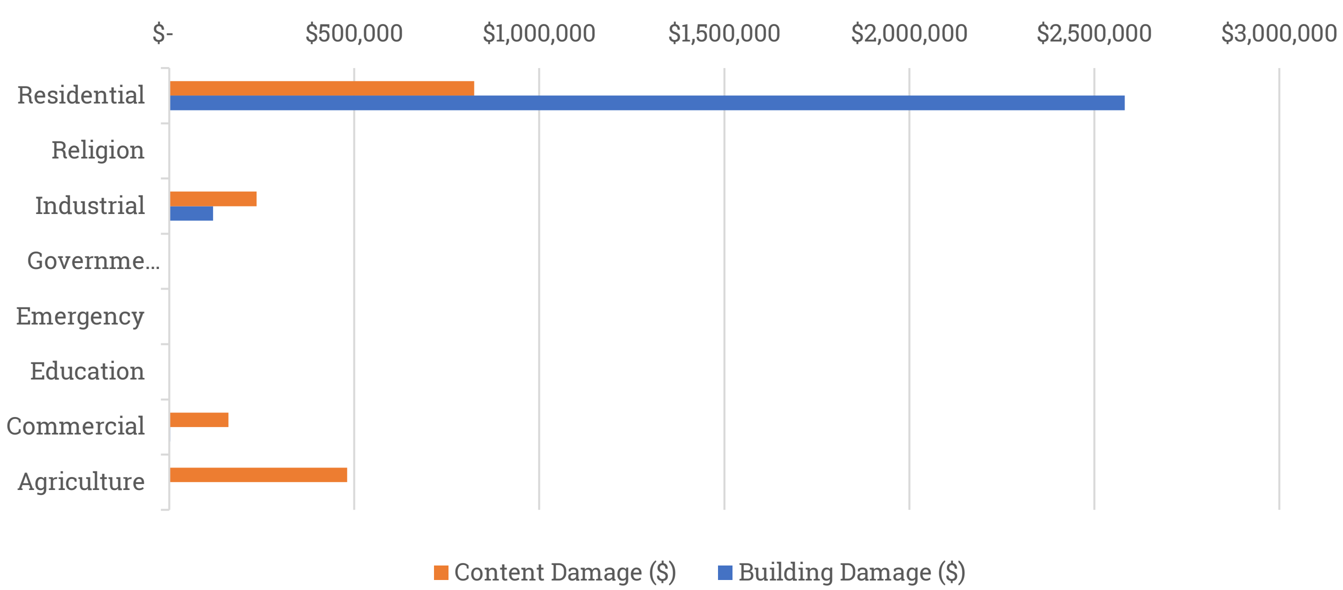


Figure 4-40: 500 YR Flood Damage Estimation by Occupancy Type

4.5.6.11 Future Trends in Development

Infrastructure has been developed to protect communities from flood damage- in particular the Coyote Valley Dam. The County is equipped to handle future growth within flood hazard areas. The County's General Plan offers goals and policies to avoid and mitigation flood impacts from new development. The County's Floodplain Ordinance (§22.17) further limits and mitigates new development in floodplains.

4.5.6.12 Flood Hazard Problem Statements

As part of the mitigation action identification process, the Planning Committee for the County and for each jurisdiction identified issues and weaknesses, also called problem statements, for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool and flood data. Flood problem statements for the County are listed in Table 4-61; problem statements for all other planning partners are accessed in Volume 2 of this plan.

Identifying these common issues and weaknesses assists the Planning Committee in understanding the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. See Table 5-6 for a full list of mitigation actions and the corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 4-61 and Table 5-6.

Table 4-61 Flood Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-FL-MC-27	Flood	Impact	PPRO - Property Protection , PE&A - Public Education & Awareness , NRP - Natural Resource Protection , SP - Structural Projects	**Mendocino County**	The following critical facilities are located in the 100-YR flood plain: Residential Elder Care Facility (131 Whitmore LN), Mendocino County Mental Health Services (221B S Lenore Ave), Hopland Volunteer FD (151 Henry Station Rd., 21 Feliz Creek Rd.), Ukiah Valley Fire Protection District (1301 Talmage Rd.), Covelo Volunteer FD (75900 Covelo Rd.)	ma-FL-MC-148, ma-FL-MC-213
ps-FL-MC-28	Flood	Impact	PPRO - Property Protection , PE&A - Public Education & Awareness , NRP - Natural Resource Protection , SP - Structural Projects	**Mendocino County**	There are approximately 112 County bridges located in the 100- YR flood plain. County bridges of concern include: Tenmile Creek @ Branscomb Rd., C-101, Hulls Creek @ Hulls Valley Rd. ford, Grist Creek @ Dobbie Ln. ford, Mill Creek @ Short Creek Rd. ford, Town Creek @ Airport Rd. ford, Strong Mt. Creek @ Sherwood Rd. ford, Tomki Creek @ Hearst Willits Rd. ford, Cave Creek @ Tomki Rd. eight fords, Busch Creek @ Busch Ln. ford, Davis Creek @ Center Valley Road, Tributary Haehl Creek @ Bray Road, Tributary Garcia River @ Mamie Laiwa Rd.	ma-FL-MC-210
ps-FL-MC-29	Flood	Impact	PPRO - Property Protection , NRP - Natural Resource Protection , SP - Structural Projects	**Mendocino County**	The Russian River (E of Ukiah) routinely floods affecting the following County infrastructure and roads: Russian River @ Main Street Potter Valley, C-106, Russian River @ Eastside Potter Valley Rd. C-103. Russian River @ Vichy Springs Rd. C-107, Tributary to Russian River @ East Gobbi St., South Doolin Creek Tributary to Russian River @ Fairview Ct & Norgard Ln., Mill Creek @ Talmage Ct., McClure Creek @ Sanford Ranch Rd., Feliz Creek @ Mt. House Rd. C-2, Feliz Creek @ MacMillian Dr.,	ma-EW-MC-207

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-FL-MC-30	Flood	Impact	PPRO - Property Protection , NRP - Natural Resource Protection , SP - Structural Projects	**Mendocino County**	The Noyo Harbor area experiences flooding from high river flows and high tides w/ storm surge that can impact County roads and infrastructure	ma-FL-MC-213
ps-FL-MC-31	Flood	Impact	PRV - Prevention , PPRO - Property Protection , SP - Structural Projects	**Mendocino County**	Buildings permitted as “class k” structures under the building code could be at a higher risk of flood events	ma-AH-MC-205
ps-FL-MC-32	Flood	Victim	PPRO - Property Protection , PE&A - Public Education & Awareness , SP - Structural Projects	**Mendocino County**	There are approximately 6,068 people living in the 100-YR flood plain in the County	ma-FL-MC-148, ma-FL-MC-125

4.5.7 Severe Weather Hazard Profile

Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life.

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

The MJHMP Planning Committee identified two types of severe weather events that typically impact Mendocino County:

- high wind
- heavy rain

Some other types of severe weather are discussed in the context of climate change. Those include extreme heat and fog. The following are characteristics of severe weather events that can occur in Mendocino County.

High Wind

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

- **Straight-line winds**—Any thunderstorm wind that is not associated with rotation; this term is used primarily to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- **Downdrafts**—A small-scale column of air that rapidly sinks toward the ground.
- **Downbursts**—A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst of damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- **Microbursts**—A small, concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph. There are both wet and dry microbursts. A wet microburst is accompanied by heavy precipitation. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.

- **Gust front—**A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes winds push up air above them, forming a shelf cloud or detached roll cloud.
- **Derecho—**A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of the boundary formed by horizontal spreading of thunderstorm-cooled air. The word "derecho" is of Spanish origin and means "straight ahead." Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.
- **Bow Echo—**A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground. (The National Severe Storms Laboratory, n.d.)

Heavy Rain

Heavy rain is described as greater than 4 mm per hour, but less than 8 mm per hour. (United States Geological Survey, n.d.) Heavy rain can lead to flooding even on dry soil and especially on impervious surfaces. In urban areas, direct runoff is relatively extensive, not only because of the density of roofs and impermeable pavements which allow less rain to infiltrate the ground but also because storm-sewer systems carry more water directly to the streams and lakes. In a more natural or undeveloped area, direct runoff is considerably less. (United States Geological Survey, n.d.) The average annual rainfall in Mendocino County ranges from slightly less than 35 inches in the Ukiah area to more than 80 inches near Branscomb. Most of the precipitation falls during the winter, and substantial snowfall is limited to higher elevations. Rainfall is often from storms that move in from the northwest. Virtually no rainfall occurs during the summer months.

4.5.7.1 Plans, Policies, and Regulatory Environment

There are very few formal regulations that pertain directly to severe weather events. The California Building Code,[10] adopted by Mendocino County and the participating jurisdictions, is generally adequate to properly address development impacts from severe weather events.

[10] Available at https://www.dgs.ca.gov/BSC/Codes.

4.5.7.2 Past Events

Heavy rain and high/strong wind events have been the primary types of severe weather events to occur in Mendocino County since the year 2000. Table 4-62 summarizes severe weather events in Mendocino County since 2000, as recorded by the National Oceanic and Atmospheric Administration (NOAA). Heavy rain events are most common, resulting in property damage 13 years out of 19.

4.5.7.3 Location

Severe weather events have the potential to happen anywhere in the planning area. Wind events are most damaging to areas that are heavily wooded. Heavy rain events can be more impactful in more populous areas with greater impervious surfaces. The following figures show average weather conditions for Mendocino County, including:

- Figure 4-41: Average Annual Precipitation (1981-210), and
- Figure 4-42: Annual Average Wind Speed.

Table 4-63 explains further the classes of wind power density shown in Figure 4-42.

4.5.7.4 Frequency/ Probability of Future Events

Severe weather events since the year 2000 have caused a total of $34,417,000 worth of property damage in Mendocino County. Severe weather events occur annually in Mendocino County to varying degree, not always with property damage involved.

High Wind: Figure 4-42 displays average annual wind speeds by power class in Mendocino County and Table 4-63 describes wind power classes.

Heavy Rain: Figure 4-21 in the Climate Change hazard profile depicts precipitation departure from average. Even if overall precipitation does not significantly depart from average in the future, heavy rainfall events are predicted to increase with climate change. (United States Geological Survey, n.d.)

Table 4-62: Severe Weather Damage Summary by Year 2000-2019

Year	Total Property Damage Value ($)	Total Crop Damage Value ($)
Heavy Rain Events		
2005	0	None reported
2017	2,500,000	None reported
2017	2,000,000	None reported
2017	1,300,000	None reported
2017	7,000,000	None reported
2017	550,000	None reported
2017	3,000,000	None reported
2017	400,000	None reported
2017	2,000,000	None reported
2017	4,500,000	None reported
2017	1,700,000	None reported
2017	1,250,000	None reported
2017	1,200,000	None reported
2017	6,000,000	None reported
2018	0	None reported
2018	0	None reported
2018	0	None reported
2019	0	None reported
2019	0	None reported
High/ Strong Wind		
2000	0	None reported
2001	0	None reported
2001	0	None reported
2002	0	None reported
2002	0	None reported
2002	0	None reported
2004	0	None reported
2005	1,000,000	None reported
2006	0	None reported
2015	0	None reported
2015	0	None reported
2017	17,000	None reported
Total	**34,417,000**	**0**

Source: NOAA Storm Events Database

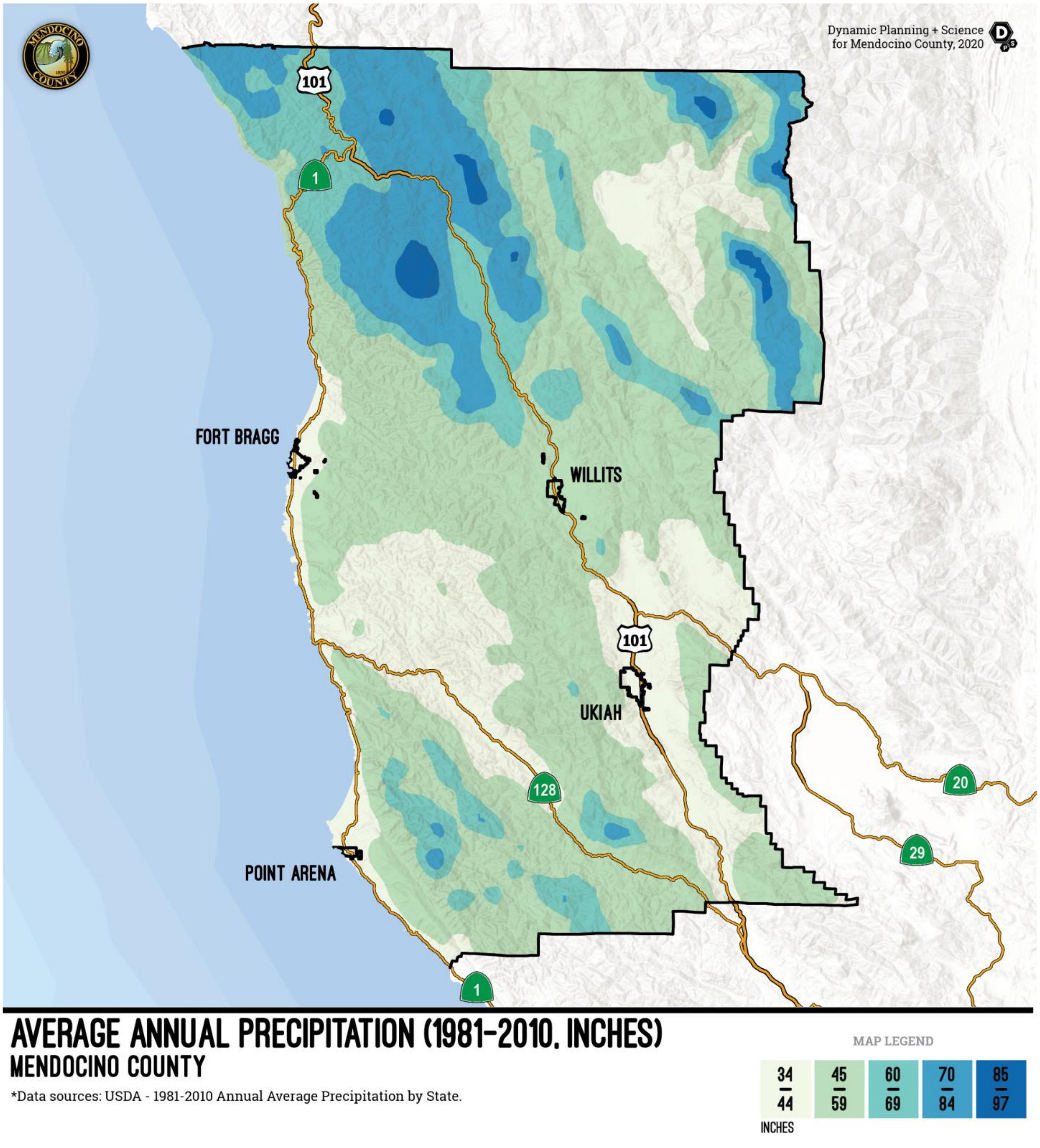


Figure 4-41: Mendocino County - Average Annual Precipitation

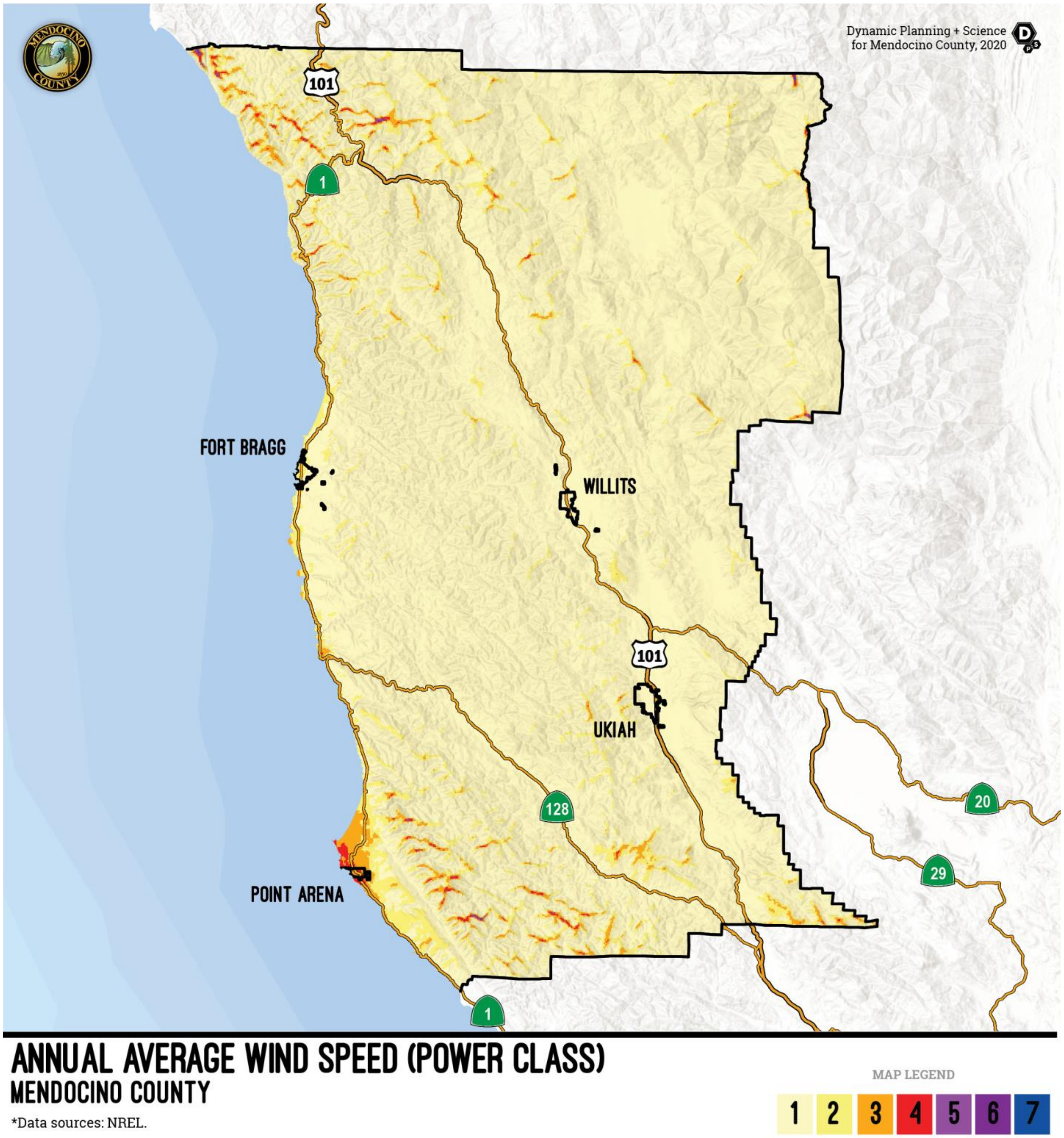


Figure 4-42: Annual Average Wind Speed (Power Class)

Table 4-63: Classes of Wind Power Density at 10 m and 50 m[a]

Wind Power Class	10 m (33 ft) Wind Power Density (W/m2)	Speed[b] m/s (mph)	50 m (164 ft) Wind Power Density (W/m2)	Speed[b] m/s (mph)
1	0	0	0	
	100	4.4 (9.8)	200	5.6 (12.5)
2	150	5.1 (11.5)	300	6.4 (14.3)
3	200	5.6 (12.5)	400	7.0 (15.7)
4	250	6.0 (13.4)	500	7.5 (16.8)
5	300	6.4 (14.3)	600	8.0 (17.9)
6	400	7.0 (15.7)	800	8.8 (19.7)
7	1000	9.4 (21.1)	2000	11.9 (26.6)

[a] *Vertical extrapolation of wind speed based on the 1/7 power law.*
[b] *Mean wind speed is based on Rayleigh speed distribution of equivalent mean wind power density. Wind speed is for standard sea-level conditions. To maintain the same power density, speed increases 3%/1000 m (5%/5000 ft) elevation.*

NOTE: Each wind power class should span two power densities. For example, Wind Power Class = 3 represents the Wind Power Density range between 150 W/m2 and 200 W/m2. The offset cells in the first column attempt to illustrate this concept.

4.5.7.5 Severity and Extent

The most common problems associated with high wind and heavy rain are immobility and loss of utilities. Fatalities are uncommon but can occur. Roads may become impassable due to flooding, downed trees, or a landslide. Power lines may be downed due to high winds, and services such as water or phone may not be able to operate without power.

High Wind: Windstorms can be a problem in the planning area and could cause damage to utilities. It is important to note that the predicted wind speed given in wind warnings issued by the National Weather Service is for a one-minute average; gusts may be 25 to 30 percent higher.

Heavy Rain: Heavy rain has been a problem in Mendocino County and could cause future damage to facilities and utilities in the planning area. From 2000 to 2019, heavy rain events were the most common form of severe weather, resulting in property damage 13 years out of 19.

4.5.7.6 Warning Time

High Wind: Meteorologists can often predict the likelihood of high winds, which can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of high winds. Some storms may come on more quickly and have only a few hours of warning time. A Red Flag Warning is issued when warm temperatures, very low humidity, and stronger winds are expected to combine in order to produce an increased risk of fire danger. (National Weather Service)

Heavy Rain: As with high winds, meteorologists can often predict their likelihood of a storm with heavy rains. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of heavy rain. Some storms may come on more quickly and have only a few hours of warning time.

4.5.7.7 Secondary Hazards

High Wind: The most significant secondary hazards associated with high winds are falling and downed trees, downed power lines, and wildfire. High winds can cause damage to properties and destruction of roadways. It can magnify wildfires and increase their rate of travel.

Heavy Rain: The most significant secondary hazards associated with heavy rains are flooding, which also includes falling and downed trees, landslides, and downed power lines. Heavy rain can cause damage to properties and destruction of roadways. Landslides occur when the soil on slopes becomes oversaturated and fails. Landslides are further outlined as slope failure in Section 4.5.8, while flooding is analyzed in Section 4.5.6.

4.5.7.8 Climate Change

The effects of climate change are varied and include warmer and more varied weather patterns, such as melting ice caps and poor air quality. As a result, climate change will likely worsen a number of natural hazards, including severe weather. The effects of climate change on severe weather are most likely to create more frequent and prolonged periods of extreme heat. However, climate change will result in unpredictable temperature fluctuations that could lead to freezing events during the warmer months of the year, which could have a devastating effect on agriculture. (United States Environmental Protection Agency, 2016)

4.5.7.9 Severe Weather Vulnerability Analysis

4.5.7.9.1 Population

It can be assumed that the entire planning area is exposed to some extent to severe weather events. Certain areas are more exposed due to geographic location and local weather patterns. Populations living at higher elevations with large stands of trees or power lines may be more susceptible to wind damage and blackout.

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

4.5.7.9.2 Property

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

4.5.7.9.3 Critical Facilities and Infrastructure

All critical facilities exposed to flooding are also likely exposed to severe weather. Additional facilities on higher ground may also be exposed to wind damage or damage from falling trees. The most common problems associated with severe weather is the loss of utilities. Downed power lines can cause blackouts, leaving large areas isolated and phone, water, and sewer systems inoperable. Roads may become impassable due to flooding, downed trees, or landslides.

4.5.7.9.4 Lifelines

Loss of roads or power and communication lines are the primary transportation failures resulting from severe weather and are mostly due to secondary hazards such as floods, falling and downed trees, landslides, and wildfire. Landslides caused by prolonged heavy rains can block roads. High winds can cause significant damage to trees and power lines, blocking roads with debris, damaging transportation infrastructure, isolating populations, and disrupting ingress and egress routes.

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

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

4.5.7.9.5 Future Trends in Development

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

4.5.7.9.6 Severe Weather Hazard Problem Statements

As part of the mitigation action identification process, the Planning Committee for the County and for each jurisdiction identified issues and weaknesses, also called problem statements, for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool and flood data. Severe weather problem statements for Mendocino County are listed in Table 4-64; problem statements for all other planning partners are accessed in Volume 2 of this plan.

Identifying these common issues and weaknesses assists the Planning Committee in understanding the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. See Table 5-6 for a full list of mitigation actions and the corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 4-64 and Table 5-6.

Table 4-64 Severe Weather Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-EW-MC-53	Extreme Weather	Impact	PPRO - Property Protection , SP - Structural Projects	**Mendocino County**	Heavy rains could create localized flooding issues around County infrastructure including buildings and roads, posing a threat to buildings and creating hazardous travel condition. The following areas experience localized flooding due to outdated storm drainage facilities: Village of Mendocino (Howard St., Ukiah St., Calpella St., Albion St., Lansing St., Main St.); Talmage (Talmage Ct., Burk Rd., Glenrob Rd.); Hopland – Old Hopland (1st St., Center St., St. Mary Ave., McDowell St., Sanel St., Howell St.); Redwood Valley at East Road & School Way; Main St. Potter Valley; Gualala Rd.;	ma-EW-MC-207, ma-EW-MC-207, ma-EW-MC-208
ps-EW-MC-54	Extreme Weather	Threat	PPRO - Property Protection , PE&A - Public Education & Awareness , NRP - Natural Resource Protection	**Mendocino County**	High winds exacerbate the threat of wildfire	ma-AH-MC-134
ps-EW-MC-55	Extreme Weather	Threat	PPRO - Property Protection , NRP - Natural Resource Protection	**Mendocino County**	High winds can blow trees over presenting hazards for buildings, roads, and pedestrians/cars	ma-WS-MC-118

4.5.8 Slope Failure Hazard Profile

Landslides, mudflow, debris flow, and rockfall, collectively known as slope failure, may cause damage across the County. These types of slope failure are addressed as one collective "slope failure" hazard in this profile, as the vulnerability assessment and mitigation strategies are similar between all types of slope failure.

They rarely present a threat to human life, but often result in a disruption of everyday services, including emergency response capabilities. Landslides can block transportation routes, dam creeks and drainages, and contaminate water supplies. When these hazards affect transportation routes, they are frequently expensive to clean-up and can have significant economic impacts on the County. (United States Geological Survey, 2004)

The four most common types of slope failure (Landslide, Debris Flow, Rockfall, and Alluvial Fans) are briefly described below.

Landslide

The many types of landslides are categorized based on form and type of movement. They range from slow-moving rotational slumps and earth flows, which can slowly distress structures but are less threatening to personal safety, to fast-moving rock avalanches and debris flows that are a serious threat to structures and have been responsible for most fatalities during landslide events. Many large landslides are complex and a combination of more than one landslide type. (United States Geological Survey, n.d.)

Mudflow/Debris Flow

When slope material becomes saturated with water, a debris flow may develop. Debris flows can also occur from horizontal seismic inertia forces induced in a slope from ground shaking. From a geologic perspective, there are generally two types of debris flows: debris flows related to shallow landslides and post-wildfire debris flows. (United States Geological Survey, 2005)

Debris flows related to shallow landslides occur on hillslope due to soil failure in which soil liquefies and runs downhill. This type of debris flow generally results from a shallow landslide (less than 10 to 15 feet deep) and has a discrete initiation zone depositional area. Shallow landslides tend to occur in winter but are most likely after prolonged periods of heavy rainfall when soil materials are saturated. Debris flows are typically more dangerous because they are fast-moving, causing both property damage and loss of life. (*Id.*)

Post-wildfire debris flows are a result of post-fire conditions, where burned soil surfaces enhance rainfall runoff that concentrates in a channel and picks up debris as it moves. The post-fire debris flow has a less discrete initiation zone but is similar to a debris flow derived from hillslopes in that it may result in inundation and a detrimental impact on lives and property within its zone of runout and deposition. It can result in downstream flooding. (*Id.*)

Figure 4-43: Landslide on Highway 101
Photo by California Highway Patrol https://sanfrancisco.cbslocal.com/2017/04/20/massive-landslide-shuts-down-highway-101-in-mendocino-county/

An example of a catastrophic slope failure is an event that occurred in Mendocino County on April 20, 2017, when significant rainfall triggered a large landslide on Highway 101. See Figure 4-43 for a photograph of this incident.

Rockfall

Rockfall is the falling of a newly detached mass of rock from a cliff or rock outcrop or a loose rock that erodes out of unconsolidated debris on a hillside and rolls or falls down a very steep slope. Over-steepened slopes like those along roadcuts or in glaciated terrain are susceptible to rockfall due to the steep slopes that are not highly vegetated or benched, which can help attenuate rockfall. Rock outcrops that are highly fractured and/or undercut by weaker rock layers are also susceptible to rockfall. (CGS, 2020)

Alluvial Fan

Alluvial fans consist of sediment deposits leftover from a flood event. The sediment is carried by a flood and distributed in a fan-like shape. Alluvial fans represent a high risk of natural hazards in the form of debris flow as the deposited soil remains unstable after the flood event. Alluvial fan channels are located on footslope landforms in the transition space between valley floodplains and steep mountain slopes and are preceded by high-gradient, contained channels. Coarse material deposits are formed by the rapid change in transport capacity as the high energy mountainslope streams spill onto the valley floor. Riparian areas resemble the shape of the landform which is narrow at the apex and broader at the bottom where the fan widens. (United States Department of Agriculture)

4.5.8.1 Plans, Policies, and Regulatory Environment

Mendocino County General Plan

The 2009 Mendocino County General Plan includes the following policies in the Resource Management Element and the Development Element to mitigate the effects of slope failure:

Resource Management Element

Policy RM-61: Development shall be located, designed, constructed, and managed as follows to protect soil resources, and minimize soil loss and erosion:

- Slopes over 15 percent: Limit land uses, densities, intensities, and disturbances, vegetation removal, and hydrologic modifications on slopes exceeding 15 percent.
- Slopes 20 percent or more: In addition to standards for slopes over 15%, establish slope stability requirements for areas with, or directly adjacent to, slopes of 20 percent or greater within geologic units susceptible to slope failure and areas of mapped landslides.
- Slopes 30 percent or more: In addition to standards for slopes over 20%, discourage road and building site construction in areas that exceed 30 percent slopes or cross slopes.

Action Item RM-61.1: Prior to development, require evaluation of slope stability in areas with the potential for landslides, including structural foundation engineering and potential impacts to adjacent lands. The Building Official may waive this evaluation for existing single-family lots.

Policy RM-62: Discourage development and conversion from rangeland to intensive agriculture in areas of known landslides or slopes where weak geologic materials are susceptible to land sliding.

Development Element

Policy DE-231: Prior to recordation, new or reconfigured lots in areas zoned for residential, commercial or industrial use shall demonstrate sufficient areas with acceptable risk of geologic, seismic, slope and soils-related hazards to accommodate the proposed land uses, densities and intensities.

Regulation of Cut Surfaces in Mendocino County Code, § 18.70

The Mendocino County Code discusses the regulation of slope via its Grading Code, § 17.28. It requires that the slope of cut surfaces shall be no steeper than is safe for the intended use and shall be no steeper than two (2) units horizontal to one (1) unit vertical, the exception being if the applicant furnishes a soils engineering or an engineering geology report, or both, stating that the site has been investigated and giving an opinion that a cut at a steeper slope will be stable and not create a hazard to public or private property.

4.5.8.2 Past Events

According to NOAA, the most common type of slope failure in Mendocino County is debris flow, which typically occurs during winter months. Table 4-65 lists the slope failure events that took place in the County since the year 2000.

Table 4-65: Slope Failure Events in Mendocino County Since 2000

Date	Type of Event	Property Damage Value ($)	Crop Damage
12/28/2005	Debris Flow	3,600,000	None reported
12/28/2005	Debris Flow	8,650,000	None reported
12/28/2005	Debris Flow	8,650,000	None reported

Source: NOAA Storm Events Database

4.5.8.3 Location

The best available predictor of where slope failure might occur is the location of past movements. Past landslides can be recognized by their distinctive topographic shapes, which can remain in place for thousands of years. Most landslides recognizable in this fashion range from a few acres to several square miles. Most show no evidence of recent movement and are not currently active. A small proportion of them may become active in any given year, with movements concentrated within all or part of the landslide masses or around their edges.

Figure 4-44: Mudslide on Highway 1 in Mendocino County
Photo by The San Francisco Chronicle, https://www.sfchronicle.com/bayarea/article/Storm-watch-Scary-moments-as-landslide-takes-out-6884870.php#photo-9612874

Recognizing ancient dormant mass movement sites is important to identify current areas susceptible to flows and slides because they can be reactivated by earthquakes or by exceptionally wet weather. Those ancient scars also consist of broken materials, frequently involve disruption of groundwater flow, and are vulnerable to construction-triggered sliding.

Mendocino County does have a history of mudflow events that have impacted transportation, access to more remote residences in the unincorporated county, and caused property damage. Figure 4-44 shows a 2016 mudflow that pressed a Caltrans employee and his dump truck against the side of a guard rail on Highway 1 in Mendocino County.

Figure 4-45 shows low, moderate, and high landslide risk exposure. The map depicts a general characteristic of higher risk throughout the county. This map should be used with caution, as site-specific conditions can make some locations in low to moderate instability areas highly unstable and some high instability locations more stable.

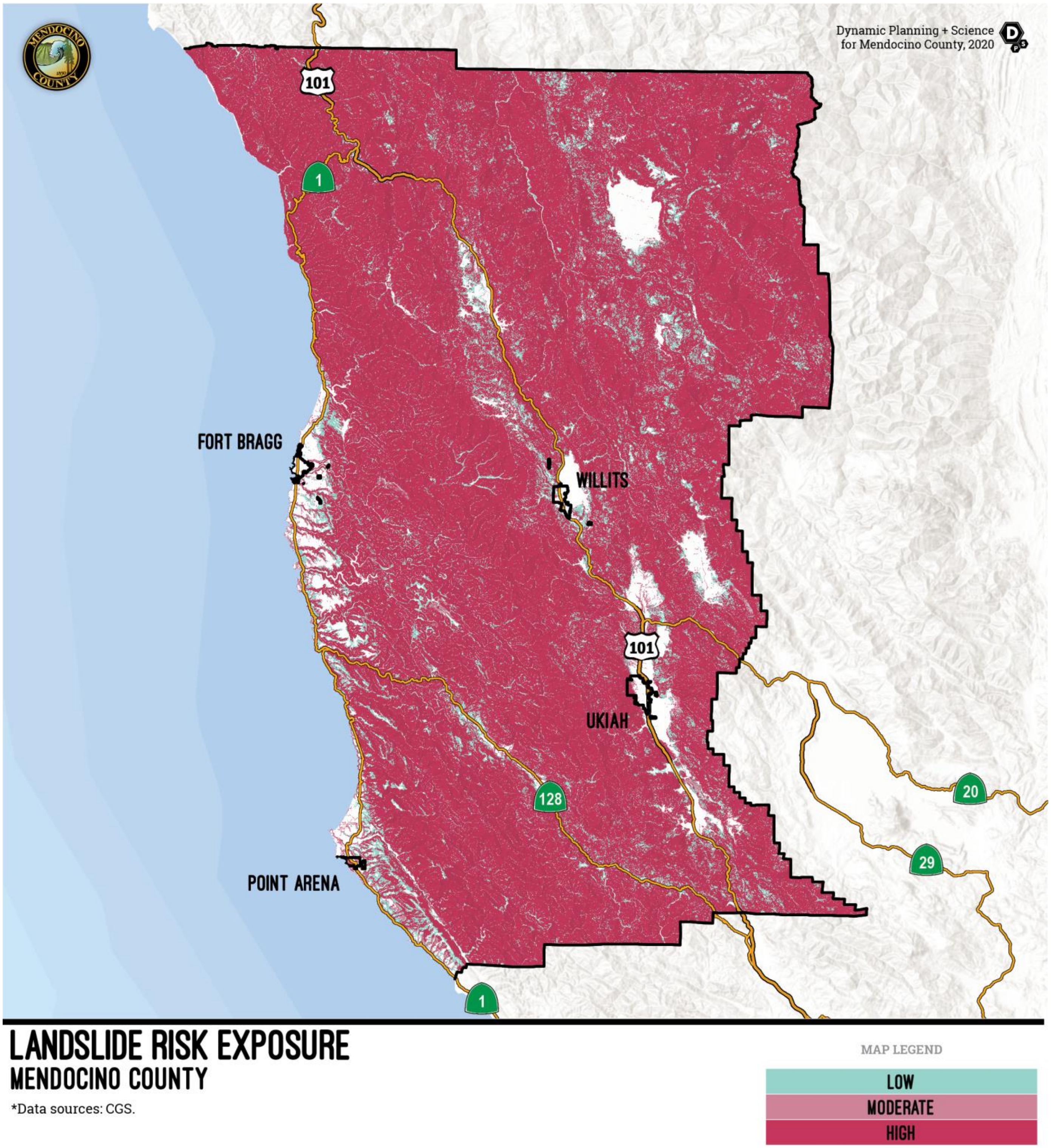


Figure 4-45: Landslide Risk Exposure

4.5.8.4 Frequency/ Probability of Future Occurrences

Slope failures are most frequently triggered in periods of high rainfall. The hazard is greatest in areas with steep slopes, although slides may occur on slopes of 15 percent or less if the conditions are right. Slope steepness and underlying soils are the most important factors affecting the landslide hazard. However, surface and subsurface drainage patterns also affect the landslide hazard, and vegetation removal can increase the likelihood of a landslide. (United States Geological Survey, 2004)

Slope failures are often triggered by other natural hazards such as earthquakes, heavy rain, floods, or wildfires, so landslide frequency is often related to the frequency of these other hazards. The probability of slope failure occurring in Mendocino County is likely (between 10 and 100% annual probability).

4.5.8.5 Severity and Extent

The severity of landslide problems depends upon the local bedrock and soil conditions, including moisture content, slope, and vegetation. Small landslides are common in the County's mountain areas as loose material moves naturally down slope or fires have caused loss of soil-stabilizing vegetative cover. In addition, many human activities tend to make the earth materials less stable and, thus, increase the chance of ground failure. Some of the natural non-seismic causes of ground instability are sCommittee and lakeshore erosion, heavy rainfall, and poor-quality natural materials. Human activities contribute to soil instability through grading of steep slopes or overloading them with artificial fill, by extensive irrigation, construction of impermeable surfaces, excessive groundwater withdrawal, and removal of stabilizing vegetation. (USGS, 2020)

4.5.8.6 Warning Time

Some geologic hazards occur slowly but can have significant property or health consequences, like erosion and some forms of slope movement or land sliding. The identification of those hazards generally takes site-specific analysis to determine if the site soils and geology are susceptible to these hazards and what mitigation is most relevant and prudent for a site. For these types of hazards, warning time is long.

For other hazards, such as debris flows, rockfall, and landslides, warning time is often very short and may not occur at all. Identifying areas where these events are known have occurred, or which have ideal characteristics for these hazards to occur, could help with hazard preparedness when triggering-type events like intense rainfall occur. This identification won't reduce the warning time, but it will make proactive response to potential triggering events more effective. (Manconi, 2016)

4.5.8.7 Secondary Hazards

There are some hazards that can trigger or exacerbate slope failure. Flooding, for example, can undercut the toe of a slope which can remove the support for the slope and cause a landslide or rockfall. Wildfires create an immediate hazard of their own and create long-term impacts by altering the soil structure, impeding its ability to absorb moisture, and destroying vegetation that binds the soil with roots and absorbs rainfall and runoff with foliage. Post-wildfire, even small rainfall events can create devastating mudflows, debris flows, and landslides. Areas that are mapped currently as low to moderate risk of these hazards may have high risk after a wildfire.

4.5.8.8 Landslide Vulnerability Assessment

Figure 4-46 displays landslide susceptibility for population and infrastructure in Mendocino County. This section discusses exposure to this vulnerability.

4.5.8.8.1 Population

An estimated 37,701 persons, or 65.40% of the County population, are exposed to slope failure areas, as shown in Table 4-66 below. Population estimates within slope failure areas were generated by analyzing County assessor and parcel data that intersect with landslide hazard areas identified by California Geological Survey. Using GIS, U.S. Census Bureau information was used to intersect slope failure hazards an estimate of population was calculated by weighting the population within each census block and track with the percentage of slope hazard areas.

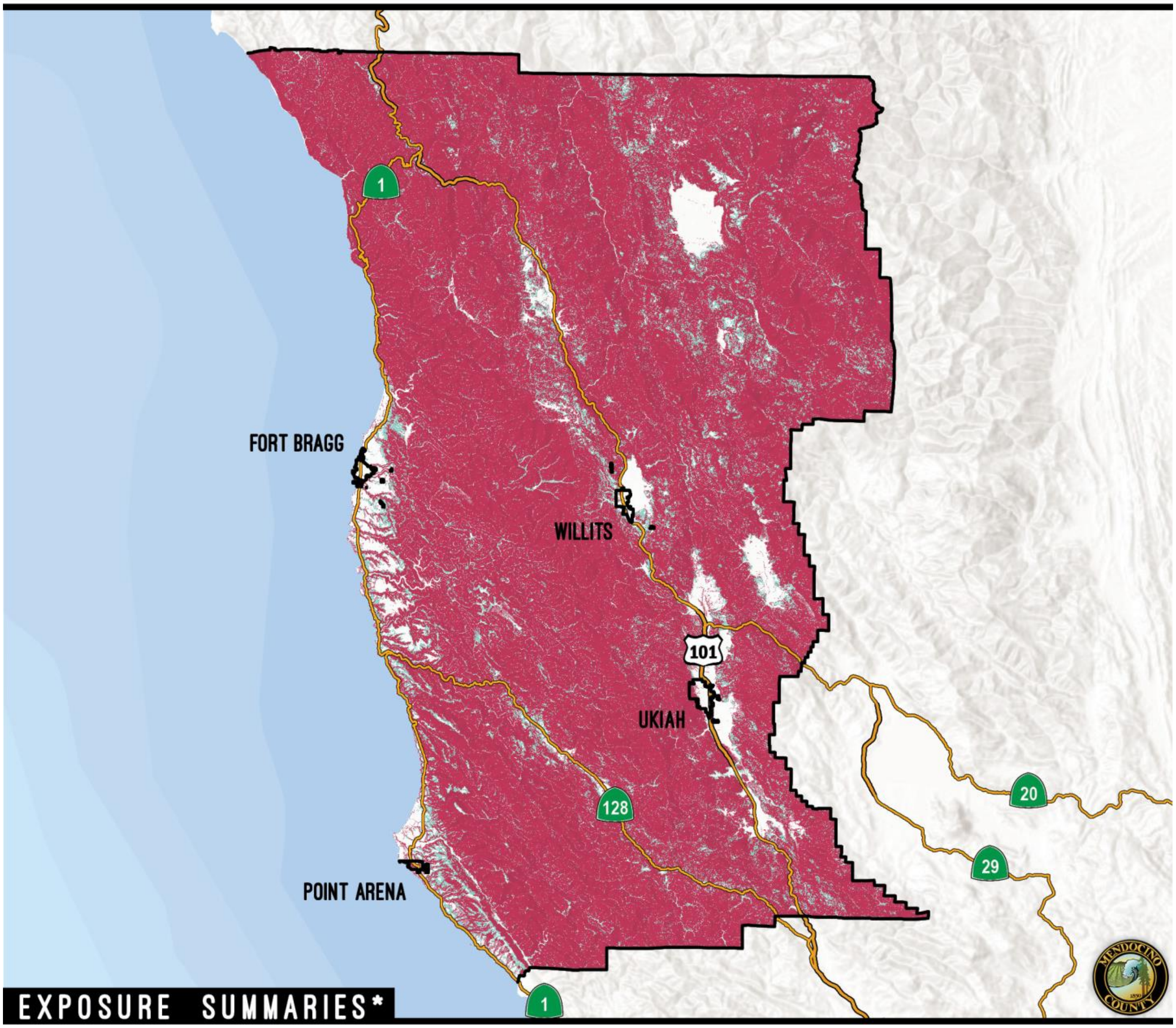
Table 4-66: Population Exposure to Landslide Susceptibility

	Total Population
Unincorporated County	58,995

Landslide Susceptibility	Population Count	% of Total
High	28,500	*48.31%*
Moderate	2,820	*4.78%*
Low	7,265	*12.32%*
Total	**38,586**	**65.41%**

LANDSLIDE RISK EXPOSURE SNAPSHOT

MENDOCINO COUNTY



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA

Count	Exp. Rate**
28,500	48%
Count Includes:	HIGH

PARCEL COUNT IN HAZARD AREA

Count	Exp. Rate**
7,627	31%
Count Includes:	HIGH

PARCEL VALUE IN HAZARD AREA

	Exp. Rate**
Sum of Improvement Value: $1,246,794,278	27%
Sum of Content Value: $715,530,178	27%
Count Includes:	HIGH

CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
Essential Facilities	5	6%	HIGH
High Potential Loss	68	14%	*Sum of Transportation & Lifeline Linear Mileage*
Transportation & Lifeline	82	24%	11,877 64%

MAP LEGEND

- LOW
- MODERATE
- HIGH

*Exposure summaries include high landslide risk exposure areas. Hazard data source: CGS.

**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

Dynamic Planning + Science for Mendocino County, 2020

Figure 4-46: Landslide Risk Exposure Snapshot

4.5.8.8.2 Property

Table 4-67 shows the number of parcels, market value exposure and content value exposure in the steep-slope risk areas. The predominant zoning classes in cities are single-family, vacant and manufactured homes.

Table 4-67: Property Value Exposed to Landslides.

	Total Parcels	Total Market Value ($)	Total Content Value ($)	Total Value ($)
Unincorporated County	24,371	$ 4,544,212,021	$ 2,693,943,855	$ 7,238,155,876

Landslide Susceptibility	Parcel Count	% of Total	Market Value Exposure ($)	Content Value Exposure ($)	Total Exposure ($)	% of Total
Low	4,571	*18.8%*	$ 888,779,787	$ 492,127,263	$ 1,380,907,050	*19.1%*
Moderate	2,035	*8.4%*	$ 445,434,110	$ 260,278,726	$ 705,712,836	*9.7%*
High	7,627	*31.3%*	$ 1,246,794,278	$ 715,530,178	$ 1,962,324,456	*27.1%*
Total	**14,233**	**58%**	**$ 2,581,008,175**	**$ 1,467,936,166**	**$ 4,048,944,341**	**55.9%**

4.5.8.8.3 Critical Facilities and Infrastructure

Several types of infrastructure are exposed to mass movements, including transportation, water, sewer, and power infrastructure. At this time, all infrastructure and transportation corridors identified as exposed to the landslide hazard are considered vulnerable until more information becomes available. Table 4-68 and Table 4-69 summarize the critical facilities exposed to the slope failure hazard.

Table 4-68: Critical Facility Points with Slope Failure Hazard Risk (Unincorporated County)

Critical Infrastructure - Landslide Susceptibility			
Infrastructure Type	High	Moderate	Low
Essential Facility	5	9	22
EOC	-	-	-
Fire Station	4	6	21
Law Enforcement	-	1	-
Medical Facility	1	2	1
High Potential Loss	68	40	56
Adult Residential Facility	-	1	-
Alternative Education Program	-	-	-
Animal Control	-	-	-
Child Care Center	1	7	1
Communication Tower	37	1	27
Community Center	1	-	-
Courthouse	-	-	-

Critical Infrastructure - Landslide Susceptibility			
Infrastructure Type	High	Moderate	Low
Dam	15	1	13
Detention Center	-	-	-
Fairground	-	-	-
Family Child Care Home	-	-	-
Foster Family Agency	-	-	-
Historic Building	1	1	3
Historic Site	-	-	1
Library	-	-	-
Museum	-	-	-
Office	-	-	-
Park and Recreation	2	2	-
Power Plant	-	-	2
Real Property Asset*	8	16	1
Residential Child Care	-	-	-
Residential Elder Care Facility	2	-	-
School	1	11	8
Shop	-	-	-
Storage	-	-	-
Wastewater Treatment	-	-	-
Transportation and Lifeline	82	27	76
Airport	-	-	1
Bridge	77	26	73
Bus Facility	-	-	-
Corp Yard	-	-	-
NG Station	-	-	-
Substation	2	1	1
Transfer Station	3	-	1
Hazmat	-	-	-
Hazmat	-	-	-
Grand Total	**155**	**76**	**154**

**Real Property Assets are digitized insurance rolls for demonstrating value and ownership and may have overlapping points with other categories such as fire stations and law enforcement.*

Table 4-69: Critical Facilities (Linear) with Slope Failure Hazard Risk (Unincorporated County)

Lifelines (miles) - Landslide Susceptibility			
Infrastructure Type (Linear)	High	Moderate	Low
Levee	0.0	0.4	-
NG Pipeline	13.0	4.2	8.9
Railroad	78.9	4.8	27.1
Street	4,046.1	211.1	1,443.1
4WD trail	800.2	10.3	259.1
4WD trail, major	20.4	-	4.4
Alley	-	-	-
Cul-de-sac	0.2	0.0	0.2
Driveway	165.3	8.7	52.2
Interstate	18.0	2.6	12.0
Local road	2,579.3	126.5	874.4
Local road, major	68.5	3.1	20.8
Primary highway	101.3	28.8	74.9
Ramp	1.8	2.1	2.0
Road, parking area	0.4	-	0.2
State/county highway	289.2	29.0	141.3
Thoroughfare, major	1.7	-	1.6
Traffic circle	-	-	0.0
Walkway	-	-	-
Transmission Line	197.9	13.4	66.8
Grand Total	**4,336.0**	**233.9**	**1,546.0**

4.5.8.8.4 Lifelines

A significant amount of linear infrastructure (or lifelines) can be exposed to mass movements:

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

4.5.8.9 Future Trends in Development

Mendocino County is equipped to handle future growth within landslide hazard areas. The 2009 Mendocino County General Plan addresses development in areas susceptible to slope failure, and the County Code implements the grading ordinance and other protective measures.

4.5.8.10 Slope Failure Hazard Problem Statements

As part of the mitigation action identification process, the Planning Committee for the County and for each jurisdiction identified issues and weaknesses, also called problem statements, for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool and flood data. Slope failure hazard problem statements are listed in Table 4-70; problem statements for all other planning partners are accessed in Volume 2 of this plan.

Identifying these common issues and weaknesses assists the Planning Committee in understand the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. Projects or actions have been developed to mitigate each problem identified. See Table 5-6 for a full list of mitigation actions and corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 4-70 and Table 5-6.

Table 4-70 Slope Failure Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-SF-MC-22	Slope Failure	Impact	PPRO - Property Protection , PE&A - Public Education & Awareness , NRP - Natural Resource Protection , SP - Structural Projects	**Mendocino County**	County transportation routes may be located near high danger landslide areas, which could result in blocked roads and dangerous driving conditions in the event of a landslide.	ma-SF-MC-225
ps-SF-MC-23	Slope Failure	Impact	PPRO - Property Protection , PE&A - Public Education & Awareness , SP - Structural Projects	**Mendocino County**	There are approximately 77 County bridges located in high landslide risk areas	ma-SF-MC-225, ma-SF-MC-151
ps-SF-MC-24	Slope Failure	Impact	PPRO - Property Protection , PE&A - Public Education & Awareness	**Mendocino County**	The following critical facilities are located in a high landslide risk area: Child Care facility located at 1 School Way Garcia Sub Station Veterans Memorial Building Community Center	ma-SF-MC-225, ma-SF-MC-151
ps-SF-MC-25	Slope Failure	Victim	PE&A - Public Education & Awareness , NRP - Natural Resource Protection	**Mendocino County**	There are approximately 27,846 people living in a high landslide risk area in the County	ma-SF-MC-225

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-SF-MC-26	Slope Failure	Impact	PPRO - Property Protection , PE&A - Public Education & Awareness , NRP - Natural Resource Protection , SP - Structural Projects	**Mendocino County**	The following County roads are located in high landslide risk areas and have experienced damages from landslides in the past (Albion Little River Rd, Albion Ridge Rd, Albion River Rd, Alder Creek Beach Rd, Bald Mountain Rd, Bell Springs Rd, Black Bart Dr, Blackhawk Dr, Blue Lake Terrace, Branscomb Rd, Briceland Rd, Buckeye Rd, Canyon Rd, Caspar Little Lake Rd, Clover Rd, Comptche Ukiah Rd, Cow Mountain Access Rd, Cutoff Rd, Cypress Rd, Daphne Wy, Deerwood Dr, East Side Calpella Rd, East Side Potter Valley Rd, Eel River Rd, Elkhorn Rd, Eureka Hill Rd, Feliz Creek Rd, Fircrest Dr, Fish Rock Rd, Flynn Creek Rd, Fort Bragg Sherwood Rd, Frontage Rd, Garcia River Rd, Goose Rd, Gualala Rd, Hawk Rd, Hearst Willits Rd, Henry Station Rd, Hulls Valley Rd, Iversen Rd, Lake MendocinoDr, Laytonville Dos Rios Rd, Lilac Rd, Little River Airport Rd, Low Gap Rd, Main St, Marina Dr, Mendocino Pass Rd, Middle Ridge Rd, Mill Creek Rd, Mina Rd, Mountain House Rd, Mountain View Rd, Muir Mill Rd, Navarro Ridge Rd, Nokomis Rd, Oak Knoll Rd, Ocean Dr, Old Coast Hwy, Old River Rd, Old State Hwy, Old Toll Rd, Omega Dr, Orr Springs Rd, Pacific Dr, Peacock Dr, Philo Greenwood Rd, Pine Ave, Pine Mountain Rd, Point Cabrillo Dr, Poonkinney Rd, Poppy Dr, Pratt Ranch Rd, Primrose Dr, Rancheria Rd, Redemeyer Rd, Reeves Canyon Rd, Reynolds Hwy, Ridge Rd, Ridgewy Hwy, Robinson Creek Rd, Sherwood Rd, Shimmins Ridge Rd, Short Creek Rd, Spanish Canyon Dr, Spyrock Rd, Stoneboro Rd, Ten Mile Rd, Tomki Rd, Usal Rd, Van Arsdale Rd, Vichy Springs Rd, Watson Rd, West Rd, West Side Rd, Wilderness Lodge Rd, Windy Hollow Rd, Woodland Terrace & Zenia Rd.	ma-SF-MC-225, ma-SF-MC-151
ps-SH-MC-51	Slope Failure	Threat	NRP - Natural Resource Protection	**Mendocino County**	A lack of erosion control in areas around steep hillsides will increase the risk of landslide/mudflow/rockslide	ma-SF-MC-225
ps-SH-MC-52	Slope Failure	Threat	NRP - Natural Resource Protection	**Mendocino County**	A lack of erosion control can contribute to storm water channels becoming clogged w/ sediment and debris	ma-SF-MC-225

4.5.9 Soil Hazard Profile

Hazards associated with soils in Mendocino County include naturally occurring asbestos and erosion.

Naturally Occurring Asbestos

Asbestiform minerals occur naturally in rock and soil as the result of natural geologic processes. Naturally occurring asbestos includes fibrous minerals found in certain types of rock formations and is commonly found in ultramafic rock, including serpentine rock, and near fault zones. The amount of asbestos typically present in these rocks ranges from less than 1% up to about 25%, and sometimes more. Not all ultramafic rock contains asbestos; it only has the potential to contain asbestos. Environmental testing is able to determine if a rock contains asbestos.

Natural weathering or human disturbance can break naturally occurring asbestos down to microscopic fibers, easily suspended in air. Asbestos fibers are too small to be seen by the naked eye. They do not dissolve in water or evaporate; they are resistant to heat, fire, and chemical or biological degradation.

There is no health threat if naturally occurring asbestos remains undisturbed and does not become airborne. When rock containing asbestos is broken or crushed, asbestos fibers may be released and become airborne; when airborne naturally occurring asbestos is inhaled, these thin fibers irritate tissues and resist the body's natural defenses. Asbestos is a known carcinogen and causes cancers of the lung and the lining of internal organs, as well as asbestosis and other diseases that inhibit lung function. Covering naturally occurring asbestos with clean soil or planting grass reduces exposure. (Mendocino County General Plan, 2009)

Erosion

Erosion is the general process whereby the materials of the earth's crust are worn down, removed by weathering, and deposited in other places by water or air. Lakeshore erosion is a special problem involving wave action and can be practically eliminated by proper engineering, construction, and soil stabilization through vegetative cover. Alluvial fans that form at the base of mountain foothills are a product of erosion in the watershed above depositing debris on the gentler valley floors, often associated with debris flows. Development in these areas can be subject to inundation from mud to boulder-sized particles. Within urbanized areas, the major problem of erosion is from the continued need to remove sediment from drainage systems and basins. Sedimentation within these systems decreases the volume of flood flows that the system can handle. (USGS, 2020)

Coastal erosion is classified as either episodic or chronic. Episodic erosion consists of the shore and backshore adjustment that results from short duration, high intensity meteorological and oceanic storm events. This type of event response results in shore adjustment and happens during a single storm or during a series of closely spaced storm events within a storm season. Chronic erosion is associated with slow, gradual shoreline adjustment associated with sea-level rise, land subsidence, changes in sediment supply which result from watershed modifications or dam building, and decadal adjustments in rainfall and runoff associated with climate change.

Mendocino County may see an increase of 8.3 square miles of erosion with a 1.4-meter sea-level rise increase. (Pacific Institute, 2009) Such erosion would create more new challenges for local habitat as well as property owners who reside near the shoreline. (Sea Grant California, 2017) Coho salmon, Chinook salmon, and steelhead trout habitats are found in large portions of Mendocino County. The status of these species is of concern to federal, state, and local resource agencies. Wind and flood erosion can result in sedimentation, which can impact water quality and aquatic health and can result in habitat loss and general habitat degradation. (Mendocino County General Plan, 2009)

Agriculture is also heavily influenced by erosion. Growers may choose to implement procedures that control dust in order to improve visibility, reduce wind erosion and loss of topsoil, minimize damage to roads and structures, and limit health impacts due to poor air quality. Effective dust control methods conserve your topsoil, protect your downwind cropped acreage, and support compliance with air quality regulations. Soils remain viable for production only when soil loss is held below about 5 tons per acre per year. Figure 4-47 depicts the various stages of erosion typical in agricultural settings.

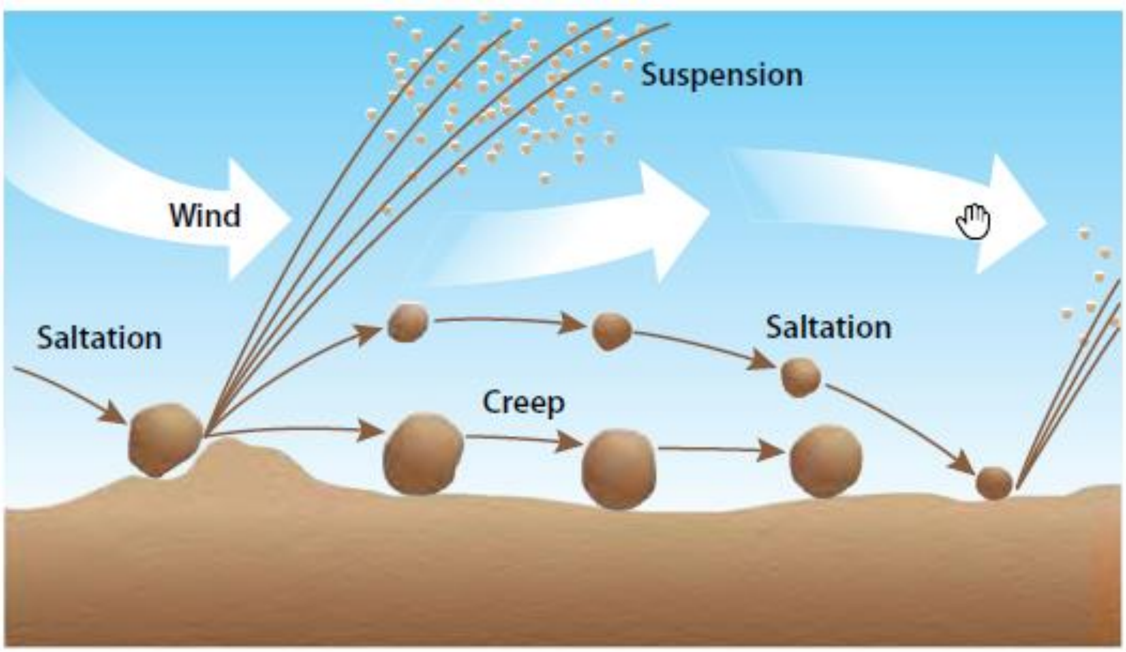


Figure 4-47: Illustration of various stages of erosion.
Source: Antelope Valley Dustbuster's Agricultural Guide to Controlling Windblown Sand and Dust, 2010, http://www.kernair.org/Documents/Dust_Buster/Dustbusters%20Agricultural%20Guide%2010-25-10.pdf

4.5.9.1 Plans, Policies, and Regulatory Environment

Naturally Occurring Asbestos

California State Naturally Occurring Asbestos Regulations: Title 17 CCR 93105

The state of California requires all districts to regulate any grading, quarrying, and surface mining operations, which have the potential to cause public health problems. Districts must either implement and enforce State regulations provided in section one of 17 CCR 93105 or propose their own asbestos airborne toxic control measure as provided in the Health and Safety Code section 39666(d).

Mendocino District Naturally Occurring Asbestos Policy

The District requires an evaluation and report by a State registered geologist to determine that any observed naturally occurring asbestos is below levels of regulatory concern in areas being disturbed. If the levels are above regulatory concern, the District requires applicants to follow mitigation measures detailed in Title 17, CCR, Section 93105(d), and (e).

Erosion

Healthy Soils Action Plan

The California Healthy Soils Action Plan was created by a collaboration of state agencies and departments, which are referred to as the Healthy Soils Initiative. They are headed by the California Department of Food and Agriculture. The California Healthy Soils Action Plan is meant to promote the development of healthy soils on California's farm and ranchlands. The benefits of healthy soil include increased plant health and yields, water retention, greenhouse gas sequestration, and reduced sediment erosion and dust. There are five primary actions which the Healthy Soils Initiative promotes:

- the protection and restoration of soil organic matter in California's soils
- the identification of sustainable and integrated financing opportunities to facilitate healthy soils
- the provision for research, education, and technical support to facilitate healthy soils
- increased governmental efficiencies to enhance soil health on public and private lands
- the promotion of interagency coordination and collaboration to support soils and related state goals

California Local Coastal Program

The California Legislature passed the Coastal Act in 1976, which created a mandate for coastal counties to manage the conservation and development of coastal resources through a planning and regulatory program called the Local Coastal Program. The Local Coastal Program is a planning document that identifies the location, type, densities, and other ground rules for future development in the coastal zone. Mendocino County has incorporated these mandates into the County's General Plan under the Mendocino County Coastal Element, which was adopted by the Board of Supervisors on November 5, 1985 and certified by the California Coastal Commission on November 20, 1985..

Protection of Air, Soil, and Water Quality in Mendocino County Code, § 9.33

The Mendocino County Code includes a provision that prohibits certain open burning to protect air quality by reducing the amount of pollutants in the air. It also prohibits open burning to protect soil and water quality. This code requirement reduces the amount of pollutants in the soil and water and consequently protects the public health and welfare.

Erosion Control in Mendocino County Code, § 18.70.130, § 20.492

The Mendocino County Code provides ordinances for mitigating erosion, which includes preparing and maintaining the faces of cut and fill slopes against erosion and other devices. The preparation and maintenance of cut and fill slope faces include effective planting and the use of check dams, cribbing, riprap, or other devices. (§ 18.70.130) Subsequent standards establish conditions to minimize any disturbance to soils, drainage patterns, geology, and topography. In particular, erosion standards are intended to minimize any impacts to erosion rates. Provisions encourage existing vegetation to be maintained on construction sites, the reseeding of any disturbed soils, and the regulation of development on sloped over 30 percent. (§ 20.492)

Mendocino County General Plan

The 2009 Mendocino County General Plan includes the following policies, implementation measures, and goals in the Resource Management Element and the Coastal Element to mitigate the effects of soil erosion and naturally occurring asbestos:

Resource Management Element

Policy RM-48: Reduce potential health hazards from disturbance in areas classified as likely to contain Naturally Occurring Asbestos (NOA).

> **Action Item RM-48.1:** Work with the Mendocino County Air Quality Management District to enforce standards for development within areas likely to contain Naturally Occurring Asbestos, including road construction, surface mining and grading operations.

Policy RM-49: Prohibit new road construction through areas with known Naturally Occurring Asbestos when feasible alternative transportation modes or routes are available.

Policy RM-59: Promote soil conservation practices by public and private landowners and managers.

Policy RM-63: Promote clustering and density transfers where appropriate to reduce soil loss and impacts to watersheds and fisheries.

Policy RM-64: Continue to identify and reduce soil erosion and sedimentation associated with lands, facilities and operations owned or operated by the County.

Coastal Element

Policy 3.4-1: The County shall review all applications for Coastal Development permits to determine threats from and impacts on geologic hazards arising from seismic events, tsunami runup, landslides, beach erosion, expansive soils and subsidence and shall require appropriate mitigation measures to minimize such threats. . .

4.5.9.2 Past Events

Naturally Occurring Asbestos: Naturally occurring asbestos emerged as a major issue in California beginning in El Dorado County with front-page news on March 29, 1998, resulting in public outcry and concern. As a result of the media attention on this issue, the county began screening sites for naturally occurring asbestos, tightening construction standards and requiring dust control measures on construction sites. The state banned the use of gravel containing asbestos above the detection level of 0.25 percent, conducted an air monitoring program to assess ambient concentrations of asbestos in the community and in other California counties, and produced a detailed geological map of rock formations in western El Dorado County more likely to contain asbestos.

What started in El Dorado County resulted in major changes to rulemaking for all counties in California and stringent requirements for school projects. Agencies involved in oversight and regulation include the California Air Resources Board, the Department of Toxic Substances Control, the Department of Conservation, the U.S. Geological Survey, the Division of Occupational Safety and Health (better known as Cal OSHA), the Agency for Toxic Substances, and the Disease Registry and U.S. Environmental Protection Agency. (Mendocino County MJHMP, 2014)

Figure 4-48: Naturally Occurring Asbestos Formation
Source: Mendocino County Air Quality Management District
http://www.co.mendocino.ca.us/aqmd/natural-occurring-asbestos.html

Erosion: Mendocino County has a number of areas susceptible to erosion. Ongoing erosion of local beaches and inland areas where soils possess low-density or low-strength properties. A critical issue related to erosion in Mendocino is sedimentation in local watersheds. Erosion from barren or poorly vegetated soils, erosion from the toes of slides along stream channels, and sediments from roads all contribute to degraded surface water quality issues in the county. Slopes are an additional factor in soil erosion in the County. The greater the slope, the greater the erosion hazard, especially if the soil is bare.

4.5.9.3 Location

Naturally occurring asbestos: In California, ultramafic rock, including serpentine rock, are often located in veins near earthquake faults in the coastal ranges and the foothills of the Sierra Nevada mountains. This type of rock is present in at least 44 of California's 58 counties. NOA is most prevalent in the eastern portion of the county; however, when airborne, it can become a risk for the entire county. The Air Quality Management District is responsible for enforcing state regulations regarding NOA in Mendocino County. Additionally, in 2003 the Natural Resources Conservation Service, the Mendocino County Department of Transportation, and Mendocino County GIS worked to develop a map of the areas in the County with a high probability of encountering serpentine or ultramafic rock formation. Consequently, additional mapping has been completed to track the possible presence of NOA; in 2005, the Mendocino County Air Quality Management District developed a map illustrating areas of concern, and in 2008, the USDA Forest Service released a map of the areas more likely to contain NOA for the Mendocino National Forest. (*Id.*) Figure 4-49 depicts areas where NOA has been found in the County and areas of concern for NOA within the County.

Erosion: Areas susceptible to erosion occur throughout the County, where surface soils possess low-density and low-strength properties. Erosion is generally located along coastal beaches, areas along surface waters, areas that have recently experienced the effects of wildfires, and it is also associated with landslides which occur in areas of the County with steep inclines, generally more inland. (Mendocino County, 2008)

4.5.9.4 Frequency/ Probability of Future Occurrences

Naturally occurring asbestos is present in Mendocino County and will continue to be. Since naturally occurring asbestos by definition is naturally occurring the County cannot control the presence of NOA, but the County can work to reduce the effects of naturally occurring asbestos. A variety of regulations have been put into place to reduce exposure to naturally occurring asbestos and to protect those when there is a potential for exposure. An example of naturally occurring asbestos mitigation includes covering asbestos-containing soils and slopes with dirt, grass or concrete, as appropriate for a site, as well as preventing dust emissions by wetting all soils at a site and those being brought to the site. There is a 100 percent chance that naturally occurring asbestos will continue to be present in Mendocino County; however, the effect of naturally occurring asbestos on the County is unknown due to the variety of factors involved in determining the effect of naturally occurring asbestos exposure.

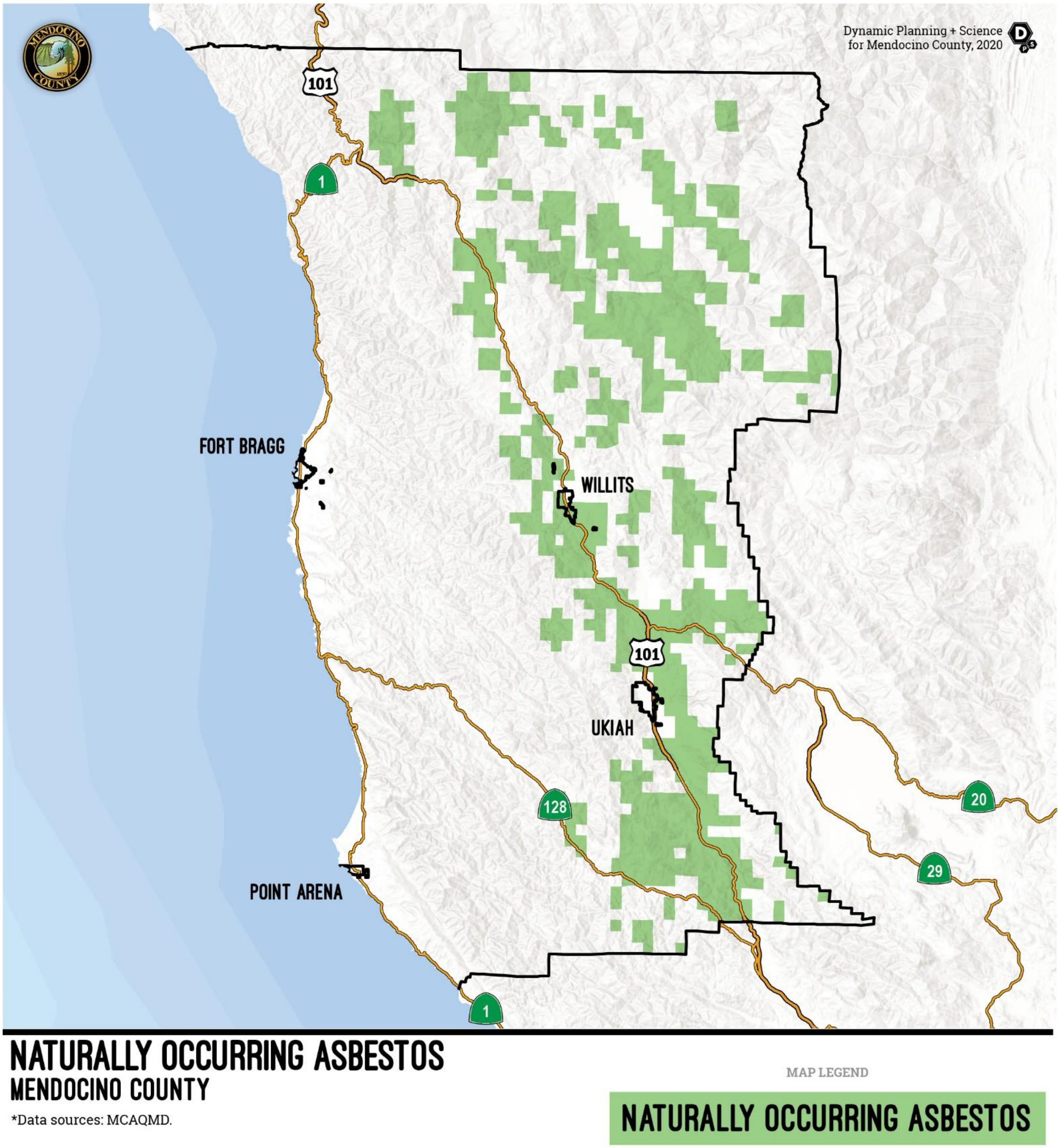


Figure 4-49: Naturally Occurring Asbestos

Erosion: Climate change has resulted in sea-level rise which is contributing to coastal erosion throughout California. It will also create a variance in terms of frequency and intensity of rainfall which also causes erosion, and which consequently results in the increased sedimentation of rivers, lakes, and streams. These changes have already been observed. While the impacts of climate change are predicted to increase regionally, the ability to predict their rate of occurrence at local scales is still limited. (United States Environmental Protection Agency, 2016)

4.5.9.5 Severity and Extent

Naturally Occurring Asbestos: If asbestos fibers are in the air, it is possible for the asbestos fibers to enter one's lungs. Breathing in the fibers is the primary way that people are exposed to asbestos. Asbestos fibers may remain in the lungs for a lifetime. In some cases, the fibers might damage the lungs or the membranes that cover the lungs, leading to illness and even death. Most people do not show signs or symptoms of asbestos-related disease until 10 to 20 years or more after they were exposed. (Mendocino County MJHMP, 2014)

Sources of asbestos emissions include unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present. (*Id.*) Figure 4-48 depicts a naturally occurring asbestos formation.

Erosion: Erosion can be a hazard for development, especially for construction near slopes with steep inclines. The greater the slope, the greater the erosion hazard, especially if the soil is bare. Most of the County has only a slight erosion hazard (slopes less than 9 percent), except for Redvine soils, which have a moderate hazard. Soils on 9 percent slopes and greater have a moderate erosion hazard, and soils on slopes greater than 15 percent have a high erosion hazard.

4.5.9.6 Secondary Hazards

Naturally Occurring Asbestos: There are no significant secondary hazards associated with asbestos. Secondary exposure to asbestos causes the same effects as primary exposure.

Erosion: Secondary hazards from erosion can include sedimentation and poor site construction conditions.

4.5.9.7 Soil Hazard Vulnerability Assessment

This soil hazard vulnerability assessment considers both naturally occurring asbestos and erosion. Naturally occurring asbestos has delineated hazard boundaries and quantifiable exposure and damage estimations, and thus tables and snapshot summary maps are included for this subhazard.

4.5.9.7.1 Population

Soil hazards pose a threat to the population of Mendocino County. Asbestos occurring near residential areas threatens the populations that live in those areas. Table 4-71 displays the potential population exposure to naturally occurring asbestos in the unincorporated county. Figure 4-50 displays an accompanying visual of population exposure summaries.

Population throughout Mendocino County may be vulnerable to erosion. The primary county vulnerability comes from coastal erosion along shorelines, in particular along bluffs. Dune erosion is projected to increase in the future due to climate change and sea level rise. 1.4 meters of sea level rise may produce 8.3 miles of erosion in Mendocino County, which leaves 930 people vulnerable to erosion under such a scenario. (Cal. Climate Change Center, 2009, pp. 83-84)

Table 4-71: Population Exposure to Naturally Occurring Asbestos (Unincorporated County)

	Total Population
Unincorporated Mendocino County	58,995

Naturally Occurring Asbestos Area	Population Count	% of Total
Within Risk Zone	20,571	*34.87%*

4.5.9.7.1 Property

This Section calculates the assets at risk of naturally occurring asbestos in those severity zones. See Table 4-72 that utilizes County parcel information to calculate exposure. In some cases, a parcel will be within multiple zones, and for this exercise every parcel with a square footage value greater than zero was developed in some way. Only improved parcels were analyzed.

Property in Mendocino County may also be vulnerable to erosion. In general, coastal erosion presents more vulnerability. Because much of the County is protected shoreline, there is no data available on the private property impacts from future coastal erosion. Anecdotally, the City of Point Arena experiences impacts to private commercial properties at Arena Cove from coastal erosion and sea level rise, as highlighted in Volume 2.

Table 4-72: Imp. Parcels and Content w/i Nat. Occurring Asbestos Areas (Uninc. Co.)

	Total Parcels	Total Market Value ($)	Total Content Value ($)	Total Value ($)
Unincorporated County	24,371	$ 4,544,212,021	$ 2,693,943,855	$ 7,238,155,876

Naturally Occurring Asbestos Area	Parcel Count	% of Total	Market Value Exposure ($)	Content Value Exposure ($)	Total Exposure ($)	% of Total
Within Risk Zone	7,721	*31.7%*	$ 1,444,250,947	$ 909,637,874	$ 2,353,888,821	*32.5%*

4.5.9.7.1 Critical Facilities

Critical facilities can be affected by asbestos and erosion. The indirect effects of asbestos would compromise the health of those responsible for operating and maintaining critical facilities. Table 4-73 and Table 4-74 both display critical infrastructure located in areas with known naturally occurring asbestos.

Erosion can limit the ability of roads to serve as conduits to critical facilities. It can also compromise the facilities themselves if they are built on areas susceptible to it. In Mendocino County, 13 miles of highway are vulnerable to future erosion impacts from a 1.4 m sea level rise along the Pacific Coast. 25 miles of other roads are vulnerable and no railways are vulnerable. (Cal. Climate Change Center, 2009, p. 85)

Table 4-73: Critical Facility Exposure to Naturally Occurring Asbestos Areas (Unincorporated County)

Critical Infrastructure - Naturally Occurring Asbestos Area	
Infrastructure Type	Within Risk Zone
Essential Facility	20
EOC	-
Fire Station	15
Law Enforcement	2
Medical Facility	3
High Potential Loss	116
Adult Residential Facility	3
Alternative Education Program	-
Animal Control	-
Child Care Center	7
Communication Tower	22
Community Center	2
Courthouse	-
Dam	16
Detention Center	-
Fairground	-
Family Child Care Home	1

Critical Infrastructure - Naturally Occurring Asbestos Area	
Infrastructure Type	Within Risk Zone
Foster Family Agency	-
Historic Building	1
Historic Site	-
Library	-
Museum	-
Office	4
Park and Recreation	2
Power Plant	9
Real Property Asset*	14
Residential Child Care	-
Residential Elder Care Facility	-
School	27
Shop	2
Storage	6
Wastewater Treatment	-
Transportation and Lifeline	109
Airport	-
Bridge	100
Bus Facility	-
Corp Yard	1
NG Station	-
Substation	6
Transfer Station	2
Hazmat	6
Hazmat	6
Grand Total	**251**

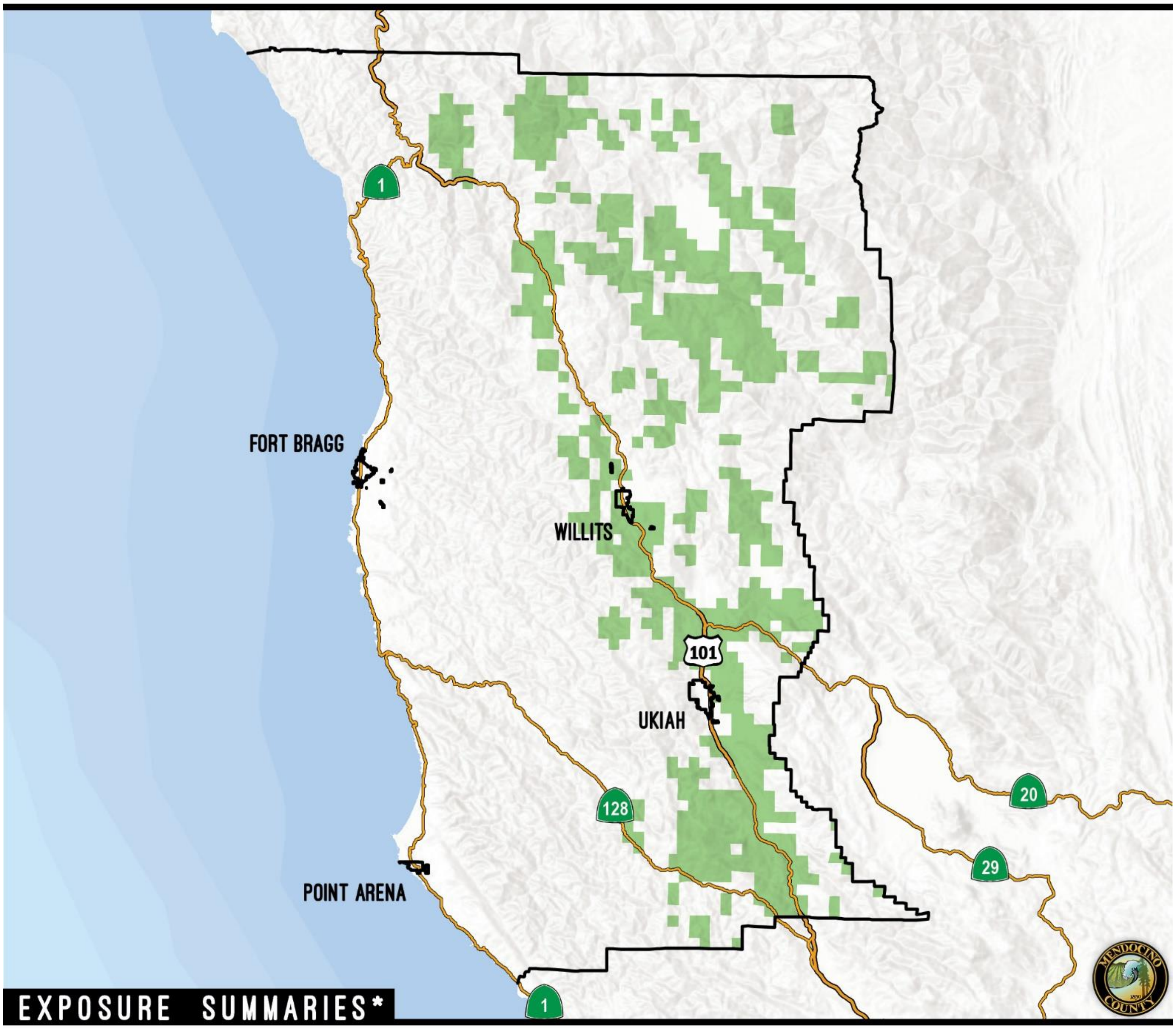
**Real Property Assets are digitized insurance rolls for demonstrating value and ownership and may have overlapping points with other categories such as fire stations and law enforcement.*

Table 4-74: Lifelines in Naturally Occurring Asbestos Areas (Unincorporated County)

Lifelines (miles) - Naturally Occurring Asbestos Area	
Infrastructure Type (Linear)	Within Risk Zone
Levee	2.6
NG Pipeline	33.1
Railroad	60.6
Street	1,476.3
4WD trail	194.5
4WD trail, major	6.1
Alley	-
Cul-de-sac	0.5
Driveway	79.2
Interstate	19.3
Local road	952.7
Local road, major	19.6
Primary highway	75.0
Ramp	6.2
Road, parking area	0.5
State/county highway	122.1
Thoroughfare, major	0.7
Traffic circle	-
Walkway	-
Transmission Line	140.8
Grand Total	**1,713.3**

NATURALLY OCCURRING ASBESTOS SNAPSHOT

MENDOCINO COUNTY



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA

Count	Exp. Rate**
20,571	35%
Count Includes:	NOA

PARCEL COUNT IN HAZARD AREA

Count	Exp. Rate**
7,721	32%
Count Includes:	NOA

PARCEL VALUE IN HAZARD AREA

	Exp. Rate**
Sum of Improvement Value $1,444,250,947	32%
Sum of Content Value $909,637,874	34%
Count Includes:	NOA

CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
Essential Facilities	20	26%	NOA
High Potential Loss	116	24%	*Sum of Transportation & Lifeline Linear Mileage*
Transportation & Lifeline	109	32%	4,154 22%

MAP LEGEND

NATURALLY OCCURRING ASBESTOS

*Exposure summaries include naturally occuring asbestos areas. Hazard data source: MCAQMD.
**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

Dynamic Planning + Science for Mendocino County, 2020

Figure 4-50: Naturally Occurring Asbestos Exposure & Vulnerability and Snapshot Map

4.5.9.8 Future Trends in Development

Naturally occurring asbestos: Future development has the potential to increase asbestos and erosion related issues in Mendocino County. Asbestos in and of itself will increase as a hazard threat; however, as population increases in the county, new residential developments might be located nearer to areas with higher concentrations of naturally occurring asbestos. It is thus important to ensure new development occurs with due consideration of these areas. The Mendocino County General Plan acknowledges asbestos issues throughout Mendocino County, and the County currently permits grading and excavation activities to ensure those activities take proper precautions around naturally occurring asbestos areas.

Erosion: Similarly, the County is well-poised to prevent and mitigate development occurring in highly erodible areas through its General Plan and Code. The County and coastal jurisdictions continue to prepare for predicted and experienced increased coastal erosion in key areas such as Arena Cove in Point Arena.

4.5.9.9 Soil Hazard Problem Statements

As part of the mitigation action identification process, the Planning Committee for the County and for each jurisdiction identified issues and weaknesses, also called problem statements, for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool and flood data. Agricultural disaster hazard problem statements are listed in Table 4-75; problem statements for all other planning partners are accessed in Volume 2 of this plan.

Identifying these common issues and weaknesses assists the Planning Committee in understand the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. Projects or actions have been developed to mitigate each problem identified. See Table 5-6 for a full list of mitigation actions and corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 4-75 and Table 5-6.

Table 4-75 Soil Hazard Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-SH-MC-49	Soil Hazard	Impact	PRV - Prevention , NRP - Natural Resource Protection	**Mendocino County**	Areas with natural occurring asbestos presents challenges for construction that involves disturbance of soil	ma-SH-MC-206
ps-SH-MC-50	Soil Hazard	Impact	PRV - Prevention , NRP - Natural Resource Protection	**Mendocino County**	Coastal erosion can impact infrastructure and buildings located in coastal areas of the County	ma-SH-MC-226

4.5.10 Wildfire Hazard Profile

A wildfire is any uncontrolled fire occurring on undeveloped land that requires fire suppression. Wildfires can be ignited by lightning or by human activity such as smoking, campfires, equipment use, and arson. The 2018 California State Hazard Mitigation Plan defines wildfires as:

> *any free-burning vegetative fire that initiates from an unplanned ignition, whether natural (e.g., lightning) or human-caused (e.g., powerlines, mechanical equipment, escaped prescribed fires), where the management objective is full suppression.* (California Office of Emergency Services, 2018, p. 507)

Wildfires are costly, putting lives and property at risk and compromising rivers and watersheds, open space, timber, range, recreational opportunities, wildlife habitats, endangered species, historic and cultural assets, scenic assets, and local economies. Vulnerability to flooding increases due to the destruction of forest and ground cover within watersheds. The potential for significant damage to life and property increases in areas where development is adjacent to densely vegetated areas, known as wildland-urban interface (WUI) areas. (FEMA, 2020)

While some fires are allowed to burn naturally in order to maintain or restore the health of forest lands, out of control wildfires, need to be prevented through cooperative, community, and land management planning. (United States Forest Service, n.d.)

4.5.10.1 Local Conditions Relating to Wildfire

Mendocino County is bounded by the Pacific Ocean to the west, Sonoma County to the south, Lake County to the southeast and east, Glenn and Tehama Counties to the east and northeast, Trinity County to the north and east, and Humboldt County to the north. The borders with Glenn and Tehama Counties are completely within the Mendocino National Forest in the county's northeastern portion. Jackson State Forest extends throughout all of the western portion of the County. The County possesses many vegetative fuel types including grass, oak woodlands, brush, mixed chaparral, timber, and cut-over slash. Brush consists primarily of chamise on the south and west-facing slopes and mixed chaparral on the north and east-facing slopes. (Mendocino Fire Safe Council, 2019)

Mendocino County has dry summers where little to no rain falls from early June through late October. The weather can also vary greatly between different portions of the County on the same day. Additionally, when the Sacramento Valley experiences warmer temperatures, deeper fog intrudes from the ocean up the coastal drainages, and the inland valleys become windier. The County experiences 40 to 100 inches of annual rainfall, depending on the location, elevation, and weather patterns, and the declared fire season in Mendocino County typically lasts from early June to mid or late October. The fire season is a time of increased risk of conflagration to residential and other development within the County. Conflagration is an extensive fire that destroys a great deal of land or property. The hilly and mountainous terrain on the east and west side of the Central Valley strongly influences both wildland fire behavior and fire suppression capabilities. (*Id.*)

Wind is also a significant factor in the spread of fire, as fires spread faster, and burning embers are carried with the wind to adjacent exposed areas. In densely-populated areas, flying ember production is the principal driver of wildfire. A related concern in built-out areas is the relative density of vegetative fuels that can serve as sites for new spot fires within the urban core and spread to adjacent structures. (*Id.*)

4.5.10.1.1 Sudden Oak Death

The County is also at risk of increased wildfire due to what is referred to as sudden oak death. Sudden oak death is caused by *Phytophthora ramorum*, a pathogen, which has been responsible for massive die-offs of true oak (*Quercus* spp.) and tanoak (*lithocarpus densiflorus*) in coastal regions of both California and Oregon. These die-offs become a source of fuel and have consequently become an increasing concern for their potential to increase fire intensity throughout the region. (Yana S. Valachovic et al., 2011) Climate change, more frequent droughts, and pathogen exposure are all necessary risks to consider when taking a proactive approach to ensuring long-term oak health and mitigating wildfire risk.

4.5.10.1.2 Human-caused Wildfires and Urban Conflagration

One of the primary causes of wildfire ignition are humans. Nearly 85% of wildland fires in the United States are caused by humans. Human-caused fires can be caused by campfires that are left unattended, equipment use and malfunction, intentional acts of arson, and carelessly discarded cigarettes. (National Park Service, 2018)

Conflagration is typically characterized as a fire that occurs in the built environment, beginning with one structure and quickly spreading to many more. It can be caused by criminal acts such as illegal explosives, or civil unrest, or residential accidents such as improper user of electrical and heating appliance, by industrial accidents such as transportation accidents, or acts of nature such as lightning. Within Mendocino County, the cities of Fort Bragg, Point Arena, Ukiah, and Willits do not have a significant history of urban conflagration. Fires within these urban areas have for the most part been quickly contained. However, the 1906 earthquake resulted in a fire that threatened the entire City of Fort Bragg. The fire downtown burned the entire block bordered by Franklin, Redwood, and McPherson streets, plus the west side of Franklin. The west Franklin block burned down to approximately one half a block beyond the intersection of Redwood and Franklin. (Mendocino 2014 MJHMP, 2014) Many jurisdictions in Mendocino County to have historic, dense, wood-built downtowns that are susceptible to conflagration events. Since this Hazard Mitigation Plan focuses on natural hazards, urban conflagration is not profiled.

4.5.10.1.3 Lightning

While humans cause the vast majority of wildfires, lightning-triggered wildfires burn about 60% of all acreage. (Climate Central, 2013) Climate change is predicted to increase the occurrence of lightning as much as 12 percent per every degree Celsius (about 2°F) rise in global temperatures, which could be as much as a 50 percent increase in lightning by the end of the century. (Thompson, 2014) This prediction is a blanket average increase across the continental United States; increases could be higher or lower depending on the distribution of increases over seasons or geographically. (*Id.*)

4.5.10.1.4 Wildland-urban interface

Human-caused wildfires are often prevalent in the wildland-urban interface (WUI). As development in many places in California has encroached on wildlands, wildfire risks have increased. Forests and grasslands are located throughout Mendocino County, side by side with residences and small communities. Even some of the more urban areas, such as of the lands surrounding Ukiah, are at risk from wildland fires. The potential fire hazard is exacerbated by the hot, dry summers typically experienced throughout most of the county and by the mountainous terrain. (Mendocino County General Plan, 2009) These are boundary areas where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels. (National Wildfire Coordinating Group, n.d.)

4.5.10.1.5 De-energization/ PSPS Events

Recent wildfire events have been linked to faulty electric transmission equipment, which in turn has led to public safety power shutoffs (PSPS), also referred to as de-energization. (California Public Utilities Commission, 2020) Pacific Gas and Energy (PG&E) reached a 13.5 billion dollar settlement and pled guilty to 84 counts of manslaughter as its transmission facilities sparked wine country blazes in 2017 and the fire that nearly destroyed the town of Paradise in 2018. (Blume, 2019) In order to avoid these catastrophic wildfire events, electric utility companies have started massive, and preemptive power shutoffs in high wind events to avoid sparking fires. This leaves communities and essential facilities without power, a particular challenge in preparing for and responding to hazard events and assisting vulnerable populations. (California Public Utilities Commission, 2020, p. 5) The increased frequency of PSPS events has renewed focus addressing the loss of power in hazard mitigation in Mendocino County as well as around the state.

4.5.10.2 Plans, Policies, and Regulatory Environment

Wildfire Protection Responsibility in California

Local, state, tribal, and federal organizations all have legal and financial responsibility for wildfire protection. In many instances, two fire organizations have dual primary responsibility on the same parcel of land—one for wildfire protection and the other for structural fire protection. To address wildfire jurisdiction responsibilities, in 1981 the California State Legislature outlined various wildfire responsibilities, described below, in Cal. Pub. Res. Code § 4291.5 and Cal. Health & Safety Code § 13108.5:

- **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, National Park Service, or U.S. Department of Defense. Primary financial and rule-making jurisdiction authority rests with the federal land agency. In many instances, FRAs are interspersed with private land ownership or leases. Fire protection for developed private property is usually the responsibility of the relevant local government agency, not the relevant federal land management agency.
- **State Responsibility Areas (SRAs)**—SRAs are lands in California where the California Department of Forestry and Fire Protection (CAL FIRE) has legal and financial responsibility for wildfire protection. CAL FIRE administers fire hazard classifications and building standard regulations in these areas. SRAs are defined as lands that:

    - are in the unincorporated county areas,
    - are not federally-owned,
    - have wildland vegetation cover rather than agricultural or ornamental plants,
    - have row crops or seasonal crops, or
    - have watershed, range, or forage values.

  CAL FIRE adopts SRA boundaries and updates them every 5 years. Where SRAs contain structures or development, the relevant local government agencies have fire protection responsibility for those improvements.

- **Local Responsibility Areas (LRAs)—**LRAs include land in cities, cultivated agriculture lands, unincorporated non-flammable areas, and lands that do not meet the criteria for SRA or FRA. LRA fire protection is typically provided by city or county fire departments, fire protection districts, or by CAL FIRE under contract to local governments. LRAs may still include areas of flammable vegetation and WUI.

In 2012, as part of local General Plan requirements, California began requiring local governments in State Responsibility Areas (SRAs) and Very High Fire Hazard Severity Zones (VHFHSZ) to:

- Update their general plan safety elements to recognize specific wildfire risks in such areas,
- Adopt special findings when approving subdivisions in such areas, and

- Use wildfire safety guidelines and California Environmental Quality Act (CEQA) initial study wildfire hazards checklist updates issued by the Governor's Office of Planning and Research (OPR) when those become available. Cal. Gov. Code § 65040.20 and § 65302.5.

For further information on the details and implications of these Safety Element requirements, see Progress Summaries 3.F and 8.A of the 2018 California State Hazard Mitigation Plan.

CAL FIRE/ Mendocino County Cooperative Fire Protection Agreement

Since the 1940s, local government entities such as cities, counties and districts have contracted with CAL FIRE to provide many forms of emergency services for their communities. CAL FIRE provides full-service fire protection to many of the citizens of California through the administration of 145 cooperative fire protection agreements in 33 of the State's 58 counties, 30 cities, 32 fire districts and 25 other special districts and service areas. As a full-service fire department CAL FIRE responds to wildland fires, structure fires, floods, hazardous material spills, swift water rescues, civil disturbances, earthquakes, and medical emergencies of all kinds. Mendocino County and Ukiah have Cooperative Fire Protection Agreements with CAL FIRE.

Healthy Forests Restoration Act (2003)

The federal Healthy Forests Restoration Act (HFRA) appropriates funding to address five main sub-categories of the National Fire Plan (NFP): preparedness, suppression, reduction of hazardous fuels, burned-area rehabilitation, and state and local assistance to firefighters. Mendocino County Community WPPs have integrated these sub-categories through the following four best practices:

1. identifying and prioritizing fuels reduction opportunities across the landscape
2. addressing structural ignitability
3. assessing community fire suppression capabilities
4. collaborating with stakeholders

California Fire Code (2019)

Mendocino County has adopted the 2019 Edition of the California Fire Code to safeguard the public health, safety, and general welfare from the hazards of fire, explosion, or dangerous conditions in new and existing buildings, structures, and premises, and to provide safety and assistance to firefighters and emergency responders during emergency operations. Section (§18.04.025) of the Mendocino County Code applies the 2019 California Fire Code, which describes what is required for a Fire Protection Plan, applicable to all new development within the Wildland-Urban Interface Fire Area. It stipulates that such a plan addresses water supply, access, fire resistance of buildings, fire protection systems and equipment, defensible space, and vegetation management.

California Building Code (2019)

The 2019 California Building Code, adopted by the County in 2020, includes materials and construction methods for exterior wildfire exposure and standards of quality for fire-resistant buildings. See Cal. Building Codes, Chapter 7a (2019).

Title 24 California Code of Regulations

The California Building Standards Code, Title 24, which incorporates the California Fire Code, is adopted every three years by order of the California Legislature with supplements published in intervening years. Title 24 mandates specific requirements for new building construction placing strong emphasis on proper address signage, apparatus access, water requirements, and defensible space.

California Code, Public Resources Code § 4290

These regulations became effective in September of 1991. They require the future design and construction of structures, subdivisions and developments in SRA to provide, for basic emergency access and perimeter, wildfire protection measures. These measures provide for emergency access; signing and building numbering; private water supply reserves for emergency fire use; and vegetation modification.

California Code, Public Resources Code § 4291

These regulations require property owners in mountainous areas, forest-covered lands, or any land that is covered with flammable material to create at minimum a 100-foot defensible space (or to the property line) around their homes and other structures.

Mendocino County Community Wildfire Protection Plan

The Mendocino County Community Wildfire Protection Plan was collaboratively developed in order to identify and prioritize areas for hazardous fuel reduction treatments. It recommends the types and methods of treatment that will protect Mendocino County, and it recommends measures to reduce the ignitability of structures throughout the area addressed by the plan. The plan was updated in 2015.

Mendocino County Fire Vulnerability Assessment & Emergency Evacuation Preparedness Plan (2020)

The Mendocino County Fire Vulnerability Assessment and Emergency Evacuation Preparedness Plan includes three components: the Fire Vulnerability Assessment, the Public Outreach Plan, and the Evacuation Plan. The Vulnerability Assessment identifies high fire risk areas in the County. It reviews existing adaptation methods and actions for remedying wildfire vulnerabilities, and it recommends specific mitigation strategies for dealing with wildfire vulnerabilities. The Evacuation Plan describes strategies for managing evacuations relating to wildland fire threats. The Public Outreach Plan serves as an opportunity for public input, and it identifies ways for educating local communities about fire safety and emergency evacuation.

Mendocino County General Plan

The 2009 Mendocino County General Plan includes the following goals and policies in the Development Element and Resource Element to mitigate the effects of wildfires:

Resource Element

Policy RM-82: Promote the conservation and use of native species or drought-tolerant, fire resistive and noninvasive vegetation.

Policy RM-83: In rural areas, promote vegetation and landscape management programs that protect wildlife and livestock habitat, discourage pest species and non-native species, reduce wildfire risk, and conserve water resources.

Development Element

Goal DE-25 (Fire): To protect life, property and natural resources by ensuring that development is compatible with fire protection capabilities.

Policy DE-212: The General Plan Land Use and zoning maps shall limit development potential commensurate with wildland fire hazards.

Policy DE-213: Development, densities, intensities, and type shall be consistent with the state wildfire hazard rating system and Fire Safe Guidelines (addressing weather, fuel and slope, access, water and other factors).

Policy DE-214: The County shall deny development proposals that present substantial fire hazard risk to residents and safety providers responding to a wildland fire.

Action Item DE-214.1: Work with CalFire to administer the Fire Safe Guidelines and fire protection programs for State Responsibility Areas and development interfaces.

Policy DE-215: Development shall be located, designed and managed to reduce fire risk to life, property and natural resources, and incorporate adequate fire protection consistent with the General Plan and adopted regulations.

Policy DE-216: Development shall facilitate and integrate the ability for fire protection agencies to access and maintain fuel and firebreaks, water supplies, and emergency access routes.

Policy DE-217: New development in State Responsibility Areas and urban/rural interfaces should incorporate:

- Fuelbreaks or greenbelts coordinated with water supplies and access providing maximum circulation consistent with topography.
- Adequate and accessible defensible space.
- At least two ingress-egress routes to a public roadway, unless alternative routes accessible to fire equipment are provided.
- Access to publicly maintained evacuation routes at regular intervals.
- Access routes sufficient to accommodate evacuating vehicles, fire equipment and vegetation management zones.
- Primary traffic lanes to all building sites with turnarounds to accommodate fire equipment.
- Water supplies within short distance of fire equipment access.
- Fire flows with adequate duration.
- Develop fire safe plans for communities to assist in qualifying for grants.

Policy DE-218: The County supports effective and economically viable fire protection and emergency response provided by fire protection agencies.

Policy DE-219: Encourage fire protection districts to determine and report capabilities to adequately serve existing and potential development.

Policy DE-220: Developments shall be approved only if sufficient fire fighting resources, such as fire stations, equipment, personnel, hydrants and water supplies, will be available to serve all phases of development.

Action Item DE-220.1: Work with fire protection organizations to achieve funding stability necessary to maintain adequate staffing, facilities and equipment.

Action Item DE-220.2: Collaborate with fire protection authorities, land managers, private landowners, and others to improve fire management strategies for reducing the impacts of wildfires on forest and watershed ecosystems.

Action Item DE-220.3: Work with fire protection providers (i.e., CalFire, U.S. Forest Service, local fire protection districts, and cities) to ensure development is compatible with fire protection capabilities.

Policy DE-223: Encourage the Air Quality Management District to coordinate with CalFire when providing public information about "burn" or "no burn" days.

Fire Protection Features in Mendocino County Code, §17-64

The Mendocino County Code aids in reducing fire risks by ensuring the provision of protection features including access roads, fire breaks, and accessibility to sufficient and available water. These protection features are provided with the approval from a qualified fire officer.

Fire Hazard-Development Standards in Mendocino County Code, §20.500.025

The California Department of Forestry's Fire Hazard Severity Classification System is used to identify hazard areas. The Fire Hazard Severity Classification System categorizes hazards into moderate, high, or extreme hazard classifications. The Fire Hazard Development Standards also provide land use restrictions which stipulate that all new development shall be sited taking into consideration the fire hazard severity of the site, the type of development and the risk added by the development to the fire hazard risk. Areas of extreme risk should be avoided, where feasible, for development except agricultural and open space uses.

4.5.10.3 Past Events

There are four major factors that contribute to historic wildfire events:

1. Extreme vegetation diversity
2. Diverse fire weather and fire behavior
3. Dynamic fire history
4. Complex land use patterns

From 2002-2018, there were 27 wildfires in Mendocino County, some of which overlapped with neighboring counties, each burning over 1,000 respective acres in the region. These events are listed in Table 4-76 and displayed in Figure 4-52.

Table 4-76: Fire Perimeter Sizes and Dates (1000 Acres or Greater 2000-2018)

Date	Name	Size in Acres
2002	Pine	1,024
2006	Noble	1,014
2006	Hunter	13,477
2008	Lost Pipe	1,187
2008	Low Gap	1,347
2008	Jack Smith	1,538
2008	Monkey Rock	1,849
2008	Navarro	1,901
2008	Middle	2,067
2008	Indian	2,096
2008	Butch	2,367
2008	Big	2,490
2008	Mill	3,042
2008	Orr Series	3,416
2008	Mallo Series	4,466
2008	Cliff	4,658
2008	Cowshed Series	4,992
2008	Hardy Series	5,354
2008	Sugarloaf	7,079
2008	Red Mountain Series	7,513
2012	Scotts	4,509
2012	Pass	4,804
2012	North Pass	41,818
2014	Lodge Complex	12,533
2017	Redwood Valley Incident	36,523
2018	River	48,920
2018	Ranch	410,202

Source: California Fire, Incident Database

Recent Large Wildfire Events

August Complex Fire (2020)

The August Complex Fire has made State history as the largest fire on record. As of September 2020, it has burned approximately 859,966 acres in both Mendocino and Humboldt Counties. The August Complex Fire started on August 16th, 2020 during a series of lightning strikes which ignited portions of the Mendocino National Forest. As of September 2020, the fire has only been 39% contained. (CAL FIRE, 2020)

Mendocino Fire Complex (2018)

The Mendocino Fire Complex was a recent large event in Mendocino County that occurred near Clear Lake in 2018. An investigation revealed that the fire began as a result of a spark or hot metal fragment from a hammer, which was being used to drive a metal stake into the ground. Ultimately, the Mendocino Fire Complex consumed over 459,123 acres and destroyed more than 280 structures. It was the most devastating fire in Mendocino County history, until the more recent August Complex Fire, and was California's largest wildfire in modern history. (Insurance Information Institute , 2020)

Figure 4-51: 2018 Mendocino Fire Complex

Photo: Mark McKenna (Patch, August, 2013)

Redwood Valley Fire (2017)

The Redwood Valley Fire was started on October 8, 2017, by trees falling on powerlines. The fire destroyed about a fourth of the homes in the rural community between Ukiah and Willits as it burned through Redwood Valley. It burned a total of 36,523 acres and was contained on October 26, 2017. (San Francisco Chronicle, 2020)

See Figure 4-52 for locations of historic fires.

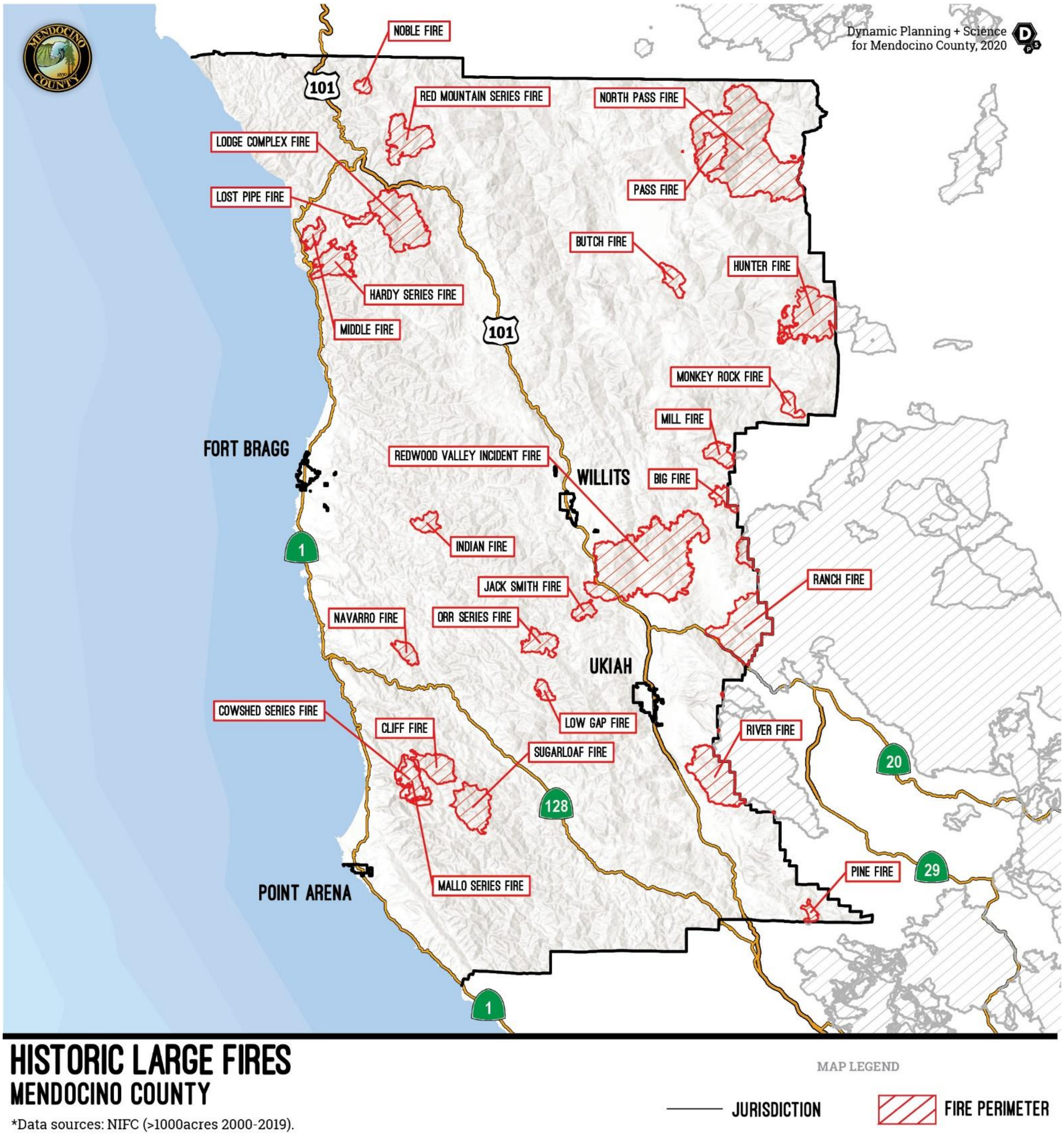


Figure 4-52: Historic Fire Occurrence Map (Fires Greater than 2,000 acres, 2000-2018)

4.5.10.4 Fire Hazard Severity Zones (FHSZs)

The County's hilly areas contain the major wildland fire hazard risks for residential structures and other development, characterized by steep slopes, poor fire suppression delivery access, inadequate water supply, and highly flammable vegetation.

To help better refine areas of wildfire concern, CAL FIRE establishes and maps **Fire Hazard Severity Zones (FHSZ),** or areas of significant fire hazards based on factors such as fuel, weather, terrain, and the number of days of moderate, high and extreme fire hazard. These zones define the application of various mitigation strategies to reduce the risk associated with wildfires.

The FHSV model inputs frequency of fire weather, ignition patterns, expected rate-of spread, and past fire history. It also accounts for flying ember production based on the area of influence where embers are likely to land and cause ignitions. The FHSZ model also is built from existing data and hazard constructs and thus does not necessarily take into consideration significant land use and structural resiliency. The geography, weather patterns, and vegetation in the planning area provide ideal conditions for recurring wildfires.

See Figure 4-53 and Figure 4-54 for wildfire return intervals and fire severity zones. These maps are the basis for this wildfire risk assessment.

4.5.10.5 Frequency/ Probability of Future Occurrences

Generally, Mendocino County faces a wildland fire threat annually. Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in the air. These conditions, when combined with high winds and years of drought, increase the potential for a wildfire to occur. Urban Wildfires often occur in those areas where development has expanded into the rural areas. A fire along this urban/rural interface can result in major losses of property and structures. Generally, there are three major factors that sustain wildfires and allow for predictions of a given area's potential to burn; fuel, topography, and weather.

Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree needles and leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Also, to be considered as a fuel source, are man-made structures and other associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for fire spread. The volume of available fuel is described in terms of Fuel Loading. Certain areas in and surrounding Mendocino County are extremely vulnerable to fires as a result of dense grassy vegetation combined with a growing number of structures being built near and within rural lands. (Mendocino Fire Safe Council, 2019)

An area's topography affects its susceptibility to wildfire spread. Fire intensities and rates of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The natural

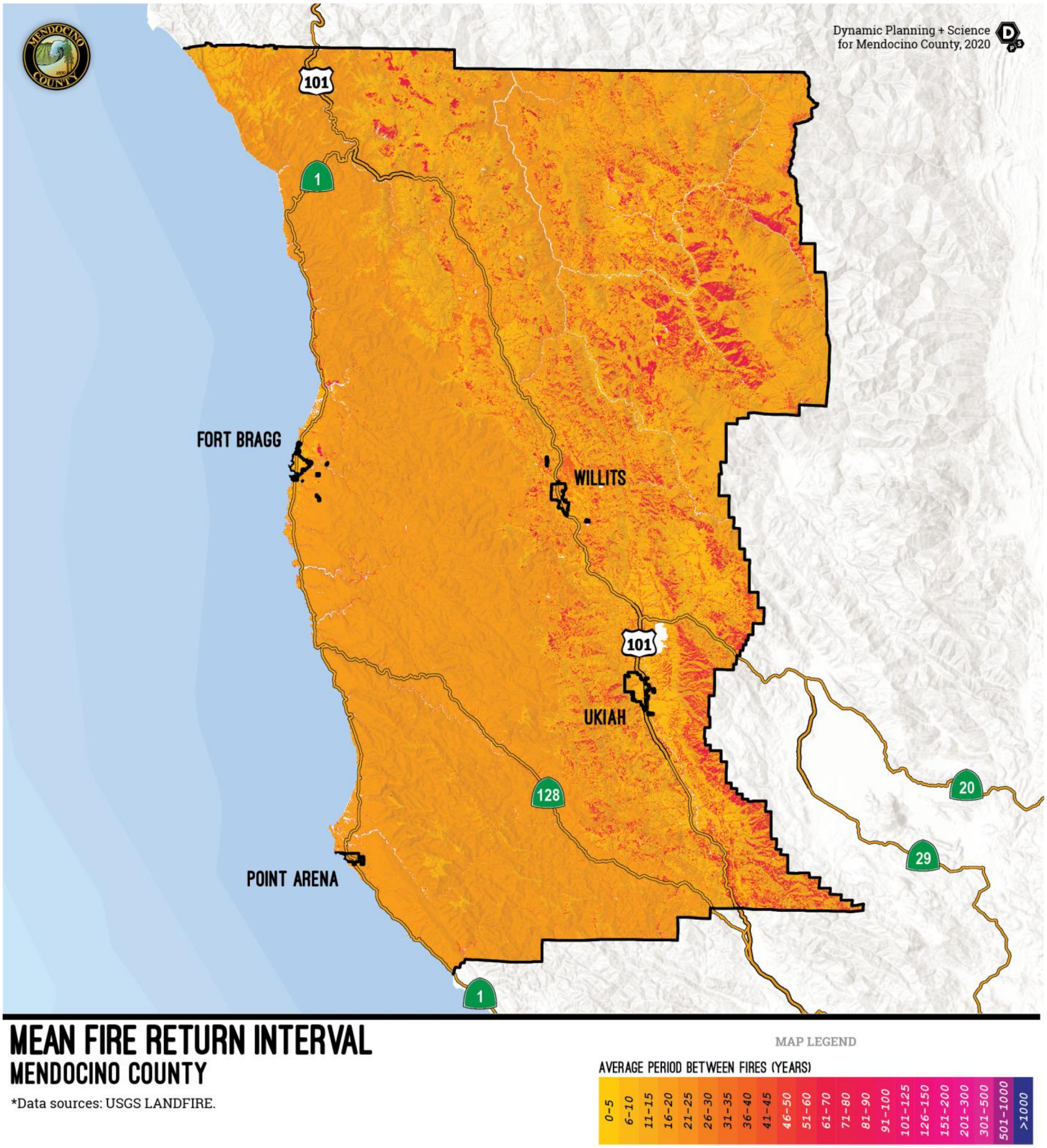


Figure 4-53: Mean Wildfire Return Intervals

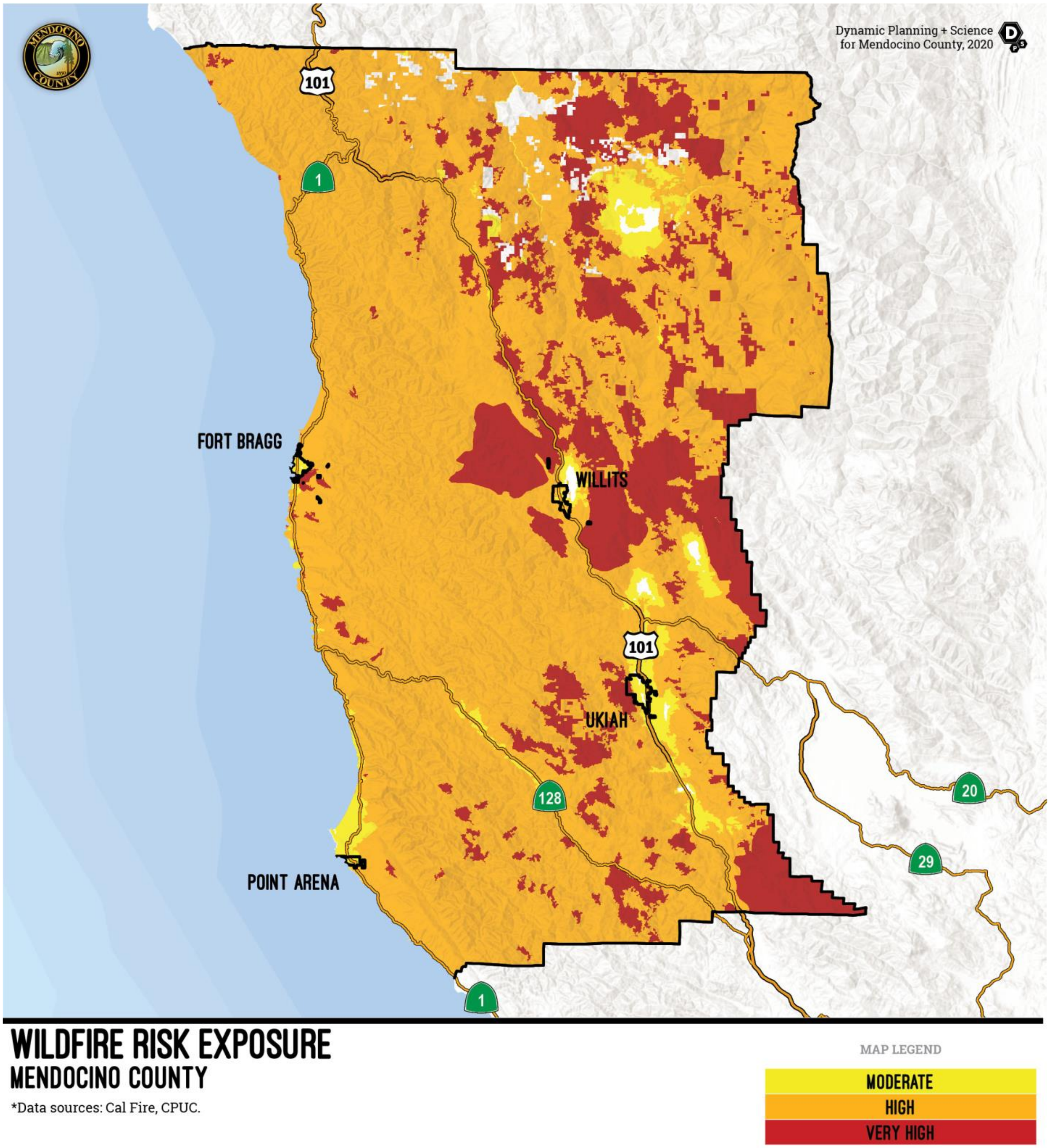


Figure 4-54: Wildfire Risk Exposure

arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes. Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out the fuels that feed the wildfire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most treacherous weather factor. The greater a wind, the faster a fire will spread, and the more intense it will be. Winds can be significant at times in Mendocino County. In addition to high winds, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Related to weather is the issue of recent drought conditions contributing to concerns about wildfire vulnerability. During periods of drought, the threat of wildfire increases. (NOAA, 2018)

The majority of past wildfire events in Mendocino County were in the late summer months (typically June through October). Frequency of wildfire events may increase because of increasingly drier conditions caused by climate change. Fire risk will also continue to grow as more people build in WUI areas, which increases fuel loads and the risk of human-caused fires. (FEMA, 2020)

As seen in Figure 4-52, fire occurrences are the most common in mountainous areas in the eastern portion of Mendocino County. The probability of a wildfire occurring in Mendocino County is highly likely (100% annual chance).

4.5.10.6 Severity and Extent

The severity of the wildland fire hazard is determined by the relationship between three factors: fuel classification, topographic slope, and critical fire weather frequency. Mendocino County has a large amount of wildfire fuels. Critical fire weather conditions occur in periods of low relative humidity, high heat, and high winds.

Smoke and air pollution from wildfires can be a health hazard, especially for sensitive populations including children, the elderly and those with respiratory and cardiovascular diseases. Wildfire may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. In addition, wildfire can lead to ancillary impacts such as landslides in steep ravine areas and flooding due to the impacts of silt in local watersheds.

4.5.10.7 Warning Time

Response time can be rapid and warning time short for wildfires. Wildfires are often caused by humans, intentionally or accidentally. There is no way to predict when one might occur. The Fourth of July can be a time of heightened concern and outreach around wildfires since fireworks can cause fires and usage is high. Dry seasons and droughts greatly increase fire likelihood. Dry lightning may trigger wildfires. Severe weather can be predicted, so special attention can be paid during weather events that may include lightning or wind events. Reliable National Weather Service lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm.

If a fire does break out and spread rapidly, residents may need to evacuate within days or hours. A fire's peak burning period generally is between 1 p.m. and 6 p.m. Once a fire has started, fire alerting is reasonably rapid in most cases. The rapid spread of cellular and two-way radio communications in recent years has contributed to a significant improvement in warning time. (California Fire, 2020)

4.5.10.8 Secondary Hazards

Wildfires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism and commerce. 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, weakening soils, and causing slope failures. 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 creating hydrophobic soils that repel water. When it rains in burned areas, more soil washes off the hills and into roads, ditches, and streams and increases flooding. (United States Department of Agriculture, n.d.)

4.5.10.9 Climate Change Impacts

Fire in western ecosystems is determined by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot, dry spells create the highest fire risk. Drought and increased temperatures intensify wildfire danger by warming and drying out vegetation. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods. (Center for Climate and Energy Solutions, n.d.)

A changing climate is expected to subject forests to increased stress due to drought, disease, invasive species, and insect pests. These stressors are likely to make forests more vulnerable to catastrophic fires. While periodic fires are natural processes and fulfill an important ecological function, catastrophic fire events that cannot be contained or managed can cause serious threats to homes and infrastructure, especially for properties located at the wildland-urban interface.

Moreover, rain events are predicted to become more severe in our changing climate. This could worsen post-rain flood events. (*Id.*) With or without rain, climate change also may bring an increased occurrence of lightning, responsible for a significant amount of wildfires and acreage burned from wildfires, as discussed above in Section 4.5.10.1.3.

It is predicted that Mendocino County will see higher daily temperatures, more heatwaves, increased wildfires, and a diminished snowpack within this century, as a result of climate change. The northwestern portion of Mendocino County is projected to experience an increase in wildfire risk by the year 2085. A low emission scenario projects an increase of 2.7 degrees Fahrenheit while a high emission scenario projects an increase of 4.9 degrees Fahrenheit by the year 2085. (California Department of Public Health, 2017)

4.5.10.10 Wildfire Vulnerability Analysis

This section describes vulnerabilities to wildfire in terms of population, property, and infrastructure. Wildfire population, parcel value, critical facilities and lifeline exposure numbers were generated by overlaying the inventory outlined in Section 4.3 with CalFire Wildfire Hazard Severity Zones. Figure 4-56 shows a snapshot of wildfire vulnerability in Mendocino County. All data sources have a level of accuracy acceptable for planning purposes. Details for each snapshot can be found in this section.

4.5.10.10.1 Population

Smoke and air pollution from wildfires can be a severe health hazard, especially for sensitive populations including children, the elderly, and those with respiratory and cardiovascular diseases. Smoke generated by wildfire contain visible and invisible emissions that contain particulate matter such as soot, tar, water vapor, and minerals; gases such as carbon monoxide, carbon dioxide, and nitrogen oxides; and toxins such as formaldehyde, benzene. Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency or temperature of combustion, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility. First responders likewise are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke.

Wildfire is of greatest concern to populations residing in the moderate, high and very high fire hazard severity zones. U.S. Census Bureau block data was used to estimate populations within the CAL FIRE identified hazard zones. See Figure 4-56, Figure 4-55, and Table 4-77 for detail on populations residing in wildfire risk areas.

Table 4-77 Populations Exposed to Wildfire Risk (Unincorporated County)

	Total Population
Unincorporated Mendocino County	58,995

Wildfire Severity Zone	Population Count	% of Total
Very High Intensity	9,163	*15.53%*
High Intensity	33,720	*57.16%*
Moderate Intensity	14,679	*24.88%*
Total	**57,562**	**97.57%**

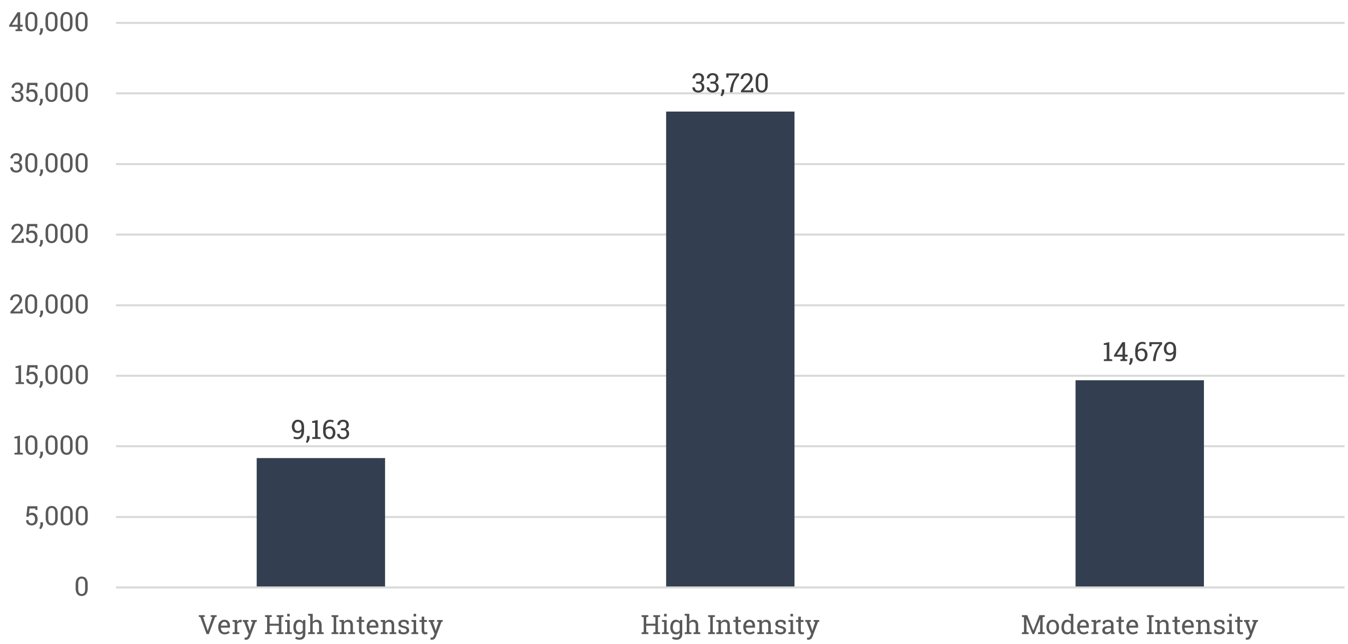
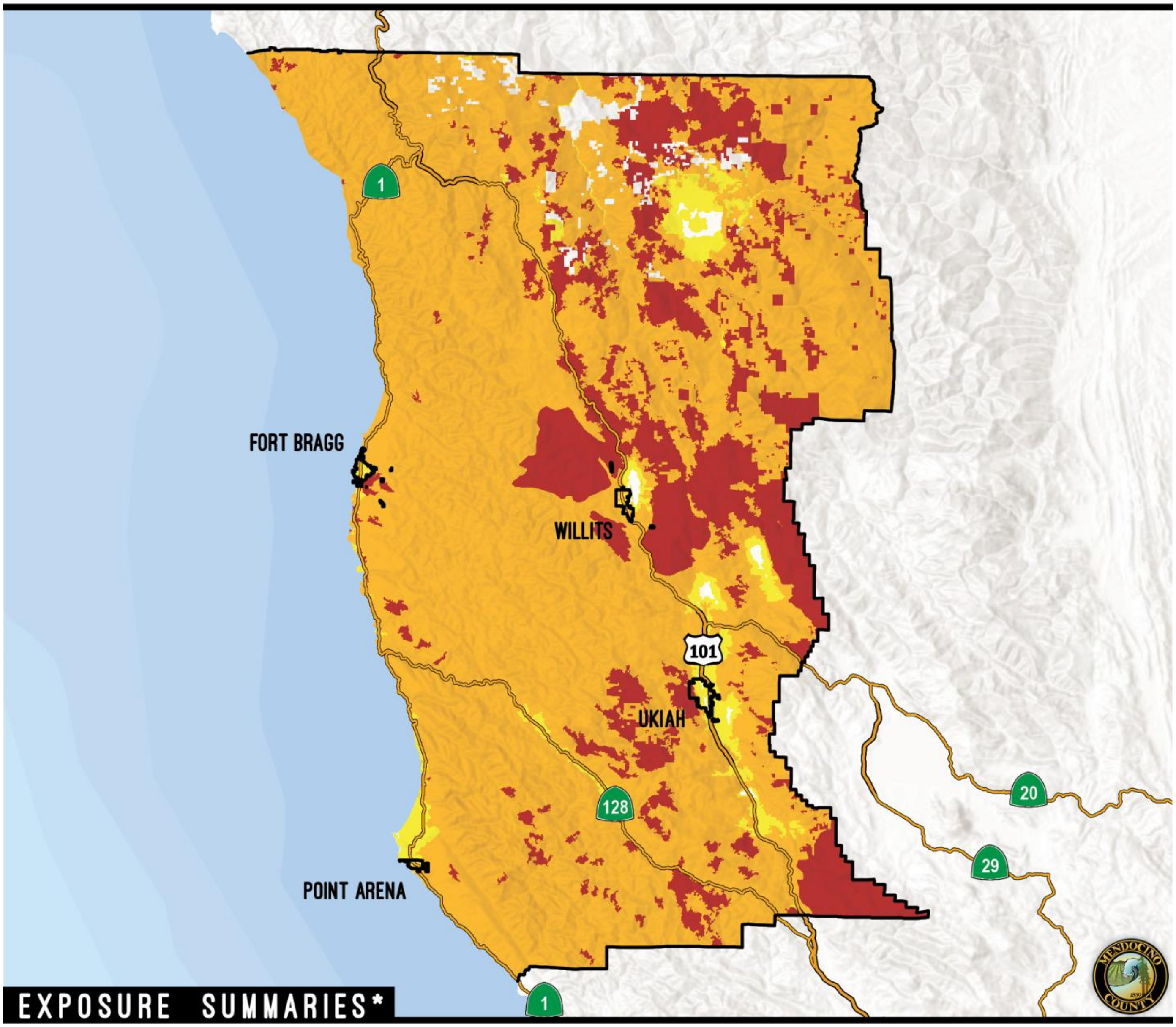


Figure 4-55: Population Exposed to Wildfire Risk

WILDFIRE RISK EXPOSURE SNAPSHOT **MENDOCINO COUNTY**



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA

Count	Exp. Rate**
42,883	73%

Count Includes: H VH

PARCEL COUNT IN HAZARD AREA

Count	Exp. Rate**
17,668	72%

Count Includes: H VH

PARCEL VALUE IN HAZARD AREA

	Exp. Rate**
Sum of Improvement Value $3,123,610,383	69%
Sum of Content Value $1,711,753,135	64%

Count Includes: H VH

CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes: H VH
Essential Facilities	47	61%	
High Potential Loss	184	39%	Sum of Transportation & Lifeline Linear Mileage
Transportation & Lifeline	241	70%	17,129 93%

MAP LEGEND

MODERATE
HIGH (H)
VERY HIGH (VH)

*Exposure summaries include high and very high wildfire classes. Hazard data source: Cal Fire, CPUC.
**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

Dynamic Planning + Science for Mendocino County, 2020

Figure 4-56: Exposure Wildfire Vulnerability and Snapshot Map

4.5.10.10.2 Property

This Section calculates the considerable assets at risk of wildfire in those severity zones. See Table 4-78, which utilizes County parcel information to calculate exposure. In some cases, a parcel will be within multiple fire threat zones, and for this exercise every parcel with a square footage value greater than zero was developed in some way. Only improved parcels were analyzed.

Table 4-78: Improved Parcel and Content within Wildfire Severity Zones (Unincorporated County)

	Total Parcels	Total Market Value ($)	Total Content Value ($)	Total Value ($)
Unincorporated County	24,371	$ 4,544,212,021	$ 2,693,943,855	$ 7,238,155,876

Fire Hazard Severity Zone	Parcel Count	% of Total	Market Value Exposure ($)	Content Value Exposure ($)	Total Exposure ($)	% of Total
Very High	3,954	*16.2%*	$591,917,815	$313,396,608	$905,314,423	*12.5%*
High	13,714	*56.3%*	$2,531,692,568	$1,398,356,527	$3,930,049,095	*54.3%*
Moderate	6,081	*25.0%*	$1,315,302,628	$918,662,698	$2,233,965,326	*30.9%*
Total	**23,749**	**97%**	**$ 4,438,913,011**	**$ 2,630,415,832**	**$ 7,069,328,843**	**97.7%**

Critical Facilities and Infrastructure

Critical facilities of wood frame construction are especially vulnerable during wildfire events; power lines are also at risk from wildfire because some poles are made of wood and are susceptible to burning.

In many cases, roads and railroads would not be susceptible to damage except in the worst scenarios, but a wildfire event could create response issues, if affected. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. Wildfire typically does not have a major direct impact on bridges, but it can create conditions in which bridges are obstructed. Many bridges in areas of high to moderate fire risk are important because they provide the only ingress and egress to large areas and, in some cases, to isolated neighborhoods. Additionally, wildfires may cause the loss of function of cellular phone sites, or cell towers, which can limit emergency services such as tracking and evacuation.

Critical facilities data was overlain with fire hazard severity zone data to determine the type and number of facilities within each risk classification. Table 4-79 lists the critical facilities in wildfire hazard severity zones for Mendocino County, and Table 4-80 similarly lists critical infrastructure.

Table 4-79: Critical Facility Exposure to Wildfire Severity Zones (Unincorporated County)

Critical Infrastructure - Wildfire Severity Zone			
Infrastructure Type	Very High	High	Moderate
Essential Facility	5	42	30
EOC	-	-	1
Fire Station	5	34	19
Law Enforcement	-	3	3
Medical Facility	-	5	7
High Potential Loss	43	141	267
Adult Residential Facility	1	-	3
Alternative Education Program	-	-	-
Animal Control	-	-	-
Child Care Center	-	5	13
Communication Tower	26	51	11
Community Center	-	1	4
Courthouse	-	-	-
Dam	8	16	5
Detention Center	-	-	-
Fairground	-	-	1
Family Child Care Home	-	-	2
Foster Family Agency	-	-	-
Historic Building	-	6	5
Historic Site	-	1	-
Library	-	-	1
Museum	-	-	-
Office	-	-	6
Park and Recreation	1	6	1
Power Plant	-	2	8
Real Property Asset*	4	26	127
Residential Child Care	-	-	-
Residential Elder Care Facility	-	2	4
School	3	25	55
Shop	-	-	3
Storage	-	-	16
Wastewater Treatment	-	-	2
Transportation and Lifeline	28	213	97
Airport	1	1	2
Bridge	25	201	81
Bus Facility	-	1	-
Corp Yard	-	1	2

Critical Infrastructure - Wildfire Severity Zone			
Infrastructure Type	Very High	High	Moderate
NG Station	-	-	1
Substation	1	4	9
Transfer Station	1	5	2
Hazmat	-	-	13
Hazmat	-	-	13
Grand Total	**76**	**396**	**407**

**Real Property Assets are digitized insurance rolls for demonstrating value and ownership and may have overlapping points with other categories such as fire stations and law enforcement.*

Table 4-80: Lifelines in Wildfire Severity Zones (Unincorporated County)

Lifelines (miles) - Wildfire Severity Zone			
Infrastructure Type (Linear)	Very High	High	Moderate
Levee	-	0.89	2.24
NG Pipeline	6.62	17.14	19.81
Railroad	27.30	84.47	26.38
Street	1210.49	4885.07	501.09
4WD trail	283.09	824.49	20.19
4WD trail, major	7.41	17.98	-
Alley	-	-	-
Cul-de-sac	-	0.54	0.33
Driveway	63.14	174.20	41.80
Interstate	3.50	30.86	21.55
Local road	722.56	3115.53	302.81
Local road, major	26.10	75.97	3.16
Primary highway	28.74	198.88	37.06
Ramp	0.11	5.36	7.18
Road, parking area	0.33	0.30	0.19
State/county highway	71.56	437.02	66.78
Thoroughfare, major	3.94	3.92	0.02
Traffic circle	-	0.04	-
Walkway	-	-	-
Transmission Line	49.76	245.69	37.77
Grand Total	**1294.16**	**5233.26**	**587.29**

4.5.10.11 Changes in Development and Future Trends

Fuel reduction projects are ongoing on federal, state, and private lands in Mendocino County. Such projects include vegetation management, broadcast burning, pre-commercial thinning, and the removal of dead, dying, and diseased trees. The Mendocino County Community Wildfire Protection Plan (CWPP), updated in 2015, specified many completed and ongoing projects that reduce the hazard risk throughout the County.

The Mendocino County Fire Safe Council (MCFSC) continues to support wildfire mitigation efforts and implement the CWPP throughout the County. MCFSC is a nonprofit partnership of people, agencies, and organizations. Its mission is to aid people, property, and resources thrive in environments with associated wildfire risk. MCFSC manages the Ukiah Valley Fire Fuels Reduction Project, which reduces wildfire risk by performing roadside clearing, creating shaded fuel breaks, and holding neighborhood chipper days. MCFSC is also responsible for the Ukiah Valley Fire Fuels Reduction Chipper Program, which aims to reduce flammable space by covering a portion of chipping costs for groups that clear and prepare brush correctly. A third program, the Redwood Complex Fire: Hazardous Tree Removal Project, reached capacity but was also initiated to provide hazardous tree removal services. (Mendocino Fire Safe Council, 2019)

4.5.10.12 Wildfire Problem Statements

As part of the mitigation action identification process, the Planning Committee for the County and for each jurisdiction identified issues and weaknesses, also called problem statements, for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping tool and flood data. Wildfire problem statements for all planning partners are listed in Table 4-81; problem statements for all other planning partners are accessed in Volume 2 of this plan.

Identifying these common issues and weaknesses assists the Planning Committee in understanding the realm of resources needed for mitigation. The goal is to have at least one mitigation action for every problem statement. See Table 5-6 for a full list of mitigation actions and the corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 4-81 and Table 5-6.

Table 4-81 Wildfire Problem Statements

Problem No.	Hazard	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-WF-MC-42	Wildfire	Impact	PRV - Prevention , PPRO - Property Protection , PE&A - Public Education & Awareness	**Mendocino County**	In the event of a large fire, residents and responding agencies could face many problems. Evacuation down steep and narrow roads could impede responding fire apparatus, causing road blockage and long response times for personnel	ma-WF-MC-238, ma-WF-MC-300
ps-WF-MC-43	Wildfire	Impact	PRV - Prevention , PPRO - Property Protection , PE&A - Public Education & Awareness	**Mendocino County**	Lack of home addresses and road signage is a huge problem throughout Battalion 4 (NW portion of Mendocino County)	ma-WF-MC-228, ma-AH-MC-299
ps-WF-MC-44	Wildfire	Impact	PRV - Prevention , PPRO - Property Protection , PE&A - Public Education & Awareness	**Mendocino County**	Buildings permitted as “class k” structures under the building code may be at higher risk of wildfire	ma-AH-MC-205, ma-WF-MC-301
ps-WF-MC-45	Wildfire	Victim	PPRO - Property Protection , PE&A - Public Education & Awareness	**Mendocino County**	There are approx. 8 Child Care Centers, 6 Residential Elder Care Facilities, and 1 Adult Residential Care Facility located in High or Very High Wildfire Severity Zones.	ma-WF-MC-227, ma-WF-MC-287, ma-WF-MC-300, ma-WF-MC-302
ps-WF-MC-47	Wildfire	Victim	PPRO - Property Protection , PE&A - Public Education & Awareness	**Mendocino County**	There are approx. 8,954 people living in the very high wildfire intensity zone	ma-WF-MC-123, ma-WF-MC-138, ma-WF-MC-287, ma-WF-MC-300, ma-WF-MC-302
ps-WF-MC-48	Wildfire	Threat	PPRO - Property Protection , NRP - Natural Resource Protection	**Mendocino County**	Understory brush and fuels are present and encroaching on established evacuation routes	ma-WF-MC-239, ma-WF-MC-287, ma-WF-MC-301

Section 5. Mitigation Strategy

The mitigation strategy is the guidebook to future hazard mitigation administration for the County and all other participating jurisdictions, capturing the key outcomes of the MJHMP planning process. The mitigation strategy is intended to reduce vulnerabilities outlined in the previous section with a prescription of policies and physical projects. These mitigation actions should be compatible with existing planning mechanisms and should outline specific roles and resources for implementation success. The Planning Committee conducted the hazard mitigation planning process through typical problem-solving, as did the Steering Committees for each participating jurisdiction. Those steps included:

- Estimate the impacts (*See* Vulnerability Assessment);
- Describe the problem (*See* Problem Statements);
- Assess what resources exist to lessen impacts and problem (*See* Capability Assessment,);
- Develop Goals and Objectives to address the problems (*See* Goals and Objectives); and
- Determine what can be done and develop actions that are appropriate for the community (*See* Mitigation Action Matrix).

5.1 Mitigation Alternatives

During Planning Committee Meeting #3 on June 24th, 2020, the MJHMP Planning Committee developed and reviewed mitigation actions with a wide range of alternatives, using FEMA's six broad categories of mitigation alternatives described below. The MJHMP Planning Committee considered many mitigation alternatives for implementation under each mitigation category, both county-wide and for individual participating jurisdictions. The County and participating jurisdictions also met several times after the large group meeting to review specific hazard-related problem statements and develop mitigation actions. These meeting relied on the following framework to explore mitigation actions.

PREVENTION (PRV):

Preventative activities keep hazard problems from getting worse and typically are administered through government programs or regulations addressing building and land development. Preventative actions are particularly effective in reducing a community's future vulnerability in areas where development has not occurred, or capital improvements have not yet been substantial. Examples of preventative activities include:

- Planning and zoning ordinances
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance

- Capital improvements programming
- Riverine or fault zone setbacks

PRV ALTERNATIVES:

- Establish ingress/ egress standards for future development.
- Enhance the County's GIS database and capabilities related to hazards information.
- Assist dam owners in updating their Emergency Action Plans.
- Maintain detention basins.
- Conduct detailed study and mapping of floodplains for Mendocino River and its tributaries, targeting problematic floodplains.
- Update and distribute wildfire risk mapping for Mendocino County.
- Restrict new development in dam inundation zones.
- Amend or revise water conservation regulations for landscape design for commercial and residential development with the goal of limiting outdoor watering.

PROPERTY PROTECTION (PPRO):

Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- Building elevation
- Critical facilities protection
- Retrofitting (e.g., seismic design techniques, etc.)
- Safe rooms, shutters, shatter resistant glass
- Insurance

PPRO ALTERNATIVES:

1. Continue to work with the Mendocino County Fire Safe Council to conduct mitigation projects with homeowners. Provide homeowners easily accessible resources for mitigating the risk of wildfire around their homes.
2. Implement additional fuel reduction projects.
3. Remove existing structures from flood areas whenever and to the greatest extent possible; Relocate farm work centers from flood risk areas.
4. Encourage privately owned critical facilities (e.g. Churches, Hotels, other gathering facilities) to evaluate the ability of the buildings to withstand earthquakes and to address any deficiencies identified.
5. Identify and harden critical lifeline systems (i.e., critical public services such as utilities and roads) to meet "Seismic Design Guidelines and Standards for Lifelines" or equivalent standards such as American Lifelines Alliance (ALA) guidance.

6. Consider participation in the Community Rating System or other ways to increase participation in NFIP.
7. Review construction plans for all bridges to determine their susceptibility to collapse and retrofitting problem bridges.
8. Use flexible piping when extending water, sewer, or natural gas service.
9. Strengthening and retrofitting non-reinforced masonry buildings and non-ductile concrete facilities that are particularly vulnerable to ground shaking
10. Install shutoff valves and emergency connector hoses where water mains cross fault lines.
11. Continue to incentivize drought-tolerant landscape design.

PUBLIC EDUCATION AND AWARENESS (PE&A):

Public education and awareness activities advise students, staff, parents, nearby residents, and elected officials about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Measures to educate and inform the public include:

- Outreach projects including neighborhood and community outreach
- Speaker series/demonstration events
- Hazard mapping
- Real estate disclosures
- Materials library
- School children educational programs
- Hazard expositions

PE&A ALTERNATIVES:

1. Continue to work with the County of Mendocino local Fire Safe Councils, educating homeowners on reducing the risk of wildfire on their property, including understanding their wildfire risk and free site visits.
2. Distribute public education materials relating to natural hazards as well as emergency notifications in both English and Spanish.
3. Partner with local water agencies such as the Mendocino County Water Agency, the Russian River Watershed Association, the Mendocino County Inland Water and Power Commission, Point Arena Water Works Inc., and Potter Valley Irrigation District, in their public education and conservation campaigns (in English and Spanish).
4. Encourage businesses to build financial reserves as part of economic development.
5. Improve floodplain management, earthquake preparedness, wildfire mitigation and preparedness, and other information on participating jurisdiction’s websites.
6. Distribute National Flood Insurance Program and floodplain development information in County libraries for access by the public
7. Focus a public education program around neighborhoods with egress/ingress issues and narrow roads.

8. Improve interactive hazard mapping resources available to the public.
9. Develop a public information campaign on 72-hour kits.
10. Develop a "Natural Hazard Awareness Week" campaign and conduct corresponding outreach to the community and all interested parties.
11. Conduct outreach to builders, architects, engineers, and inspectors about building susceptibility to earthquakes and proper design and building requirements.
12. Educate on the importance of drought-tolerant landscaping, low flow indoor fixtures, and other water savings techniques to better withstand periods of drought.
13. Partner with local organizations such as the Mendocino County Water Agency education farmers on soil and water conservation practices.
14. Offer agricultural disaster training and networking opportunities for farmers and ag regulatory agencies.

NATURAL RESOURCE PROTECTION (NRP):

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes, and sand dunes. Parks, recreation, or conservation agencies and organizations often implement these protective measures. Examples include:

- Floodplain protection
- Watershed management
- Vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)
- Erosion and sediment control
- Wetland and habitat preservation and restoration

NRP ALTERNATIVES:

1. Protect and restore wetlands, riparian areas, and natural buffers to sea level rise, in particular continuing to implement restoration of Mendocino County rivers.
2. Continue to implement the County of Mendocino Storm Water Resource Plan.
3. Complete vegetation management projects as prescribed in Community Wildfire Protection Plans.
4. Encourage and incentivize drought-tolerant landscape design.
5. Establish a priority list of slope failure locations and implement slope stabilization projects in the highest risk areas.

EMERGENCY SERVICES (ES):

Although not typically considered a “mitigation” technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Construction of evacuation routes
- Sandbag staging for flood protection
- Installing temporary shutters on buildings for wind protection

ES ALTERNATIVES:

1. Construct/Install back up power generators for fire stations, pump houses, emergency shelters, and cooling centers.
2. Develop a website for vulnerable populations to register information such as where the individual in question lives, medications, restrictions, etc. Map registrants or tie information to Nixle alert system
3. Focus capital improvements on evacuation or emergency access routes needing attention.
4. Increase the capacity of existing hospitals through retrofits or upgrades such as isolation wings.
5. Construct or improve egress for wildfire emergencies in wilderness-urban interface (WUI) areas.

STRUCTURAL PROJECTS (SP):

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environment and natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Stormwater diversions / detention / retention infrastructure
- Utility Upgrades
- Seismic Retrofits

SP ALTERNATIVES:

1. Continue the Eel River Recovery project and the associated Tenmile Creek Pilot Project.
2. Continue to work with the Russian River Watershed Association on clean water, habitat restoration, and watershed enhancement.
3. Improve water supply and delivery systems to be more resilient during times of drought.
4. Construct and develop alternative water supplies to augment single sources of water delivery.
5. Construct rainwater catchment systems to recharge groundwater in government ROWs.
6. Install water monitoring devices and drought-tolerant landscaping on government-owned facilities.
7. Improve stormwater drainage capacity; construct/improve stormwater basins County-wide to accomplish 100-YR protection.
8. Construct, install, and maintain warning gauges on local dams as the opportunity or need arises.
9. Create an inventory and establish a priority list for culvert replacement that takes into account fish passage, flood depth reduction, and future losses avoided.
10. Retrofit critical care facilities with enhanced HVAC and isolation areas.

5.2 Identifying the Problem

As part of the mitigation action identification process, the MJHMP Planning Committee identified the areas of concern and potential impacts of each of the identified hazards on the community. Developing these "problem statements" for areas of concern, which describe the nature of the consequences or effects of a hazard occurrence on the community and its assets, ensures the identified mitigation actions are tailored to the specific problems created by various hazard scenarios and are specific to each participating jurisdiction. Each jurisdiction's problem statements are available as part of the Mitigation Action Support Tool (MAST), which is summarized in Section 3, STEP 3: Develop a Mitigation Strategy, available on mitigatehazards.com, and summarized in individual planning partners in Volume 2 of this plan.

See Section 5.5 for County-wide mitigation actions and Volume 2 for mitigation actions for each participating jurisdiction.

5.3 Capabilities Assessment/Adaptive Capacity

This section examines the County's planning and regulatory, administrative, technical, financial, educational, and outreach capabilities to augment known issues and weaknesses from identified natural hazards. Volume 2 of this HMP includes a capabilities assessment for each participating jurisdiction as part of their annexes.

Capabilities assessments in this Volume 1 and in Volume 2 include considerations of a community's adaptive capacity for climate change, as outlined in Cal OES' 2020 California Adaptation Planning Guide. Adaptive capacity is a community or region's existing ability to moderate climate change impacts. Assessing adaptive capacity includes analysis of policies, plans, programs, funding, and staffing capacity. (Cal. Adaptation Planning Guide, 2020, p. 94)

The tables in this section explore various local planning mechanisms, administrative capacity, financial capabilities, and education and outreach initiatives. For more information on the regulatory environment surrounding each hazard, see hazard-specific sections of Section 4.5.The columns in each table represent deeper dives into the following questions:

- Is the existing planning or regulatory mechanism used currently? (*Column 1, Status*)
- Has the HMP been integrated into the planning mechanism currently so that the named mechanism is currently used in HMP planning? (*Column 2, Current Mitigation Use*)
- Is there a future opportunity to expand, improve upon, and incorporate this 2020 HMP Update into the planning or regulatory mechanism? (*Column 3, Future Opportunity*)

The capabilities assessment is easily-digestible and based on color coding to indicate which policies and plans are adequate, need improvement or in which the HMP could be integrated. Each table includes a legend that explain how each one of these questions are being answered according to the color indicated: green, yellow, and orange.

5.3.1 Planning and Regulatory Mitigation Capabilities

The information in Table 5-1 is used to align mitigation actions with the existing planning and regulatory capabilities of the County. Planning and regulatory tools typically used by local jurisdictions to implement hazard mitigation activities are building codes, zoning regulations, floodplain management policies, and other municipal planning documents.

Table 5-1: Mendocino County Planning and Regulatory Mitigation Capabilities

CAPABILITY ASSESSMENT LEGEND

Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

	HMP Integration			
Resource	Status	Current Mitigation Use	Future Opportunity	Notes / Additional Detail
Planning and Regulatory Capabilities				
Construction and Future Development Regulations				
Building Codes				2019 California Building Code
BCEGS Rating				BCEGS class 3
Public Protection (ISO Class)				Rating of 4
Hazard Related Development Standards				Regulations for Limited Density Rural Dwellings (Ch. 18); Fire Safety Requirements (18.23.345)
Zoning Ordinance				
Hazard-Specific Ordinance				Unreinforced Masonry Buildings Article 1 (Ch. 18); Mitigation Program (18.30.060)
Growth Management Ordinance				Chapter 4.13 of the Coastal Element for the County includes growth management policies.
Hazard Reduction Programs (Annually Conducted)				
Capital Improvements Program (CIP) or Plan				FY 2018-19 Proposed Budget page 18.
Erosion/Sediment Control Program				County provides documents such as Erosion and Sediment Control Best Management Practices and Erosion and Sediment Control Practices for Construction Projects..
Hazard-Related Public Outreach Program				

Resource	HMP Integration: Status	HMP Integration: Current Mitigation Use	HMP Integration: Future Opportunity	Notes / Additional Detail
Planning and Regulatory Capabilities				
Stormwater Management Program (Annual Inspections)				Mendocino County Storm Water Management Program Annual Report.
Seismic Safety Program (Non-structural)				
Earthquake Modernization Plan (Building Safety)				
Hazard Plans				
General Plan Safety Element				Part of the Development Element, adopted 2009.
Community Wildfire Protection Plan (CWPP)				2016 County-wide CWPP in existence.
Floodplain Management Plan				
Stormwater Management Plan				Coastal Mendocino Co Storm Water Resource Plan, 2019 Update, applies to the County Unincorp. and Fort Bragg.
Emergency Operations Plan				Mendocino County Operational Area Emergency Operations Plan (2016)
Climate Action Plan				The County is developing a new 2020 Climate Vulnerability Assessment.
Ground Water Management Planning / Plans				Ukiah Valley is the only groundwater basin required to have a groundwater sustainability plan in the County.
National Flood Protection Program (NFIP)				
Floodplain Management Regulations				Floodplain Requirements (Ch. 20.420).
Flood Insurance Education and Technical Assist.				
Flood Hazard Mapping / Re-Mapping				
Community Rating System (CRS)				

5.3.2 Financial Capabilities

Table 5-2 identifies the financial tools or resources that the County has used to fund mitigation activities.

Table 5-2: Mendocino County Fiscal Capabilities Summary

CAPABILITY ASSESSMENT LEGEND

Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

Resource	HMP Integration: Status	HMP Integration: Current Mitigation Use	HMP Integration: Future Opportunity	Notes / Additional Detail
Fiscal Capabilities				
Financial Resources for Hazard Mitigation				
Levy for Specific Purposes with Voter Approval				
Utilities Fees				
Benefit assessments				
System Development Fee				For example: the Building Division Master Fee Schedule.
General Obligation Bonds to Incur Debt				Mendocino County Comprehensive Annual Financial Report, June, 2019.
Special Tax Bonds to Incur Debt				
Withheld Spending in Hazard-Prone Areas				
Stormwater Service Fees				
Capital Improvement Project Funding				Fiscal Year 2018-19 Proposed Budget.

5.3.3 Education and Outreach

Table 5-3 lists the local citizen groups that communicate hazard risks.

Table 5-3: Mendocino County Education/ Outreach Capabilities Summary

CAPABILITY ASSESSMENT LEGEND

Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

	HMP Integration			
Resource	Status	Current Mitigation Use	Future Opportunity	**Notes / Additional Detail**
Education / Outreach Capabilities				
Education/Outreach Resources				
Website Dedicated to Hazard Topics				
Dedicated Social Media				
Hazard Info. Avail. at Library/ Planning Desk				
Annual Public Safety Events				
Ability to Field Public Tech. Assistance Requests				
Public Safety Newsletters or Printed Outreach				County Newsletter.
Fire Safe Councils				The Mendocino County Fire Safe Council assists local Councils a variety of needs. These Councils include: the Caspar Community and Island Cove Estates (south of Point Arena) on the coast; Pine Mountain, Ridgewood Park, and Willowbrook/Sherwood Forest Hills (past Brooktrails) in the Willits area; and Deerwood, Oak Knoll Road, Upper Parducci Road, Black Bart Trail and Robinson Creek Road in the Ukiah area.
Resource Conservation Districts				The Mendocino County Resource Conservation District has implemented a wide range of programs across the County
Other	N/A	N/A	N/A	

5.3.4 Administrative and Technical Capabilities

Table 5-4 shows the administrative and technical capabilities of Mendocino County.

Table 5-4: Mendocino County Administrative and Technical Capabilities

CAPABILITY ASSESSMENT LEGEND

Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

	HMP Integration			
Resource	Status	Current Mitigation Use	Future Opportunity	**Notes / Additional Detail**
Administrative and Technical				
Community Planning and Development Services				
Community Planner				Department of Planning and Building Services.
Civil Engineer				
Building Code Official (Full time or Augmented)				Department of Planning and Building Services.
Floodplain Administrator				Building Official serves as Floodplain Administrator
Fire Marshal				Fire Marshall is with Ukiah Valley District
Dedicated Public Outreach Personnel				Division of Information Services.
GIS Specialist and Capability				Mendocino County Public GIS Portal.
Emergency Manager				Emergency Services Coordinator.
Full-Time Building Official				Department of Planning and Building Services.
Grant Manager, Writer, or Specialist				
Other	N/A	N/A	N/A	
Warning Systems/Services				
General				Mendocino County Citizen Emergency Alert and Notification System (MendoAlert).
Flood				Included in MendoAlert.
Wildfire				Included in MendoAlert.
Geological Hazards				Included in MendoAlert.

5.3.5 Federal and State Funding Opportunities

Table 5-5 is a list of available funding sources from state and federal agencies. This includes the FEMA Hazard Mitigation Assistance grant program, which is described in more detail in Section 6.3.5. This list serves as a resource and is not exclusive.

Table 5-5: Federal and State Funding Opportunities

Agency / Grant Name	Potential Programs/Grants
FEMA Hazard Mitigation Assistance Grants	See Section 6 for FEMA/ HMA grant details. For more information on current grants visit https://www.fema.gov/hazard-mitigation-assistance ▪ Hazard Mitigation Grant Program (HMGP): https://www.fema.gov/hazard-mitigation-grant-program ▪ Building Resilient Infrastructure and Communities (BRIC): https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities ▪ Flood Mitigation Assistance Grant Program (FMA): https://www.fema.gov/flood-mitigation-assistance-grant-program
FEMA other grant programs	Including: ▪ Assistance to Firefighters Grant Program. Assistance to Firefighters Grants, Fire Prevention & Safety, and Staffing for Adequate Fire and Emergency Response. https://www.fema.gov/welcome-assistance-firefighters-grant-program ▪ Emergency Management Performance Grants (EMPG). Good for Equipment, Back Up Generators, Etc. https://www.fema.gov/emergency-management-performance-grant-program ▪ Regional Catastrophic Preparedness Grant Program (RCPGP). Housing and Logistics and Supply Chain Management, encouraging innovative regional solutions to issues related to catastrophic incidents, and building on existing regional efforts. https://www.fema.gov/regional-catastrophic-preparedness-grant-program
U.S. Dept. of Energy / Energy Efficiency and Conservation Block Grant Program	***Provides funding for weatherization of structures and development of building codes/ordinances to ensure energy efficiency and restoration of older homes.*** https://www.energy.gov/eere/wipo/energy-efficiency-and-conservation-block-grant-program
State and County Community Development Dept. Block Grants (CDBG)	Through Cal. Dept. of Housing and Community Development Dept. (HCD) Programs Include: ▪ Community Development (CD) ▪ Economic Development (ED) ▪ Disaster Recovery Initiative (DRI) ▪ Neighborhood Stabilization Program (NSP) https://www.hcd.ca.gov/grants-funding/active-funding/cdbg.shtml

Agency / Grant Name	Potential Programs/Grants
Cal OES **Proposition 1B Grants Programs**	The Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006, approved by the voters as Proposition 1B at the November 7, 2006 general election, authorizes the issuance of $19,925,000,000 in general obligation bonds for specified purposes, including grants for transit system safety, security, and disaster response projects. http://www.caloes.ca.gov/cal-oes-divisions/grants-management/homeland-security-prop-1b-grant-programs/proposition-1b-grant
California Proposition 1: the Water Bond (AB 1471)	Authorize $7.545 billion in general obligation bonds for state water supply infrastructure projects, such as public water system improvements, surface and groundwater storage, drinking water protection, water recycling and advanced water treatment technology, water supply management and conveyance, wastewater treatment, drought relief, emergency water supplies, and ecosystem and watershed protection and restoration. The State Water Resources Control Board (State Water Board) will administer Proposition 1 funds for five programs. The estimated implementation schedule for each is outlined in Five Categories: ▪ Small Community Wastewater ▪ Water Recycling ▪ Drinking Water ▪ Stormwater ▪ Groundwater Sustainability http://www.waterboards.ca.gov/water_issues/programs/grants_loans/proposition1.shtml
Assistance to Firefighters Grant Program (AFG); Fire Prevention and Safety (FP&S)	The primary goal of the FP&S Grants is to enhance the safety of the public and firefighters with respect to fire and fire-related hazards. The Grant Programs Directorate administers the FP&S Grants as part of the AFG Program. FP&S Grants are offered to support projects in two activity areas: 1). Fire Prevention and Safety (FP&S) Activity Activities designed to reach high-risk target groups and mitigate the incidence of death and injuries caused by fire and fire-related hazards. 2). Research and Development (R&D) Activity To learn more about how to prepare to apply for a project under this activity, please see the FP&S Research and Development Grant Application Get Ready Guide. https://www.fema.gov/fire-prevention-safety-grants
California Housing and Community Development (HCD) Emergency Solutions Grant (ESG) Program	***To fund projects that serve homeless individuals and families with supportive services, emergency shelter/transitional housing, assisting persons at risk of becoming homeless with homelessness prevention assistance, and providing permanent housing to the homeless population. The Homeless Emergency Assistance and Rapid Transition to Housing (HEARTH) Act of 2009 places new emphasis on assisting people***

Agency / Grant Name	Potential Programs/Grants
	to quickly regain stability in permanent housing after experiencing a housing crisis and/or homelessness. http://www.hcd.ca.gov/fa/esg/index.html
CalTrans Division of Local Assistance / Safe Routes to School Program	California Dept. of Transportation. Federal funding administered via Caltrans. Local 10% match is the minimum requirement. http://www.dot.ca.gov/hq/LocalPrograms/saferoutes/saferoutes.htm Active transportation grant program. Creating mobility and connectivity. Prioritize projects, and preparation of PED for active transportation projects.
Property Assessed Clean Energy (PACE) Programs	PACE financing allows property owners to fund energy efficiency, water efficiency and renewable energy projects with little or no up-front costs. With PACE, residential and commercial property owners living within a participating district can finance up to 100% of their project and pay it back over time as a voluntary property tax assessment through their existing property tax bill.
HazMat Emergency Preparedness Grant	The purpose of this grant program is to increase effectiveness in safely and efficiently handling hazardous materials accidents and incidents; enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA); and encourage a comprehensive approach to emergency training and planning by incorporating the unique challenges of responses to transportation situations. http://www.caloes.ca.gov/cal-oes-divisions/fire-rescue/hazardous-materials/hazmat-emergency-preparedness-grant
CERT Program Manager Course	The purpose of this Community Emergency Response Team (CERT) Program Manager course is to prepare CERT Program Managers for the tasks required to establish and sustain an active local CERT program. http://www.californiavolunteers.org/index.php/CERT/PM/
California Residential Mitigation Program	The California Residential Mitigation Program (CRMP) was established to carry out mitigation programs to assist California homeowners who wish to seismically retrofit their houses. http://www.californiaresidentialmitigationprogram.com/
Earthquake Brace + Bolt (EBB)	EBB, part of the California Residential Mitigation Program, was developed to help homeowners lessen the potential for damage to their houses during an earthquake by offering eligible homeowners up to a $3,000 incentive to seismically retrofit their homes. https://www.earthquakebracebolt.com/

Agency / Grant Name	Potential Programs/Grants
California Air Resources Board Air Pollution Incentives, Grants and Credit Programs	These programs have hundreds of millions of dollars in grants available over the next several years to reduce emissions from on- and off-road vehicles and equipment. https://www.arb.ca.gov/ba/fininfo.htm
California Department of Water Resources Grants and Loans	https://water.ca.gov/Work-With-Us/Grants-And-Loans Agency offers a variety of grants and loans related to integrated regional water management, flood mitigation, water conservation and efficiency, environmental restoration, groundwater, water quality, and water supply.
US Bureau of Reclamation WaterSMART Grants	Annual funding available for: ▪ Water Reclamation and Reuse funding ▪ Drought Resiliency Project funding ▪ Water and Energy Efficiency Grant funding https://www.usbr.gov/watersmart/

5.4 Mitigation Goals

Hazard mitigation plans must identify goals for reducing long-term vulnerabilities to identified hazards (44 C.F.R. § 201.6(c)(3)(i)). The Steering Committee established a set of goals for this plan, based on data from the preliminary risk assessment and the results of the public involvement strategy.

Goals discussed in this section describe what actions should occur. Specific, measurable mitigation actions explain how to accomplish the goals. The goals and actions form the basis for the development of the Mitigation Action Strategy and specific mitigation projects. The process consists of 1) setting goals, 2) considering mitigation alternatives, 3) identifying strategies or "actions", and 4) developing a prioritized action plan resulting in a mitigation strategy.

The goals and mitigation actions in this plan all support each other. Actions were prioritized based on their ability to achieve multiple goals. A mitigation strategy is considered effective based on how well the goals of the strategy are achieved. The following are the goals for this plan:

Goal 1: Reduce loss of life, injuries, and structural and economic damage through the use of planning, regulations, and preventative measures.

Goal 2: Reduce loss of life, injuries, and structural and economic damage through the use of property protection measures.

Goal 3: Reduce loss of life, injuries, and structural and economic damage through the use of public education and awareness programs.

Goal 4: Reduce loss of life, injuries, and structural and economic damage through the use of natural resource/ systems protection.

Goal 5: Reduce loss of life, injuries, and structural and economic damage through the use of structural/ infrastructure projects.

Goal 6: Reduce loss of life, injuries, and structural and economic damage through the use of emergency services in relation to natural hazards.

5.5 County Wide Mitigation Actions

Mitigation actions were developed based upon planning committee priorities, risk assessment results, and mitigation alternatives. Most importantly, the newly-developed mitigation actions acknowledge updated risk assessment information outlined in Section 4.

Mitigation actions are available on MAST linked through mitigatehazards.com; the format allows for regular updating and easy sorting by jurisdiction and hazard. Figure 5-1 illustrates the mitigation actions entered through MAST.

Table 5-6 establishes mitigation actions for the County. Each participating jurisdiction developed mitigation actions specifically tailored to their vulnerabilities and capabilities. Those mitigation actions are available as part of the planning process library, which is summarized in Section 3, STEP 3 (County Planning Process Library), are available on the Mitigation Action Application, and available for each individual participating jurisdiction in Volume 2 of this plan.

Some mitigation actions support ongoing activities of participating jurisdictions, while other actions are intended to be completed when funding is available. All mitigation actions will be reviewed annually.

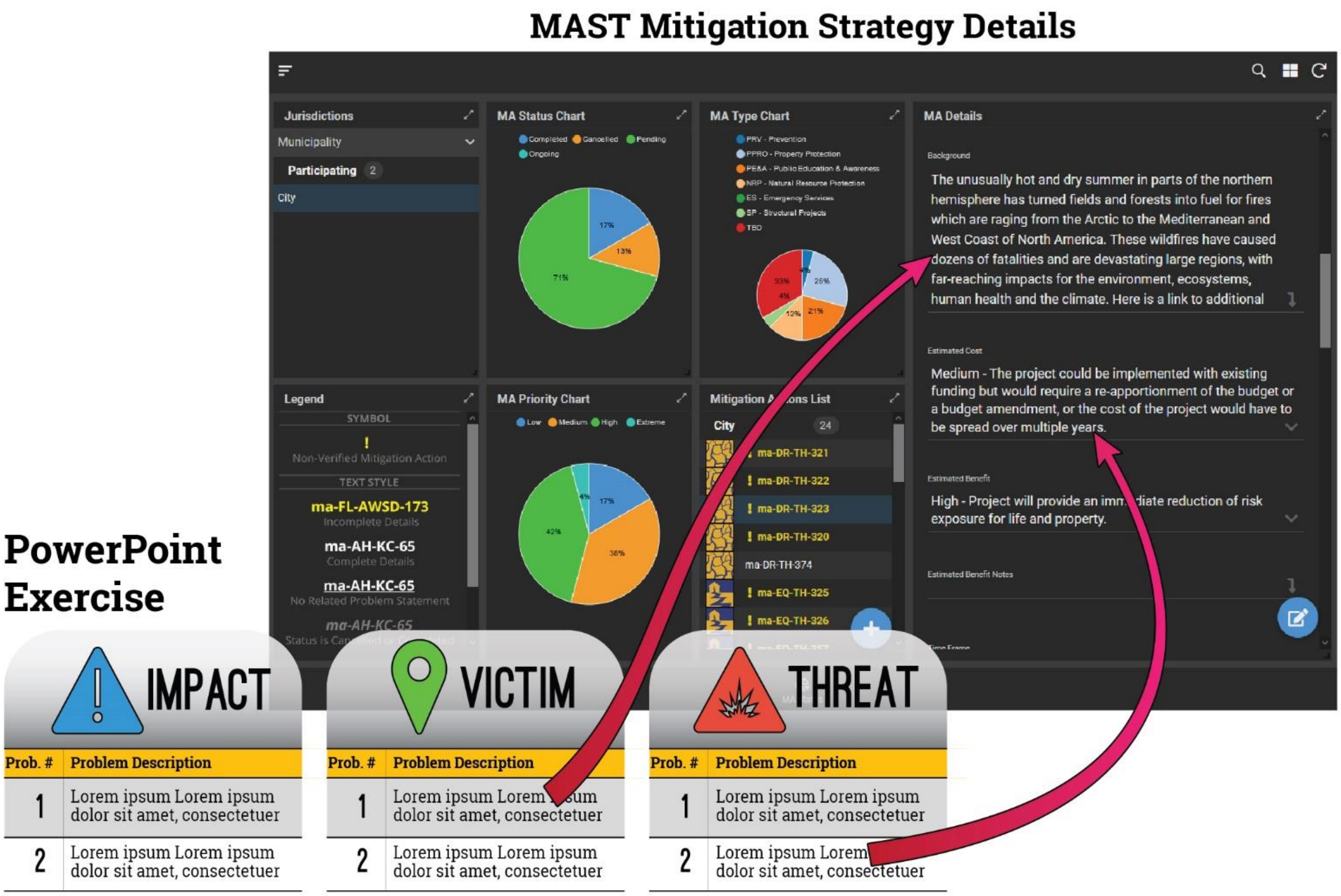


Figure 5-1: Mitigation Action Application

5.5.1 Prioritization of Mitigation Actions

Implementing the identified mitigation can be overwhelming for any local jurisdiction or district, especially with limited staffing and fiscal resources; prioritizing the identified mitigation actions can help greatly with this. To ensure this MJHMP realistically reflects available resources, mitigation actions are prioritized by considering benefit cost review, public input, and MJHMP Planning Committee agreement.

5.5.1.1 Cost/ Benefit Review

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 C.F.R. §201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. This review does not meet FEMA Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) grant program requirements. A less formal, less costly approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects. Cost ratings were defined as follows:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).
- **Medium—**The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low—**The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Benefit ratings were defined as follows:

- **High—**Project will provide an immediate reduction of risk exposure for life and property.
- **Medium—**Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.
- **Low—**Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly. For many of the strategies identified in this action plan, the partners may seek financial assistance under the HMGP or BRIC programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define "benefits" according to parameters that meet the goals and objectives of this HMP.

5.5.1.2 Public Input

An 8-question community survey was distributed to the public, yielding 376 survey responses and useful insight into the community's perception of natural hazards affecting Mendocino County. Specific question responses heavily influenced the prioritization of mitigation actions, including:

- 79% of participants believe their property is at risk from a natural hazard disaster.
- 44.3% of respondents have experienced earthquakes, 37.9% experienced wildfire, 53.1% experienced a pandemic, and 45.1% experienced drought. Only 9.9% of respondents (or someone in their household) had not experienced a natural hazard.
- 50.8% of participants considered the risk of naturally occurring hazards when choosing their home.
- 60.4% of respondents felt they were well-informed about the dangers of natural hazards, while 33.5% felt somewhat informed and 6.1% felt uninformed.
- When asked what incentives would encourage additional home protection from possible natural hazards, the top responses were insurance premium discounts (63.3%), rebate programs or reimbursement of upfront costs (62.5%), and building permit fee waivers (49.2%).
- Respondents indicated top mitigation projects that local government agencies should focus on:
    - Retrofit and strengthen essential facilities (54.8%)
    - Replace inadequate or vulnerable bridges and roadways (61.4%)
    - Retrofit or upgrade drainage systems (36.7%)
    - Work on improving damage resistance of utilities (71.8%)
    - Ensure emergency shelters, the Emergency Operations Center, and communication towns have backup power generators (63.3%)
    - Assist vulnerable property owners with securing funding to mitigate impacts to their properties (51.3%)

The complete survey results can be found in Appendix B.

5.5.2 Mitigation Action Plan

Table 5-6 lists each mitigation action for the County. Each participating jurisdiction developed unique mitigation actions as well, targeted at their own unique priorities and vulnerabilities; these are available on MAST and in Volume 2 of this MJHMP. Each mitigation action identifies the responsible party, time frame, potential funding source, implementation steps and resources needed to implement these priority mitigation actions. As a living document, hazard problem statements and mitigation activities will be updated through MAST.

The detail provided in MAST and captured in Table 5-6 meets the regulatory requirements of FEMA and DMA 2000.

The actions detailed in Table 5-6 and MAST contain both new action items developed for this plan Update as well as old actions that were yet to be completed from the 2014 Plan. The action numbers indicate whether the action is new or from the 2014 plan. A sample of the action number nomenclature is presented in Figure 5-2.

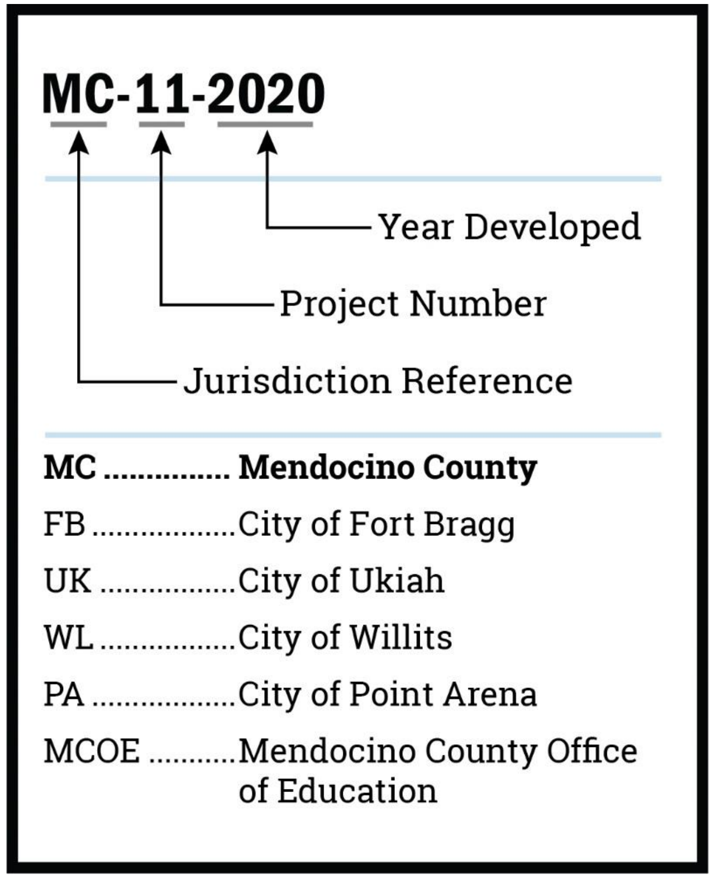


Figure 5-2: Mitigation Action Number Key

Section 2, What's New, illustrates progress towards new and previous mitigation action and indicates how many actions have been completed, deleted, or are ongoing or pending.

Important to note: The Planning Committee realizes that new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions and edit existing actions as necessary as long as they conform to the overall goals of the plan.

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Table 5-6: County Wide Mitigation Action Tracker

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Problem Statements
ma-AH-MC-134	All Hazard	PE&A - Public Education & Awareness	Pending	2008	Mendocino County	Develop a public outreach program that distributes consistent hazard mitigation content and mitigation tips for property owners. For example, wildfire outreach should focus on necessary ignition resistance and home hardening features - including defensible space - for county residents.	Mendocino County	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	Ongoing	5%	HMGP / BRIC	Low	ps-EQ-MC-40, ps-EQ-MC-38, ps-EQ-MC-39, ps-CC-MC-59, ps-EW-MC-54
ma-AH-MC-205	All Hazard	PE&A - Public Education & Awareness	Pending	2020	Mendocino County	Develop an education program to inform both existing Class K structure owners and applicants of building permits for Class K structures of the inherent risks of such structures to all natural hazards	Planning and Building Services	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	1-3 Years	5%	HMGP / BRIC	High	ps-EQ-MC-40, ps-FL-MC-31, ps-WF-MC-44
ma-SH-MC-226	All Hazard	PPRO - Property Protection	Pending	2020	Mendocino County	Establish a priority list of coastal erosion locations and implement slope stabilization projects in the highest risk areas, specially those projected to be impacted by sea level rise most significantly.	Mendocino County	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC	Medium	ps-SH-MC-50, ps-CC-MC-59
ma-AH-MC-299	All Hazard	ES - Emergency Services	Pending	2020	Mendocino County	Construct evacuation routes as needed to ensure multiple egress routes from neighborhoods.	Mendocino County Department of Transportation	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	Funding Dependent	Project	HMGP / BRIC , FP&S	High	ps-WF-MC-43, ps-EQ-MC-36, ps-EW-MC-53
ma-CC-MC-221	Climate Change	PE&A - Public Education & Awareness	Pending	2020	Mendocino County	Offer agricultural disaster training and networking opportunities for farmers and agricultural regulatory agencies.	Mendocino County	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	3-5 Years	5%	HMGP / BRIC	Medium	ps-CC-MC-58
ma-CC-MC-298	Climate Change	PE&A - Public Education & Awareness	Pending	2020	Mendocino County	Develop public outreach to educate the public on household practices that can lessen the impacts of climate change and adaption practices for climate change impacts such as sea level rise.	Mendocino County	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	Ongoing	5%	HMGP / BRIC	Medium	ps-CC-MC-60

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Problem Statements
ma-DF-MC-126	Dam Failure	PE&A - Public Education & Awareness	Pending	2014	Mendocino County	Develop a public outreach program that informs property owners located in the dam or levee inundation areas about voluntary flood insurance.	Planning and Building Services	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	1-3 Years	5%	HMGP / BRIC	Medium	ps-DF-MC-56, ps-DF-MC-57
ma-DF-MC-199	Dam Failure	ES - Emergency Services	Pending	2020	Mendocino County	Design and implement County-wide warning system program, with all other HMP participating jurisdictions as secondary participants, to warn everyone within a dam inundation zone of impending dam failure	Mendocino County	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC , FMA	Medium	ps-DF-MC-56, ps-DF-MC-57, ps-DF-UK-173
ma-DR-MC-196	Drought	PE&A - Public Education & Awareness	Pending	2020	Mendocino County	Develop a public education campaign to encourage water conservation during drought.	Planning and Building, Env. Health,	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	5%	HMGP / BRIC	Medium	ps-DR-MC-18, ps-DR-MC-19
ma-DR-MC-197	Drought	PRV - Prevention	Pending	2020	Mendocino County	Amend land use codes to incorporate regulations that encourage and incentive water savings for development.	Planning and Building Services	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	1-3 Years	Planning	HMGP / BRIC	Medium	ps-DR-MC-21, ps-CC-MC-60
ma-DR-MC-198	Drought	NRP - Natural Resource Protection	Pending	2020	Mendocino County	Replace existing turf grass and water intensive landscaping with drought resistant landscaping	Mendocino County	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	Medium	ps-DR-MC-20
ma-EQ-MC-127	Earthquake	SP - Structural Projects	Pending	2014	Mendocino County	Seismically retrofit or replace County and local ramps and bridges that are categorized as structurally deficient by Caltrans, identified as needing replacement by the County, are located in an high ground shaking areas, and/or are necessary for first responders to use during and/or immediate after a disaster or emergency.	Planning and Building Services	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC	High	ps-EQ-MC-36

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Problem Statements
ma-EQ-MC-200	Earthquake	PE&A - Public Education & Awareness	Pending	2020	Mendocino County	Encourage privately owned critical facilities (e.g. churches, hotels, other gathering facilities) to evaluate the ability of the buildings to withstand earthquakes and to address any deficiencies identified.	Mendocino County	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	5%	HMGP / BRIC	High	ps-EQ-MC-33, ps-EQ-MC-37, ps-EQ-MC-38, ps-EQ-MC-39, ps-EQ-MC-41
ma-EQ-MC-201	Earthquake	SP - Structural Projects	Pending	2020	Mendocino County	Retrofit / Harden County-owned critical facilities (including water & sewer infrastructure) and buildings and their ability to withstand earthquakes.	Planning and Building Services, Mendocino County Dept. of Transportation	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	5-10 Years	Project	HMGP / BRIC	High	ps-EQ-MC-34, ps-EQ-MC-33, ps-EQ-MC-37, ps-EQ-MC-36
ma-EQ-MC-202	Earthquake	SP - Structural Projects	Pending	2020	Mendocino County	Retrofit non-compliant suspended ceilings in County buildings. This includes Non-Structural Suspended Gypsum Dry-Wall & Cement Plaster Ceilings built 1950-1974.	Mendocino County	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC	High	ps-EQ-MC-33, ps-EQ-MC-34
ma-EQ-MC-203	Earthquake	SP - Structural Projects	Pending	2020	Mendocino County	Install seismic gas shut-off valves on County buildings to prevent the flow of gas into buildings during a seismic event	Mendocino County	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	ps-EQ-MC-35
ma-WS-MC-118	Extreme Weather	PPRO - Property Protection	Pending	2014	Mendocino County	Manage vegetation in areas within and adjacent to rights- of-way and in close proximity to critical facilities in order to reduce the risk of tree failure and property damage and avoid creation of wind acceleration corridors within vegetated areas.	Mendocino County	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	ps-EW-MC-55
ma-EW-MC-207	Extreme Weather	NRP - Natural Resource Protection	Pending	2020	Mendocino County	Routinely inspect storm water channels for vegetation build up or encroachment, trash and debris, silt and gravel build up, and erosion or bank failure.	Mendocino County Department of Transportation	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	Project	HMGP / BRIC , FMA	High	ps-EW-MC-53, ps-EW-MC-53, ps-FL-MC-29

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Problem Statements
ma-EW-MC-208	Extreme Weather	SP - Structural Projects	Pending	2020	Mendocino County	Perform a feasibility study for flood proofing options and analyze the drainage systems County-wide.	Mendocino County DOT	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC , FMA	High	ps-EW-MC-53
ma-FL-MC-125	Flood	PPRO - Property Protection	Pending	2014	Mendocino County	Acquire, relocate, or elevate residential structures, in particular those that have been identified as Repetitive Loss (RL) properties that are located within the 100-year floodplain.	Planning and Building Services	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	FMA	High	ps-FL-MC-32
ma-FL-MC-210	Flood	SP - Structural Projects	Pending	2020	Mendocino County	Elevate and retrofit bridges and culverts to allow proper stormwater / 100-YR flows.	Mendocino County DOT	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	5-10 Years	Project	HMGP / BRIC , FMA	High	ps-FL-MC-28
ma-FL-MC-213	Flood	NRP - Natural Resource Protection	Pending	2020	Mendocino County	Draft a Floodplain Management Plan to address County-wide flooding and identify specific mitigation projects to reduce the magnitude, frequency, and severity of flooding in Mendocino County.	Mendocino County	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Planning	HMGP / BRIC , FMA	High	ps-FL-MC-27, ps-FL-MC-30, ps-FL-MC-174
ma-FL-MC-215	Flood	PRV - Prevention	Pending	2020	Mendocino County	Adopt higher regulatory standards (including but not limited to freeboard, comp storage, lower substantial damage thresholds, setback and fill restrictions) as means to reduce future flood risk and support a no-adverse-impact (NAI) philosophy to floodplain management.	Mendocino County	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC , FMA	Medium	ps-FL-MC-31, ps-FL-MC-32
ma-PN-MC-222	Pandemic	SP - Structural Projects	Pending	2020	Mendocino County	Assess and institute necessary upgrades to critical facilities to allow for usage during pandemic, including adequate ventilation and physical barriers	Mendocino County	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	ps-PN-MC-115, ps-PN-MC-61
ma-PN-MC-223	Pandemic	SP - Structural Projects	Pending	2020	Mendocino County	Institute necessary structural improvements to evacuation centers/sheltering locations to allow for proper ventilation, space for staff, and structural barriers to be used during pandemic and hazard event.	Mendocino County	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	ps-PN-MC-115, ps-PN-MC-61

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Problem Statements
ma-PN-MC-224	Pandemic	ES - Emergency Services	Pending	2020	Mendocino County	Develop alternative sheltering/ evacuation locations for social distancing required during pandemic and other hazard event	Mendocino County	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	High	ps-PN-MC-114, ps-PN-MC-61
ma-SF-MC-139	Slope Failure	PPRO - Property Protection	Pending	2008	Mendocino County	Construct a lightweight fill prism under roads to prevent the slip plain from further movement and subsequent damage to roads.	Mendocino County	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC	High	ps-SF-MC-22, ps-SF-MC-23, ps-SF-MC-26
ma-SF-MC-225	Slope Failure	PPRO - Property Protection	Pending	2020	Mendocino County	Establish a priority list of slope failure locations and implement slope stabilization projects in the highest risk areas,.	Mendocino County Department of Transportation	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	1-3 Years	Planning	HMGP / BRIC	Medium	ps-SF-MC-22, ps-SF-MC-23, ps-SF-MC-24, ps-SF-MC-25, ps-SF-MC-26, ps-SH-MC-51, ps-SH-MC-52
ma-SH-MC-206	Soil Hazard	PE&A - Public Education & Awareness	Pending	2020	Mendocino County	Develop educational outreach during the building permit process to raise awareness about the presence naturally occurring asbestos.	Planning and Building Services	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	1-3 Years	5%	HMGP / BRIC	Medium	ps-SH-MC-49
ma-WF-MC-123	Wildfire	PPRO - Property Protection	Pending	2014	Mendocino County	Create and/or help strengthen existing vegetation management programs that provides vegetation management services to elderly, disabled, or low-income property owners who lack the resources to remove flammable vegetation from around their homes.	Office of Emergency Services	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC , FP&S	High	ps-WF-MC-47
ma-WF-MC-227	Wildfire	PPRO - Property Protection	Pending	2020	Mendocino County	Retrofit critical facilities (adult care, child care, schools, railways) with fire-resistant materials and create defensible space around structures.	Mendocino County	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC , FP&S	High	ps-WF-MC-45

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Problem Statements
ma-WF-MC-228	Wildfire	ES - Emergency Services	Pending	2020	Mendocino County	Ensure addresses and locations are easily accessed during emergency, especially in the WUI. Methods include installation of high visibility address markers, partnering wiht County Fire Chief to reduce overlapping, duplicate, or misordered street and address markings, and developing GPS-based locating options for more remote or hard to find locations.	Mendocino County	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC , FP&S	High	ps-WF-MC-43
ma-WF-MC-238	Wildfire	PRV - Prevention	Pending	2020	Mendocino County	Update County Code/ Land Use Regulations/Subdivision Design Guidelines to include design and siting standards to incorporate, for example, emergency response access and turn around space or fire suppression water needs.	Planning and Building Services	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	High	ps-WF-MC-42
ma-WF-MC-239	Wildfire	NRP - Natural Resource Protection	Pending	2020	Mendocino County	Coordinate with fire protection agencies to develop vegetation management program to remove understory brush, hazardous trees, and excessive fuels around County roads and evacuation routes.	Mendocino County Department of Transportation	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	Project	HMGP / BRIC , FP&S	High	ps-WF-MC-48
ma-WF-MC-287	Wildfire	PPRO - Property Protection	Pending	2020	Mendocino County	Implement and continue to re-prioritize Mendocino County CWPP Mitigation Projects and support smaller scale neighborhood and community plans as appropriate.	Mendocino County	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC , AFG , FP&S	High	ps-WF-MC-47, ps-WF-MC-48, ps-WF-MC-45
ma-WF-MC-300	Wildfire	PPRO - Property Protection	Ongoing	2020	Mendocino County	Identify and develop a plan and maintenance schedule for key fuel breaks currently existing around population centers and other key resources; develop new fuel breaks as identified.	County in partnership with MCFSC	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	Project	HMGP / BRIC	Medium	ps-WF-MC-42, ps-WF-MC-45, ps-WF-MC-47
ma-WF-MC-301	Wildfire	PRV - Prevention	Ongoing	2020	Mendocino County	Continue to support programs to reduce fuel loads in the County, including but not limited to continuing the chipper program, mastication and removal of fuels, and encouraging prescribed burns when practicable.	County in partnership with MCFSC	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	Project	HMGP / BRIC , FP&S	High	ps-WF-MC-48, ps-WF-MC-44

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Problem Statements
ma-WF-MC-302	Wildfire	PRV - Prevention	Ongoing	2020	Mendocino County	Develop a program to map and manage emerging high risk fuel sources.	County in partnership with Mendocino Fire Safe Council	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	Planning	HMGP / BRIC , FP&S	Medium	ps-WF-MC-45, ps-WF-MC-47

Note: As a living document, project descriptions and actions in the tables above will be modified to reflect current conditions over time in MAST.

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Section 6. Plan Implementation and Maintenance

It is important that this plan becomes a usable, used tool for all planning partners to ensure reductions in possible damage from a natural hazard event. This section discusses adopting, implementing, monitoring, evaluating, and updating the MJHMP, which should help ensure that the MJHMP remains relevant. This section describes the incorporation of the MJHMP into existing planning mechanisms, and how the jurisdictions will continue to engage the public.

6.1 Plan Adoption

To comply with DMA 2000, the Mendocino County Board of Supervisors has officially adopted the Mendocino County Multi-Jurisdiction Hazard Mitigation Plan. The adoption of the MJHMP recognizes the County's commitment to reducing the impacts of natural hazards within the County. A copy of the MJHMP adoption resolution is included immediately following the Executive Summary.

6.2 Plan Implementation

Over time, implementation strategies for mitigation actions will become more detailed. MAST will be extremely useful to plan for updates to this MJHMP and to update individual mitigation actions as implemented or revised. In conjunction with the progress report processes, implementation strategy worksheets will be extremely useful as a plan of record tool for updates. Each implementation strategy worksheet provides individual steps and resources need to complete each priority mitigation action. The following are considerations for developing future implementation strategies:

- **Use processes that already exist.** Take advantage of the tools and procedures identified in the capability assessment in Section 5.3. Using planning mechanisms already in use and familiar to planning partners will give the planning implementation phase a strong initial boost.
- **Updated work plans, policies, or procedure.** Incorporating hazard mitigation concepts and activities can help integrate the HMP into daily operations. These changes can include how major development projects and subdivision reviews are addressed in hazard-prone areas or ensure that hazard mitigation concerns are considered in the approval of major capital improvement projects.
- **Job descriptions.** Working with department or agency heads to revise job descriptions of government staff to include mitigation-related duties, including designating a "mitigation lead" within a department, can further institutionalize hazard mitigation with little financial expenditure or programmatic overhaul.

6.2.1 Steering Committee

The Steering Committee oversaw the development of the plan and made recommendations on key elements of the plan, including the maintenance strategy. The Steering Committee recommended that an oversight committee referred to herein as the MJHMP Steering Committee, should have an active role in the plan maintenance strategy. Therefore, it is recommended that the MJHMP Steering Committee become involved in key elements of the plan maintenance strategy. The new MJHMP Steering Committee should strive to include representation from the planning partners, as well as other stakeholders in the planning area.

The new MJHMP Steering Committee will review the annual progress report and provide input to Mendocino County on possible improvements or action steps to be considered at the next update. Keeping this new MJHMP Steering Committee intact will also jump-start future updates. Completion of a progress report is the responsibility of each participating jurisdiction, not the responsibility of the steering committee. It will simply be the MJHMP Steering Committee's role to review the progress report in an effort to identify issues needing to be addressed by future plans..

6.3 Monitoring, Evaluating and Updating the MJHMP

This section describes the schedule and process for monitoring, evaluating, and updating the MJHMP. The Mitigation Action Support Tool (MAST), has been developed as a primary resource for updating and monitoring mitigation actions. See subsection 6.3.2 below for more information on MAST.

6.3.1 Schedule

Monitoring the progress of the mitigation actions will be ongoing throughout the five-year period between the adoption of the MJHMP and the next update effort. The newly-formed MJHMP Steering Committee will meet biannually to monitor the implementation of mitigation actions and develop updates as necessary.

The MJHMP will be updated every five years, as required by DMA 2000. The update process will begin at least one year prior to the expiration of the MJHMP. However, should a significant disaster occur within the County, the MJHMP Steering Committee will reconvene within 30 days of the disaster to review and update the MJHMP as appropriate. The Board of County Commissioners will adopt written updates to the MJHMP as a DMA 2000 requirement.

6.3.2 Mitigation Action Support Tool (MAST) Updates

Hazard problem statements and mitigation activities will be updated through a web interface application developed specifically for Mendocino County, available on the project website, (https://mitigatehazards.com/mendocino-county/), to ensure this MJHMP remains a living document.

MAST is a web-based interactive tool that enables multiple users to search, view, enter, and update mitigation actions, ideas or projects, and other information. MAST provides participating jurisdiction staff and plan reviewers (Cal OES/FEMA) access to valuable mitigation information that can be leveraged by future planning or other risk reduction efforts. Users can update the status of their mitigation projects throughout the planning lifecycle and this web-based tool will improve participating jurisdiction's ability to apply for FEMA's Hazard Mitigation Assistance (HMA) grant programs including the initial grant application processes through Cal OES.

6.3.3 Process

The MJHMP Steering Committee will coordinate with responsible agencies/organizations identified for each mitigation action. These responsible agencies/organizations will monitor and evaluate the progress made on the implementation of mitigation actions and report to the MJHMP Steering Committee on an annual basis. These responsible departments will assess the effectiveness of the mitigation actions and modify them as appropriate. MAST will assist mitigation project managers in reporting on the status and assessing the effectiveness of the mitigation actions. Most updates to the HMP will occur easily through MAST.

MAST Mitigation Strategy Details

Figure 6-1: Diagram of MAST viewing details

Information from the mitigation leads within responsible departments will be used to monitor mitigation actions and annual evaluation of the MJHMP. The following questions will be considered in evaluating MJHMP effectiveness:

- Has the nature or magnitude of hazards affecting the County and other jurisdictions changed?
- Are there new hazards that have the potential to impact the County and other jurisdictions?
- Do the identified goals and actions address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the MJHMP?
- Should additional local resources be committed to address identified hazards?

Future updates to the MJHMP will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. Issues that arise or updates made during monitoring and evaluating the MJHMP will be incorporated into the next update of the MJHMP in 2025. The questions identified above would remain valid during the preparation of the 2025 update.

6.3.4 Continuing Public Involvement

During the five-year update cycle, County staff will involve the public through public workshops and meetings. Information on upcoming public events related to the MJHMP or solicitation for comments will be announced via newspapers, mailings, and on the County MJHMP website (https://mitigatehazards.com/mendocino-county/). An electronic copy of the current MJHMP document will be accessible through the County website as well as at the County Courthouse in the City of Mendocino. The MJHMP Planning Committee will, as much as practicable, incorporate the following concepts into its public outreach strategy to ensure continued public involvement in the MJHMP planning process:

- Work with public service clubs, i.e., the Rotary Club of Mendocino, and the Mendocino County Library.
- Collaborate with faith-based organizations, i.e., Mendocino Presbyterian Church, Mendocino Baptist Church, Sant Anthony Roman Catholic Church, Mendocino Coast Jewish Community, etc.
- Create story ideas for media outlets, such as newspapers, local radio, and TV
- Distribute emails and postcards/mailers to County/ City/ Town residents about hazard mitigation updates
- Post meeting announcements at City Halls, community centers, coffee houses, grocery stores, etc.
- Educate and collaborate with insurance companies.
- Participate in other existing local community meeting places, i.e., Mendocino Farmers Market, Ukiah Farmers Market, Point Arena Farmers Market, etc.
- Distribute information through K-12 schools
- Continue to use the County website as a distribution point of hazard mitigation information

6.3.5 HMA Monitoring

FEMA's Hazard Mitigation Assistance (HMA) Program is the catalyst that drives increased understanding and supports proactive community action to reduce losses from natural hazards. To support this vision, FEMA funds three grant programs under HMA. The three programs are the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA) Program, and Building Resilient Infrastructure and Communities (BRIC) Program.[11]

- **HMGP** assists in implementing long-term hazard mitigation planning and projects following a Presidential major disaster declaration
- **BRIC** provides funds for hazard mitigation planning and projects on an annual basis
- **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) on an annual basis.

HMGP funding is generally 15% of the total amount of Federal assistance provided to a State, Territory, or federally-recognized tribe following a major disaster declaration. BRIC and FMA funding depends on the amount congress appropriates each year for those programs. The HMGP supports cost-effective post-disaster projects and is the longest-running mitigation program among FEMA's three grant programs. A 2017 study by the National Institute of Building Sciences' (NIBS) Multihazard Mitigation Council has shown that every federal dollar spent on mitigation saves six dollars in response and recovery costs.

MAST will be extremely useful in applying for Cal OES funding. Plan maintenance will be primarily done through MAST. Figure 6-2 demonstrates how MAST information will translate into Cal OES NOIs and grant Sub application requests.

[11] In August of 2020, the BRIC program replaced Pre-Disaster Mitigation (PDM) grant program.

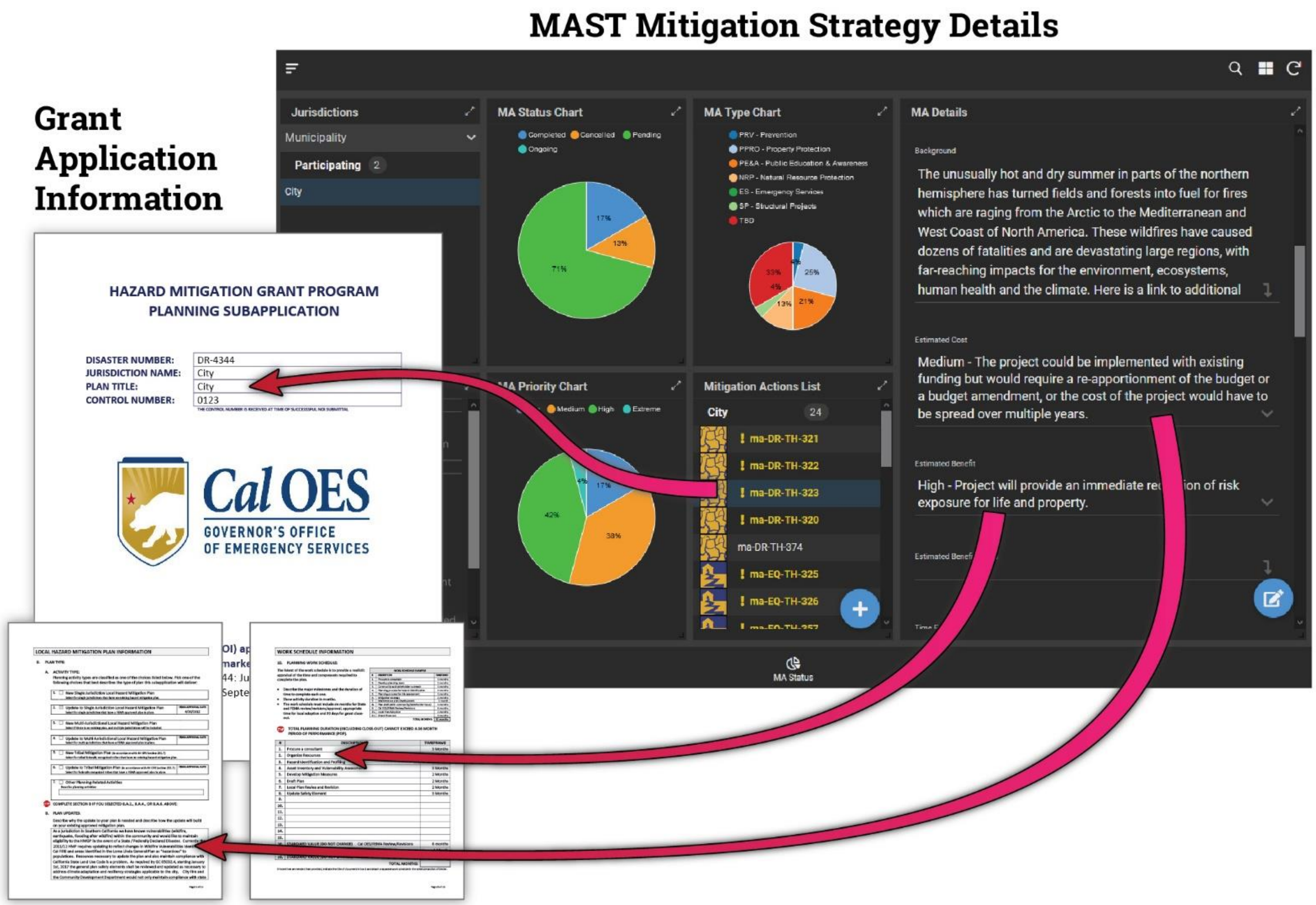

Figure 6-2: MAST and Cal OES Grant Applications

Following a disaster, California Office of Emergency Services (Cal OES) and local Mendocino County officials in a joint effort with FEMA will perform Preliminary Damage Assessments (PDA) of the areas that sustained damage. Cal OES submits, through the FEMA Regional Office, the information collected along with a damage estimate to request a declaration from the President. A Presidential Major Disaster Declaration provides for the availability of HMGP funds at the request of a state's Governor in eligible communities within a state, tribe, or territory. Figure 6-3 depicts this.

Figure 6-3 shows a timeline of how projects should be developed and administered by local government and FEMA under the HMGP program. HMGP grant recipients will have 36 months from the close of the application period to complete projects.

Figure 6-3: HMGP Timeline

For More information on HMGP project development process visit:
www.fema.gov/hazard-mitigation-grant-program-guide-state/local-governments

6.3.6 Incorporation into Other Planning Mechanisms

For the HMP to be successful, the recommendations and underlying principles of the MJHMP should be incorporated into community planning and development such as capital improvement budgeting, building and zoning codes, general plans and regional plans. Integration into a variety of departments at the County and participating jurisdiction level provides an opportunity to network, identify, and highlight mitigation activities and opportunities at all levels of government. It is also important to monitor funding opportunities that can be leveraged to implement the mitigation actions.

Information from this MJHMP can be incorporated into:

- **Mendocino County and Municipal General Plans:** The MJHMP will provide information that can be incorporated into the Safety, Land Use, and Conservation Elements of General Plans for municipalities and the County as they are updated. Many jurisdictions will update the Safety Element of the General Plan to incorporate the MJHMP in compliance with AB 2140. Specific risk and vulnerability information from the Mendocino County MJHMP will assist in identifying areas where development may be at risk to potential hazards, which in turn can be incorporated into General Plans. For example, jurisdictions may consider instituting a hazard overlay zone that requires additional scrutiny because of close proximity to certain hazards.
- **Building / Development Codes and Zoning Ordinances:** The MJHMP provides information to enable the County and municipalities to make decisions on appropriate building/development codes and ordinances. Appropriate building codes and ordinances can increase resilience against natural disasters. Some County and municipal mitigation actions directly recommend updates or new regulations as mitigation for hazard risks; those mitigation actions indicate priorities for regulatory updates in participating jurisdictions.

- **Community Wildfire Protection Plans (CWPP):** The MJHMP will provide information that can be incorporated into CWPPs and Strategic Fire Plan updates for areas within the County. The MJHMP likewise captured mitigation actions derived from CWPPs.
- **Water/ Flood Management Plans:** The MJHMP will provide information that can be included in updates of the Mendocino County Groundwater Monitoring Plan, Stormwater Management Plan, the Mendocino River Flood Management Plan, and other water/ flood management plans. While the process for updating these types of plans will vary by jurisdiction, the flood data developed for the MJHMP can be used in other mechanisms along with exposure and damage estimation information.
- **Planning Mechanisms for Special Districts.** Special districts and other participating jurisdictions likely have specific planning documents that will incorporate elements of the MJHMP as well. These will vary by jurisdiction and are explored more specifically in each Annex Capability Assessment. These include capital improvement plans, maintenance plans, emergency response or operations plans, and other relevant planning documents. Mitigation actions prioritize what plans may need to be updated to reflect this MJHMP information. Valuable information includes exposure and damage estimation and granular spatial footprint information from RAMP.

6.1.1 Planning Integration Processes

With adoption of this plan, Mendocino County and planning partners will be responsible for the plan implementation and maintenance. The County and the MJHMP Steering Committee will continue to:

- Act as a forum for hazard mitigation issues,
- Disseminate hazard mitigation ideas and activities to Mendocino County communities,
- Ensure hazard mitigation risk assessments and maps remain a consideration for safety decisionmakers,
- Report on plan progress and recommended changes, and
- Inform and solicit input from the public.

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Appendix A. Analysis Methodology

MENDOCINO COUNTY
MULTI-JURISDICTIONAL
HAZARD MITIGATION PLAN

A GIS-based vulnerability assessment was conducted for each of the priority hazards identified by the Planning Committee. Several sources of data are necessary to conduct a vulnerability analysis. This appendix presents an outline of the data inputs, processing steps, and outputs used to create the vulnerability analysis results presented in the Hazard Mitigation Plan. The analysis methodology is presented first, followed by an overview of the analysis data.

A.1. Natural Hazard Exposure

The natural hazard exposure analysis (see C. Natural Hazard Exposure in Figure 7-4) is an inventory of population, parcels, critical facilities, and other assets within each natural hazard area. As shown in Figure 7-1, the presence of a structure inside a natural hazard area (the flood zone in this example) qualifies that structure as exposed to the natural hazard.

Figure 7-1: Hazard Exposure

The total counts of parcels, people, facilities, assets and the sum of values within the planning area which could be exposed to a hazard event is referred to as the “exposure” in this plan. A natural hazards overlay was developed to reflect the combination of many known natural hazard spatial footprints. The spatial overlay method enables summarization of building values, parcel counts, population exposure, and critical facility exposure within a hazard’s geographic extents (see C. Natural Hazard Exposure in Figure 7-4). The input data is used to evaluate exposure for earthquakes, landslides, flooding, dam inundation, wildfire, tsunami, sea-level rise, and areas of naturally occurring asbestos.

A.1.1. Damage Estimation with Hazus

FEMA’s Hazus software was implemented to conduct a detailed loss estimation for flood, earthquake, and dam inundation. Hazus is a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. Hazus uses Geographic Information Systems (GIS) technology to estimate physical, economic, and social impacts of disasters. For purposes of this planning effort, Hazus was used to generate damage estimations due to possible earthquakes, flooding, and dam inundation depths. The estimated damage and losses provided by the Hazus Software provide the ability to understand possible widescale damage to buildings and facilities (see D. Hazus Damage Estimations in Figure 7-4).

In the hypothetical geography shown in Figure 7-3, even though both structures are exposed to flooding, it is expected that the structure with a first floor height below the depth of flooding will receive significantly more damage than the structure with a first floor height above the expected water depth. Note that not all building data contains first floor height and first floor height is an example of the type of field utilized by Hazus in calculating damage estimates.

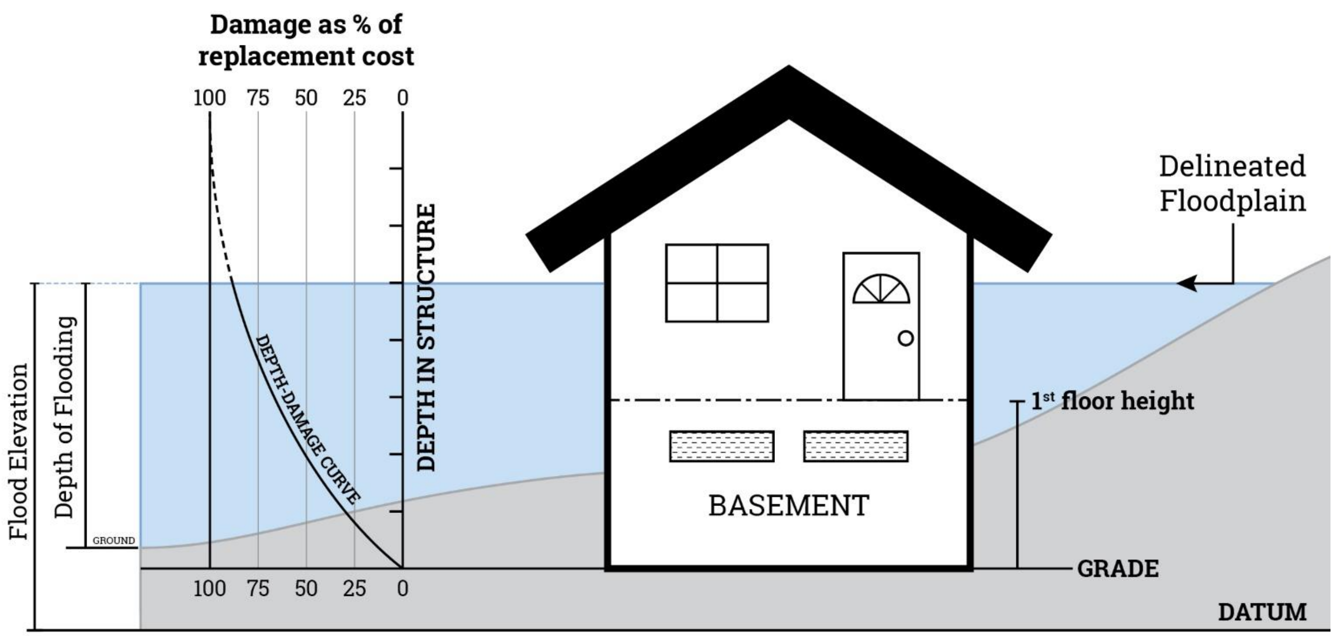

Figure 7-2: Flood Depth and Damage Curves

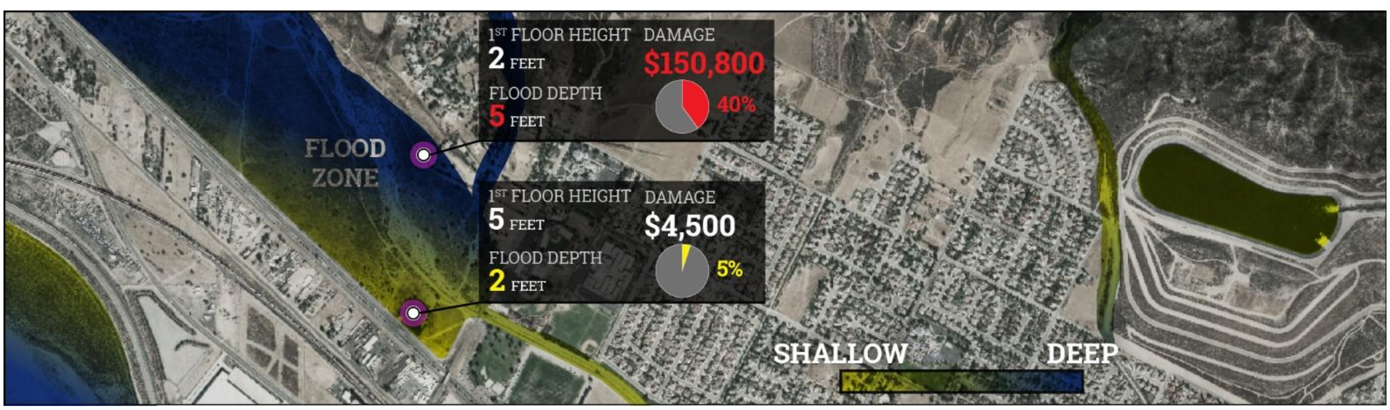

Figure 7-3: Hazus Damage Estimations

Hazus is a FEMA product with highly detailed documentation provided on the analysis steps and algorithms performed against the input data and associated scenarios in the process of obtaining loss estimates. The explanation in this appendix section is simplified. Refer to the full documentation and technical manuals from FEMA for greater explanation on Hazus specifics.

A.1.2. Distinguishing Results – Natural Hazard Exposure Analysis vs Hazus Results

Table and chart references throughout the hazard mitigation plan are explicitly called out for Hazus results as "Damage Estimates". There are expected differences in the results between estimations of Natural Hazard overlays and detailed Hazus results. Snapshot tables and Natural Hazard Exposure sections do not contain Hazus estimates.

A.2. Analysis Data

A.2.1. Assets, Value, and Population

A.2.1.1. Parcels

County provided parcel geometry was joined with county assessor data. Centroids were created to represent parcels at a single location. Fields required by Hazus that were not present in the parcel data provided were given default values based on the mapped use-codes of each parcel. Earthquake building design level attribution was based on year built (where the default was 1972) and building code adaptation chronology. Improved parcels were chosen for the parcels dataset by a query of improvement value presence and use-code descriptors.

A.2.1.2. Asset Insurance Schedules

County and jurisdictional insurance schedules were used in developing Real Property Asset data with valuations and structural data for analyses. The county owned assets were utilized in Hazus analysis. County owned real property assets and individual participating jurisdiction asset data were used in exposure analysis. The tabular data were geocoded and quality checked for building placement. These data are presented in the exposure analysis as "Real Property Assets" and in Hazus results as appropriate general use code type or specific building location description.

A.2.1.3. Population

Population estimates were derived from 2013-2017 5-year Census American Community Survey (ACS) numbers as applied to Census block groups and Census Place geographies, then processed through GIS modeling in order to break down the proportional population for smaller units of area in relation to natural hazards.

A.2.1.4. Critical Infrastructure

Critical facilities and transportation/lifeline typically include hospitals, fire stations, police stations, storage of critical records, and similar facilities. These data came from a collection of sources including but not limited to: County GIS, County and local jurisdiction insurance data, CDSS, CEC, FCC, Hazus, USACE, FEMA, and NPS. All data sources have a level of accuracy acceptable for planning purposes. See Table 7-2 for a list of Critical Infrastructure data used in the analysis.

A.2.1.5. Hazus Inputs

Hazus data inputs include hazard scenario data and detailed building data. The GIS team conducted a Level 2 analysis utilizing user-defined buildings with refined building characteristic parameters as inputs for the damage estimation calculations (See A.2.1.1 and A.2.1.2). Both countywide building data and government assets were used as inputs in this level 2 analysis. The customized user defined building dataset allows for more accurate results for damage estimation based upon detailed building characteristics.

Note: FEMA's Hazus software utilizes different user defined building information inputs to develop loss estimates depending on the hazard module. The Hazus flood and earthquake modules use fragility curves based upon the user's definition of building characteristics including but not limited to:

- ***Area***
- ***Year Built***
- ***Construction Type***
- ***Number of Stories***
- ***EQ Design Level***
- ***Occupancy Type (Residential, Government, etc)***
- ***Building Values***

Defaults were used for missing fields and values based on use-code and other available information for that input.

A.2.2. Natural Hazard Data

A.2.2.1. Dam Inundation Zones

Dam inundation zone GIS data were provided by Cal OES and DWR. These represent the estimated flood extent in the event of dam failure for individual dams.

A.2.2.2. Dam Inundation Depth Grids

Flooding depth grids of dam inundation events is provided by DWR. This is an evolving collection of site-specific studies. The timing of availability is dictated by dam risk classification.

A.2.2.3. Earthquake Shaking

The CGS 2 percent chance – 50-yr probability map was used as a qualitative guide in selecting an earthquake epicenter based shakemap scenario for analyses. The M7.4 Maacama Garberville and M7.8 N. San Andreas -N. Coast – Peninsula – SC MTN Scenario were chosen for use in Hazus damage estimations.

A.2.2.4. Flood Zones

The input parameters for Hazus analysis of Flood exposure included depth grids created with the FEMA Flood Zone data mentioned in section A.2.2.4. 100-YR and 500-YR were scenarios that were used to analyze the exposure to inputs as depicted in Figure 7-4. 100-YR Coastal zones were analyzed in the exposure analysis with limited findings of exposure.

A.2.2.5. Landslide Susceptibility

GIS layer with geographic boundaries defining the likelihood of deep-seated landslides. Underlying geology and slope angle are used in the creation of this layer by the California Geological Society. Low, Medium, and High landslide classes were chosen as summary classes for this plan.

A.2.2.6. Naturally Occurring Asbestos

GIS layer provided by Mendocino County Air Quality Management District outlining areas likely to contain naturally occurring asbestos. These areas are locations were asbestos is more likely, but not necessarily present.

A.2.2.7. Sea-level rise

GIS layer composite from NOAA sea-level rise data. Zero to ten feet of rise were classified based on Global Mean Sea Level (GMSL) Scenarios where low rise is 0-1’, intermediate-low 2’, intermediate 3’, intermediate-high 4-5’, high 6-7’, and extreme >=8’.

A.2.2.8. Tsunami Run-up

GIS layer obtained from DWR that outlines ten-foot tsunami run-up inundation area.

A.2.2.9. Wildfire Hazard Severity

A proprietary DP+S composite GIS layer derived from Wildland-urban interfaces, California Public Utilities Commission fire threat areas and Fire Hazard Severity Zones. See Table 7-1.

Table 7-1: Wildfire Hazard Severity Classification

Hazard	Native Class	Description
Moderate	Tier 1	HHZs are zones in direct proximity to communities, roads, and utility lines, and are a direct threat to public safety.
	1	WUI is the potential treatment zone in which projects could be conducted to reduce wildland fire threats to people.
	1 / Moderate	See Cal Fire FHSZ (State Responsibility Area [SRA] & Local Responsibility Area [LRA])
High	Tier 2	Tier 2 fire-threat areas depict areas where there is an elevated risk (including likelihood and potential impacts on people and property) from utility associated wildfires.
	High	See Cal Fire FHSZ (State Responsibility Area [SRA] & Local Responsibility Area [LRA])
Very High	Tier 3	Tier 3 fire-threat areas depict areas where there is an extreme risk (including likelihood and potential impacts on people and property) from utility associated wildfires.
	Very High	Classification of a zone as moderate, high or very high fire hazard is based on a combination of how a fire will behave and the probability of flames and embers threatening buildings. Each area of the map gets a score for flame length, embers, and the likelihood of the area burning. Scores are then averaged over the zone areas. Final zone class (moderate, high and very high) is based on the averaged scores for the zone.

Source: Moderate - Cal Fire Tree Mortality, WUI, FHSZ; High - CPUC Utility Threat, Cal Fire FHSZ; Very High - High - CPUC Utility Threat, Cal Fire FHSZ (SRA & LRA)

A.2.3. Methodology Overview

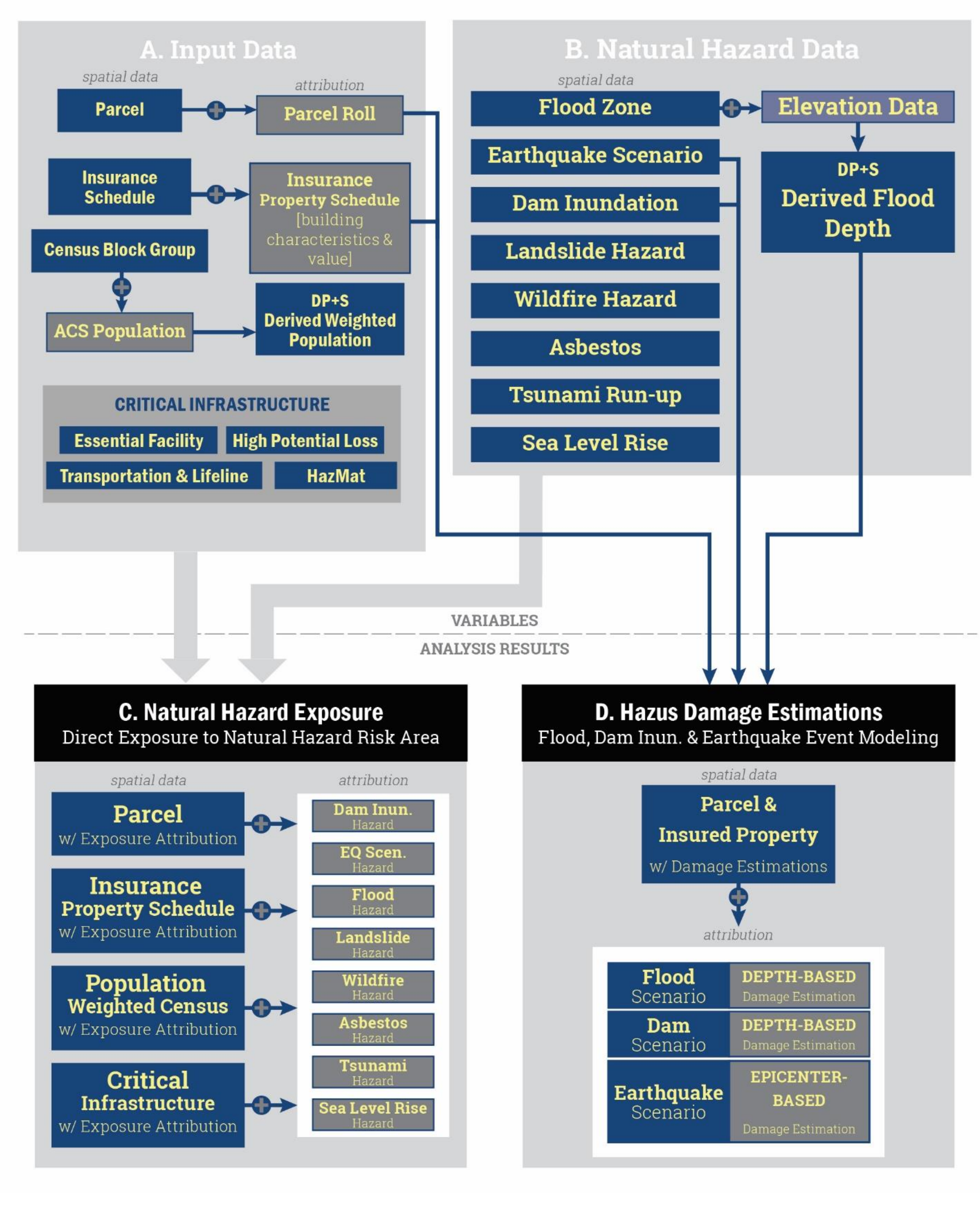

Figure 7-4: Data Analysis Methodology

A.2.4. Data Dictionary

Table 7-2: Data Dictionary

Dataset	Data Steward	Notes
Jurisdictional/Municipal Boundaries	Local Jurisdiction	Local jurisdiction
Aerial Imagery	USDA	NAIP
County Boundary	Local Jurisdiction	Local jurisdiction
Elevation Model	NED	1/3 arc second
GNIS	USGS	Get from Census
School Districts	Census	Can get census school districts
Stream	Esri, NHD	Rivers and Streams
Water	Esri, NHD	Bodies of water
Building Outlines	MS	MS
Parcel Geometry	Local Jurisdiction	Default lookup tables applied for some HAZUS fields
Parcel Roll	Local Jurisdiction	Default lookup tables applied for some HAZUS fields
Emergency Operations Center	Local Jurisdiction	951 Low Gap Rd / Sheriff Office
Fire	Local Jurisdiction	Provided by county
Law Enforcement	Local Jurisdiction	This is a consolidated layer of law enforcement provided by local jurisdiction
Adult Residential Facility	CA Department of Social Services	CDSS likely most complete source
Alternative Education Program	Local Jurisdiction	Provided by county
Animal Control	Local Jurisdiction	Provided by county
Child Care Center	CA Department of Social Services	Geocoded CDSS data
Communication Tower	Local Jurisdiction	Wireless Towers and emergency repeater Provided by County
Community Center	Local Jurisdiction	Provided by county
County/Municipality Insured Assets	Insurance Provider	Municipality / County insured assets. Source noted below. County - Mendocino County Executive Office, Heather Correll Rose, Property Schedule Willits - Community Development, Dusty Duley, Property Schedule Fort Bragg - Public Works, Tom Varga,

Dataset	Data Steward	Notes
		Property Schedule Ukiah - Community Services, Tami Bartolomei, Property Schedule Point Arena - City Admin, Paul Andersen, Property Schedule
Court House	Local Jurisdiction	Provided by county
Dam	USACE NID and DWR	Cross referenced DSOD in 2014 HMP and consolidated with NID and DWR table
Detention Center	Local Jurisdiction	Provided by county
Fairground	Local Jurisdiction	Provided by county
Family Child Care Home	CA Department of Social Services	Geocoded CDSS data
Foster Family Agency	CA Department of Social Services	Geocoded CDSS data
Historic Building	NPS	National Park Service Data
Historic Site	NPS	National Park Service Data
Library	Local Jurisdiction	Provided by county
Medical Facility	Local Jurisdiction	In Medical Facility Dataset also contains hospitals
Museum	Local Jurisdiction	Provided by county
Office	Local Jurisdiction	Provided by county
Park and Recreation	Local Jurisdiction	In park dataset from county
Power Plant	CEC	Includes non-traditional power plants
Residential Child Care	CA Department of Social Services	Geocoded CDSS data
Residential Elder Care Facility	CA Department of Social Services	Geocoded CDSS data
School	CDE	Department of Education
Shop	Local Jurisdiction	Provided by county
Storage	Local Jurisdiction	Provided by county
Airport	Local Jurisdiction	Provided by county
Bridge	NBI	National bridge inventory
Bus Facility	HAZUS	From Hazus regional dataset
Corp Yard	Local Jurisdiction	Provided by county
Levee	FEMA	From NFHL
Levee Flood Wall	USACE NLD	No long available from WFS

Dataset	Data Steward	Notes
Levee Levee Centerline	USACE NLD	Centerlines match levees from NFHL
NG Pipeline	CEC	CEC likely best source
NG Station	CEC	CEC likely best source
Railroad	Esri	Provided by county
Road	Local Jurisdiction	Provided by county
Street	Esri	ESRI streets has the subcategories utilized in lifeline analysis
Substation	CEC	Only large ones from CEC
Transfer Station	Local Jurisdiction	Provided by county
Transmission Line	CEC	CEC data is limited
Transmission Line Tower	CEC	CEC data is limited
Wastewater Treatment	Hazus	Have data from Hazus
Hazmat	Hazus	Have data from Hazus
Census Block	US Census Bureau	Census Tiger geometry
Census Block Group	US Census Bureau	Census Tiger geometry and ACS 2017 5-year estimates
Census Place	US Census Bureau	Census Tiger geometry and ACS 2017 5-year estimates
Census Tract	US Census Bureau	Census Tiger geometry and ACS 2017 5-year estimates
Dam Inundation	Cal OES	Consolidated from DWR and Cal OES data
Shake Potential	USGS, CISN	Utilized in scenario selection
EQ Scenarios 1-X	USGS, CISN	Chosen qualitatively from shake potential map
Flood Hazard	FEMA	Regional study from FEMA
Sea-level rise	NOAA	NOAA Office for Coastal Management Sea-level rise Data: 1-10 ft Sea-level rise Inundation Extent
Landslide Susceptibility	CGS	Low medium and high classifications
Naturally Occurring Asbestos	MCAQMD	Mendocino GIS Dept - Obtained from KML download on county website (http://www.co.mendocino.ca.us/aqmd/natural-occurring-asbestos.html).
Tsunami Runup	CGS	10' tsunami run-up inundation zone.
Wildfire Hazard Severity Zone	Cal Fire / CPUC	Composite fire layer: Fire Threat CPUC, Tree Mortality, WUI, FHSZ
EQ Fault Zones	CGS	Locally obtained
Fire Perimeter Calfire	NIFC	Statewide for burn perimeters 2000-2019 (Geomac Archive)

Dataset	Data Steward	Notes
Fire Regime MFRI	USGS	https://www.landfire.gov/NationalProductDescriptions13.php
Qfaults	USGS	Locally Obtained

A.2.5. Insured Assets Roll

Building/ Site Name	# Bldg.	Site Value: Structure	Site Value: Content	Site Value: Total
Administration	3	$11,963,350	$7,257,925	$19,221,275
County Administration Office	1	$11,567,360	$7,085,361	$18,652,721
Modular Office	1	$85,378	$22,094	$107,472
Storage Building	1	$310,612	$150,470	$461,082
Agricultural	2	$4,432,589	$2,647,120	$7,079,709
Enviromental Health Building	1	$3,488,557	$2,306,252	$5,794,809
Office Building	1	$944,032	$340,868	$1,284,900
Airport	4	$852,073	$83,647	$935,720
Airport Hangar	2	$385,991	$16,358	$402,349
Airport/Radio Equipment	1	$12,002	$41,800	$53,802
Terminal/Off./Frame Han-	1	$454,080	$25,489	$479,569
Animal Control	1	$2,138,393	$15,856	$2,154,249
Animal Control	1	$2,138,393	$15,856	$2,154,249
Communications	3	$3	$53,583	$53,586
Radio Tower Repeater	1	$1	$17,861	$17,862
Repeater Site - Cahto Mountain	1	$1	$17,861	$17,862
Repeater Site - Spanish Mountain (Clevland)	1	$1	$17,861	$17,862
Community Building	8	$4,756,473	$346,600	$5,103,073
Community Building	1	$1,279,469	$74,263	$1,353,732

Building/ Site Name	# Bldg.	Site Value Structure	Content	Total
Justice Court/City Hall	1	$703,567	$57,810	$761,377
Radio Tower Repeater	1	$1	$11,906	$11,907
Veteran'S Memorial Building	5	$2,773,436	$202,621	$2,976,057
County Building	28	$6,302,236	$1,973,177	$8,275,413
Administration Building	1	$1,331,670	$309,423	$1,641,093
Dot Storage	1	$1	$3,746	$3,747
Equipment Building	2	$99,778	$74,534	$174,312
Equipment Building 2	1	$46,331	$1	$46,332
Equipment Storage	1	$53,399	$9,534	$62,933
Flammable Liquids Building	1	$4,272	$10,137	$14,409
General Services Building	1	$1,785,363	$525,860	$2,311,223
Main Building	1	$377,116	$148,499	$525,615
Modular Break Room	1	$165,510	$1	$165,511
Modular Office	1	$37,000	$13,367	$50,367
Oil Shed	1	$5,131	$4,906	$10,037
Parts Storage	1	$103,958	$8,309	$112,267
Shop Building	5	$640,493	$263,440	$903,933
Storage Building	2	$291,225	$22,793	$314,018
Storage Facility	1	$1	$5,458	$5,459
Storage Shed	3	$88,584	$124,018	$212,602
Storage Unit	1	$1	$1,785	$1,786
Tire Shed	1	$4,666	$399	$5,065
Vehicle Service Building	1	$1,054,828	$385,273	$1,440,101
Veterans Service Office	1	$212,909	$61,694	$274,603
Courthouse	2	$15,892,732	$2,018,005	$17,910,737
Courthouse	1	$14,396,012	$1,540,043	$15,936,055
Courthouse Annex	1	$1,496,720	$477,962	$1,974,682
Detention Facility	10	$24,932,751	$2,181,951	$27,114,702

Building/ Site Name	# Bldg.	Site Value Structure	Content	Total
Administration Building	1	$2,433,079	$338,258	$2,771,337
Adult Detention Facility	1	$8,110,655	$347,942	$8,458,597
Adult Detention(Maximum Security)	1	$6,074,661	$925,893	$7,000,554
Classroom/Training Building	1	$1,545,431	$97,508	$1,642,939
Juvenile Hall Admin	1	$537,980	$38,873	$576,853
Juvenile Hall Classroom	1	$429,856	$49,112	$478,968
Juvenile Hall Dorm	1	$1,958,563	$125,134	$2,083,697
Juvenile Hall Kitchen,	1	$616,890	$55,533	$672,423
Juvenile Hall/Violent Hall	1	$2,147,001	$53,717	$2,200,718
Kitchen/Laundry Building	1	$1,078,635	$149,981	$1,228,616
Emergency Operations	5	$1,612,688	$2,126,084	$3,738,772
Dispatch Center	1	$1	$1,165,446	$1,165,447
I.D. & Evidence	1	$1	$148,499	$148,500
Sheriff	1	$1	$4,459	$4,460
Sheriff Admin/Probation	1	$1,612,684	$647,091	$2,259,775
Sheriff Commet	1	$1	$160,589	$160,590
Fair Grounds	29	$6,664,751	$29	$6,664,780
Administration Building	1	$287,175	$1	$287,176
Agric.Bldg./Exhibit Hall .Bldg	1	$1,522,765	$1	$1,522,766
Arts & Crafts Bldg.	1	$606,837	$1	$606,838
Auditorium	1	$603,767	$1	$603,768
Commercial Bldg./Exhibit Hall	1	$724,276	$1	$724,277
Dinning Hall	1	$218,838	$1	$218,839
Dormitory	1	$96,274	$1	$96,275

		Site Value		
Building/ Site Name	# Bldg.	Structure	Content	Total
Field Bleachers 1	1	$26,408	$1	$26,409
Field Bleachers 2	1	$11,825	$1	$11,826
Grandstand	1	$402,829	$1	$402,830
Hog Barn	1	$241,535	$1	$241,536
Jr. Barn 1	1	$98,120	$1	$98,121
Jr. Barn 2	1	$98,120	$1	$98,121
Judging Booth	1	$4,667	$1	$4,668
Lamb Palace	1	$241,032	$1	$241,033
Marvin Barn	1	$88,318	$1	$88,319
Open Barn	1	$496,968	$1	$496,969
Pumphouse	2	$24,863	$2	$24,865
Restroom	3	$500,585	$3	$500,588
Restrooms	1	$123,766	$1	$123,767
Shop Building	1	$76,778	$1	$76,779
Shop Storage Shed	1	$1,345	$1	$1,346
Show Barn	1	$144,048	$1	$144,049
Show Barn Bleachers	1	$7,918	$1	$7,919
Ticket Office	1	$5,825	$1	$5,826
Wood Bleachers	1	$9,869	$1	$9,870
Health Services	11	$11,047,323	$3,976,707	$15,024,030
County Health Building	1	$661,359	$259,209	$920,568
Hhsa	1	$1	$300,722	$300,723
Mental Health	1	$1	$29,766	$29,767
Mental Health Annex	1	$534,584	$118,823	$653,407
Mental Health Office	1	$509,591	$1	$509,592
Modular Building	1	$1	$44,184	$44,185
Office	1	$223,369	$1	$223,370
Public Health Center	1	$8,411,295	$3,143,292	$11,554,587
Public Health Storage	1	$106,394	$54,993	$161,387
Social Services	1	$567,393	$1	$567,394
Storage Building	1	$33,335	$25,715	$59,050
Library	5	$7,488,326	$10,613,038	$18,101,364
Covelo Library	1	$1,116,120	$1,062,466	$2,178,586
Fort Bragg Library	1	$1,211,737	$2,655,032	$3,866,769

Building/ Site Name	# Bldg.	Site Value Structure	Content	Total
Point Arena Library	1	$757,965	$805,729	$1,563,694
Ukiah Library	1	$2,895,989	$3,404,642	$6,300,631
Willits Library	1	$1,506,515	$2,685,169	$4,191,684
Miscellaneous	13	$1,077,145	$402,688	$1,479,833
Buildings & Grounds Building	1	$476,209	$61,315	$537,524
Office	3	$10,878	$2,229	$13,107
Offices	1	$1	$37,125	$37,126
Old Justice Court	1	$126,835	$11,964	$138,799
Recycling Facility	1	$186,474	$9,521	$195,995
Shop Building	1	$95,649	$9,935	$105,584
Site Office	1	$4,691	$743	$5,434
Values Formerly Reported - Replacement Cost	2	$2	$2	$4
Vehicle Value Scheduled At Location 100	1	$1	$221,200	$221,201
Willits Action Group	1	$176,405	$48,654	$225,059
Museum	5	$5,621,348	$1,468,329	$7,089,677
Artifact Storage	1	$1	$498,860	$498,861
Exhibit Building	1	$1	$29,047	$29,048
Museum	2	$5,621,345	$337,918	$5,959,263
Restoration Building	1	$1	$602,504	$602,505
Park	10	$609,229	$120,014	$729,243
Community Building	1	$79,443	$22,278	$101,721
Picnic Shelter	2	$251,704	$14,585	$266,289
Restroom	6	$278,081	$8,904	$286,985
Shed	1	$1	$74,247	$74,248
Social Services	33	$21,074,994	$5,049,159	$26,124,153
Child Support Office	1	$997,071	$590,909	$1,587,980
Childrens Office	1	$1	$101,304	$101,305
Family Center	1	$1	$37,125	$37,126
Family Recources	1	$1	$8,191	$8,192

Building/ Site Name	# Bldg.	Site Value		
		Structure	Content	Total
Fort Bragg Justice Center	1	$2,606,077	$376,334	$2,982,411
Hopsital Office	1	$1	$9,223	$9,224
Human Resources	1	$510,036	$118,823	$628,859
Justice Center	1	$3,470,062	$191,464	$3,661,526
Maintenance Garage	1	$306,960	$77,530	$384,490
Office	1	$425,391	$236,211	$661,602
Public Health	1	$1,459,003	$361,143	$1,820,146
Social Services Building	1	$2,643,876	$447,975	$3,091,851
Social Services Gain Unit	1	$1	$301,167	$301,168
Social Services Modular Office	1	$316,760	$120,357	$437,117
Social Services Office	1	$6,198,465	$1,486,033	$7,684,498
Social Services Storage	7	$7	$19,064	$19,071
Storage	5	$5	$52,707	$52,712
Storage Shed	1	$1,913	$1	$1,914
Storage Unit	2	$2	$6,688	$6,690
Storage-Ergo	1	$1	$1,126	$1,127
Wellness & Eap	1	$102,111	$24,255	$126,366
Wisc Social Services	1	$2,037,249	$481,529	$2,518,778
Grand Total	**172**	**$126,466,404**	**$40,333,912**	**$166,800,316**

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Appendix B. Process Documentation

MENDOCINO COUNTY
MULTI-JURISDICTIONAL
HAZARD MITIGATION PLAN

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