GAVIN NEWSOM
GOVERNOR

MARK S. GHILARDUCCI
DIRECTOR

Cal OES
GOVERNOR'S OFFICE
OF EMERGENCY SERVICES

June 24, 2022

Toni Akins, Senate President pro Tempore
Anthony Rendon, Speaker of the Assembly
California State Capitol
Sacramento CA 95814

Subject: AB 100 Annual Report

Dear Senate President pro Tempore Akins and Speaker Rendon,

The Alfred E. Alquist Seismic Safety Commission (SSC) was established in 1975 to advise the Governor, Legislature, State and local agencies, and the public about strategies to reduce earthquake risk. The SSC investigates earthquake-related issues and evaluates and recommends to the Governor and Legislature policies and programs needed to reduce earthquake risk.

Assembly Bill 100 (Committee on Budget) enacted as Chapter 20 of the Statutes of 2020, established an annual reporting requirement of the SSC. AB100 recognized that numerous agencies at various levels of government have substantial responsibilities in the fields of earthquake preparedness and seismic safety. Through these annual reports the SSC can assist in providing a consistent policy framework to track and monitor these activities, work with specific state departments as well as various stakeholders on findings, progress, and recommendations that will highlight higher levels of seismic safety and other seismic safety issues. These annual reports will be submitted to the Governor and State Legislature, along with periodically updates by these entities to the SSC, through Commission hearings.

Through examination of existing partnerships, in 2021 the SSC Executive leadership team requested reports from the California Geological Survey and the California Department of Health Care Access and Information, formally known as the Office of Statewide Health Planning and Development. These reports highlighted the seismic programs and products of the respective organizations and included a description of the value of the program(s) and product(s) to the public, State, local government, businesses, and other entities.

These reports also identify long term goals for the organization's seismic program(s). Attached, is the California Geological Survey's report *California Geological Survey Contributions to Earthquake Preparedness* and the California Health Care Access and Information's report *HCAI's Seismic Compliance Program and Product Report.*

Should you have any questions please contact Reggie Salvador at Reggie.Salvador@caloes.ca.gov or 916-845-8473.

Sincerely,

Salina M. Valencia

Salina M. Valencia
California Seismic Safety Commission, Acting Executive Director

Attachments:
Attachment A: California Geological Survey Contributions to Earthquake Preparedness and Safety
Attachment B: Health Care and Access Information Seismic Compliance Program and Product Report

c: Mark S. Ghilarducci, Director, Governor's Office of Emergency Services

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Making California Safer — California Geological Survey Contributions to Earthquake Preparedness and Safety

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The California Geological Survey (CGS) provides scientific products and services about the state's geology, seismology, and mineral resources, including their related hazards, that affect the health, safety, and business interests of Californians. The CGS operates programs in five main areas: Mineral Resources and Mineral Hazards, Forest and Watershed Geology, Regional Geologic and Landslide Mapping, Seismic Hazards, and Strong Motion Instrumentation.

The CGS contributes directly to the earthquake safety of Californians through its scientific work on hazards mapping, identification of earthquake faults and surface ruptures, and by monitoring and reporting on all earthquakes in the state.

The CGS Seismic Hazards Program (SHP) creates maps that identify specific areas known to be vulnerable to earthquake hazards such as surface fault rupture, soil liquefaction, landslides, and tsunami inundation. These maps and services are utilized in pre-development planning at the local level, with the aim of building communities that are more resilient to seismic hazards. The program also conducts site evaluations for every proposed school and hospital in the state to assess the sites for seismic and geologic hazards.

Through its Strong Motion Instrumentation Program (SMIP), the CGS installs and monitors seismic instruments on buildings, dams, bridges, hospitals, and other structures to analyze ground motion during earthquakes and to examine the response of these structures to ground shaking. The data collected by the program are shared and utilized by the larger seismic community to reassess building codes and improve structural seismic design practice, thereby protecting citizens and property from hazards and economic loss.

SMIP cooperates with other seismic networks to produce ShakeMaps, which are distributed to emergency management and response teams within 5-7 minutes of an earthquake to assist with immediate emergency responses in areas suffering damage. Also in coordination with other agencies, SMIP is working to develop an earthquake early warning system, which would provide Californians with advance warning of strong shaking when an earthquake occurs.

The CGS Regional Geologic and Landslide Mapping Program (RGLMP) conducts detailed geologic mapping of the state, showing geologic structures, fault locations, landslides, and unstable soils. This information is essential for the construction of earthquake-resilient housing, buildings, and essential infrastructure such as bridges, dams, water conveyance and treatment facilities, and fire and police stations. RGLMP mapping also produces landslide inventories and data that assist in planning for long-term landslide hazard mitigation by developers and planners throughout the state.

The California Geological Survey provides crucial and timely information, materials, and services to the Governor's Office, the Legislature, state and local authorities, consultants, the business community, and individuals. These products are foundational to the quality of decision-making related to life and safety issues, the economy, and the well-being of communities.

The CGS is developing its first regulatory Tsunami Hazard Zone maps. Like existing hazard zone maps that show areas prone to surface rupture, landslides, and liquefaction, these new maps will require site-specific geotechnical studies to help communities minimize the tsunami hazard.

Sidebar

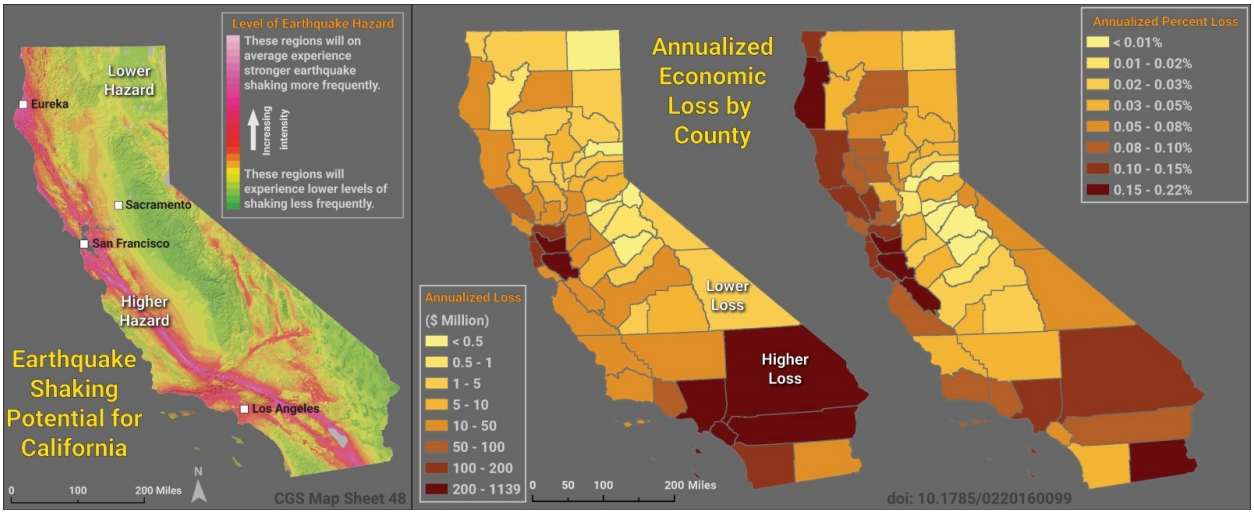
The California Geological Survey is one of the oldest geological surveys in the nation. Our mission is to provide scientific products and services about the state's geology, seismology, and minerals that affect the health, safety, and business interests of the people of California. "Altiora Petimus" (We Reach Higher)

Identifying, characterizing, and assessing the impact of earthquake-related hazards in the state

The CGS estimates future earthquake shaking levels and the economic losses associated with earthquake shaking. The CGS maintains a database of active earthquake faults, which is provided to the USGS and is used to forecast large seismic events in the state for emergency response planning (the Uniform California Earthquake Rupture Forecast). The CGS Seismic Hazards Assessment unit performs independent reviews of geotechnical and seismological reports prepared for other state agencies that oversee critical and essential-services facilities around the state. These assessments include the review of school and hospital sites for the Division of the State Architect and the Office of Statewide Health Planning and Development. These products and services assist in the development of earthquake-resilient structures, reducing both casualties and economic losses.

The CGS creates Tsunami Hazard Area maps for evacuation planning, tsunami "playbook" products to assist in local evacuation and maritime response activities, and Harbor Improvement Reports providing mitigation activities for county Local Hazard Mitigation Plans. These products help maritime communities reduce tsunami impacts on life-safety, infrastructure, and recovery.

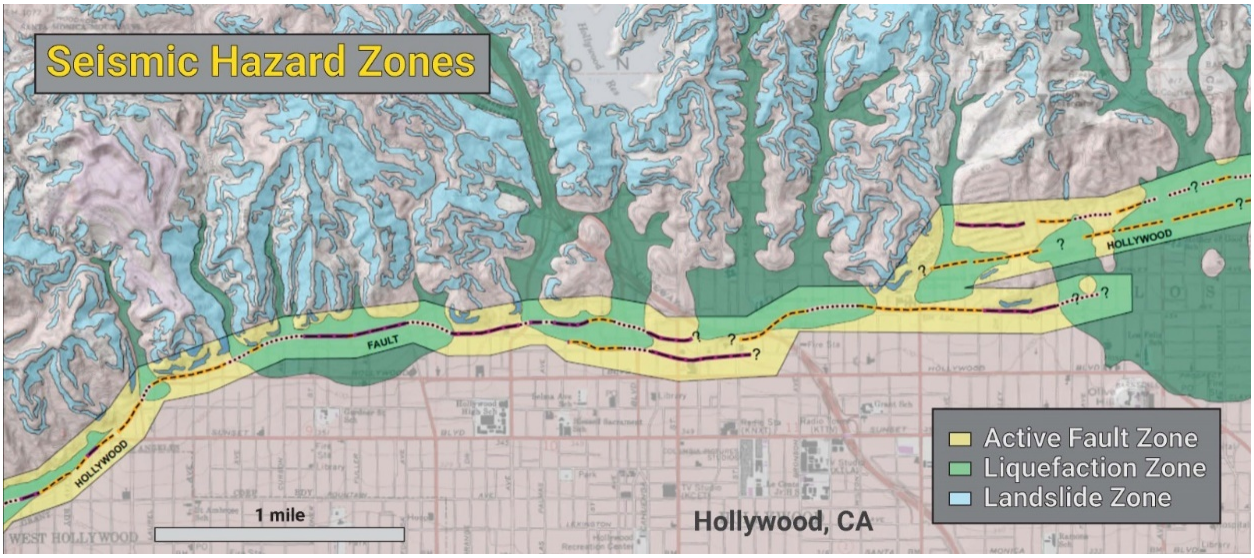
To support this earthquake hazard assessment program, the CGS plans to create a public-facing, statewide geological and geotechnical database and repository that agencies and consultants can access directly to upload, view, and download data and reports. This database will improve access to information and increase public awareness of earthquake hazards.



Earthquake Hazard Assessment. Shaking Potential and Shaking Loss Estimates (left: Annualized Economic Loss; right: Annual Percentage Loss).

The CGS delineates areas susceptible to various types of ground-failures during and after earthquakes such as surface fault rupture, soil liquefaction, and landslides. These hazard zones are discoverable via the CGS "EQ Zapp" where one can search an area and view a specific property's exposure to these hazards. Tsunami hazard zones will be added in late 2021. These regulatory zones, along with their associated reports and guidance documents, provide the public and local governments with tools to mitigate hazards before the earthquake or tsunami occurs. These tools make communities more resilient to earthquakes, thereby reducing the costs and time of recovery. Analysis of the CGS Seismic Hazard Zone Mapping Project, submitted to FEMA, suggested that these regulatory zones have a 9 to 1 benefit-cost ratio.

Through the CGS Strategic Framework, the CGS plans to develop fully probabilistic and semi-automated seismic hazard zoning methodologies, so all seismic hazard zones are prepared statewide and updated regularly. This will lead to increased efficiencies, lower costs, and greater statewide consistency in hazard delineation.



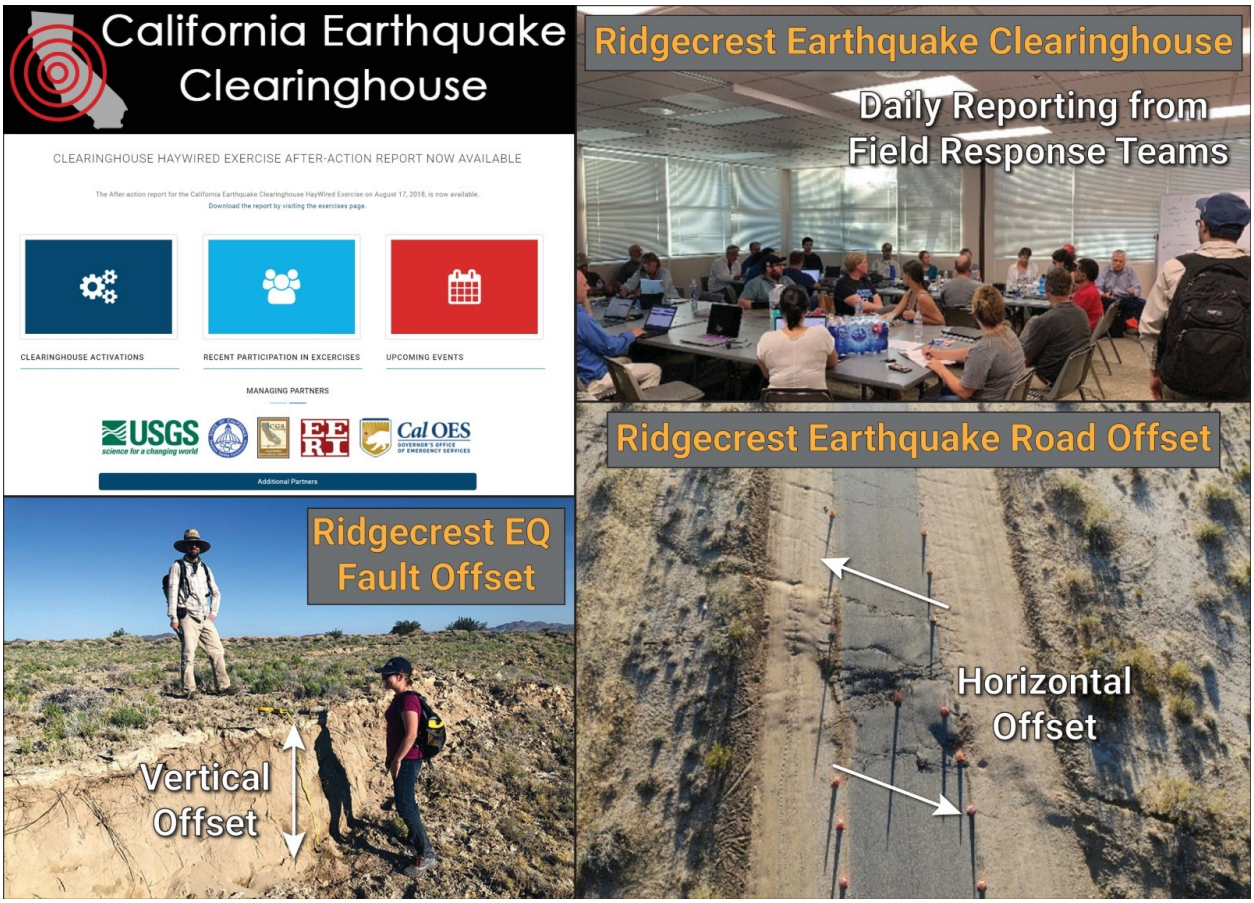
Earthquake Hazard Zoning. Fault (yellow), Liquefaction (green), and Landslide (blue) Zones of Required Investigation near Hollywood.

Following significant seismic, tsunami, and volcanic events, as Chair of the California Post-Earthquake Information Clearinghouse (EQCH), the CGS provides real-time geoscience and engineering field intelligence to Federal and State Emergency Operation Centers, the State Geologist, the USGS, and the public. The 2019 Ridgecrest earthquake sequence is the most recent example for which CGS personnel used the EQCH to document field observations of perishable features, evidence of the coseismic surface rupture, landsliding, and liquefaction.

The CGS provides real-time response to tsunami and volcanic events. For example, CGS geologists documented observations of the 2011 East Japan tsunami as it impacted the residents of and visitors to California. The Seismic Hazards Program also provides earthquake-related and tsunami-related information to local and regional governments,

the U.S. Coast Guard, ports and harbors, professional organizations, and science teachers, often in partnership with the USGS, the Earthquake Engineering Research Institute, the California Earthquake Alliance, the California Earthquake Authority, the Southern California Earthquake Center, and other NGOs.

The CGS plans to expand the earthquake emergency response program by improving the disaster response tools, protocols, and procedures for earthquakes, tsunamis, storm-driven landslides, and debris flows to prepare for geologic and coastal hazards. This will improve the seismic hazards products that the CGS provides to the public.

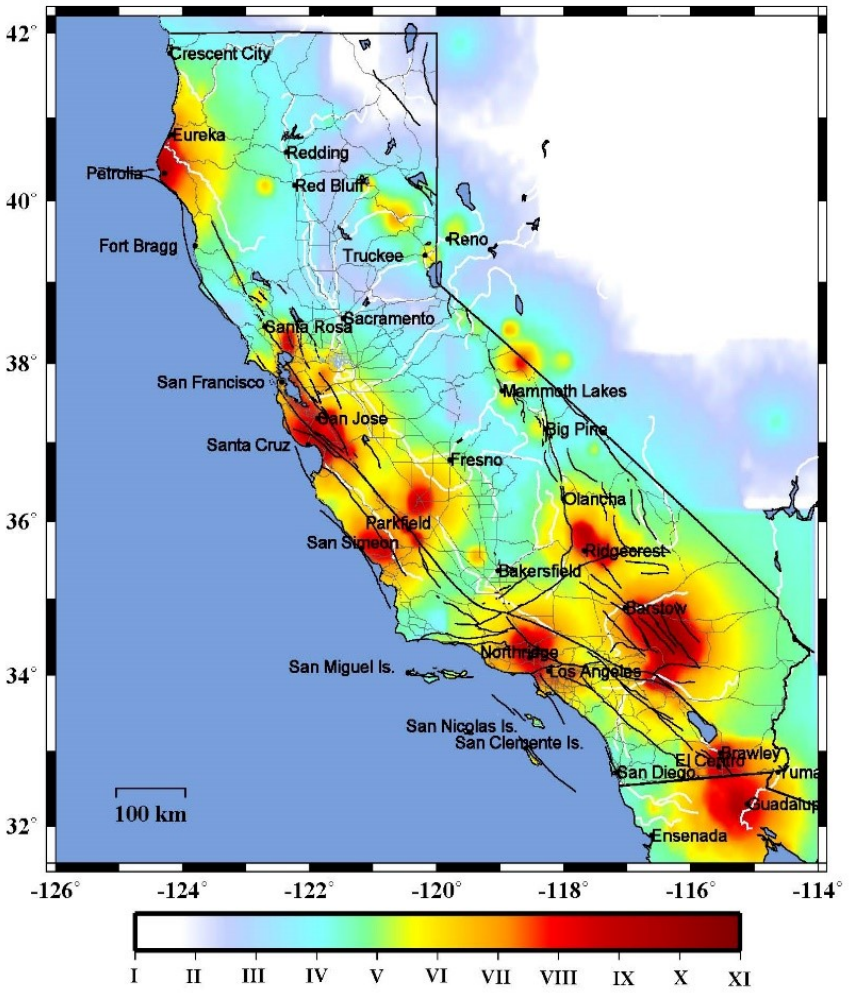


Earthquake Emergency Response. Top: Web-Based (left) and Physical (right) Clearinghouse. Bottom: 2019 Ridgecrest Earthquake Sequence fault rupture.

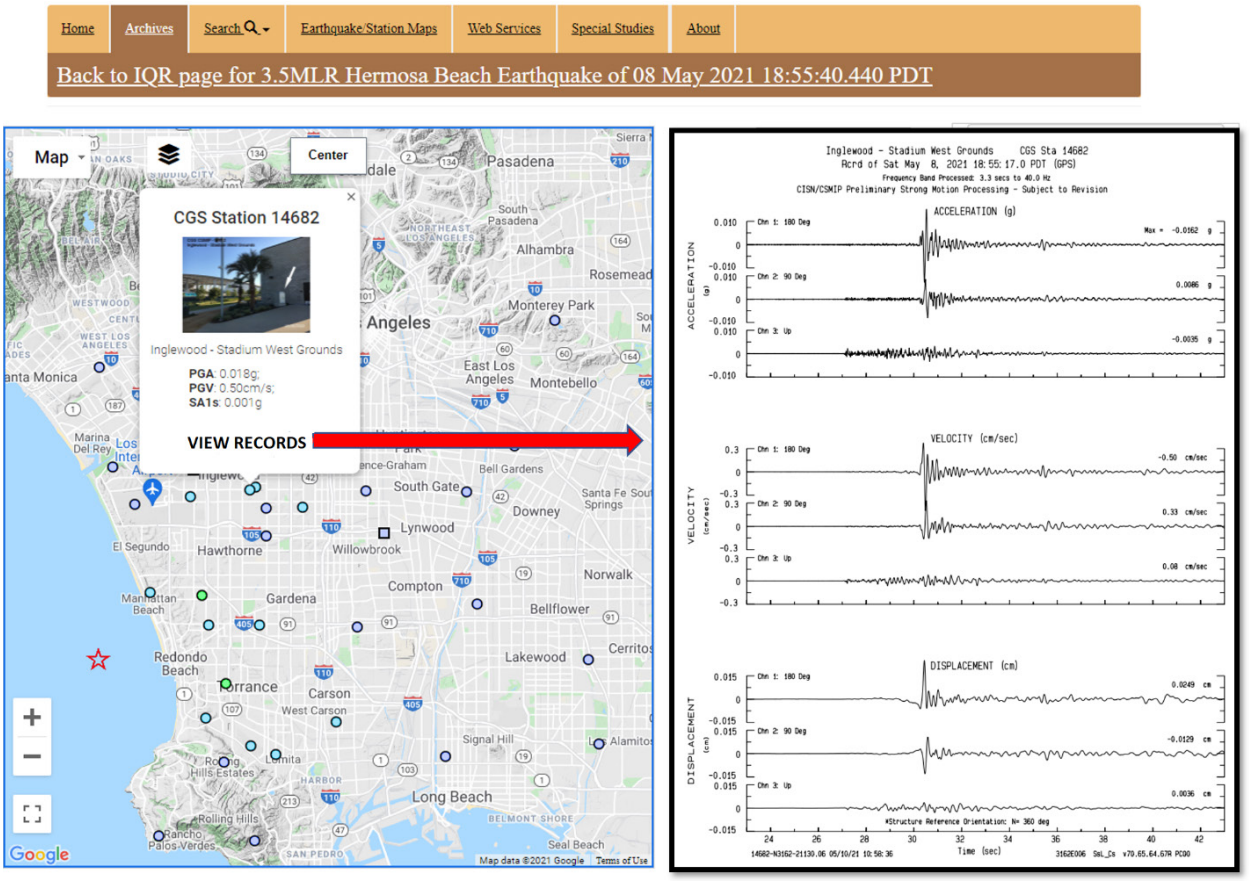
Constantly monitoring the seismic activity of the state for emergency response and long-term resilience of structures to earthquake shaking

The CGS operates one of the largest seismic networks in the world through its Strong Motion Instrumentation Program (SMIP). The network comprises over 1,360 stations and continues to grow each year as the CGS installs sensitive seismic monitoring instruments in the ground and in structures such as buildings, dams, bridges, wharves, and water conveyance facilities throughout California. In partnership with Caltrans, the

CGS has installed seismic instrumentation on approximately 84 bridges. In addition, over 250 buildings have been instrumented by the CGS. This includes 86 hospitals instrumented in partnership with the Office of Statewide Health Planning and Development. The goal in deploying these seismic monitoring instruments is to record the shaking response of the ground and structures to earthquakes. These recorded data can then be used to further our understanding of structural and ground motion phenomena, improve seismic design code provisions and design practices, and provide information to guide post-earthquake emergency response.



Maximum earthquake shaking intensity experienced from 1981-2020. Colors represent the shaking intensity on a scale of 1 (not felt) to 11 (extreme).

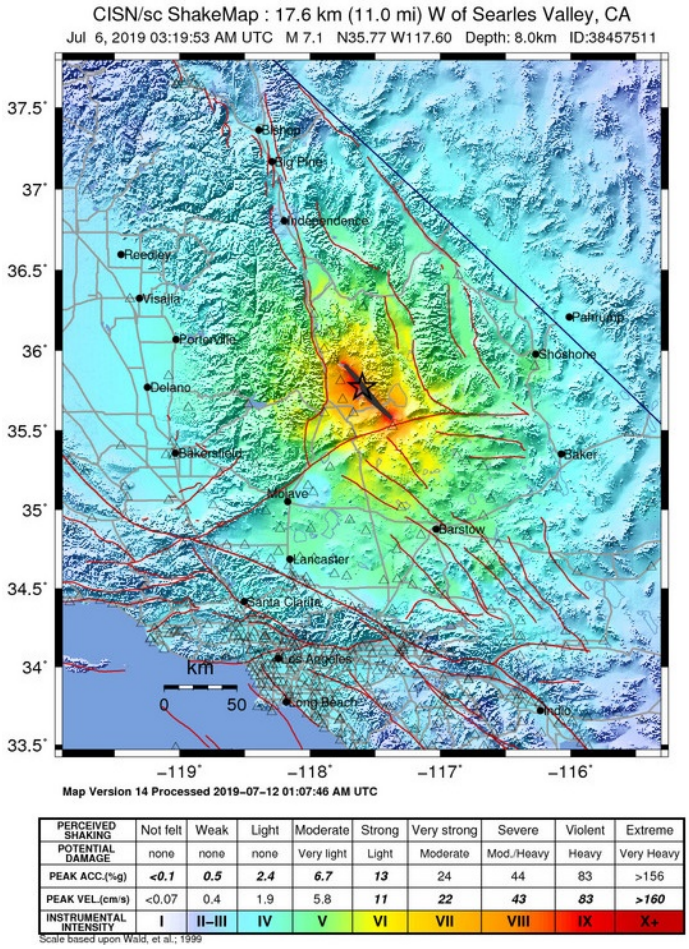


Example of earthquake records available at the CESMD website (CGS Station 14682). Records include acceleration, velocity, and displacement data.

In partnership with the USGS, the CGS created and operates the Center for Engineering Strong Motion Data (CESMD). The CESMD is the official repository of earthquake strong motion data recorded by the USGS and CGS both in California and around the world. These strong motion data are made accessible to the scientific and engineering communities at the CESMD website as soon as they are available. The data are used by researchers worldwide to study earthquakes and their effects on natural and built environments. Each year, the CGS sponsors research projects related to these topics, and the results have led to numerous improvements in the building code and seismic design practice, which have made communities safer and more resilient.

The CGS cooperates with the other seismic networks in California in a partnership called the California Integrated Seismic Network (CISN). The CISN is an effort that focuses on standardizing the collection of earthquake information in California, and it operates with sponsorship from the California Office of Emergency Services (CalOES). Other key partners in the CISN include UC Berkeley Seismic Laboratory, Caltech Seismic Laboratory, and the USGS.

The CISN records between 450 and 750 earthquakes per week in California, most of which are imperceptible to humans. The CISN produces maps showing the intensity and distribution of the ground shaking, called ShakeMaps, within 5-7 minutes following an earthquake. The ShakeMaps are automatically distributed to emergency management and first responder teams to assist in assigning emergency equipment and personnel to localities indicating the greatest damage from an earthquake.

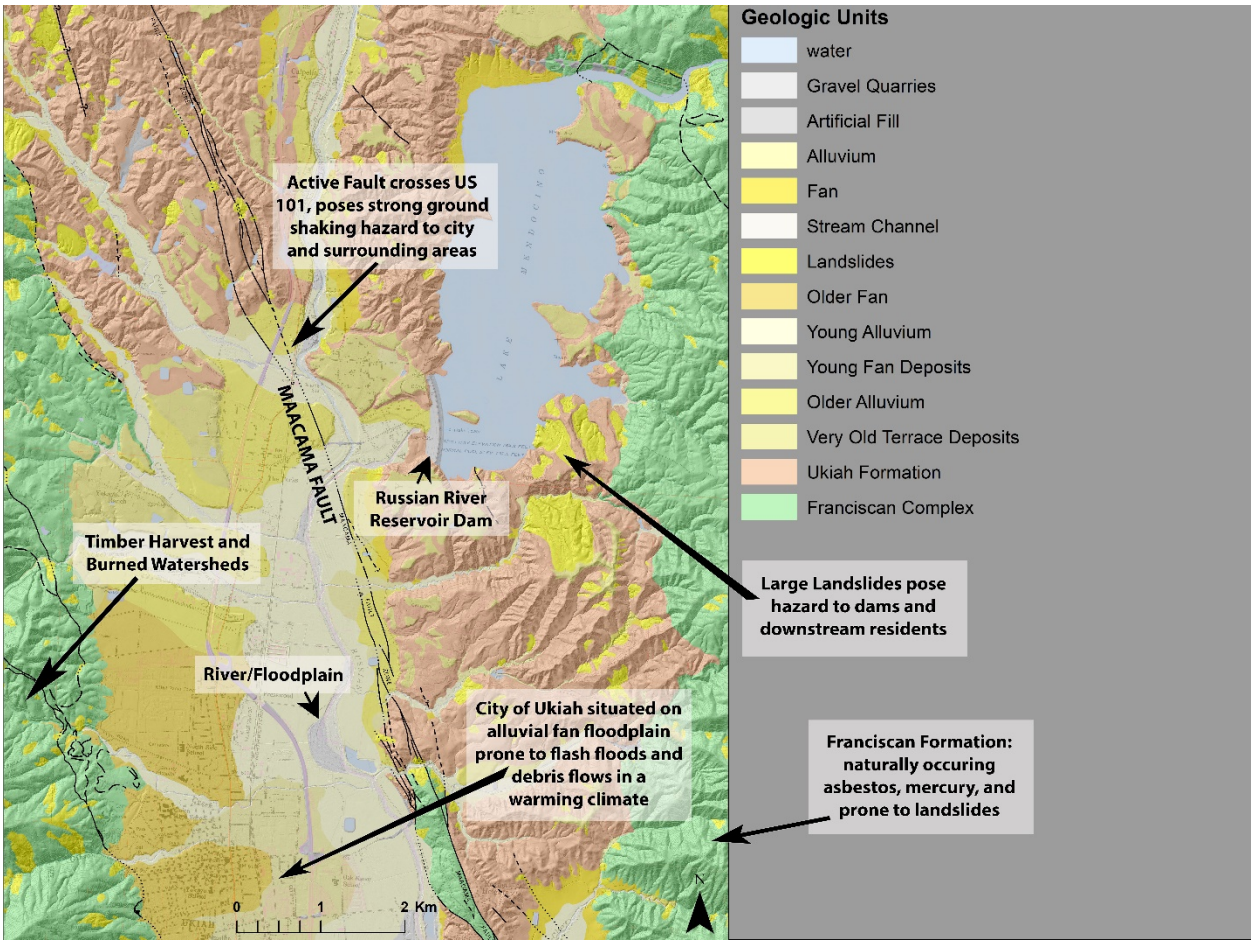


CISN ShakeMap from the magnitude M 7.1 Ridgecrest Earthquake on 5 July 2019. Colors represent the shaking intensity on a scale of 1 (not felt) to 10+ (extreme).

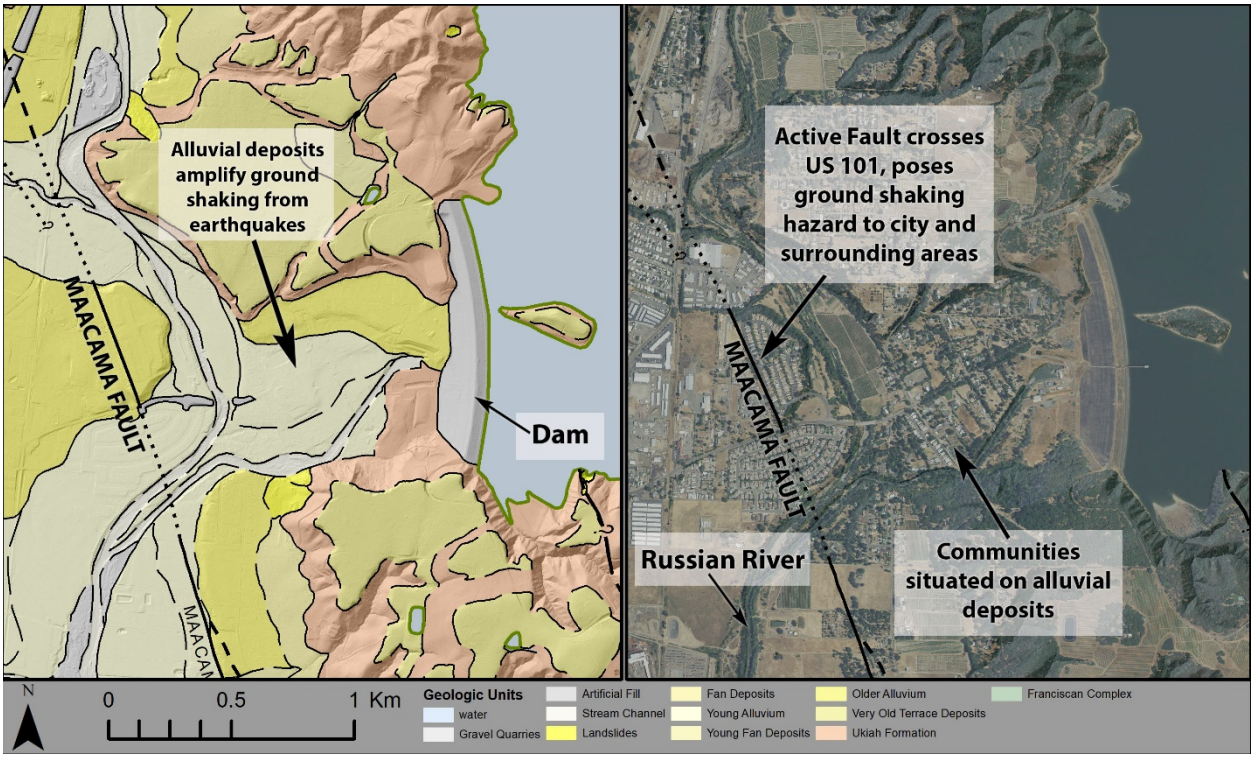
The CGS is working closely with CalOES, USGS, and others in developing and implementing a 2013 state-mandated California Earthquake Early Warning System (CEEWS). The plan is to install or upgrade 1,115 ground motion stations distributed throughout the state to be used in the CEEWS. The CGS has already completed approximately 176 stations, with 66 more stations to be completed by March of 2023. The CEEWS provides advance warning of strong shaking in the event of an earthquake. Individuals can receive audio and visual warnings through the free smartphone app called MyShake. This advance warning can provide individuals with crucial seconds to take cover before strong shaking arrives.

Locating seismic hazards - earthquake faults and surface ruptures, earthquake-induced landslides, liquefiable soils

The CGS conducts regional geologic mapping across California to identify and document potential impacts of geologic and seismic hazards in regions with high population growth, development pressure, significant infrastructure, and climate change hazards. CGS mapping products are significant resources for the public because they utilize advanced geologic mapping techniques, consider changes in land use development, and include recent mapping from historical geologic events such as earthquakes and landslides, providing the most up-to-date understanding of the regional and local geology across the state.



The geologic map above highlights the various geologic hazards that exist in the Ukiah region of Northern California. The geologic maps produced by CGS provide significant information critical for determining geologic hazard locations and risks.



The above maps from Mendocino County show the close relationship that communities, infrastructure, and developments have with the surrounding geology. Accurately located fault traces and identified geologic units significantly aid in seismic hazard prevention and earthquake preparedness.

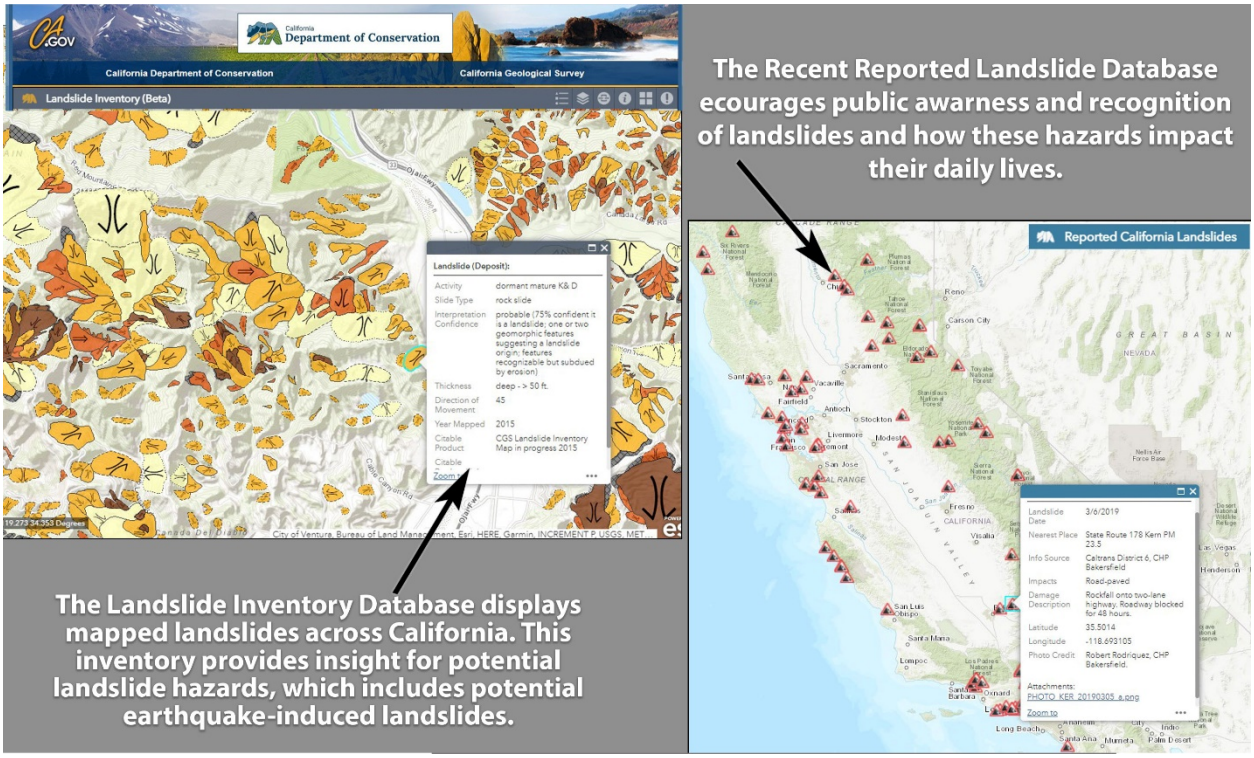
The geologic mapping conducted by the CGS includes geologic interpretation of advanced imagery such as satellite, lidar, and digital elevation model (DEM) processing, as well as vintage aerial photograph analysis, new field mapping, and sample collection and testing. The CGS also reviews previously published and unpublished geologic maps for additional information that is then integrated into the Geographic Information System (GIS) database for each map.

Once digitally prepared, reviewed, and published, the geologic maps are available as free downloadable PDFs. The GIS data used to construct these maps are also freely available to the public upon request. The information presented in the geologic maps provides the public with access to geologic data for the areas that are of interest to them and has the potential to support development decisions made by local municipalities.

The CGS produces landslide inventories that provide information about the type of landslide, extent of material deposited, the source area, the movement history, and the approximate direction of ground failure. These inventories assist with planning for long-term landslide hazard mitigation, support landslide-aware maintenance practices, and inform developers and planners in counties and cities.

The CGS orchestrates its landslide mapping agenda by coordinating with the projects of the CGS Seismic Hazards Program (SHP), and by contracting with other lead agencies, such as Caltrans. In some parts of the state where seismic hazard zone maps have not yet been produced, the CGS will initiate landslide mapping inventories to assist in the future development of these maps.

Once landslide inventories are completed, they are published on the publicly available CGS landslide inventory database. In 2019, the CGS established a crowdsourced database where members of the public can contribute to data collection efforts by submitting photos and location information of recent landslides to the Recent Reported Landslides Database.



The CGS Landslide Inventory is a statewide landslide map database that shows many of the landslides mapped by the CGS and others over the past 50 years. The Recent Reported Landslides Database is an online interactive map built on data sent to the CGS by government agencies, media, and community members. Although typically driven by storm events, seismically generated rock falls are also documented.

The CGS geologic and landslide mapping serves as the foundation for maps generated by other CGS programs. The creation of complete and consistent map products across CGS programs increases the efficiency of these programs and results in more accurate data available to the public.

Collaborations with the USGS, Department of Water Resources (DWR), local municipal planning and development departments, private consulting firms, and Caltrans, along with support from the U.S. Forest Service, enable the CGS to efficiently and effectively

gather the data needed to produce the best available and most current geologic mapping products.

California State Mandates – The Laws that Guide our Work

Seismic Hazard Program's mandates:

- Alquist-Priolo Earthquake Fault Zoning Act (1972).
- Seismic Hazards Mapping Act (1990).
- California Business and Professions Code sections 7800 – 7887, regarding registration of civil engineers and geologists and certification of engineering geologists and geotechnical engineers.
- Emergency response to geologic hazards, operation of a clearinghouse.
- Review of engineering geology and seismology consulting reports for public schools and hospitals (California Building Code).

California Strong Motion Instrumentation Program's mandates:

- Public Resources Code sections 2700 – 2709.1, Strong Motion Instrumentation Program.
- State legislation (SB 135, Padilla, 2013) provides for the development and implementation of a California Earthquake Early Warning System (CEEWS).

Regional Geologic and Landslide Mapping Program's mandates:

- PRC Division 2, Chapter 2, sections 2201 and 2211
- National Geologic Mapping Act of 1992

Funding Sources

The primary funding sources of the CGS in supporting California's resiliency and earthquake preparedness and recovery is the Strong Motion Instrumentation and Seismic Hazard Mapping Fund (SMISHM) and the State's General Fund. In all, the CGS received an annual appropriation for the current fiscal year (21/22) of $14.1M from the SMISHM Fund and approximately $4.6M from the General Fund, respectively.

Additionally, the CGS has reimbursement authority for another $5.5M for contractual work from our partners to support various projects such as the California Earthquake Early Warning project with CalOES, ensuring the safety of our essential facilities (schools and hospitals) through work with Division of the State Architect and the Office of Statewide Health Planning and Development, and increasing the safety of the State's critical infrastructure through partnerships with Caltrans and DWR.

The CGS also receives a small amount of grant funding through our federal partners (USGS and FEMA) that go directly to earthquake mitigation projects.