Cal OES

GOVERNOR'S OFFICE
OF EMERGENCY SERVICES

CALIFORNIA STATE HAZARD MITIGATION PLAN

Volume 1

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Part 1—Background Information

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1. INTRODUCTION

The State of California is committed to protecting its communities through ongoing efforts to reduce risk from future hazard events. California is culturally, ethnically, economically, ecologically, and politically diverse, with almost 12 percent of the U.S. population. If it were a separate nation, California would have the fifth-largest economy in the world as of November 2022. A catastrophic disaster in the State could adversely affect the national and world economies.

The State of California actively works to reduce risks from the many types of hazards that the State experiences. Past hazard events—from floods, fires, and earthquakes to atmospheric, biological, geologic, human-caused, climate-related, and other hazards—have resulted in significant costs to the State's people, property, environment, infrastructure, and economy. As the climate continues to change, the pace and scale of hazard events will increase, resulting in more losses to California communities. Reducing these hazard risks requires integrated, collaborative, and equitable strategies to build statewide community resilience.

Hazard mitigation is the sustained effort to reduce loss of life and property by lessening or eliminating the impacts of natural disasters, climate hazards, and human-caused threats. It creates safer communities and helps maintain quality of life. It differs from climate mitigation, which strives to reduce greenhouse gases (GHGs). Still, it is essential to consider climate mitigation in hazard mitigation efforts to ensure that mitigation actions do not unintentionally worsen the effects of climate change.

Effective hazard mitigation requires an understanding of all risks and a sustained investment in long-term community well-being through the implementation of short- and long-term strategies before the next disaster (FEMA 2015). The 2023 State Hazard Mitigation Plan (SHMP or Plan) presents a robust risk assessment of the hazards that present the greatest threat to California's communities and outlines a collaboratively developed, science-based strategy to reduce these risks. California's mitigation

strategy emphasizes equitable, whole community risk reduction that protects natural and cultural resources and promotes resilient social and economic systems.

1.1. STATE HAZARD MITIGATION PLAN OVERVIEW

1.1.1. History of the California SHMP

On September 28, 2004, the State of California's first approved SHMP went into effect. As required by Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (the Stafford Act; 44 Code of Federal Regulations 201.3(c), 201.4(d), and 201.5(c)), California reviews and updates this Plan on a five-year cycle. The Federal Emergency Management Agency (FEMA) approved, and California adopted the most recent SHMP in 2018 (Cal OES 2018a). The 2023 Plan is the fifth update to the SHMP.

1.1.2. Purpose of the 2023 SHMP

The State of California is required to have a FEMA-approved hazard mitigation plan to be eligible for certain types of federal assistance under the Stafford Act. The SHMP provides a road map to reduce death, injury, environmental damage, and property losses caused by natural hazards. It identifies hazards based on the history of disasters within California and lists goals, objectives, strategies, and actions for reducing future losses. Implementing planned, technically feasible, and cost-effective mitigation measures helps reduce damage to life, property, and the environment and streamlines the disaster recovery process. Hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster strikes.

States with Enhanced Plans must demonstrate commitment to a comprehensive statewide mitigation program and capabilities to administer FEMA grant programs. A state that meets the Enhanced Plan requirements will receive additional post-disaster mitigation funds compared to states with Standard Plans. The 2023 SHMP satisfies all requirements of an Enhanced Plan.

The 2023 SHMP was developed to prioritize actionability and usability and to highlight emerging and critical issues, such as climate impacts and equity.

It is a comprehensive update of the 2018 SHMP and performs the following functions:

- Presents a robust risk assessment for California's most prominent hazards
- Describes goals, objectives, and actions for future mitigation efforts
- Documents statewide hazard mitigation systems implemented to reduce risk
- Highlights new hazard mitigation initiatives since the 2018 SHMP
- Describes mitigation processes and success stories
- Facilitates integration of local, State, Tribal Nation, and non-governmental hazard mitigation activities into a comprehensive statewide effort
- Complies with applicable federal statutes and regulations authorizing federal grant funding
- Maintains State eligibility to participate in all FEMA funding programs
- Maintains California's Enhanced status by demonstrating California's commitment to a comprehensive mitigation program and capabilities to administer the additional funding conferred by this status
- Outlines a process to amend the SHMP whenever necessary to reflect changes in State or federal laws and statutes as required in Title 44 of the Code of Federal Regulations (CFR) (44 CFR 201.4(c)(7) and (d), and 201.5(c))

Guiding Risk-Informed Decision-Making

As the State's primary hazard mitigation guidance document, the SHMP provides an updated and comprehensive description of California's historical and current hazards, a robust risk analysis for current hazards, and mitigation strategies, goals, and objectives to guide risk-informed decision-making. A statewide, collaborative planning process provided the opportunity to identify, select, and prioritize mitigation strategies that address vulnerabilities identified in the Plan's comprehensive Risk Assessment.

The SHMP provides critical information and guidance to local governments about risks from natural hazards and State capabilities, priorities, and action plans. It addresses risks to the built and natural environment and to community lifelines and considers future conditions, demographics, land use, and disparities in underserved communities to inform equity priority actions. The SHMP also considers the effects of climate change on hazards, hazard impacts, and long-term mitigation strategies.

Community Lifelines

Community lifelines are the most fundamental services available to a community. When stabilized, they enable all other aspects of society to function. They include the following (FEMA 2021e):

- Safety and Security
- Food, Water, and Shelter
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

Establishing Eligibility for FEMA Assistance

States must have an approved Standard state mitigation plan meeting the requirements in 44 CFR 201.4 as a condition of receiving the Stafford Act assistance and FEMA mitigation grants listed in Table 1-1. FEMA requires that states update their mitigation plans every five years and submit them for review and approval. States must ensure that each update reflects changes in development, progress in statewide mitigation efforts, and modifications to priorities.

Table 1-1. Non-Emergency Stafford Act Assistance Programs

Program	Description
Public Assistance (PA) Categories C-G	Post-disaster reimbursement of response and recovery costs
Fire Management Assistance Grants (FMAG)	Mitigation, management, and control of fires on publicly or privately owned forests or grasslands that threaten destruction that would constitute a major disaster
Building Resilient Infrastructure and Communities (BRIC)	Pre-disaster funding for proactive mitigation and community resilience projects and plans
Hazard Mitigation Grant Program (HMGP)	Post-disaster funding for mitigation and community resilience projects and plans
HMGP-Post Fire	Assistance to help communities implement hazard mitigation measures after wildfire disasters
Flood Mitigation Assistance (FMA)	Pre-disaster funding for flood hazard mitigation and community resilience activities that benefit properties insured under the National Flood Insurance Program (NFIP)
Rehabilitation of High Hazard Potential Dams (HHPDs)	Technical, planning, design, and construction assistance in the form of grants for the rehabilitation of eligible dams

Source: (FEMA 2023f)

Assisting Local Governments

Local jurisdictions can use the SHMP as a reference and guidance document when developing their own hazard mitigation plans to satisfy FEMA requirements. The SHMP provides critical guidance to local jurisdictions about California's risks from natural hazards and the State's capabilities, priorities, and mitigation actions. Local jurisdictions can also use this SHMP to guide their risk assessment and mitigation strategies, as the hazards and risks assessed in this SHMP also affect local jurisdictions. This SHMP discusses risk impacts on the built environment, community lifelines, future conditions, demographics, population, land use, and existing disparities in underserved communities. The SHMP also discusses the effects of climate change on hazards and strategies to address potential impacts.

1.1.3. State Authorities and Responsibilities for Hazard Mitigation Planning

California's statewide hazard mitigation effort is led by the California Governor's Office of Emergency Services (Cal OES), whose charge is protecting lives and property, building capabilities, and supporting local communities for a more resilient California. California's State Emergency Plan (SEP) assigns mitigation duties to Cal OES and other State agencies under various emergency support functions. The Emergency Management Activities section of the 2017 SEP requires the following of the lead agency for each emergency support function:

- Identify stakeholders and engage them in the development and maintenance of the emergency support function
- Complete a vulnerability assessment and prioritize actions to reduce vulnerabilities within the scope of the emergency support function
- Collaborate to pool emergency support function resources to prevent hazards and reduce vulnerability (leveraging funding, resources, and people)
- Develop strategies and processes to prevent or reduce the impact of emergency events and reduce the need for response activities
- Support the SHMP

In 1991, Governor's Executive Order W-9-91 authorized the Cal OES Director to assign emergency support functions to State agencies through standing administrative orders (Executive Department, State of California 1991). The current administrative order

includes the following requirements related to hazard mitigation for agencies across State government:

- Identify, document, and, when practical, implement activities that could reduce or lessen the impact of an emergency or hazard
- In alignment with the SHMP, establish hazard mitigation as an integral element in operations and program delivery as appropriate
- Participate in the development, annual maintenance, and implementation of the SHMP
- During a federal declaration of a major disaster, participate in the hazard mitigation planning process and in project identification and prioritization
- Provide subject matter expertise and technical assistance to Cal OES in support of developing complex mitigation actions, including technical feasibility and cost/benefit, and in support of post-wildfire watershed and debris flow mitigation
- Track and report to Cal OES on changes to natural hazard risk exposure, emerging vulnerabilities, and newly available mapping and data sources

The Governor first included hazard mitigation in emergency management standing orders in an update letter sent to agency secretaries on September 12, 2000.

The Cal OES Hazard Mitigation Section is responsible for supporting State and local mitigation planning, grant administration, and technical assistance. The Hazard Mitigation Planning Division, housed within the Hazard Mitigation Section, develops and maintains the SHMP and supports the development and review of local hazard mitigation plans (LHMPs). This division consists of the State Mitigation Planning Unit (SMP Unit) and Local Mitigation Planning Unit (LMP Unit).

Cal OES responsibilities in preparing and implementing the SHMP include the following:

- Ensuring that the SHMP meets FEMA Standard and Enhanced Hazard Mitigation Plan Requirements, is approved by FEMA, and is adopted by the State of California
- Coordinating the continued development, implementation, and maintenance of the SHMP with stakeholders, strategic working groups, and federal, State, Tribal Nation, local, and non-governmental agencies
- Providing ample opportunities for stakeholder involvement in the SHMP update

- Administering FEMA Hazard Mitigation Assistance (HMA) programs, including the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) grants, and Flood Mitigation Assistance (FMA) grants
- Supporting integration of local, regional, and Tribal Nation hazard mitigation efforts with the SHMP

1.1.4. Federal Guidance for State Hazard Mitigation Planning

In 2000, the Disaster Mitigation Act of 2000 (DMA) was enacted to amend the Stafford Act to provide a framework for hazard mitigation planning. The requirements for meeting federal standards for hazard mitigation planning are established in 44 CFR Part 201. FEMA publishes further guidance to assist state, local, Tribal Nation, and territorial governments in preparing a hazard mitigation plan. In 2022, FEMA updated its *State Mitigation Planning Policy Guide*, effective April 2023 (FEMA 2022r).

The updated guidance serves as the official interpretation of 44 CFR Part 201 and provides additional clarity and guidance on hazard mitigation planning requirements. Notable updates to the guidance include spotlighting the importance of integrating considerations for climate change impacts and equity. California began integrating climate change into the SHMP in 2007 and equity beginning in 2018. The updated guidance calls for assessing climate change impacts in terms of hazard impacts, vulnerability, extent, and location. Impacts on equity priority communities are assessed for each hazard.

Hazard mitigation plans developed to meet federal standards must document the planning process, identify hazards, assess risk, assess state capabilities, document local planning coordination and capability building, develop a mitigation strategy, and establish an approach for plan maintenance and updates.

The planning process must include stakeholders from emergency management, economic development, land use and development, housing, health and social services, infrastructure, and natural and cultural resources. Additional stakeholders providing services associated with FEMA's community lifelines should also be engaged. The hazard identification and risk assessment provide the basis for plan development; the risk assessment establishes hazards impacting the planning area and associated vulnerabilities. Identifying state capabilities aids in determining what existing resources there are to address and mitigate vulnerabilities. This is further accomplished by documenting the resources available to local communities to ensure the state has a comprehensive, statewide approach to mitigation in terms of

overarching goals, utilization of data, and ensuring technical assistance is available to develop local plans. The mitigation strategy is the long-term roadmap for implementing activities to reduce risk. It establishes the goals of the plan and prioritizes actions for risk reduction.

The 2023 SHMP complies with FEMA's updated guidance and exemplifies climate change and equity integration. Central elements are described below.

Planning for Equitable Outcomes

California's disasters have significantly impacted the health and economic security of its diverse communities across the State. Cal OES recognizes that long-standing institutional and systemic barriers continue to deliver disparate outcomes by which systems of inequity based on race, ethnicity, gender, sexuality, disability, socio-economic status, and other forms of discrimination intersect to create and maintain disadvantages for some and privileges for others. Californians who live in historically underserved and under-invested communities are more likely to be hit harder by and bear a disproportionate burden of the impact of disasters than other communities.

Equity is essential to reducing risk to the whole community, including those who face barriers to accessing information, assistance, and resources to recover from disasters. Cal OES defines equity to mean that all people are justly and fairly included in society and that everyone is able to participate, prosper, and achieve their full potential. Whereas equality means providing the same to all, equity means recognizing that not all people start from the same place and acknowledging and adjusting for imbalances. The ongoing process requires identifying and overcoming intentional and unintentional barriers arising from bias or systemic structures.

The concept of equity recognizes that everyone enjoys different advantages and faces different challenges and that everyone should be treated justly and fairly, according to their circumstances, socio-historical experiences, and structurally imposed barriers. This builds upon FEMA's definition of equity as "the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities of color, persons who belong to communities that may face discrimination based on sex, sexual orientation, and gender identity (including members of the LGBTQ+ community); persons with disabilities, persons who may face discrimination based on their religion, national origin and persons with Limited English Proficiency, and persons who live in rural areas that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life" (FEMA 2022r).

Critical Cal OES Equity Partners

Office of Access and Functional Needs— Recognizing the disproportionate impact disasters have on individuals with access and functional needs (AFN) (e.g., people with disabilities, older adults, children, limited English proficiency, and transportation disadvantaged), California's Governor established the Office of Access and Functional Needs (OAFN) within Cal OES in 2008. OAFN is tasked with a two-fold mission: Identifying the needs of all Californians before, during, and after disasters and working with emergency managers and whole community stakeholders to integrate those needs throughout every facet of the State's emergency management system. To meet its mission, OAFN adopts a multi-pronged approach to inclusion and integration, which includes providing technical assistance, guidance, facilitation, partnership outreach, training, and other support services to emergency managers, disability stakeholders, and service providers responsible for planning for, preparing for, responding to, and recovering from all hazards.

Office of Diversity, Equity, and Inclusion—As part of its continued commitment to making emergency management equity-centered, Cal OES formally created the Office of Diversity, Equity, and Inclusion (ODEI) in 2022 to elevate and expand current equity and access programs and embed equity and engagement principles throughout Cal OES's actions, policies, programs, and procedures, both internally and externally. ODEI works to ensure that principles of equity, justice, inclusion, transparency, and accountability govern all aspects of emergency services. ODEI prioritizes actions promoting equity, fostering community resilience, and putting diversity into purposeful and meaningful action. The office knows it is impossible to be equitable without being inclusive of diverse voices. Thus, it continues to build a culture of belonging, respect, and connection by actively inviting the contribution and participation of all people. At Cal OES, diversity is an asset, one which is essential for a more resilient California.

Office of Tribal Coordination—The role of the Office of Tribal Coordination is to improve and maintain communication and collaboration between the Cal OES and all Native American Tribal Nations in California. The office aims to create effective collaboration and provide relevant information that allows for informed decision-making so that all parties can share the goal of reaching an informed decision together. The Office of Tribal Coordination shares resource information, including grants, training opportunities, and key initiatives, provides consultation and technical assistance and addresses inquiries from our Tribal Nation partners. Its priorities are to educate internal and external agencies and partners, to become informed about the cultural settings of California Native Americans, to understand and relay Tribal Nations' priorities for emergency management and homeland security issues, to provide cultural awareness and sensitivity, and to improve Cal OES's understanding of all Native American Tribal Nations and related issues in California.

Equity-Related Definitions

To include equity in a plan, individuals and communities facing greater barriers must first be identified. Many definitions exist related to equitable planning. In this SHMP, "**social vulnerability**" is generally called "**equity priority.**" Social vulnerability is commonly used, but California recognizes that the purpose of an equity focus is to prioritize closing inequitable gaps through proactive action. Additionally, "socially vulnerable" may convey a negative connotation to those unfamiliar with the concept. This is similar to using the term "disaster victim" versus "disaster survivor." The former implies a focus on the impacts an individual has endured; the latter calls attention to the individual's power and resilience in the face of a disaster. "Equity priority" conveys a more positive connotation and better expresses the goal of these considerations; it focuses on empowering communities rather than on the barriers and challenges they face. However, the SHMP still uses "social vulnerability" when referring to a specific tool or resource, such as the Social Vulnerability Index (Section 0). The Equity Working Group for this SHMP identified the following relevant definitions for use in this Plan:

- The term "**equity priority**" was identified by stakeholders in the Equity Working Group (see Appendix D), which discussed how to define equity and integrate it into the SHMP. It was important to stakeholders that social vulnerability be discussed to ensure the term included the various factors that may contribute to vulnerability. It also highlighted the State's commitment to be proactive and intentional and aid individuals and communities in need.
- **Social Vulnerability** refers to social factors that influence the susceptibility of various groups to harm and govern their ability to respond. It can also be the product of plan inequalities— those characteristics of communities and the built environment, such as urbanization, growth rates, and economic vitality, that make the people who live or work there vulnerable to disaster (Cutter, Boruff and Shirley 2003).
- **Equity Priority Communities** are those that bear a disproportionate burden of emergency hazards because of a history of being systemically marginalized due to structural inequities relating to race, ethnicity, gender, sexuality, access and functional needs, language, documentation status, native or indigenous origins, mental health, age, socio-economic status, country of origin, religion, disability, etc. The term "equity priority communities," identified by stakeholders in the Equity Working Group, is the umbrella term used in the Plan to include all other communities.
- **Access or Functional Needs Communities** refer to individuals and groups who have access or functional needs, such as, but not limited to, people without vehicles, people with disabilities, older adults, and people with limited English proficiency, as defined by California Government Code 8593.3.

Equity-Related Definitions (Continued)

- **Underserved Communities** refer to populations and geographic communities sharing characteristics that have been systematically denied a full opportunity to participate in aspects of economic, social, or civic life (Executive Order 13985).
- **Underrepresented Communities** refer to populations or groups lacking historical or current representation in decision-making or aspects of economic, social, or civic life.
- **Historically Marginalized Communities** refer to groups and communities that experience discrimination and exclusion because of unequal power relationships across economic, political, social, and cultural dimensions (National Collaborating Centre for Determinants of Health n.d.).
- **Environmental Justice** is the fair treatment and meaningful involvement of all people—regardless of race, color, national origin, or income—in the development, implementation, and enforcement of environmental laws, regulations, and policies (EPA 2023).
- **Diversity** refers to physical, social, and psychological differences between people and groups with multiple subjectivities, perspectives, experiences, backgrounds, and socially constructed differences.
- **Inclusion** means building a culture of belonging, respect, and connection by actively inviting the contribution and participation of all people.

Often, populations and communities are categorized based on shared characteristics that create barriers to accessing resources, leading to increased vulnerability. An individual or community may face barriers or have characteristics that apply to multiple populations and communities. Appendix B describes the many communities that need to be considered in integrating equity as a priority for hazard mitigation.

Cal OES has had a strong history of adopting integrated approaches to managing disasters and is a global leader in inclusive planning. Identifying concentrations of priority and underserved populations can assist emergency managers and the whole community in preparedness, response, recovery, and mitigation actions. Inclusive planning to help identified populations may be accomplished through partnerships and relationships with whole community leaders as representatives of these populations. The State must ensure that considerations for higher-risk populations, such as those with disabilities or financial challenges, are included in the decision-making process when identifying projects to mitigate risk and carrying out disaster management processes.

Centering equity in the mitigation plan helps ensure an inclusive planning process that benefits the whole community and directs information and resources to those disproportionately impacted by disasters. Intentional inclusive planning ensures that everyone has access and the opportunity to meaningfully participate and contribute to successful hazard mitigation.

Equity considerations are woven throughout the 2023 SHMP. The hazard Risk Assessments all consider the risk to equity priority communities, and the goals, objectives, and outcomes of the 2023 SHMP were developed through the lens of inclusion and equity. The State intends to prioritize the principles of social justice, equity, and inclusion in the planning and administration of all hazard mitigation programs and actions statewide.

Planning for Climate Change

When planning for climate change, the terms "climate adaptation," "sustainability," and "resilience" are frequently used interchangeably and associated with mitigation. "Climate adaptation" describes the actions taken to prepare for and adjust to current and projected impacts of climate change (EPA 2022). For this SHMP, "sustainability" includes the preservation of resources—physical, social, economic, environmental, historical, and cultural—for the benefit of future generations. One path to sustainability is through investment in strong disaster mitigation. "Resilience" is defined as the ability of a system to absorb shock and maintain its structure and functions with a minimum of loss. A resilient system can resume pre-event functionality in a relatively short time. A community is resilient when it maintains continuity and recovers quickly despite experiencing disaster events. Combined with these efforts, it is also important to ensure that these measures do not inadvertently cause unintended consequences and further contribute to GHG emissions. Addressing adaptation, sustainability, and resilience in the SHMP allows communities to identify ways they might be harmed by future conditions—including those unique to their communities—and provides a tool for finding solutions to those risks.

Climate adaptation efforts may be undertaken separately or in addition to the hazard mitigation planning process. Hazard mitigation and climate adaptation are complementary efforts with the same goal: long-term risk reduction for people and increased safety for communities. Adapting to the expected impacts of climate change is a form of hazard mitigation. A climate change-informed risk assessment and mitigation strategy provide the greatest potential for long-term risk reduction and increased resilience.

Integrating resilience into the SHMP addresses two factors:

- The connection and dependencies among multiple geographic levels—cities, counties, regions, Tribal Nations, and the State
- The capacity of the city, county, Tribal Nation, or State to change and adapt during recovery to meet challenges posed by changed conditions

Resilience can be built through mitigation or coordinated development, and implementation of other disaster management functions such as preparedness, response, and recovery (Topping, et al. 2010).

An integrated approach to climate change and resilience involves adapting to future climate conditions and reducing GHG emissions. Climate adaptation activities can have several benefits, such as increased public health and safety, greater economic stability, reduced healthcare and infrastructure costs, increased housing resilience, improved air and water quality, and better stormwater management (Cal OES 2020). Climate adaptation strategies can also lead to the sustainability of resources.

The best available science overwhelmingly confirms that climate change will continue to increase the frequency, duration, and intensity of natural hazards such as floods, wildfires, extreme heat, drought, storms, heavy precipitation, and sea-level rise. A changing climate increasingly impacts communities, and many of these climate trends will continue and amplify for decades. Climate change heightens risks to California communities and residents and challenges conventional hazard mitigation approaches. It poses a unique threat to the nation's most at-risk populations by exacerbating the effects of disasters on marginalized and historically underserved communities, which already experience the greatest impacts from natural hazards.

Tools such as Cal-Adapt will be critical for assessing vulnerability to climate impacts. Cal-Adapt provides a way to explore peer-reviewed data that portrays how climate change might affect California at the State and local levels. This data is available through downloads, visualizations, and the Cal-Adapt application programming interface (API) for research, outreach, and adaptation planning needs. Cal-Adapt is a collaboration between State agencies, universities, and private-sector researchers.

Cal OES has also developed the Climate Adaptation Planning Guide (APG) as a tool that local governments and organizations can use to integrate best practices into their adaptation planning efforts. First published in 2012 and updated in 2020, the APG includes an improved step-by-step process communities can use to plan for climate

change. The updated APG reflects the latest best practices, especially considering the many updates to California's plans, programs, science, regulations, and policies.

Climate Adaptation and Mitigation

Climate change adaptation describes measures that seek to assist communities in adjusting to the actual or expected climate and its effects (IPCC 2014). Mitigating natural hazards is a key component of climate change adaptation that focuses specifically on hazard risk reduction. Climate adaptation and hazard mitigation focus on long-term threats to human life, property, economic continuity, ecological integrity, and community function.

Effective hazard mitigation requires accurate, science-based, and data-driven prediction of the likelihood of hazard events. Historically, predictions are based on statistical projections from records of past events. This approach assumes that the probability of hazard events remains unchanged over time. Thus, averages based on the past frequencies of hazards are used to estimate future frequencies. For example, if a river has flooded an average of once every five years for the past 100 years, it can be expected to continue to flood an average of once every five years.

For hazards that are affected by climate conditions, the assumption that future behavior will be equivalent to past behavior is no longer valid. As flooding is generally associated with precipitation frequency and intensity, for example, the frequency of flooding will not remain constant if broad precipitation patterns continue to change over time. Specifically, as hydrology changes, storms currently considered to be the 1% annual chance flood might strike more often, leaving many communities at greater risk. The risks of flood, landslide, severe storms, extreme heat, drought, and wildfire are all affected by climate patterns.

For this reason, understanding climate change is pertinent to mitigating natural hazards. Hazard risk assessments must be based on the best available data incorporating future climate conditions. Information about changing climate patterns provides insight into the reliability of future hazard projections used in mitigation analysis.

Source: (FEMA 2023h)

The 2023 SHMP incorporates climate change considerations throughout the Risk Assessments and in developing mitigation goals and actions. The Risk Assessments in this Plan are based on the best available data that incorporates future conditions and

an increase in the pace, intensity, and scale of future hazard events. Climate adaptation is a key theme in the goals and objectives outlined in this Plan.

1.2. HOW THIS PLAN WAS PREPARED

S1 – 44 CFR 201.4(b) and (c)(1): Does the plan describe the planning process used to develop the plan?
Section 1.2 addresses this requirement, including how the Plan was prepared, schedule or timeframe, specific milestones and activities, agencies and other stakeholders who were involved, and the efforts to integrate that process into additional state planning efforts.

The planning process lays the foundation for developing an effective plan, maintaining, updating, integrating, and improving it, and tracking and evaluating progress on the recommended mitigation efforts. A successful planning process involves consultation with a cross-section of stakeholders, including those impacted by the plan and those with authority to implement specific actions, reaching a consensus on desired outcomes, and resolving problems. It results in widespread support for directing financial, technical, and human resources to the plan's recommended courses of action.

The Cal OES SMP Unit managed the planning process for the 2023 SHMP. The Unit's activities included convening and supporting expert working groups; providing subject-matter expertise in hazard mitigation, planning, and FEMA requirements; researching and writing plan content; and making daily operational decisions. The SMP Unit coordinated the process with the support of consultant firm Tetra Tech.

Cal OES began the 2023 SHMP update in August 2021 to incorporate a broader range of stakeholders into the planning process. The Plan was made available for public review and comment on February 7, 2023. Comments were addressed, and a first draft was submitted to FEMA Region 9. The final draft was submitted to FEMA for review on June 9, 2023. FEMA issued an Approved Pending Adoption (APA) letter on July 24, 2023. California adopted the FEMA-approved SHMP on August 23, 2023. The signed adoption letter and final approval letter are included following the Executive Summary of this Plan.

The hazard mitigation planning process consisted of four major tasks, as further described in the sections below:

- Organizing the process and resources

- Assessing risk and capabilities
- Developing a mitigation strategy
- Adopting and implementing the Plan

1.2.1. Organizing the Process and Resources

S2 – 44 CFR 201.4(b) and (c)(1): Does the plan describe how the state coordinated with other agencies and stakeholders?
Section 1.2.1 satisfies this requirement by documenting coordination with agencies and stakeholders and how their input was utilized to inform the Plan update.

Cal OES initiated the 2023 SHMP update by conducting an internal review of the 2018 SHMP's content, format, and opportunities for enhancement. Cal OES also compared this information against FEMA's new guidance once it was released to determine necessary edits. Cal OES established expert working groups organized around different hazards and themes, known as the Hazard and Working Groups, by examining California's disaster landscape since the 2018 SHMP and the overarching themes to be highlighted in the 2023 Plan.

Hazard and Working Group Activities

Since the 2023 SHMP Kickoff in August 2021, the Hazard and Working Groups and group leadership met 102 times, accounting for over 100 hours of active, collaborative planning. Appendix D lists meetings and dates. The Hazard and Working Groups will remain active following approval of the 2023 SHMP to facilitate its implementation and monitoring and to streamline the planning process for the 2028 SHMP.

FEMA's National Mitigation Framework (FEMA 2020a) emphasizes the value of collaboration among sectors to ensure that mitigation capabilities continually develop, and that comprehensive mitigation includes strategies for all community systems. Cal OES facilitated numerous meetings throughout the planning process to ensure a robust Risk Assessment based on the best available validated data, an extensive review of capabilities and mitigation progress, and a comprehensive updated mitigation strategy. The following sections describe engagement outreach activities and the resulting input from participating planning partners.

Activities to Engage with Stakeholders

The 2023 SHMP planning process engaged a wide range of whole community stakeholders and subject matter experts. As the lead agency, Cal OES collaborated with partners across State government, local and Tribal Nation jurisdictions, federal agencies, and non-governmental organizations (NGOs).

The "public" for this SHMP update was defined in three categories:

- State agencies and subject matter experts
- Local jurisdictions
- The general public

Agency Engagement

HHPD1 – 33 USC 467f-2: Did Element S2 (planning process) describe how the state dam safety agency, other agencies, and stakeholders participated in the planning process and contributed expertise, data, studies, information, etc., relative to high hazard potential dams? Text under the "Agency Engagement" part of Section 1.2.1 describes how state agencies were engaged during this Plan update process, including those agencies associated with Dam Safety and program administration.

The SMP Unit collected significant input across Cal OES directorates and other State agencies and departments, such as the California Department of Forestry and Fire Protection (CAL FIRE), the California Governor's Office of Planning and Research (OPR), the California Department of Water Resources (DWR), the DWR Division of Safety of Dams (DSOD), the California Geological Survey (CGS), and the California Department of Housing and Community Development (HCD).

Engagement with agencies that own and operate the State-owned facilities that are the basis of the Risk Assessment occurred through various working groups, which met bi-monthly. Four Hazard Groups and four Working Groups were established to assist in developing this SHMP update. Each group was co-led by the SMP Unit, and one or two subject-matter experts referred to as "champions," as listed in Table 1-2. All groups met regularly between August 2021 and September 2022 to discuss the content and themes of the Plan.

Table 1-2. Hazard Group and Working Group Champions

Hazard Group/ Working Group	Champion Name	Title	Agency
Seismic Hazards	Cindy Pridmore	Engineering Geologist	California Department of Conservation (DOC)
Flood Hazards	Mike Mierzwa	Technical and Policy Advisor	DWR
	Remy Gill	Engineer, Water Resources	DWR
Fire Hazards	Edith Hannigan	Executive Officer	California Board of Forestry and Fire Protection (BOF)
Other Hazards	No designated champion		
Geographic Information System (GIS) Technical Assistance Working Group	Michael Crews	Information Security Officer	Cal OES
	David Harris	Enterprise Data Services	California Natural Resources Agency (CNRA)
	Eric Howard	Geospatial Data Scientist	Cal OES
Goals and Objectives Working Group	Victoria LaMar-Haas	Program Manager, LMP Unit	Cal OES
Climate Impacts Working Group	JR DeLaRosa	Climate and Science Advisor	Cal OES
	Neil Matouka	Program Manager, Fifth Climate Change Assessment	OPR
Equity Working Group	L. Vance Taylor	Chief of the Cal OES Office of Access and Functional Needs	Cal OES
	Abby Browning	Chief of the Cal OES Office of Private Sector/Non-governmental Organization Coordination	Cal OES
	Monisha Avery	Chief of the Cal OES Office of Diversity, Equity, and Inclusion	Cal OES
	Priscilla LoForte	Diversity, Equity, and Inclusion Specialist	Cal OES

By collaborating with the Hazard Groups and Working Groups, Cal OES engaged with various sectors throughout the planning process. Sector areas included emergency management, economic development, land use and development, housing, health

and social services, infrastructure, and natural and cultural resources. Their participation provided these sectors with opportunities to offer plan input.

Appendix D lists key stakeholders engaged in the update process, provides rosters of each Hazard Group and Working Group, and presents details on coordination with agencies and stakeholders (e.g., distribution of capability assessment tables, interactive exercises at leadership meetings, meetings to discuss and collect Risk Assessment data and methodology).

Local Jurisdiction Engagement

County and operational area emergency managers were invited to participate in a webinar hosted by Cal OES on September 13, 2022. This webinar explained the SHMP planning process, the 2023 Plan update, and recent FEMA mitigation state-level guidance updates. The webinar concluded with a discussion of opportunities for continued SHMP involvement.

Following this webinar, Cal OES scheduled and delivered local listening sessions. The purpose of these listening sessions was to further develop working relationships between Cal OES and local jurisdictions and to determine how to maximize the usefulness of the 2023 SHMP for counties developing their hazard mitigation plans. Representatives from all 58 California counties were invited. Sessions were kept small, and attendees were grouped by common attributes to the extent possible. These attributes included hazards, geography, hazard history, planning experience, and planning challenges and strengths. Some key themes from these sessions included:

- Additional support and assistance to bolster the capability and capacity of local planning entities
- Challenges to accessing funding to prepare and implement local plans
- Aligning feedback from Cal OES and FEMA with plan guidance and requirements, as well as State legislative requirements
- Better explanations of minimum requirements for plans and plan updates
- Techniques and best practices for engaging stakeholders and the public to create or update local plans
- Identifying mitigation actions to include in plans and implementing those actions and the overall plans

These listening sessions were held from October 27, 2022, to November 9, 2022. Representatives from 32 counties attended.

Public Outreach

Residents of the State were engaged through a public-facing website that was continually updated throughout the process. The public comment period took place from February 7 to March 24, 2023. During this time, the draft Plan was posted online, and the Cal OES SMP Unit socialized the public comment opportunity on various social media outlets, including Twitter, Facebook, Instagram, and LinkedIn, and through extensive listserv emails and speaking engagements. During this public comment period, Cal OES received comments from 38 separate entities, including State agencies and departments, federal agencies, local governments, Tribal Nations, NGOs, and independent citizens of California. Cal OES received over 1,000 comments from these entities.

Plans for Ongoing Engagement

Hazard mitigation planning is an ongoing process, and Cal OES is committed to increasing coordination and collaboration in future hazard mitigation planning and grant activities. Cal OES will further integrate agencies/departments and stakeholders as documented in the mitigation action plan (see Chapter 47) and plan maintenance strategy (see Chapter 48).

Support Received From Participating Agencies and Stakeholders

The content of the SHMP is the culmination of information provided by numerous stakeholders from local, Tribal Nation, State, and federal government agencies, public and private business organizations, and individual citizens. The following sections describe the contributions of each type of participating partner.

Hazard Groups and Working Groups

The Hazard Groups and Working Groups provided guidance and subject matter expertise for the Plan. The Hazard Groups focused on specific hazard profiles and mitigation actions. The Working Groups evaluated overarching themes integrated throughout the 2023 SHMP.

Subject-Matter Experts

Many hazard subject-matter experts in California participated in the 2023 SHMP Hazard Groups and Working Groups by providing spatial data, guiding the vulnerability assessment methodology, reviewing the draft Risk Assessment, and providing critical text updates to various hazard profiles. These subject-matter experts were consulted from the beginning stages of the planning process. Cal OES also engaged subject matter experts, including the Cal OES Statewide AFN Community

Advisory Committee, on critical themes such as equity and climate change through the Working Groups.

State Agencies

The 2023 SHMP reflects specific mitigation actions and activities from programs administered by other agencies and departments throughout the State. State agencies provided subject matter experts to participate in the Hazard and Working Groups, and partner agencies were consulted in developing the goals and objectives and the mitigation actions assigned to their agency.

Counties, Operational Areas, and Tribal Nation Governments

Local governments provided input on the content of the Plan to support local mitigation planning and capacity-building efforts through the county and operational area webinar and the listening sessions with local jurisdictions.

Through the Cal OES Tribal Coordination Office, Cal OES also leveraged relationships with Tribal Nation associations to gather input on the 2023 SHMP planning process. This input included how to best incorporate Tribal Nation populations into the SHMP while maintaining their sovereignty regarding mitigation planning.

Public and Private Business Organizations and Individual Citizens

The SHMP was made available to this audience via the public-noticed, 45-day public comment period that commenced on February 7, 2023, and concluded on March 24, 2023. During this timeframe, the SHMP was available for review and comment through a publicly accessible website providing a web-based platform to submit comments. Various public and private businesses and individual citizens used this opportunity to give feedback and comments on the SHMP draft.

1.2.2. Assessing Risk and Capabilities

Hazard Groups and Working Groups were consulted to determine how to organize and assess hazards in the 2023 update. The 2018 SHMP organized hazards by type (earthquake/geologic, flood, fire, and other). Based on input from the 2023 SHMP Hazard Groups and Working Groups, Cal OES elected to present hazards in order of impact rating for this update. Natural hazards of interest are grouped first, followed by other hazards of interest.

Subject matter experts were consulted to determine which phenomena should be assessed as stand-alone hazards and which ones represent cascading impacts of a

standalone hazard. For example, post-fire debris flow is an impact of wildfire, while urban structural fire is a standalone hazard.

Cal OES worked with Hazard Groups and Working Groups to identify key information for integration into the Plan, including the best available data on climate change and equity priority communities. The Hazard Groups guided the development and methodologies for the hazard Risk Assessments.

1.2.3. Developing a Mitigation Strategy

Goals and Objectives

The 2023 SHMP describes the State's commitment to reducing or eliminating impacts of natural and human-caused disasters by preparing and implementing comprehensive hazard mitigation strategies, plans, and actions. This commitment is reflected in the SHMP goals and objectives discussed in Chapter 44, which were reviewed and updated by the Goals and Objectives Working Group for this update.

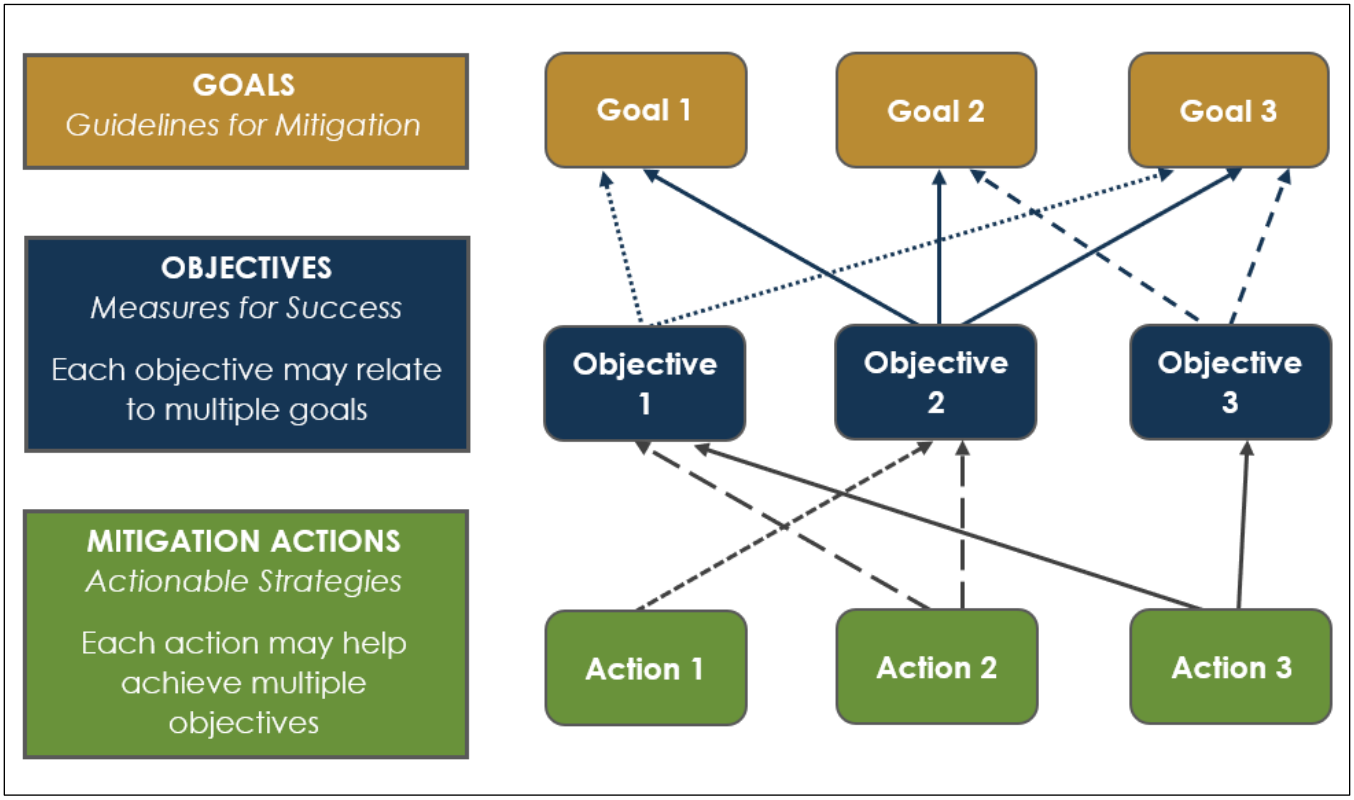
The Goals and Objectives Working Group was responsible for reviewing the 2018 SHMP goals and objectives and updating them to reflect priorities for the 2023 update. The 2023 SHMP adopted a new strategy for goals and objectives, as shown in Figure 1-1. This strategy allows multiple objectives to apply under multiple goals. It provides an opportunity to establish more comprehensive objectives that the State can use to set priorities for actions identified in the Plan. All stakeholders were invited to review and refine the goals and objectives.

Mitigation Actions

Once goals and objectives were confirmed, an action plan was developed and prioritized. The first step in action planning was to reconcile all actions recommended in the 2018 SHMP. The reconciliation process, discussed in Chapter 45, identified which actions would be carried over to the 2023 SHMP.

Actions carried over from the previous SHMP were vetted through the Hazard Groups and Working Groups, which also identified any new actions to be added to the Plan based on the groups' expertise and understanding of hazard impacts in California. After identifying the actions, each was assigned a priority based on metrics that emphasized State priorities and concerns, as discussed in Chapter 47.

Figure 1-1. Goal-Setting Approach



Opportunities for Mitigation Activities

Developing new mitigation actions for this SHMP considered options from catalogs of potential mitigation opportunities. Each risk assessment chapter of this SHMP provides a catalog outlining potential actions for mitigating the hazard addressed in that chapter. These potential actions are categorized in two ways:

- By who would carry out the action:
  - Community-scale (a group of individuals, caregivers, guardians, households, and families; while a single individual may undertake preparedness measures, the SHMP recognizes that community-scale actions may require an entire neighborhood or community to take part in implementing the action)
  - Organizational scale (businesses and organizations, including non-profits and community-based organizations)
  - Government-scale (any government agency that has permit authorities and police powers within a defined planning area)

Opportunities for Mitigation Activities (continued)

- By how the action mitigates hazard risks:
  - Manipulate the hazard (actions to prevent hazard events from occurring)
  - Reduce exposure and vulnerability (actions to safeguard people, property, and the environment from the impacts of the hazard)
  - Build local capacity (actions to improve abilities to mitigate and respond to hazard events)

Nature-Based Solutions

California's climate adaptation strategy highlights using nature-based solutions to promote environmental and community resilience. Nature-based solutions are long-term sustainable planning, design, environmental management, and engineering practices that weave natural features or processes into the built environment to build more resilient communities. Projects incorporating nature-based solutions can achieve multiple benefits and contribute to climate change mitigation, climate adaptation, and hazard mitigation goals (FEMA 2021d). Additionally, nature-based solutions provide health, well-being, and environmental justice benefits.

Historically, most hazard mitigation projects have employed "gray" or "hard" infrastructure solutions in engineering projects that use concrete and steel. For example, seawalls are a gray infrastructure solution to protect shorelines from wave action and coastal erosion, thereby reducing coastal flooding. Preferred building materials in wildfire-prone areas have transitioned from wood to stone, steel, or composites. These approaches have effectively provided site-specific hazard mitigation and are important risk reduction tools in certain circumstances. However, they can result in negative consequences. For example, seawalls can lead to the loss of beaches, and many gray solutions result in high GHG emissions. Projects that utilize nature-based solutions can, in some cases, achieve similar risk reduction benefits while providing social, economic, and environmental benefits. Nature-based solutions often employ "green infrastructure"—intentional or strategic preservation, enhancement, or restoration of a natural or semi-natural system to provide a desired benefit. Green infrastructure can simultaneously reduce risk, protect or enhance the environment, create wildfire habitats, reduce GHGs, and provide recreational opportunities (The Nature Conservancy n.d.).

In addition to the environmental benefits, green infrastructure provides health and wellbeing benefits. Communities can suffer significantly from natural hazards if they are under-invested in, under-targeted for, or excluded from community investment in

green infrastructure and other nature-based solutions. Frontline communities are "neighborhoods or populations of people who are directly affected by climate change [and other natural hazards] and inequity in society at higher rates than people who have more power in society. They are on the frontlines of the problem" (NAACP 2018). These communities are at greater risk as structural and institutional inequities often create additional barriers that prevent these populations from being adequately prepared to withstand and recover from a disaster or emergency. Investing in natural systems can improve air quality, reduce impacts from extreme heat, serve as storage for rainwater and flooding, and provide recreational and exercise opportunities for the whole community (Kingsley 2019).

California's hazard mitigation strategy prioritizes using nature-based solutions to reduce hazard risk while enhancing the environment. Nature-based solutions such as the following can mitigate risk for most hazard types, especially those exacerbated by climate change:

- Floodplain restoration is an effective way to reduce riverine flooding by providing natural storage for floodwaters while reducing erosion, enhancing water quality, and creating habitat (FEMA 2021d)
- The restoration or creation of coastal dunes, marshes, and other coastal habitats can serve as a barrier between the ocean and inland areas, reducing coastal erosion and flooding
- Forest restoration, ecologically informed vegetation management, and prescribed fire and fire-resilient community design are examples of nature-based solutions that can reduce wildfire risk
- In urban areas, green infrastructure such as urban tree canopies, rain gardens, and green roofs can assist in stormwater management and reduce the impacts of extreme heat events and drought events

Hazard mitigation projects employing nature-based solutions are key for promoting resilient communities and advancing climate adaptation goals. FEMA is increasingly recognizing the importance of nature-based solutions to reduce hazard risk. For example, the FEMA BRIC program provides additional scoring criteria to promote and encourage the utilization of nature-based solutions. FEMA has produced guidance and other resources to assist communities with planning and implementing nature-based solutions.

1.2.4. Emergency Management Accreditation Program

The Emergency Management Accreditation Program (EMAP) provides emergency management programs an opportunity to be evaluated and recognized for compliance with standards certified by the American National Standard Institute and recognized by the industry and for compliance with EMAP's mission to build safer communities through standards of excellence. EMAP demonstrates accountability and focuses attention on areas and issues where resources are needed to heighten preparedness efforts for any disaster that may affect communities.

Applicants must demonstrate through self-assessment, documentation, and peer assessment verification that their programs meet the Emergency Management Standard. An emergency management program uses the accreditation to prove the capabilities of its disaster preparedness and response systems. Accreditation is valid for five years. The program must maintain compliance and be reassessed to maintain accredited status.

The EMAP process accredits an overall emergency management program, of which hazard mitigation is one component. Many EMAP standards for hazard mitigation planning fall outside of what FEMA requires for state hazard mitigation plans. This SHMP has been developed to comply with EMAP standards and criteria fully. The Core Plan emphasizes elements required by FEMA to better support local planning in the State. Since EMAP is a voluntary program, its components that deviate from FEMA requirements are packaged in Appendix C to this Plan.

1.3. ADOPTING AND IMPLEMENTING THE PLAN

Adoption of the 2023 SHMP is implemented on behalf of the State government by the Cal OES Director. The adopted SHMP communicates the State's priorities and facilitates communication and collaboration among jurisdictions and stakeholders.

Upon conditional approval of the finalized 2023 SHMP by FEMA, the Cal OES Director, acting as the Governor's designated official, formally adopts the SHMP, as required by 44 CFR Section 201.4(c)(6). The Director's letter of adoption is immediately forwarded to FEMA to finalize the approval process. The adoption letter and final approval letter are included following the Executive Summary of this Plan.

1.4. THE UPDATED PLAN—WHAT IS DIFFERENT?

The updated Plan differs from the 2018 SHMP in a variety of ways due to program requirements and Plan enhancements. Key differences may be summarized as follows:

- The 2023 SHMP uses plain language that emphasizes readability for the general reader
- The Plan format has been changed for a simplified Core Plan supported by a technical volume presenting multiple appendices
- The number of fully assessed hazards of concern has been expanded from 13 to 15
- Another 19 hazards of interest, including non-natural hazards, are profiled
- The planning process was conducted through a series of working groups consisting of subject-matter experts covering focus topics for the plan
- Goals and objectives have been revised using an approach that emphasizes multi-objective actions
- The SHMP uses a hazard impact scoring methodology that categorizes risk as high, medium, or low based on the projected impacts of each hazard
- The SHMP includes a catalog of best management practices for local hazard mitigation planning
- The SHMP applies a new methodology for prioritizing actions
- The Risk Assessment for the SHMP has been expanded to include a quantitative analysis that looks at the vulnerability of equity priority communities

Appendix E indicates the significant changes between the two Plans as they relate to federal requirements for state hazard mitigation plans.

1.5. HOW TO NAVIGATE THE PLAN

California's SHMP has been designed to use plain language and provide an engaging experience for readers by making critical information easily identifiable and ensuring increased accessibility. Additionally, the SHMP is a resource for local governments to inform their planning efforts. The Plan consists of two volumes:

- Volume 1 is the Core Plan, highlighting essential information on hazards and risks in California and the proposed strategy for actions to mitigate the risks. Volume 1 also includes a glossary defining the terms and acronyms used in this SHMP and a list of references cited in the Core Plan as authoritative sources of information.
- Volume 2 consists of technical appendices. Development of the 2023 SHMP yielded an extensive collection of documents and data that support the findings presented in the Core Plan. The appendices present these detailed results for readers who have a use for technical information about hazard mitigation in California.

Throughout Volume 1, requirements for FEMA's Standard state hazard mitigation planning, Enhanced state mitigation planning, and EMAP requirements are identified using the icons below. The information is highlighted to indicate how the requirements are met for each program.

FEMA Standard State Hazard Mitigation Plans 44 CFR Section 201.4:
Utilized to highlight the minimum standards required for a state-level hazard mitigation plan.

FEMA Enhanced State Hazard Mitigation Plans 44 CFR Section 201.5:
Utilized to highlight the heightened standards required for an Enhanced state-level hazard mitigation plan that qualifies to receive additional funding.

Emergency Management Accreditation Program:
Utilized to highlight the required EMAP standards. EMAP accreditation is a voluntary program not required by FEMA for Standard or Enhanced State Planning Requirements. EMAP standards are considered to be above and beyond those required by FEMA.

2. California's Hazards of Concern

2.1. California's Hazard History

California is subject to many natural and human-caused hazards. Wildfires are the most frequent disaster, followed by floods. Earthquakes occur less frequently but account for the greatest combined losses (deaths, injuries, and damage costs). Since 1950, California has experienced 702 hazard events, including 345 wildfires, 150 floods, 30 severe storms, and 27 damaging earthquakes. Over 530 of these events also included impacts from mud and landslides. Since 2000, 201 disaster events in California (approximately 9 per year) have cost the State over $19 billion. Most of the disasters have taken place between July and October, with the number of disasters increasing in frequency over the last 20 years (FEMA 2022d); (NCEI 2022a); (Cal OES 2022d).

Over the past seven decades, the frequency of disasters and corresponding losses have grown rapidly. Table 2-1 shows the increase in State emergency proclamations and federal disaster declarations from 1950 through 2022. The table shows casualties and Cal OES-administered disaster costs by decade. These casualties and costs peaked in the 1990s due to the 1994 Northridge Earthquake. Appendix F presents a detailed history of disaster declarations for California.

Table 2-1. Hazard Event Frequency and Losses Since 1950

Year	State Emergency Proclamations	Federal Disaster Declarations	Deaths*	Injuries	Cal OES-Administered Costs
1950-1959	8	3	100	227	$332,283,000
1960-1969	32	12	99	1,224	$706,931,196
1970-1979	60	18	96	2,226	$4,197,670,330
1980-1989	60	23	128	5,243	$3,342,205,537
1990-1999	48	19	224	15,592	$9,245,038,369
2000-2009	63	101	59	885	$1,845,112,390
2010-2019	72	123	184	10	$1,120,667,471
2020-2022	22	38	28	4	____**
TOTAL	**365**	**337**	**918**	**25,411**	**$20,789,908,293**

Source: (FEMA 2022d); (CAL FIRE 2022a); (Cal OES 2022d)

* Cal OES tracks fatality reporting based on voluntary local jurisdiction reporting. Figures are likely undercounted because local jurisdictions are not mandated to report fatality numbers. As of January 2023, California has had roughly 11 million Coronavirus Disease 2019 (COVID-19) cases and over 98,000 COVID-19-related deaths. These numbers are not reflected in this table because of the unique disaster type of COVID-19. The most updated statistics are available on California's COVID-19 website. (https://covid19.ca.gov/state-dashboard/)

** At the time of this Plan update, the administered cost calculations were still being finalized due to the volume of events and the scope of costs associated with the COVID-19 federally declared disaster.

Disaster Declarations

Formal disaster declarations provide a good indication of the historical occurrences of a hazard in a given area. Such declarations may be issued by State, local, or federal government agencies. This SHMP reviews the following types of declarations for past hazard events:

- **Federal (or Presidential) Major Disaster Declaration (DR)—**For a natural event that the President believes has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. Provides a wide range of federal assistance programs for individuals and public infrastructure (FEMA 2023i).
- **Federal (or Presidential) Emergency Declaration (EM)—**For an event when the President determines federal assistance is needed to supplement state and local emergency services efforts or lessen the catastrophe threat. The total assistance for a single event may not exceed $5 million (FEMA 2023i).
- **Federal Fire Management Assistance Declaration (FM)—**Establishes eligibility for Fire Management Assistance Grants (FMAGs) from FEMA for mitigating, managing, and controlling fires that threaten to be major disasters. This declaration type replaced the fire suppression declaration in 2003 (FEMA 2023).

Disaster Declarations (Continued)

- **Federal Fire Suppression Authorization (FS)—**Funding under FEMA's Fire Suppression Assistance Program and this declaration type were replaced with FMAGs after 2002 (FEMA 2021g).

- **U.S. Department of Agriculture (USDA) Disaster Designation—**Designates counties as disaster areas to make EM loans available to producers suffering losses in those counties and contiguous counties (USDA n.d.-a).
- **California State of Emergency Proclamation—**Issued by the Governor in cases of disaster or extreme peril to the safety of persons and property that are likely to be beyond the control of any single county or city and require the combined forces of a mutual aid region or regions to combat (Cal OES 2023b).
- **California Disaster Assistance Act (CDAA)—**Authorizes the Director of Cal OES to administer a disaster assistance program providing State financial assistance for disaster-related costs incurred by local governments. Funding becomes available when the Director concurs with a local emergency proclamation requesting State disaster assistance. Funds may be used to repair, restore, or replace public real property damaged by a disaster. The program may assist with cost-sharing required under federal public assistance programs in response to disaster events (Cal OES 2023b).
- **U.S. Small Business Administration (SBA) Physical Disaster Loan**—Provides loans up to $2 million for businesses and private non-profit organizations to repair or replace damaged or destroyed real estate, machinery and equipment, inventory, and other business assets. Funds may also be used to help businesses and homeowners with the cost of improvements to protect, prevent, or minimize the same type of disaster damage from occurring in the future (SBA 2022).
- **SBA Home and Personal Property Loan**—Covers disaster losses not fully covered by insurance or other sources. Disaster loans up to $200,000 are available to homeowners to repair or replace damaged or destroyed real estate. Homeowners and renters are eligible for up to $40,000 to repair or replace damaged or destroyed personal property (SBA 2023).
- **USDA Secretarial Disaster Designation**—Establishes eligibility for farm operators in primary counties and contiguous counties to be considered for certain assistance from the Farm Service Agency, provided eligibility requirements are met. This assistance includes Farm Service Agency emergency loans. Emergency loans help producers who suffer qualifying farm-related losses directly caused by the disaster in a county declared or designated as a primary disaster or quarantine area (USDA 2022).

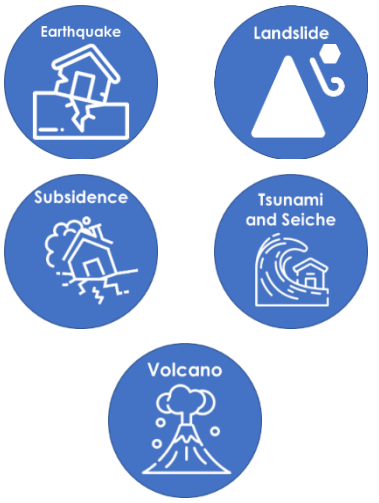
2.2. HAZARDS OF CONCERN

California's physical location, geographic features, population, and assets make the State susceptible to a wide variety of hazards. These hazards include geologic, flood, fire, meteorologic, biologic, energy-related, and human-caused threats. The 2023 SHMP includes 34 hazards across these categories, as shown below.

Some assessed hazards are critical to include to ensure eligibility for federal funding. Others are profiled to establish a comprehensive view of risk in the State. The hazards identified in the SHMP were selected through a collaborative process with the Hazard Working Groups to ensure widespread and regionally specific hazards are assessed in the SHMP. Additionally, some hazards must be included in the SHMP by State legislation, including electromagnetic pulse (EMP) attack, geomagnetic storm, and other potential causes of long-term electrical outrages.

"Mineral hazards" also have been identified as a hazard of interest in California. However, based on FEMA criteria, these are not typical hazards for local or state mitigation plans. Therefore, this hazard is not profiled or assessed within the same context as the hazards listed above. To address these hazards, an overview of potential impacts from mineral hazards is provided in Appendix R of Volume 2.

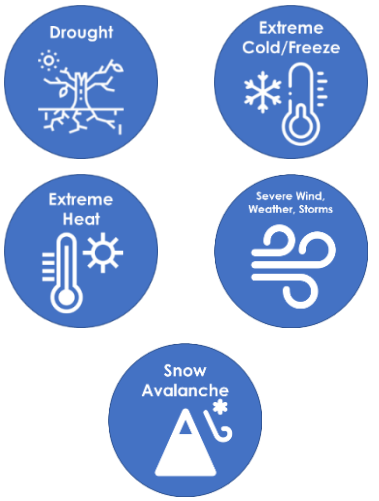
Geological Hazards



Flood Hazards

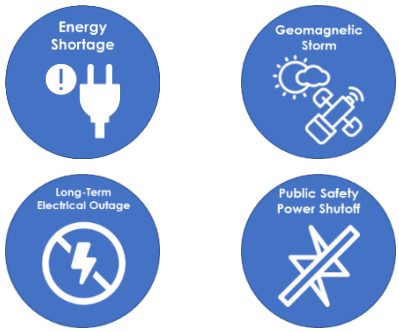
Fire Hazards

Meteorologic Hazards



Biological Hazards

Other Hazards



Human-Caused Hazards

2.3. COMMONLY RECOGNIZED NATURAL HAZARDS OMITTED

At the national level, hurricanes and tropical cyclones are significant natural hazards. However, due to their statistical historical improbability of impacting California, they are not assessed in this Plan.

2.4. THE ROLE OF CLIMATE CHANGE

S4 – 44 CFR 201.4(c)(2)(i): Does the risk assessment provide an overview of the probabilities of future hazard events?
The SHMP assesses 34 hazards of interest in Parts 2 and 3 of the Plan. All 34 hazard profiles have a section dedicated to an overview of the probabilities of future hazard events. The assessment of future probability includes consideration of the potential impacts of climate change on hazard risk.

"California is one of the most 'climate-challenged' regions of North America; its historical climate is extremely variable, and climate change is making extreme conditions more frequent and severe. California's temperatures are already warming, heat waves are more frequent, and precipitation continues to be highly variable."

Source: (State of California 2018)

2.4.1. Climate Change and Hazard Mitigation

Climate change will continue exacerbating the frequency, scale, and intensity of hazards across California. Many communities have experienced substantial damage from climate-related hazards, and 20 counties identify climate change as a hazard in LHMPs. Climate patterns are shifting, resulting in more extreme and variable weather conditions across the State, with more extreme precipitation events, declining snowpack, more frequent and severe heat waves, and drought conditions (CNRA; CEC; OPR 2022). Climate change has impacted the State's natural areas and forests, increasing the frequency of catastrophic wildfires. The planet's oceans and glaciers have also experienced changes: oceans are warming and becoming more acidic, ice caps are melting, and sea levels are rising. Global sea level has risen

approximately 9 inches, on average, in the last 140 years (NASA 2022a). This has already put some coastal homes, beaches, roads, bridges, and wildlife at risk.

Areas across the State have experienced negative impacts on air and water quality and energy reliability from wildfires and extreme heat. Drought conditions have stressed water supplies and affected large industry sectors such as agriculture. There are no parts of California that escape climate impacts, although the scale, severity, and population vulnerability vary across the State.

Adapting to the changing climate will require an approach to hazard mitigation that prioritizes long-term community resilience practices. Such practices aim to reduce harm for those who experience greater risk and burden of harm due to historical and current marginalization and under-investment, thus resulting in greater resilience across the whole community. The hazard mitigation actions necessary to achieve this goal constantly evolve as conditions change, and the participation of all levels of government, non-profit organizations, the private sector, and the public enhances all actions. In addition, it is important to ensure that the mitigation actions implemented do not contribute to GHG emissions, which exacerbate climate change impacts.

As defined by the Intergovernmental Panel on Climate Change, climate adaptation actions are adjustments in natural or human systems that respond to climatic conditions and moderate harm (IPCC 2022). Both hazard mitigation and climate adaptation actions ultimately move toward the same goal of long-term risk reduction. Integration of hazard mitigation and climate adaptation planning is particularly applicable to natural hazards influenced by climate change, such as coastal flooding and sea-level rise, extreme heat, wildfire, and drought.

2.4.2. Projected Impacts

The scientific consensus is that climate change will continue to increase the frequency, duration, and intensity of many natural hazards. According to California's Fourth Climate Change Assessment, the State will experience the following climate impacts (CNRA; CEC; OPR 2022):

- Annual average daily high temperatures are expected to rise by 2.7 °F by 2040, 5.8 °F by 2070, and 8.8 °F by 2100 compared to observed and modeled historical conditions. These changes are statewide averages
- Heat waves are projected to become longer, more intense, and more frequent

- Warming temperatures are expected to increase soil moisture loss and lead to drier conditions. Summer dryness may become prolonged, with soil drying beginning earlier in the spring and lasting longer into the fall and winter
- Droughts are likely to become more frequent and persistent through 2100
- The strength of the most intense precipitation and storm events affecting California is expected to increase
- Snowpack levels are projected to decline significantly by 2100 due to reduced snowfall and faster snowmelt
- Marine layer clouds are projected to decrease
- Extreme wildfires (i.e., fires larger than 24,710 acres) would occur 50 percent more frequently. The maximum area burned statewide may increase by 178 percent by the end of the century
- Sea-level rise is expected to continue to increase beach, cliff, and bluff erosion

California's Fifth Climate Change Assessment will be released after this SHMP is published; the impacts listed above will change in the updated assessment. These hazards will threaten public health, safety, and well-being, damage infrastructure and property, and degrade natural resources (CNRA; CEC; OPR 2022).

2.5. LOCAL HAZARDS OF CONCERN

S6 – 44 CFR 201.4(c)(2)(ii) and 201.4(c)(2)(iii): Does the risk assessment include an overview and analysis of jurisdictions' vulnerability to the identified hazards and the potential losses? Does the risk assessment include an overview and analysis of the potential losses to the identified vulnerable structures based on estimates in the local risk assessments as well as the state risk assessment?
Section 2.5 includes a review and discussion on which hazards have been identified to have high impacts on all 58 counties within the State. This was based on a review of LHMPs within each of the 58 counties in the State.

California has 58 counties, 482 cities, and over 1,500 special purpose districts that are eligible to develop an LHMP. Many counties have led the development of multi-jurisdictional LHMPs, in addition to the single-jurisdiction plans led by cities and special districts.

The information and data gathered through local planning efforts are valuable as the State implements mitigation strategies and actions and develops funding priorities. Planning efforts between the State and local jurisdictions should be consistent. The State Plan integrates local assessments and data emphasizing the hazards posing the greatest risks.

As shown in Figure 2-1, all of California's counties have been included in State and federal disaster declarations (from 2018 to 2022)—ranging from as few as three declarations in several counties to as many as 18 in Los Angeles County.

Preparation of this SHMP included a comprehensive review of approved county LHMPs to determine the following:

- Hazards assessed by each county
- How each hazard was ranked based on its impacts as defined by each planning process
- Hazard ranking by county
- Exposure statistics for each hazard assessed for analysis in this SHMP

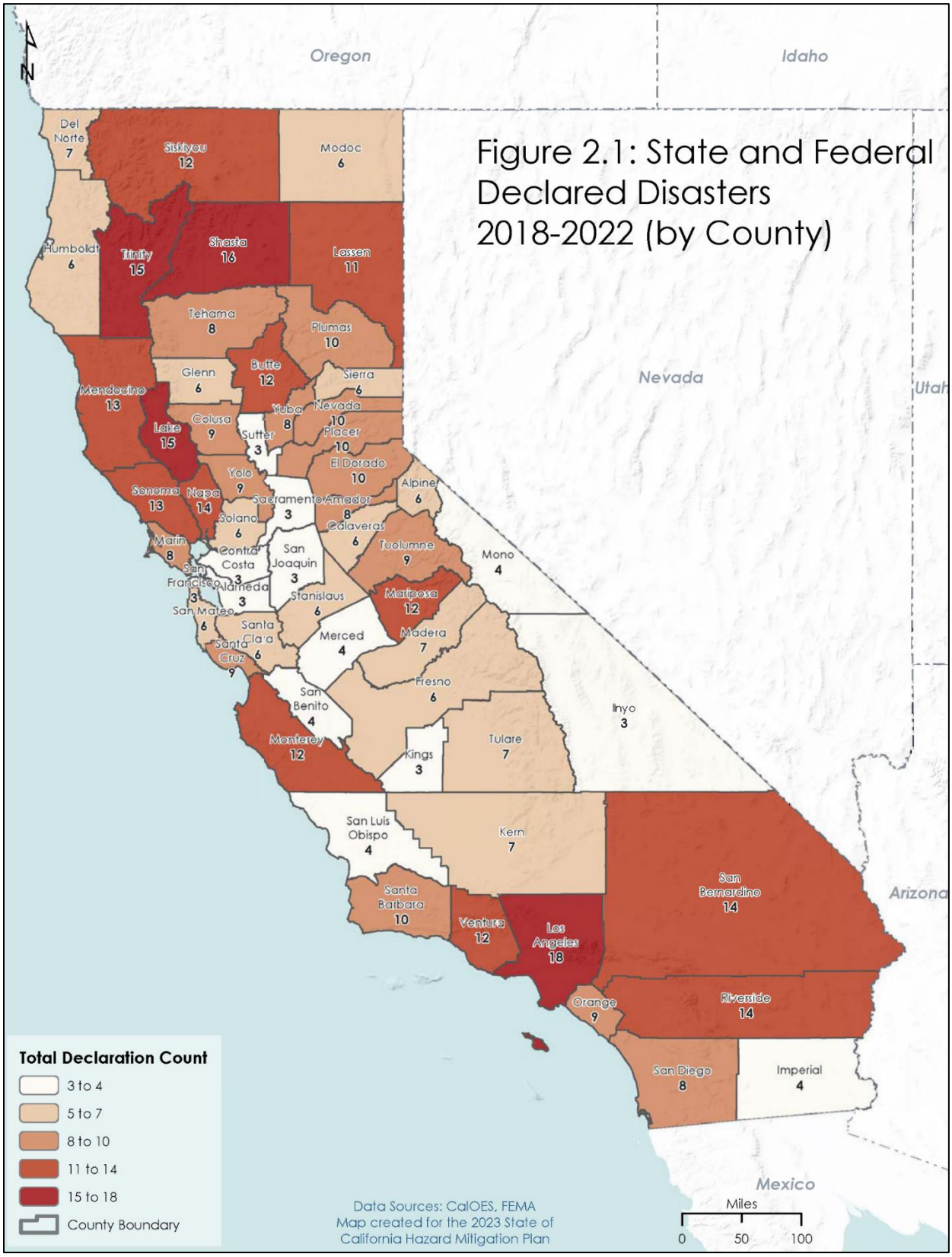
2.5.1. Hazard Risk Assessments

This review identifies high-impact hazards for each of California's 58 counties based on risk assessments that follow a standardized process as required under 44 CFR 60.3. All plans reviewed have been approved by FEMA, so it is assumed that each planning effort met FEMA requirements for extent, location, and impact.

In developing LHMPs, each jurisdiction identified the hazards of greatest concern to its jurisdiction based on factors such as impact, history, probability, and local knowledge. Most plans identify significant "hazards of concern"—rated as high, medium, or low risk—as well as lesser "hazards of interest"—described but not given a full risk assessment and rating.

Different plans use different wording to identify hazards. The SHMP identifies several hazards in addition to the 19 hazards identified in county hazard mitigation plans. The SHMP's hazards of concern include natural and human-caused hazards, which are not required by FEMA for Standard or Enhanced State Planning Requirements. These hazards were identified through coordination with the Hazard Groups and Working Groups, as required through legislation.

Figure 2-1. State and Federal Declared Disasters, 2018 – 2022, by County



Expanding the types of hazards profiled and assessed in the SHMP ensures that the State comprehensively understands potential statewide risk. However, local jurisdictions are not required to include all the hazards of concerns identified in the SHMP.

The hazards of concern from the 58 county hazard mitigation plans in California can be summarized as follows:

- Agricultural Hazards (includes pest infestation for plants and livestock)
- Avalanche
- Climate Change
- Coastal Hazards (includes erosion and sea-level rise)
- Dam Failure
- Dam/Levee Failure
- Drought
- Earthquake
- Flood
- Levee Failure
- Mass Movement (includes landslides, mudslides, and debris flow)
- Other Weather (includes freeze, extreme heat, and extreme cold)
- Seiche Wave
- Severe Weather (includes hail, high winds, winter storms, and fog)
- Subsidence
- Tornado
- Tsunami
- Volcano
- Wildfire

Figure 2-2 indicates the number of counties listing each hazard as a hazard of concern and the number that rate the hazard as a high, medium, or low risk. Table 2-2 lists what each county identified as its high-risk hazards and when FEMA approved each plan.

The highest-ranked hazards in the LHMPs were wildfire, earthquake, and flood, all of which were evaluated in all but one county plan (a different county for each of the three). The counties assessing these hazards ranked them as follows:

- **Wildfire**—48 counties identified it as high risk, and seven counties identified it as medium risk
- **Earthquake**—42 counties identified it as high risk, and twelve counties identified it as medium risk
- **Flood**—38 counties identified it as high risk, and 16 counties identified it as medium risk

Figure 2-2. Identified Hazards From Local Plans

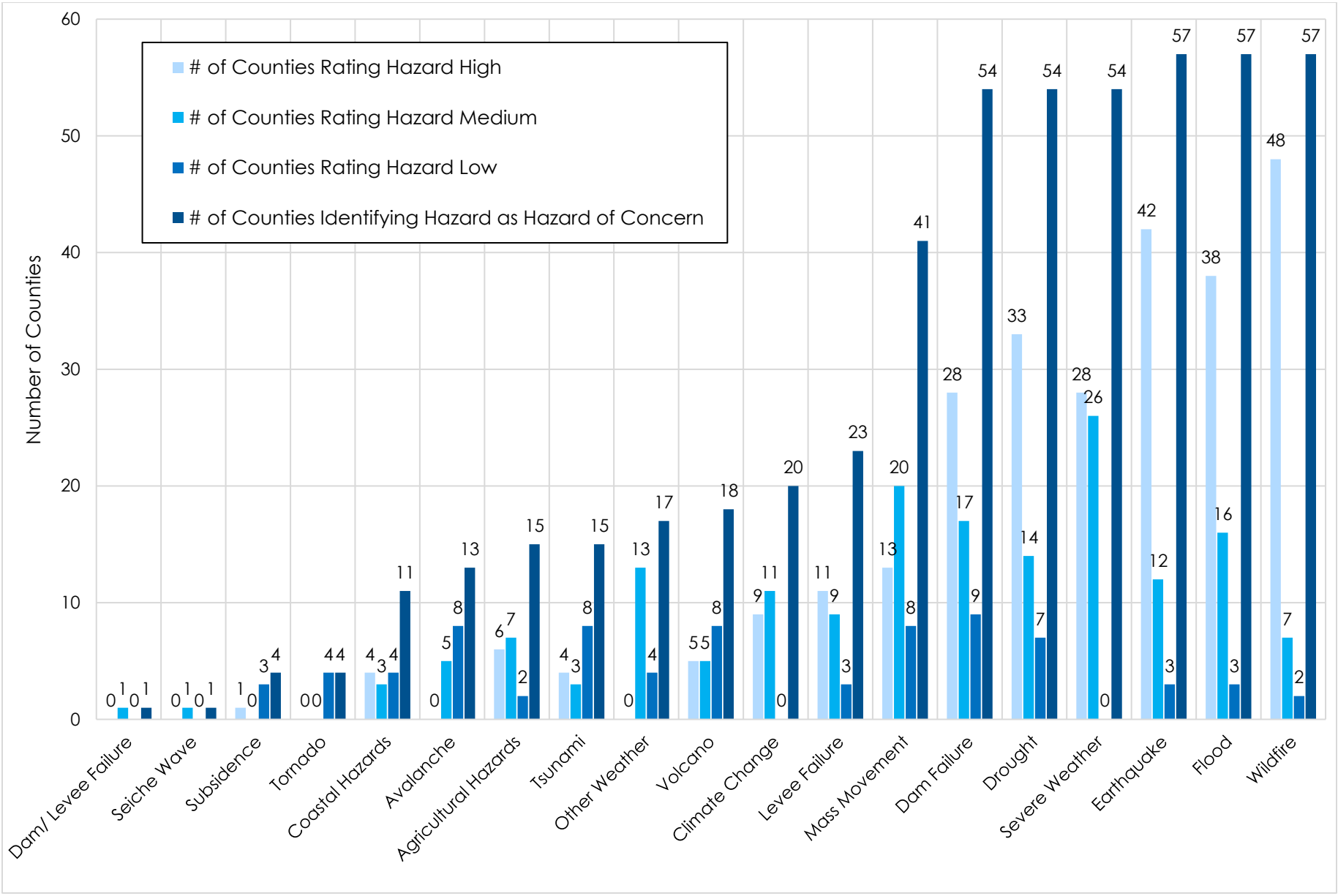


Table 2-2. High Hazards Listed by Counties in California

County	High-Risk Hazards*
Alameda	dam failure, wildfire, earthquake, drought, flood, landslide, tsunami
Alpine	wildfire, severe weather, drought
Amador	earthquake, wildfire, flood, dam failure mass movement, severe weather
Butte	dam failure, wildfire, earthquake, flood, levee failure, mass movement, drought, severe weather
Calaveras	wildfire drought, severe weather
Colusa	flood, drought, dam failure, levee failure, wildfire, agricultural, volcano, climate change
Contra Costa	earthquake, mass movement
Del Norte	earthquake, tsunami
El Dorado	wildfire, flood, severe weather, drought, dam failure, earthquake
Fresno	earthquake, dam failure, wildfire, flood, levee failure
Glenn	wildfire, drought, levee failure, flood
Humboldt	earthquake, wildfire, severe weather
Imperial	earthquake, flood, dam failure, severe weather, volcano
Inyo	wildfire, severe weather, flood, earthquake, drought
Kern	wildfire, severe weather, flood, earthquake, drought
Kings	drought, earthquake, wildfire, dam failure, flood
Lake	drought, earthquake, severe weather, wildfire, volcano, agricultural hazards
Lassen	earthquake, wildfire, flooding, levee failure, drought
Los Angeles	earthquake, wildfire, dam failure, drought, mass movement, climate change
Madera	wildfire, flood, dam failure, agricultural hazards, climate change, drought, earthquake, mass movement, severe weather
Marin	earthquake, dam failure, mass movement, flood, wildfire
Mariposa	wildfire, climate change
Mendocino	earthquake, wildfire, dam failure, flood, drought, severe weather
Merced	severe weather, flood, levee failure, drought
Modoc	drought, earthquake, wildfire, agricultural hazards, dam failure, mass movement, severe weather, volcano
Mono	wildfire, severe weather
Monterey	drought, earthquake, wildfire, severe weather, flood
Napa	wildfire, severe weather, drought, earthquake, flood, climate change, mass movement
Nevada	wildfire, dam failure, flood, agricultural hazards, drought, earthquake, climate change, mass movement, severe weather
Orange	earthquake, dam failure, levee failure
Placer	wildfire, severe weather, flood, drought, dam failure, earthquake, agricultural hazards
Plumas	wildfire, dam failure, earthquake, flood
Riverside	earthquake, wildfire, floods, pandemic, extreme weather
Sacramento	dam failure, flood, wildfire, levee failure

County	High-Risk Hazards*
San Benito	earthquake, severe weather, wildfires
San Bernardino	wildfire, flood, earthquake
San Diego	drought, earthquake, extreme heat, flood, sea-level rise, wildfire, climate change
San Francisco	Earthquake
San Joaquin	floods, dam-related incidents, drought, wildfire
San Luis Obispo	wildfire, mass movement, earthquake flood, dam failure, drought
San Mateo	earthquake, mass movement, coastal hazards
Santa Barbara	wildfire, drought and water shortage, earthquake, extreme heat and freeze
Santa Clara	earthquake, flood, severe weather
Santa Cruz	earthquake, wildfire, drought, flood, tsunami, climate change, coastal erosion, coastal storm, debris flow, landslide, liquefaction
Shasta	flood, wildfire, severe weather, earthquake
Sierra	wildfire, flood, earthquake
Siskiyou	severe weather, wildfire, food
Solano	wildfire, flood, earthquake, drought, extreme weather, slope failure
Sonoma	mass movement, earthquake, wildfire
Stanislaus	drought, extreme temperatures, severe weather
Sutter	levee failure, flood, dam failure, drought and water shortage
Tehama	wildfire
Trinity	drought, flood, severe weather, wildfire, dam failure
Tulare	dam failure, drought and water shortage, flood, wildfire
Tuolumne	wildfire, earthquake
Ventura	dam failure, drought, earthquake, flood, landslide and mass movement, sea-level rise and coastal erosion, severe storms, heat, freeze, tsunami, wildfire
Yolo	dam failure, levee failure, flood, severe weather, volcano, wildfire, earthquake, drought, subsidence, climate change
Yuba	levee failure, flood, wildfire

* Based on the most recently approved LHMP as of April 18, 2023. This table reflects natural hazards only.

In their mitigation planning initiatives, local jurisdictions recognize that a hazard can cause secondary and sometimes tertiary hazard impacts. For example, a destructive wildfire can burn away all the hillside vegetation. When winter weather occurs, the lack of vegetation that usually holds soil and slopes in place may result in a landslide. This possible occurrence has also been identified in State mitigation planning efforts.

Understanding the ranking of hazards at the local level informs the identification and ranking of hazards in the SHMP. Local hazard mitigation plans and the SHMP are integrated to ensure the SHMP serves as a resource for planning data and establishes shared statewide risk reduction goals. Local plans inform the SHMP's Risk Assessment

and mitigation priorities by providing insight into how hazards are experienced at the local level and identifying local concerns. Integration of these planning efforts supports the better alignment of mitigation actions and ensures the SHMP, and the local plan may support future mitigation grants.

To achieve this, Cal OES will create a database to track trends in prioritizing hazards, baseline equity data, and local mitigation action measures and strategies to reduce risk and vulnerability in California communities. The Cal OES LMP Unit will use this database to implement the 2023 FEMA Local Hazard Mitigation Planning Policy Guide. As the LMP Unit continues to conduct technical assistance and training sessions on the new guidance, Cal OES staff will highlight best practices in reporting hazard vulnerability data in local risk assessments so that Cal OES may more easily monitor vulnerability and roll up data into future SHMP updates.

Within California, the local identification and ranking of wildfire, flood, and earthquake affirm the State's perspective of these hazards as the "Big Three"— historically the most frequent and impactful hazards affecting the State. Additionally, a hazard may be more regionally focused, such as snow avalanche, and therefore not identified in all local plans. In these instances, the localized hazard is included in the SHMP to provide a comprehensive statewide Risk Assessment and ensure data related to regional hazards is still available to local jurisdictions.

2.5.2. LHMP Mitigation Actions

To further evaluate the hazards of concern addressed by LHMPs, Cal OES reviewed the mitigation actions identified in all the county plans and mapped the actions to the hazards that they address. This review found that over 70 percent of actions in LHMPs in the State address at least one of the flood, earthquake, or wildfire hazards (the "Big Three"). Table 2-3 shows the results of this analysis.

Table 2-3. Mitigation Actions by Hazard in LHMPs

Hazard	Actions Addressing the Hazard		Counties with Actions Addressing the Hazard	
	Number of Actions	% of All Actions Across LHMPs	Number of Counties	% of All Counties
All Hazards/Multi-Hazard	921	40.82%	55	94.83%
Wildfire	367	16.27%	48	82.76%
Earthquake	166	7.36%	43	74.14%
Flood	367	16.27%	41	70.69%
Drought	96	4.26%	30	51.72%
Dam Failure	49	2.17%	26	44.83%
Severe Weather	60	2.66%	23	39.66%
Climate Change	54	2.39%	17	29.31%
Extreme Temperatures	22	0.98%	14	24.14%
Landslide	35	1.55%	12	20.69%
Tsunami	11	0.49%	7	12.07%
Avalanche	13	0.58%	6	10.34%
Agricultural Hazards	9	0.40%	6	10.34%
Slope Failure	8	0.35%	4	6.90%
Levee Failure	32	1.42%	3	5.17%
Soil Hazards	9	0.40%	3	5.17%
Volcano	5	0.22%	3	5.17%
Severe Wind	7	0.31%	3	5.17%
Erosion	4	0.18%	2	3.45%
Subsidence	2	0.09%	2	3.45%
Sea-Level Rise	14	0.62%	2	3.45%
Debris Flow	2	0.09%	1	1.72%
Seiche	1	0.04%	1	1.72%
Fog	1	0.04%	1	1.72%
Tree Mortality	1	0.04%	1	1.72%

3. California State Profile

California is the third-largest U.S. state geographically and the largest by population. With Oregon and Washington, it makes up the western border of the contiguous United States. Known as the Golden State, it is bordered by Oregon to the north, Nevada to the east, Arizona to the southeast, Mexico to the south, and the Pacific Ocean to the west.

The State is filled with valleys, lakes, rivers, mountains, volcanos, beaches, forests, and deserts. California's diverse landscape includes 840 miles of coastline; nine national parks; 279 State parks; three desert regions; giant redwood and sequoia forests unique to the State; mountain ranges creating the important Central Valley; world-famous wine regions; major metropolitan areas in the Bay Area, Los Angeles, and San Diego; and significant agricultural lands predominantly throughout the Central Valley that supply more than half of the fruits, vegetables, and nuts grown in the United States.

California is the most biodiverse state in the continental U.S. and one of the most biodiverse regions in the world (CDFW 2023). The rich biodiversity of the State contributes to the quality of life, environment, and economy of the State. However, that biodiversity is also at risk to the hazards impacting the State. Biodiversity loss can be due to climate change and other disasters. The State has experienced a 20 percent decline in native species, and over 600 additional species are at risk of extinction; in addition, 90 percent of the State's coastal wetlands and inland wetlands have been lost, along with 99 percent of riparian areas and native grasslands (NRDC 2020). Protecting fragile species and landscapes is crucial to effectively utilizing nature to combat impacts from hazards.

Understanding the State's unique characteristics provides a foundation for identifying risks related to the natural hazards—based on California's physical geography—and the State's assets, which may be viewed as targets and increase the risk of human-caused threats. Discussion of the history and governance of California provides details on how the State has historically approached reducing risk and building resilience. The State profile provides a foundational understanding of these factors to assist with

understanding the impacts that hazards may have on the State's people, environment, infrastructure, and economy.

Information from the State profile also is used to inform the Risk Assessment. Evaluating development trends, population and demographic changes, and the State's assets and capabilities provides insight into how vulnerability may evolve over a period of time. Identifying geographic areas of increased risk, equity priority communities, and future land use changes guides the development of the mitigation strategy to consider how future changes may increase or decrease vulnerability.

3.1. HISTORY

California's history serves as the background to understanding how risk has evolved. Vulnerability may be increased or decreased based on land use, governance, and allocation and use of resources.

The area now known as California has always been characterized by diversity. California is the original home of numerous Tribal Nations, many of which still reside in the State despite centuries of genocide and occupation. At the time of European colonization, California was one of the most linguistically diverse areas of the world, with 20 percent of all the languages spoken in North America present and with population densities among the highest of any American region north of what is now known as Mexico (Lightfoot and Parrish 2009). Like today, the most populous settlements of Native California tended to be in and around the coastal areas that provided the most plentiful resources, with areas away from the coast becoming less densely populated. However, desert, mountainous, and valley areas were not without settlement (Codding and Jones 2013).

California's Native populations helped create and shape much of the ecosystem diversity by employing various kinds of cultural activities and land management practices based on traditional ecological knowledge, such as prescribed burning, which helped prevent catastrophic wildfires and other ecological consequences (K. Anderson 2013, Lightfoot and Parrish 2009, Risling Baldy 2013, Tushingham, et al. 2019). Colonization by Europeans led to many tumultuous changes that still have sociological and ecological consequences today.

Spain claimed the unceded area in the mid-1760 and divided the region into Alta California and Baja California as provinces of New Spain, now known as Mexico.

Following this, multiple missions, presidios, and pueblos were established in what are now California's major cities, including San Francisco, Los Angeles, San Diego, San Jose, Monterey, Santa Cruz, and others.

Traditional Ecological Knowledge

Traditional ecological knowledge, also called by other names, including indigenous knowledge or native science, refers to the evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment and generational cultural transmission. This knowledge is specific to a location and includes but is not limited to the relationships between plants, animals, natural phenomena, climate, landscapes, and timing of events that are used for lifeways (e.g., food resources, tools, clothing resources, ceremonial regalia, housing, etc.). The following are possible examples of land management practices based on traditional ecological knowledge:

- Prescribed burning
- Pruning trees, bushes, and other vegetation
- Protection, conservation, and recovery of endangered species
- Analysis of ecosystem change and application of data to facilitate human adaptations

Source: (U.S. Fish and Wildlife Service n.d.)

In the aftermath of their encounters with the Spanish, the Mexicans, and mass immigration and widespread genocide with the beginning of the "Gold Rush" and statehood, the Native American population was cut off from their traditional life, land, and resources, but not without resistance, from some more than others (Burris 2020, State Parks 2022, Office of Governor 2019, Clarke 2016a). These changes led to an increased risk of catastrophic fire due to the prohibition of prescribed burning and, subsequently, flood, drought, famine, and violent conflict. This was due to the consequences of the shifting of the land and its resources from being managed by traditional ecologic knowledge to a land of mining and industrial farming and herding with non-native plants and animals (Lightfoot and Parrish 2009, Office of Governor 2022a, UC 2022, National Park Service 2022).

When California became the 31st U.S. state in 1850, the area experienced a large influx of non-Native populations and businesses, including the construction of the State's first railroad connecting Sacramento to Omaha, Nebraska, completed in 1869. The railroad was built primarily by Chinese immigrant labor forces and other workers from various ethnic and cultural backgrounds (NPS 2022, B. Voss 2005, B. Voss 2015).

As the population grew, so did the need for water. Large infrastructure projects moved water from within the State and outside it—the largest water sources for California are the California Delta system and the Colorado River—and built reservoirs and canals. This allowed for the growth of agriculture in the Central Valley but also created a flood risk from dams.

Today, California is the most populous state in the United States and one of the world's largest producers of agricultural resources. In addition to agriculture, California has one of the most diverse economies in the nation, dealing in technology, entertainment, tourism, manufacturing, health care, construction and development, and professional sports, among other sectors.

The State's past settlement patterns and economy are still reflected in modern-day land use. Early settlement areas have continued to grow and have high population densities, so a larger percentage of the population may be exposed to hazards. In areas where the population has historically been less dense, and agriculture is the dominant land use, the population's exposure is decreased, but potential impacts on the agricultural economy increase.

The experiences of Native populations of California and other marginalized populations, and the history of European colonization, are central to understanding the State's complicated and often oppressive past, but it is also the key to developing an inclusive and resilient future.

3.2. GOVERNMENT

California gained statehood through the Compromise of 1850 and was the first declared U.S. state on the west coast (CDPR n.d.). The current capital city is Sacramento, but past capitals included Monterey, San Jose, Vallejo, Benicia, and San Francisco (California State Library n.d.). The State comprises 58 counties and 482 incorporated cities. California also has one city-county, the City and County of San Francisco (CSAC n.d.). California is home to 109 federally recognized Tribal Nations, and several non-federally recognized Tribal Nations.

The multiple levels of government result in varying degrees of responsibility and authority for carrying out hazard mitigation planning and actions. This creates a need for strong inter-jurisdictional coordination and support from the State to ensure success at the city, county, and Tribal Nation levels. Additionally, inter-jurisdictional coordination is often

required to address hazards at a meaningful scale rather than strictly based on jurisdictional boundaries.

3.3. GEOGRAPHY AND ENVIRONMENT

California's geography and environment have been shaped by many forces that present hazards today, and the large area and landscape diversity present challenges in developing plans for statewide hazard mitigation. The State's diverse landscape includes a long coastline, lakes, rivers, mountains, volcanos, valleys, desert areas, giant redwood and sequoia forests, vineyards, major metropolitan areas, and major agricultural fields.

3.3.1. Topography and Geology

California's topography and geology vary significantly. Elevations range from Mount Whitney's 14,505 feet above sea level—the tallest peak in the continental United States—to Badwater Basin's 282 feet below sea level—the lowest point in North America—with less than 100 miles between the two landmarks. California has one of the longest coastlines of any U.S. state, and the San Francisco Bay and Sacramento-San Joaquin Delta stretch far inland, making much of the geographic interior of the State near or even below sea level.

Geologic forces are active throughout California, resulting in highly varied topography and geology that are often categorized as distinct regions. The Coastal Ranges, the Great Valley, and the Sierra Nevada mountains cover much of the State, running roughly 400 miles from north to south and each spanning over 50 miles east to west. The Coastal Ranges run along the State's coastline from the Oregon border to Santa Barbara County, separated into two portions by San Francisco Bay. The Great Valley of the Sacramento and San Joaquin Rivers lies to the east, and further east lies the Sierra Nevada mountains. The Klamath Mountains, the Cascade Mountains, and the Modoc Plateau stretch from the northern end of the Great Valley to the Oregon border. Southern California comprises the Transverse and Peninsular Ranges along the coast and the Mojave and Colorado Deserts farther inland.

These topographic and geologic variations are due to geologic forces, including faulting, erosion, and volcanism, which continue today:

- The San Andreas Fault System extends over 800 miles from Mendocino in the northwest to the Salton Sea in the southeast. Additional faults, including the

Hayward Fault, run nearly parallel to the San Andreas Fault in the San Francisco Bay area.

- Rivers transport rainfall and snowmelt across the State and erode land, depositing sediment in alluvial fans at the foot of steep mountains, deltas, or offshore environments where it can be re-deposited in beaches.
- The ocean has shaped California's coastline, eroding the land to create sea cliffs such as in the Lost Coast, Big Sur, and Palos Verdes.
- Landslides and similar flows also erode the land, especially in steeper terrains. Events like wildfires, heavy rains, and earthquakes can trigger these flows.
- California's Pacific coastline borders the Ring of Fire, a string of volcanoes and sites of significant seismic activity. Inland, California has eight potentially active volcanoes.

Topography in California also influences weather. For example, steep mountains enable fast, dry, downslope winds with different local names—most notably Santa Ana winds in Southern California and Diablo Winds in Northern California. The speed and dryness of these types of wind make them an extreme concern for wildfires. Additionally, elevation influences weather patterns and plant type, impacting hazards such as extreme temperatures and wildfires.

These geologic processes that created the current geographic landscape of the State over millions of years also can create disasters in California and present a risk to human life and property today. These geologic processes contribute to the "Big Three" hazards: earthquake, fire, and flood. Due to the physical characteristics of California, some of the risks posed by those and other hazards will always be present. Mitigative measures can be taken to reduce and lessen impacts, but the natural occurrence of contributing factors such as shifting tectonic plates, vast forested areas, and extensive waterways means there will also be residual risks.

3.3.2. Hydrography and Hydrology

Water plays a vital role in California's natural and human landscapes. Natural features provide protection from natural hazards but are also vulnerable to impacts from hazards. Natural systems, such as wetlands and estuaries, provide multiple co-benefits to the environment and people. These natural systems can improve air quality, reduce impacts from extreme heat, serve as storage for rainwater and flooding, provide recreational and exercise opportunities for people, and contribute to creating species habitats (Kingsley 2019).

Potable drinking water in California highlights the nexus of mitigation, critical services, and natural hazards. In addition to in-state resources, California relies on water delivered to the State via built infrastructure, such as canals and aqueducts. California's built water infrastructure is vulnerable to natural and human-made hazards, including earthquakes, wildfires, and terrorism.

The most significant external water source is the Colorado River, which forms the California-Arizona border (Stern 2022). It currently provides up to one-third of the drinking water for Southern California and significant irrigation water for the region (E. Hanak 2018). Under the Law of the River, California is entitled to 4.4 million acre-feet of water from the Colorado River, which arrives through the Colorado River Aqueduct and All-American Canal (Stern 2022). Multiple jurisdictions manage numerous other aqueducts, canals, and ditches to move water around the State. The water infrastructure providing this critical water supply to California's population is vulnerable to impacts from natural disasters. Earthquakes can damage pipes and interrupt potable water services to one-third of the State's population.

Water accumulates in natural lakes and artificially dammed reservoirs, providing recreational opportunities and hazard potential. Major water bodies include the Salton Sea, Lake Tahoe, Clear Lake, Mono Lake, and Owens Lake. Statewide, 240 large reservoirs account for 60 percent of the State's water-storage capacity (A. Escriva-Bou 2019). All water bodies are vulnerable to seiches, which are large tsunami-like waves that can endanger shoreline communities and infrastructure.

Major dams include Shasta Dam, which creates the largest-volume reservoir in California, and Oroville Dam, the tallest dam in the United States. Dams, like other forms of water infrastructure, are susceptible to hazards, including earthquakes and human-caused events. Degradation or overfilling from extreme precipitation or snowmelt can cause devastating flooding.

Groundwater is a vital water resource in California, threatened by the State's prolonged drought. In an average year, groundwater accounts for 38 percent of the State's total water supply. During dry years, groundwater accounts for over 45 percent of the statewide annual supply (DWR n.d.). Many communities rely on groundwater for up to 100 percent of their water supply. Removing groundwater faster than it is recharged can lead to groundwater depletion, which can lead to subsidence that can impact infrastructure at the surface.

3.3.3. Regional Climate

Evaluating current and future climate conditions establishes a baseline for the potential intensity, probability, and magnitude of several natural hazards. As the climate continues to change over the next several decades, the resulting impacts from hazards will also change. The climate of California varies widely, from arid desert to highland and timberline, due to significant variations in latitude, elevation, and proximity to the Pacific Coast (California Department of Fish and Game 2003).

California's most common climate classification is Mediterranean under the Köppen climate classification, characterized by hot, dry summers and cool, wet winters. The Mediterranean classification is most commonly associated with locations between about 30° and 45° latitudes north and south of the equator and on the western sides of continents. Different sub-classifications of the Mediterranean climate exist in California's coastal regions, the Sierra Nevada foothills, and much of the Central Valley. Also common across the State are arid, semi-arid, and steppe climate classifications, which occur in the southern Central Valley and Southern California, except for the coastal mountains. These hotter, drier climates extend north inland beyond the Mojave Desert. The remainder of the State in the northeast is classified as cool continental, except for the Sierra Nevada, which gets even colder and is classified as highland/timberline. All of California's climates present opportunities for severe weather, including extreme heat or cold and high winds. Almost all present conditions for wildfires.

The average annual statewide precipitation is 23 inches, with significant variation from year to year—from as low as 7.9 inches in 2013 to as high as 42.5 inches in 1983. Fifty percent of the annual precipitation occurs from December to February (OEHHA 2019). Much of the year-to-year variability in precipitation has been linked to storms called "atmospheric rivers." Atmospheric rivers carry narrow bands of water vapor up to 1,000 miles long and several hundred miles wide. On average, atmospheric rivers that hit California provide 30 to 50 percent of the State's annual precipitation and 40 percent of the Sierra Nevada snowpack. The absence of atmospheric rivers can contribute to drought conditions, while too many atmospheric rivers can lead to catastrophic flooding, such as the Great Flood of 1862 and the atmospheric river 1,000 storm (ARkStorm) megaflood scenario (Porter 2011). The ARkStorm megaflood scenario models a 1% annual chance storm from an atmospheric river, which would result in $725 billion in damage and widespread flooding, landslides, and extended disruption of critical services (USGS 2018b).

Locally, annual precipitation varies from less than 3 inches in Death Valley to more than 100 inches near the City of Eureka (NCEI n.d.-a). Precipitation tends to be low during

summer and highest during winter. Different regions of the State may be more prone to drought or flood due to the variability of precipitation throughout the year.

California's vast and diverse land area contributes to the State's ranging climate. As a result of the varying climate, it is necessary to evaluate current and future risk that will be influenced by changes in climate.

3.4. POPULATION

Population and demographic data provide baseline information about California's residents. This baseline data and information may be used to identify the percentage of the population exposed to a hazard and identify communities prone to higher impacts and vulnerabilities from natural hazards.

3.4.1. Statewide Trends

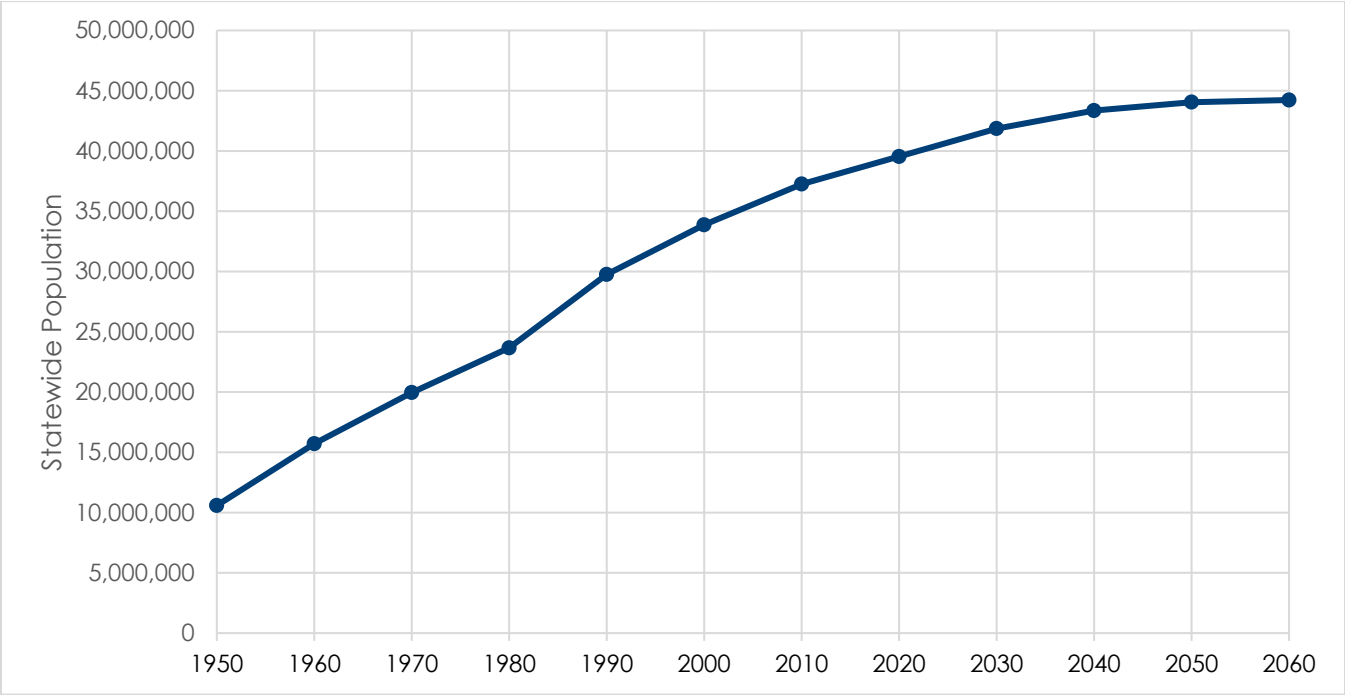
The California Department of Finance (DOF) publishes population estimates annually. Combined with U.S. Census Bureau decennial census data, these estimates show that the State's population has increased significantly in the past seven decades. However, while the population is estimated to continue to grow, it will slow down drastically, as shown in Figure 3-1.

The State's population is dynamic and composed of several subgroups and communities that comprise large percentages of the total statewide population. California saw a 3.32 percent increase in population between 2012 and 2022, but Census data show a decrease in the State's population from 39,648,938 in 2020 to 39,185,605 in 2022.

DOF attributes the population decrease to the following factors (DOF 2022):

> "…Baby Boomers [aging], and fertility declines among younger cohorts, the continuing slowdown in natural increase—births minus deaths—underlies the plateauing of the state's population growth. The addition of COVID-19-related deaths, federal policies restricting immigration, and an increase in domestic out-migration further affected population totals. Overall growth was also affected by continuing federal delays in processing foreign migration: while last year saw positive immigration (43,300), the level was below the average annual rate of 140,000 before the pandemic."

Figure 3-1. Historical Statewide Population



Sources: (DOF 2023a) and (DOF 2023)

Although the population is estimated to stabilize in the coming decades, California's population will continue to represent a significant portion of the total U.S. population.

3.4.2. Regional Trends

The number of people in the State may remain relatively the same, but where people live, work, and visit could continue to change. In addition to reviewing population changes, it will be critical to evaluate development trends to determine where people are in comparison to hazard-prone areas.

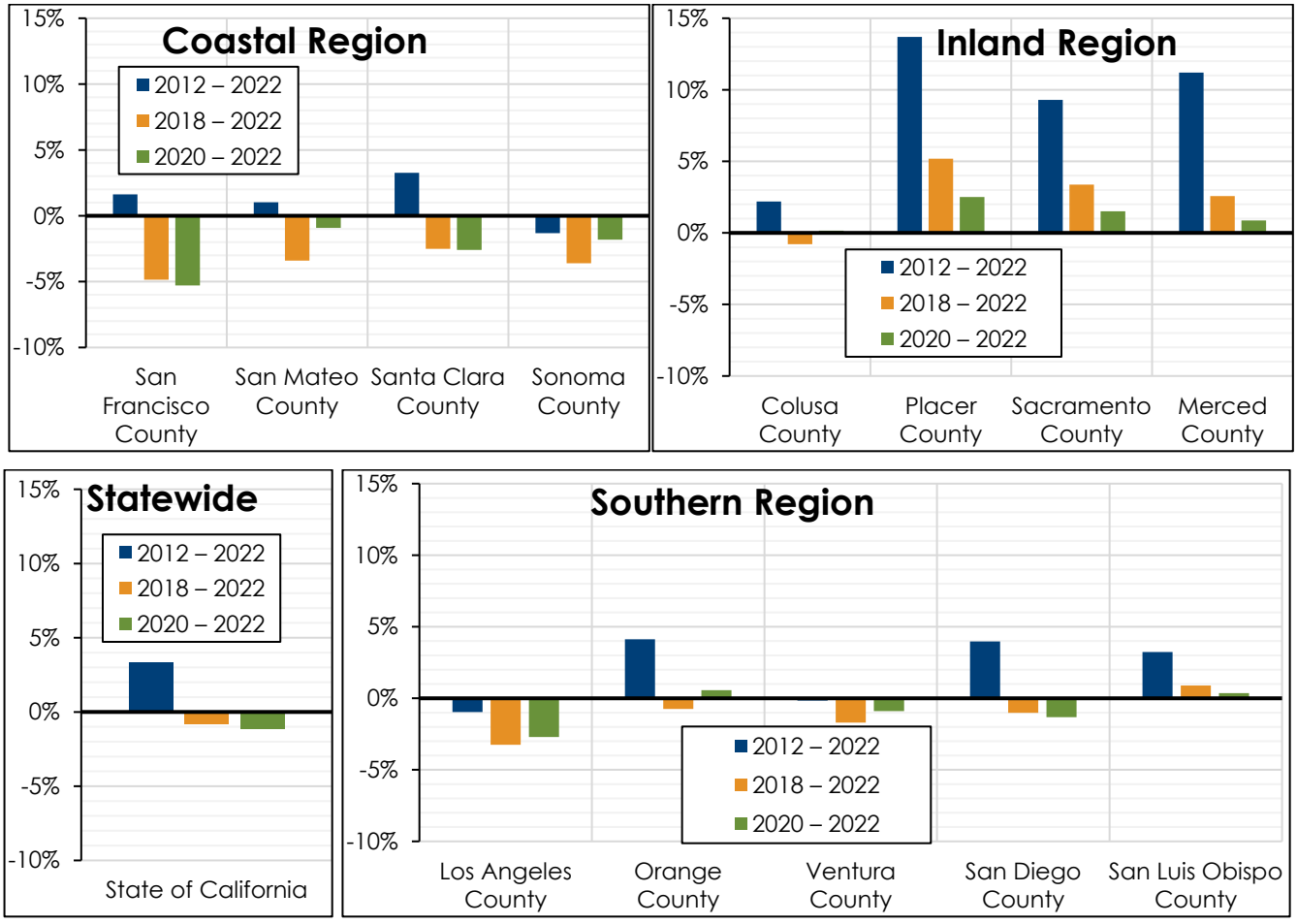
Most counties experienced their highest population count between 2019 and 2020. Between 2021 and 2022, 34 counties saw a decrease in population, while 24 experienced an increase. The Los Angeles metropolitan area (Los Angeles, Orange, and Ventura Counties), San Diego County, and the San Francisco Bay Area (Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, and San Mateo Counties), have all experienced a population decline. Outside the larger metropolitan areas, counties such as Sacramento, Merced, Colusa, San Luis Obispo, Placer, and others have witnessed population growth. Other counties have remained relatively flat.

Figure 3-2 highlights the population change in selected regions over the following time periods:

- 2012 – 2022: 10 years preceding this Plan update (two Hazard Mitigation Plan cycles)
- 2018 – 2022: time from the 2018 Plan to this Plan
- 2020 – 2022: reflective of recent downward population trend in major areas

Los Angeles continues to be the most populated county, with 10,163,139 people in 2019. San Diego County's population peaked at 3,31,279 in 2019, and Orange County peaked that year at 3,185,378.

Figure 3-2. Population Growth Trends in Cal OES Regions



Source: (DOF 2023)

3.4.3. Equity Priority Populations

California is committed to pursuing equitable outcomes for all populations by delivering hazard mitigation programs and actions. Decision makers must first identify equity priority populations that are underserved or historically marginalized, have access or functional needs, or face additional barriers when preparing for, responding to, or recovering from a disaster. Such information can assist communities in achieving authentic engagement of these populations in the planning process and ensuring that projects and benefits prioritize these populations within communities. This includes identifying populations based on demographic information such as age, disability, income, and race and identifying communities where data may not be as readily available, such as refugee and undocumented populations.

Examples of Equity Priority Communities

- Children (aged five years and under) depend on others to safely access resources during emergencies.
- Older adults (typically 65 and over) are more likely to lack the physical, technological, and economic resources necessary to respond to hazard events.
- Economically disadvantaged populations will likely lack the resources to adequately prepare for and respond to hazards.
- People with physical, developmental, or intellectual disabilities may be less able to receive, process, or respond to emergency information and warnings.
- Individuals with limited English proficiency may have difficulty understanding the information being conveyed to them. Cultural differences can also complicate how information is conveyed to populations with limited English proficiency.

Note: These definitions are established by the Centers for Disease Control and Prevention (CDC); the CDC refers to these populations as socially vulnerable populations.

Available Socioeconomic Data Sets

Several resources provide demographic and socioeconomic data for California. Each has useful data and gaps; the SHMP Equity Working Group determined the most beneficial data for the SHMP. Other data sources may be more applicable based on the particular objectives or planning areas of other initiatives. Below is a non-exhaustive list of datasets reviewed by the Equity Working Group:

- **Center for Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry Social Vulnerability Index (SVI)—**Identifies areas of

vulnerability based on 15 indicators ranging across household composition, minority status, and access to transportation

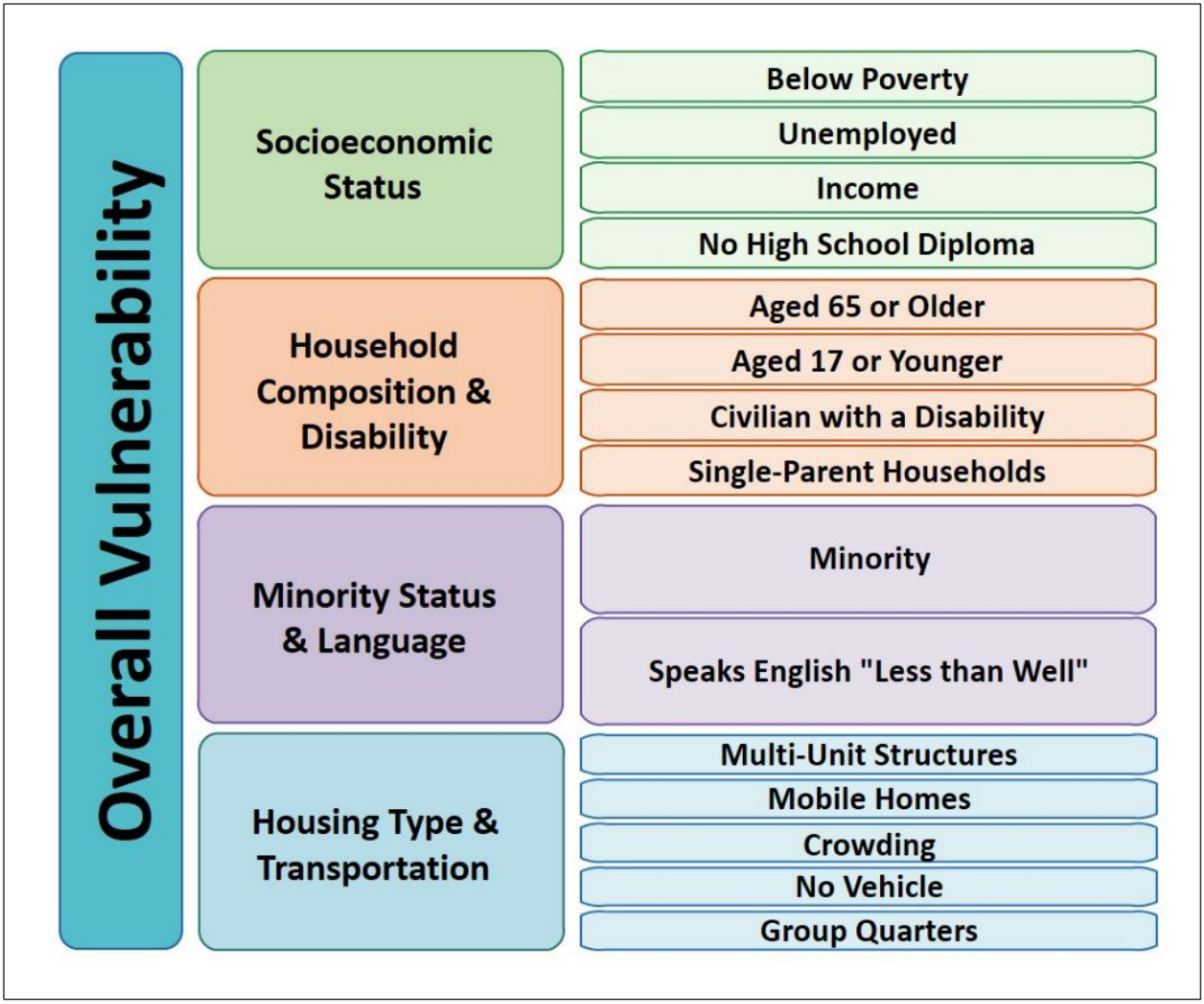
- **Hazards and Vulnerability Resilience Institute Social Vulnerability Index—**Measures the social vulnerability of all U.S. counties to environmental hazards. The index uses 29 socioeconomic variables
- **Hazards and Vulnerability Resilience Institute Base Resilience Indicators for Communities—**Considers six broad categories of community disaster resilience, including social, economic, community capital, institutional, infrastructural, and environmental at the county level
- **U.S. Environmental Protection Agency (EPA) EJScreen—**A national dataset that combines environmental and demographic socioeconomic indicators. The tool uses several indicators, including 12 environmental, seven socioeconomic, 12 environmental justice, and 12 supplemental indices
- **FEMA Resilience Analysis and Planning Tool—**Includes over 100 preloaded layers, including community resilience indicators from peer-reviewed research, the most current census demographic data, infrastructure data, and data on weather, hazards, and risk
- **FEMA National Risk Index (NRI)—**Ranks risk based on 18 natural hazards
- **CalEnviroScreen**—Identifies California communities most affected by pollution, particularly in vulnerable socioeconomic areas
- **Healthy Places Index**—Combines 25 community characteristics, such as access to healthcare, housing, and education, into a single indexed score. The healthier a community, the higher the score

Index Selected for Risk Assessment in This SHMP

For this Plan, the CDC's 2018 SVI was identified by the SHMP Equity Working Group as the most appropriate and authoritative dataset to identify geographic areas where efforts can be prioritized to ensure equitable outcomes from mitigation planning and actions. At the time of this direction and analysis, the 2020 SVI updates had not yet been made public. The planning team adjusted the 2018 data to account for more current population data, as described in Appendix G.

The SVI combines 15 social factors contributing to social vulnerability, as shown in Figure 3-3. Index values are based on a percentile ranging from 0 to 1, with higher values indicating greater vulnerability. Appendix G describes the development of SVI data used in the Risk Assessment for this SHMP.

Figure 3-3. Factors Included in SVI



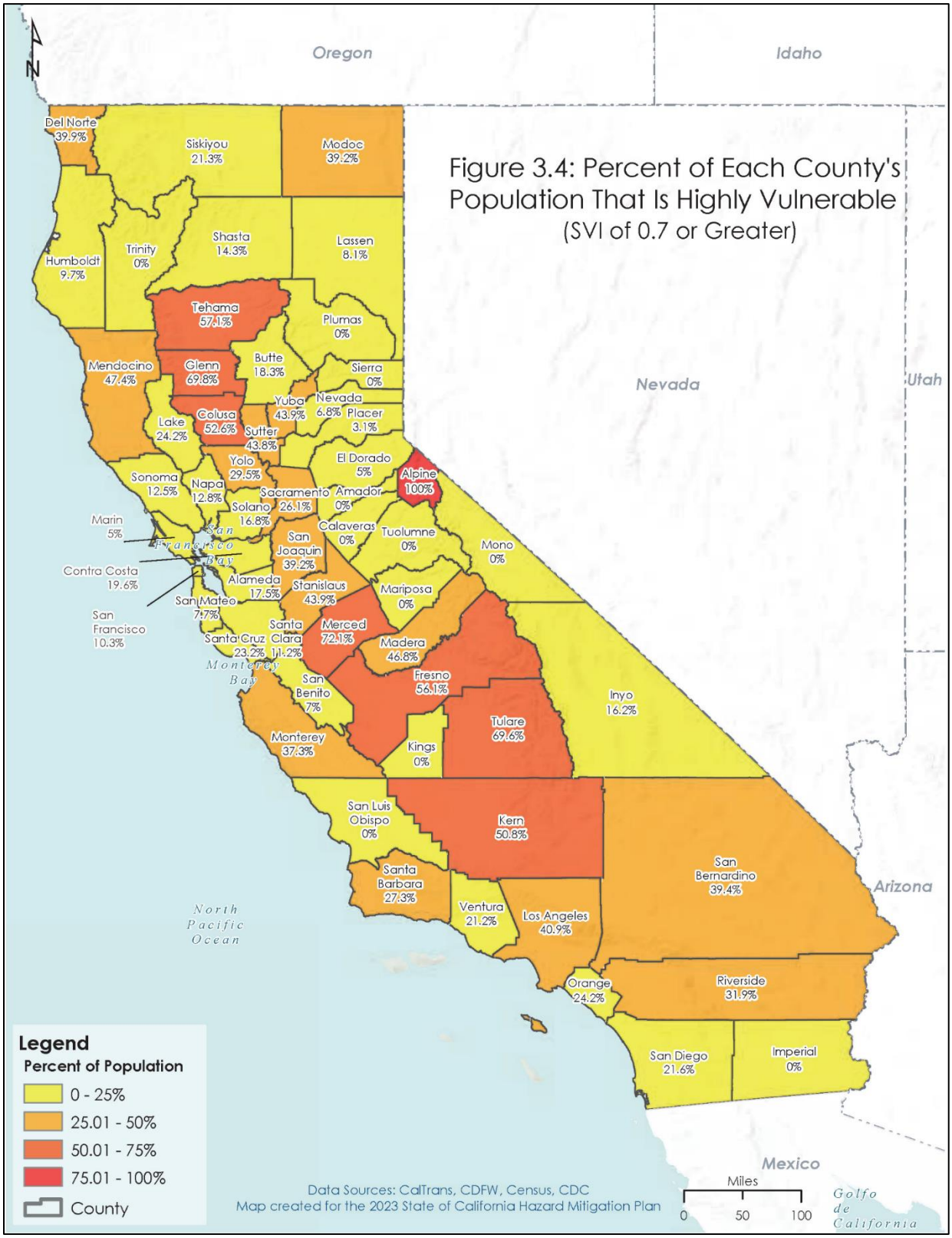
Source: (ATSDR 2022)

For hazard risk analysis in this plan, equity priority communities are defined as areas with an SVI of 0.7 or greater; federal grant programs commonly establish thresholds in the range of 0.60 to 0.75 to prioritize communities with a greater need for funding.

Baseline Equity Priority Communities

Figure 3-4 shows the percentage of the population in each county living in equity priority communities (census tracts with an SVI of 0.7 or greater) as of November 2022. Eleven counties in the State have no equity priority communities. The equity priority population makes up more than 50 percent of the population in eight counties, including 100 percent of the population of Alpine County. Statewide, 30.4 percent of the population lives in an equity priority community.

Figure 3-4. Percent of Each County's Population that is Highly Vulnerable



Since including equity priority communities is a relatively new element in hazard mitigation planning, assessing such communities has not been a regular part of local hazard mitigation planning processes across California. As local plans require updating, consideration for such efforts will be included in the assessment and planning process per updated FEMA Local Planning Requirements. Jurisdictions are not required, however, to follow this Plan's definition of equity or analytical approach.

Although the State uses the CDC's SVI in this Plan, local jurisdictions are encouraged to use the data source that best represents their community. Some communities may have finer scale data than at the census tract level or may determine that other sources are more useful in identifying equity priority areas within their community.

As population changes occur, the percentage of the population within one or more equity priority population categories will fluctuate. Maintaining current demographic data will allow the State to better assess the vulnerability of communities and population categories to develop inclusive mitigation strategies that protect the whole community.

3.5. LAND USE AND DEVELOPMENT

Land strategies impact who is exposed to hazards, and development strategies affect how vulnerable people are to the hazards they experience. Effective land use and development planning can reduce the risk of disasters in the future by reducing development in high-risk areas or by leveraging engineering and mitigation strategies to build homes and infrastructure that are resilient to hazards. Assessing current and projected land use and development patterns is a critical step in the risk assessment process and in developing mitigation strategies that will meet the community's needs in the future.

Identifying where people and development are located compared to hazard-prone areas allows the State to evaluate the exposure of the population, structures, and State assets. When assessing future development, it is important to ensure that new development is implemented in a manner compatible with existing land uses and the natural environment; avoiding unintended consequences is a mitigation strategy to alleviate future burdens on communities.

3.5.1. Statewide Guidance for Land Use

Consistency and compatibility between hazard mitigation and land use initiatives are critical to protecting California's residents, natural resources, businesses, and infrastructure.

OPR formulates long-range goals and policies for land use, population growth and distribution, urban expansion, land development, resource preservation, and other factors affecting statewide development. OPR periodically revises the State General Plan Guidelines for the preparation and content of general plans for cities and counties in California. The guidelines provide information on planning for climate resilience, environmental justice, fire hazards, and equitable and resilient communities (OPR 2020) and were utilized in drafting this SHMP update.

California has very strong building and hazard-related codes and standards related to growth management and requires the integration of hazard mitigation planning with land use planning. This enables the State and local governments to effectively manage risks using the best available data and science on hazard extent and location.

3.5.2. Existing Land Use

A 2018 study by the Terner Center for Housing Innovation at the University of California (UC), Berkley found that most of the land in California is zoned for single-family housing, which limits opportunities to construct multifamily housing (Mawhorter, et al. 2018). This can result in a scarcity of affordable housing and result in economically disadvantaged individuals and families seeking housing that does not provide adequate protection against disasters or housing that is located in hazard-prone areas. Limited housing options become more pronounced during recovery if displaced residents require housing and sheltering.

3.5.3. Development Trends

S7 – 44 CFR 201.4(d): Was the risk assessment revised to reflect changes in development?
Sections 3.5.3, 3.5.4, and 3.5.5 include a review of population change trends as well as a look at building permit volumes since the last plan update in 2018.

In 2010, California's housing density, as shown in Figure 3-5, indicated an accumulation of residents in the three metropolitan areas—the Bay Area, Los Angeles, and San Diego—along with a band across the central portion of the State from Kern County to just north of Sacramento. With recent population changes (see Figure 3-2), development is occurring in some of the more inland counties and moving away from the larger coastal and metropolitan areas of San Diego, Los Angeles, and the Bay Area (see Figure 3-6).

3.5.4. Implications of Growth on Risk

Growth patterns directly affect hazard impacts, risk, and vulnerability. Growth can lead to an increase in the number of people and developed properties exposed to hazards. However, the vulnerability of those exposed does not necessarily increase at the same rate.

Reviewing building permit volumes can help paint a picture of development trends. However, it is difficult to directly correlate permit activity to an increase in hazard risk because, except for development in regulated floodplains, it is not a standard practice for local governments to track building permit activity within designated hazard areas.

According to the Construction Industry Research Board, California's residential housing production from 2018 to 2022 was 15 percent greater than from 2013 to 2017. The increase could likely be tracked to counties that saw increases in population during this timeframe. Table 3-1 shows housing production by year for 2013 to 2022.

Table 3-1. Housing Production in CA for 2013 to 2022

Year	Single-Family Units	Multi-Family Units	Total Units
2013	36,991	48,481	87,485
2014	37,089	48,755	87,858
2015	44,896	53,337	100,248
2016	49,208	51,753	102,977
2017	55,827	59,843	117,687
2018	59,049	58,843	119,910
2019	58,052	53,232	113,303
2020	57,084	43,525	102,629
2021	65,022	53,268	120,311
2022	66,351	55,263	123,636

Source: (Construction Industry Research Board 2022)

Figure 3-5. Development (2020 Housing Density)

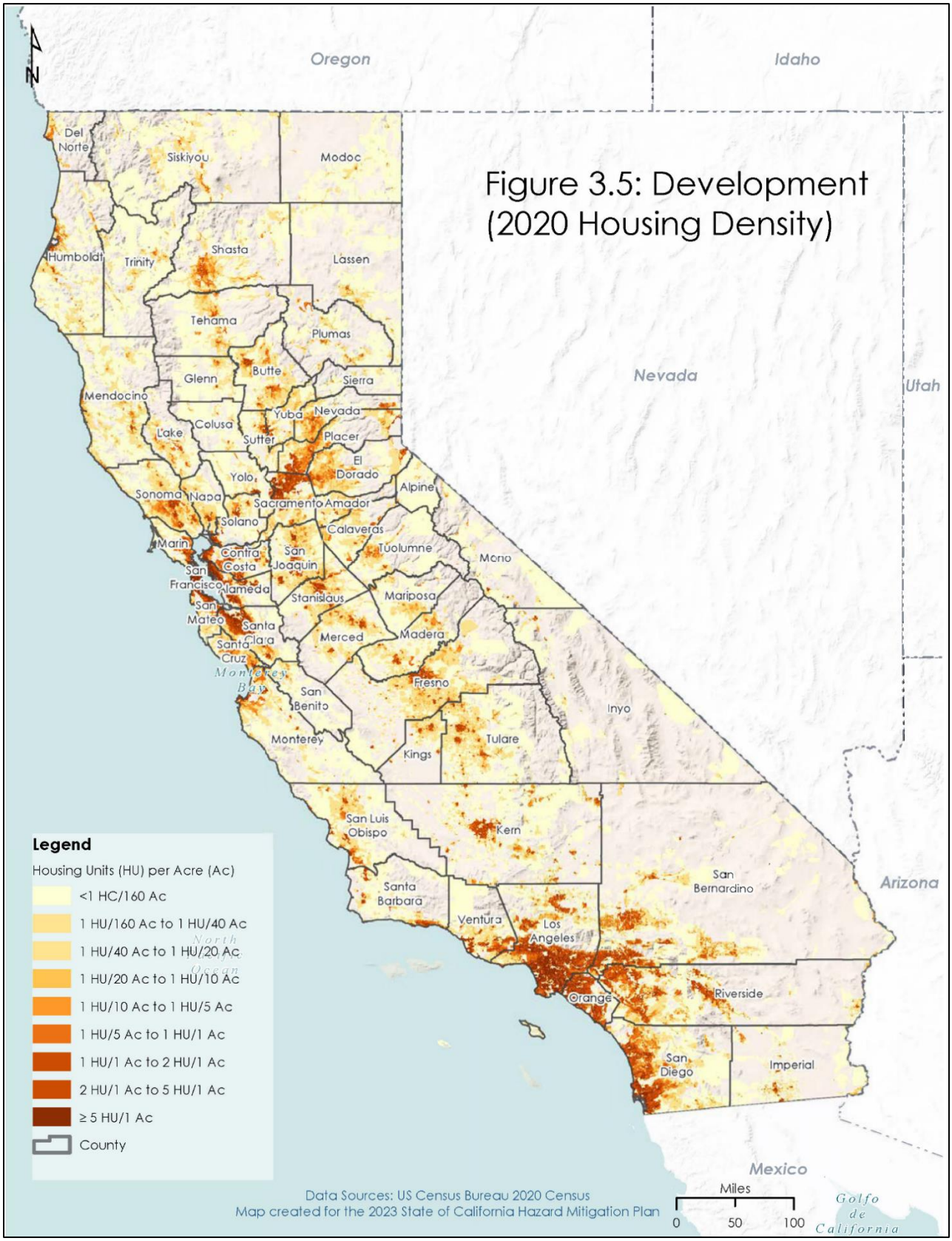
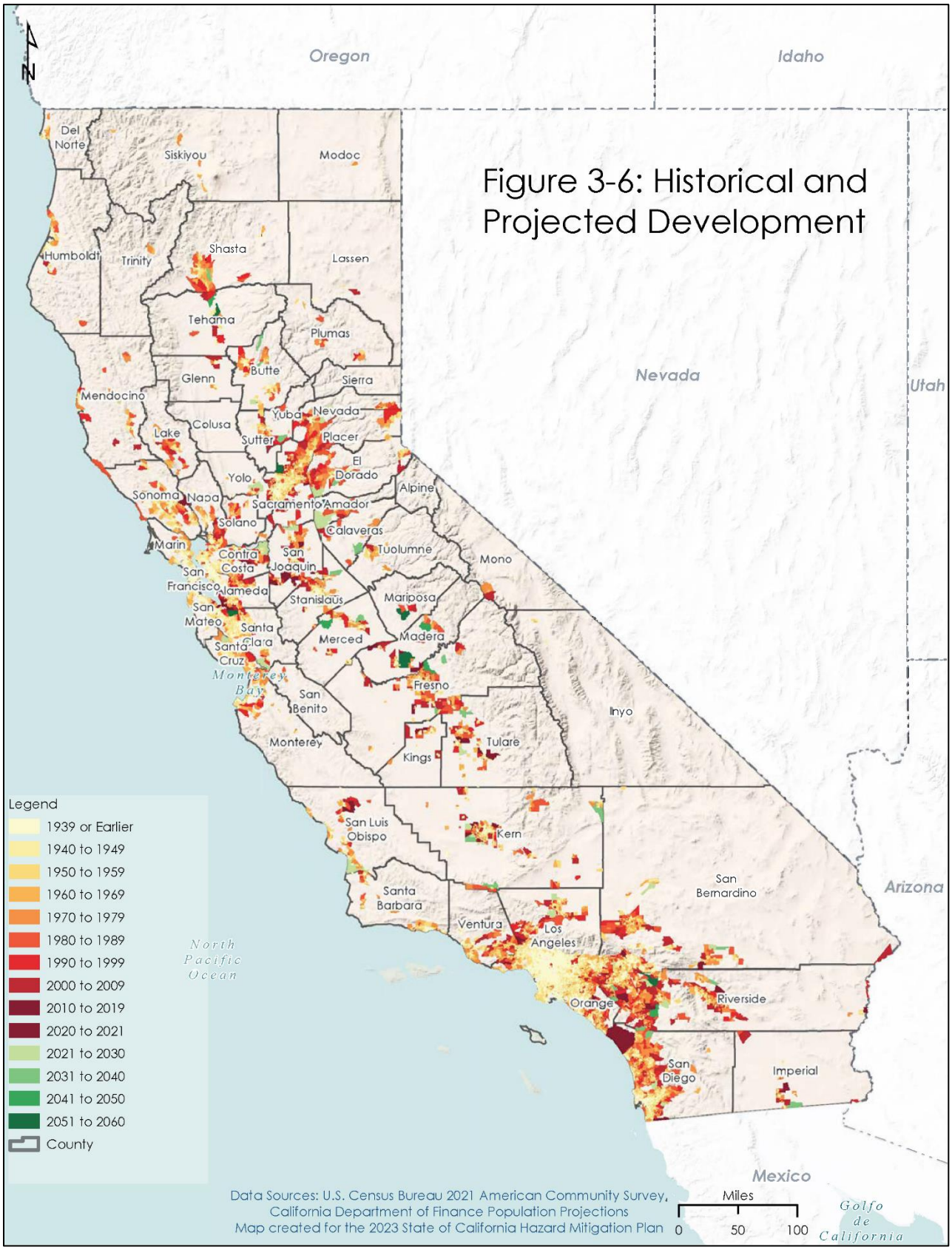


Figure 3-6. Historical and Projected Development



According to HCD, the State faces the following housing challenges:

- **Not enough housing being built**—In the last 10 years, housing production averaged fewer than 80,000 new homes each year, and production continues to be far below the projected need of 180,000 additional homes annually.
- **Increased inequality and lack of opportunities**—Lack of supply and rising costs compound growing inequality and limit advancement opportunities for younger Californians. Much of the new housing growth is expected to be in areas where fewer jobs are available to families that live there.
- **Too much of people's incomes go toward rent**—The majority of Californian renters—more than 3 million households—pay more than 30 percent of their income toward rent. Nearly one-third—more than 1.5 million households—pay more than 50 percent of their income toward rent.
- **Fewer people are becoming homeowners**—Overall homeownership rates are at their lowest since the 1940s.
- **Disproportionate number of Californians experiencing homelessness**—California is home to 12 percent of the nation's population, but 22 percent of the nation's population is experiencing homelessness.
- **Barriers other than cost in finding an affordable place to live**—For California's vulnerable populations, discrimination and inadequate accommodations for people with disabilities are worsening housing costs and creating affordability challenges.

Severe housing pressure makes Californians vulnerable to disaster in numerous ways. Individuals experiencing homelessness are extremely vulnerable to various disasters due to the lack of shelter, difficulties receiving disaster-related communication, and many other factors. High fractions of income going to rent means families have fewer resources available for individual adaptive action. The low building rates mean that when a disaster destroys residences, there are fewer options for where to house survivors. Low homeowner rates mean that people move more frequently, reducing social ties essential for community resiliency.

As described previously, frontline communities often face disasters and impacts from hazards due to historical discrimination and underinvestment. Due to the history and current ramifications of systemic racism in public policy (e.g., racially motivated refusal of loans known as redlining) and the private housing market (racial covenants), current and future housing challenges and related risk of impact from hazards disproportionately impact Black, Indigenous, Latina/e/o, Hawaiian or Pacific Islander,

and other communities of color. For example, Black, Indigenous, Latina/e/o, and Pacific Islander Californians are over-represented within populations currently unhoused, in substandard housing, and overburdened by the cost of rent or mortgage while experiencing lower homeownership rates.

As California works to ensure equity, reduce GHG emissions, and reduce the loss of natural areas, many cities are encouraging compact development that reduces sprawl. Urban sprawl means that buildings and people can encroach into areas at high risk for wildfires, flooding, and other hazards while damaging natural resources. However, targeting development to specific areas can put pressure on limited land and compromise ecosystem services, resulting in higher costs. Through careful risk assessment that considers future land use and development patterns, communities can use land use planning as a mitigation strategy to avoid building in high-risk areas or by implementing engineering strategies incorporating nature-based solutions to build more resilient communities.

3.5.5. Future Trends in Development

S7a – 44 CFR Section 201.4(d): Does the plan provide a summary of recent development and potential or projected development in hazard-prone areas based on state and local government risk assessments?
In addition to Section 2.5, Section 3.5.5 outlines a summary of findings about how LHMPs assess changes in development.

California is a strong growth management state that equips its local governments with general plans to address future developments, including safety and housing elements. Regional housing needs assessments are mandated by State law as part of the periodic process of updating local general plan housing elements. Safety elements have similar mandates, including those that promote integration with LHMPs. These initiatives provide a strong footing for local governments to deal with development pressures as they interface known hazard areas. These land use initiatives, and the adoption and enforcement of strong building codes and standards are key ingredients to overall community resilience.

A review of LHMPs within the State, as described in Section 2.5, found that most LHMPs address future development trends for the entire planning area and are not specific to each hazard of concern. It is not a standard practice for municipal governments to track development activity specific to hazard areas, with one exception: development in the Special Flood Hazard Area (SFHA) pursuant to the National Flood Insurance Program (NFIP) requirements. Therefore, specifically providing an overview of potential

or projected development in hazard-prone areas is not feasible. This section uses a similar approach to looking at future development by looking at historical trends.