USGS Scientific Earthquake Studies Advisory Committee (SESAC) Annual Report, FY2026

Executive Summary

The U.S. Geological Survey (USGS) Earthquake Hazards Program (EHP) supports innovative, leading-edge scientific research and earthquake monitoring that contributes to U.S. economic security and life safety through informed decision-making surrounding earthquake preparedness and response. The Scientific Earthquake Studies Advisory Committee (SESAC) provides independent advice to the USGS Director on the USGS role in the National Earthquake Hazards Reduction Program (NEHRP). SESAC oversees subcommittees that guide earthquake prediction evaluation, earthquake forecasting, seismic hazard modeling, and seismic monitoring, while also reporting to the interagency Advisory Committee on Earthquake Hazards Reduction. In FY2026, SESAC met twice to review the USGS EHP. This annual report is the product of those meetings.

SESAC reaffirms the critical role of the EHP as an **essential investment in national security, public safety, resilient infrastructure, economic prosperity, and U.S. scientific leadership.** The cost of maintaining these capabilities is small compared with the human and economic consequences of being unprepared for the earthquakes that will inevitably occur. **EHP's contributions to earthquake science and engineering research** and their practical applications include (1) a substantive revision of the **50-state national seismic hazard map**, application of new hazard models for Puerto Rico and the U.S. Virgin Islands, and new assessments for the U.S. overseas territories; (2) significant advances in the **ShakeAlert Earthquake Early Warning System**, which provides short-term alerts of strong earthquake shaking in the western states of California, Oregon, and Washington, as well as an initial stage of expansion to Alaska and planning for possible expansion to Nevada; (3) major roles in **post-earthquake response to both domestic and international earthquakes**, including major international earthquakes this year in Colombia, Venezuela, Indonesia, and Japan and a domestic earthquake in Hawaii; (4) highly successful **distribution of EHP scientific products** in response to growing domestic and global demand.

Our report highlights five major challenges (and linked opportunities) facing the EHP this year, each accompanied by a specific recommendation. These challenges (and accompanying recommenda–tions) include: (1) loss of scientific and technical personnel; (2) disruption of the EHP future workforce pipeline; (3) impacts of changes to IT Support of the EHP mission; (4) fiscal threats to the EHP external research program; and (5) diminishment of the EHP core research program.

SESAC Recommendations:

(1) We strongly encourage EHP staff to work with the USGS Director and DOI administration to expand the waiver program to backfill key positions vacated by retirements and resignations.

(2) We recommend that EHP develop and implement a long-range strategic hiring plan that focuses on strengthening the workforce development chain through revitalization of the EHP's internship program for promising undergraduate and graduate students, reinvigoration of the Mendenhall postdoctoral program, exploring creative mechanisms for recruitment of new scientific and technical staff, and ensuring continuity of training and professional development for USGS staff.

(3) To ensure continuity and reliability of EHP service to the nation, we recommend that personnel and budgets providing core information technology (IT) support for operational, computational, and communication needs be directly associated with earthquake rapid-response and research and returned from DOI to EHP control.

(4) We strongly encourage USGS and DOI leadership to communicate the essential role of the external funding program in supporting the hazard reduction mission of the USGS. It is essential to communicate the impact of unfunded budget directives to our congressional supporters, to ensure that the critical mission of the EHP is not further compromised in the FY2027 appropriation process.

(5) SESAC urges the EHP to devote at least 50% of its effort to core research and hazard assessment and to account explicitly for the research impact of long-term operations and maintenance costs when planning new monitoring activities.

We conclude our report by identifying five prominent issues for future attention by SESAC. These include: (1) efforts to reinvigorate research that combine geoscience and public communication and response, which in turn can help ensure that the USGS hazard mitigation programs reach intended targets; (2) engagement with other, newly developed USGS hazard advisory groups; (3) changes to international engagement through the EHP's new collaboration with the State Department's Bureau of Disaster and Humanitarian Response; (4) use of artificial intelligence/machine learning in understanding earthquake processes and anticipating their hazards, including assessment of AI/ML for earthquake forecasting and prediction; and (5) exploring the impact of private organizations' earthquake early warning systems.

Introduction

This report summarizes the recommendations of the Scientific Earthquake Studies Advisory Committee (SESAC), which provides independent advice to the Director of the U.S. Geological Survey. This report is provided as the summary of the committee's deliberations over the past fiscal year. The SESAC committee met twice during FY2026 to review activities of the Earthquake Hazards Program—on March 18-19, 2026 in virtual format and on September 9-10, 2026 in hybrid format in Washington, DC. The meetings are organized in collaboration with Earthquake Hazards Program (EHP) staff, but the conclusions represent the independent advice of SESAC committee members. Meeting agendas and minutes, as well as past committee reports, are available here[1].

The USGS Earthquake Hazards Program and Its Critical Value to the Nation

The USGS **Earthquake Hazards Program** (EHP) remains a cornerstone of the **National Earthquake Hazards Reduction Program**[ii] (NEHRP), the nation's primary federal effort to reduce earthquake risk. Through state-of-the-art scientific research, earthquake monitoring, hazard assessment, engineering support, and public preparedness, the EHP plays a key role in protecting lives, property, infrastructure, and economic security while sustaining U.S. international leadership in earthquake science and engineering.

The risk to our nation is substantial. **The United States is among the world's most seismically active nations,** and our densely populated urban areas, critical infrastructure, and formidable economy create enormous exposure to earthquake losses. The most recent national assessment[iii] estimates nearly $15 billion in annualized earthquake losses, with at least 36 states facing significant vulnerability. Since the establishment of NEHRP in 1977, sustained federal investment in earthquake science, technology, and engineering has given the federal government, states, and communities the knowledge and tools required to reduce these risks. The scientific findings and products of EHP are highly valued by a broad range of public and private entities supporting earthquake risk mitigation.

Investment in earthquake hazard mitigation produces measurable returns, in terms of both life safety and economic security**.** State and local governments that adopted modern building codes have avoided an estimated $1.6 billion in damage each year from major hazards, with cumulative savings projected to reach $132 billion by 2040[iv]. The National Institute of Building Sciences estimates that **every $1 invested in earthquake resilience saves $12 in economic losses, damage, and recovery costs**[v]. Sustained federal investment in earthquake hazard reduction decreases the nation's exposure to disaster costs, short-term and long.

Earthquake risk extends beyond U.S. borders. Major earthquakes anywhere in the world can affect American citizens, government operations, economic and military interests, allies, and global supply chains. The EHP provides scientific expertise to U.S. government agencies following major international earthquakes and advises on hazard mitigation affecting U.S. interests and partners. The study of international earthquakes provides critical scientific information that improves preparedness for future earthquakes at home. **International scientific collaboration strengthens domestic capability.** Major earthquakes—including recent events in Venezuela, Colombia, and Japan—provide critical observations of how faults, buildings, infrastructure, and communities respond to extreme shaking. USGS scientists and their international partners turn those observations into scientific knowledge that improves U.S. hazard models, engineering practices, emergency response, and preparedness for the next major domestic earthquake.

For decades, the Earthquake Hazards Program has been **a global leader in fundamental and applied earthquake research.** USGS-led advances have created reliable national seismic and geodetic monitoring through the **Advanced National Seismic System** (ANSS)[vi], transformed understanding of earthquake hazards through the **National Seismic Hazard Model** (NSHM)[vii], and advanced earthquake early warning through the **ShakeAlert**[viii] system. These capabilities directly translate science into public safety: they enable communities to strengthen buildings, retrofit critical infrastructure, improve emergency response, and act rapidly when earthquakes occur. Every product of the EHP's earthquake hazard toolkit (as illustrated in Figure 1) is the product of years of fundamental scientific research by USGS scientists and engineers, in collaboration with academic and private sector research partners.

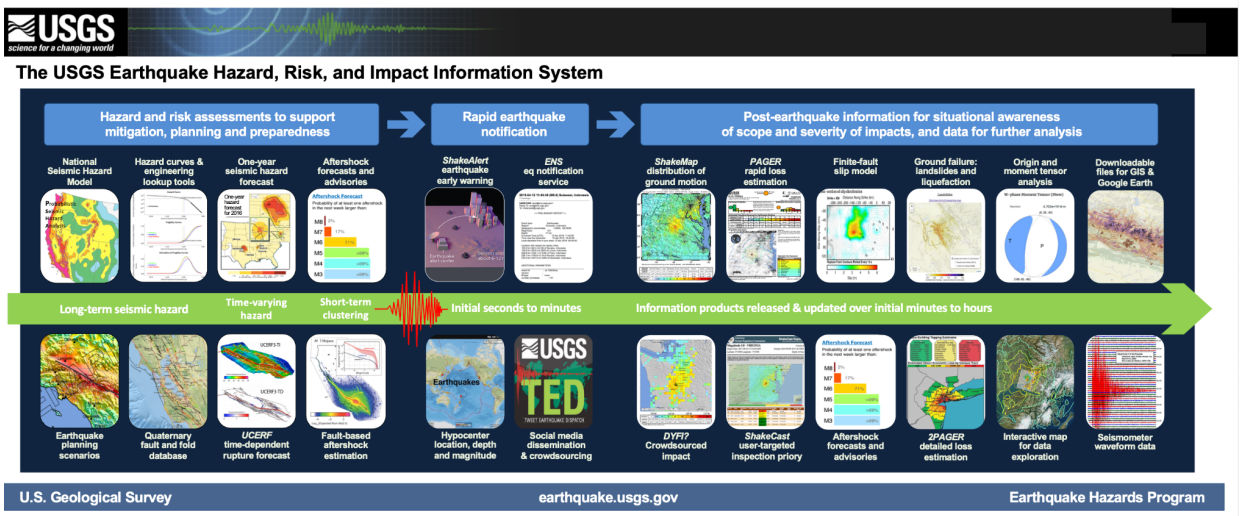


Figure 1. EHP Research Products and the USGS Earthquake Hazard, Risk, and Impact Information System. Figure courtesy of USGS Earthquake Hazards Program.

Earthquake risk is not only a West Coast issue. Although California's exposure is well known, significant earthquake hazards exist across much of the nation, including urban areas in Tennessee, Utah, South Carolina, Washington, Oregon, Idaho, Nevada, Oklahoma, Alaska, Arkansas, and Washington D.C. Earthquake science also improves understanding of cascading hazards—including tsunamis, landslides, liquefaction, and flooding—and addresses emerging risks associated with human activities such as waste-water injection, reservoir impoundment, and CO_2 sequestration. The vast investments in data centers, power stations, and related infrastructure across the US and globe require quality seismic hazard information. These are national-scale challenges that require sustained federal scientific expertise, coordination, monitoring, and investment.

The work of the EHP ensures that **evidence-based, actionable safety science supported by cutting-edge technologies reaches the people who need it**. Its communication, education, and outreach activities help communities, emergency managers, businesses, and the public understand earthquake risk and take effective action before and after damaging events. Reliable, actionable data and products have their greatest value when they lead to better decisions, stronger infrastructure, and faster, more effective response.

Continued support for the USGS Earthquake Hazards Program—accompanied by sustained collaboration across the federal NEHRP agencies—is an **essential investment in national security, public safety, resilient infrastructure, economic prosperity, and U.S. scientific leadership.** The cost of maintaining these capabilities is small compared with the human and economic impact of being unprepared for the earthquakes that will inevitably occur.

Program Successes

The committee notes significant programmatic achievements by the EHP team during this fiscal year.

SESAC remains deeply impressed by the continued pace of the **EHP's contributions to earthquake science and engineering research** and seismic hazard mitigation, particularly in the shadow of severe personnel limitations and the fiscal impacts of budget directives (see below). The dedicated staff of the EHP makes substantive contributions to all aspects of the earthquake hazard spectrum (Figure 1), from long-term research on hazard assessment to short-term earthquake early warning and near-real time analysis and communication on earthquake impacts to post-earth-quake assessments critical for recovery and reconstruction efforts. Examples of key advancements during FY26 include: (1) a landmark study documenting supershear fault motion (i.e., fault rupture at speeds exceeding seismic wave velocities, which extends damage to greater distances) associated with the 2025 Mandalay (Myanmar) earthquake[ix]; (2) new research on fault slip triggered by moderate earthquakes along the southern San Andreas system[x]; (3) a new suite of Antarctic seismic instruments deployed in "the quietest site on Earth"[xi]; (4) a new study using distributed acoustic sensor (DAS) technology to constrain structure in the subducted plate beneath California and Oregon[xii]; and (5) studies of induced seismicity associated with geothermal energy production[xiii].

The **National Seismic Hazard Assessment team** continues to make major contributions to its core mission of assessing and mitigating the nation's exposure to future earthquake impacts. They completed a substantive revision of the 50-state national seismic hazard map, incorporated new hazard models for Puerto Rico and the U.S. Virgin Islands[xiv], and are now working on new assessments for the U.S. Territories in Guam, northern Mariana Islands, and American Samoa. These assessments are regularly updated to incorporate the best-available science, with efforts

already underway to produce the next-generation 50-state national hazard map. Engineering groups are already using these results to incorporate into the next generation of U.S. building codes.

The **ShakeAlert Earthquake Early Warning System has made significant advances in its mission to provide short-term alerts** in the seconds before strong earthquake shaking arrives at locations in the western states of California, Oregon, and Washington. The buildout of the seismic network in those three states is now at 98% completion and moving into the Operations and Maintenance phase. The ShakeAlert team is proceeding with initial stages of seismic infrastructure installation for Alaska and is collaborating with the state of Nevada to develop plans for possible expansion to that state as well. The ShakeAlert system was successfully activated for 34 events in the past year, with eight events meeting the threshold for issuing successful warnings of shaking from moderate-sized earthquakes in California and the Pacific Northwest, notably including the M5.6 June 24, 2026 earthquake near Redwood City, CA. Finally, the USGS quickly responded to a false alarm released on December 4, 2025 triggered by faulty data from a few seismic stations near the fringe of the ShakeAlert network along the California-Nevada border[xv]. SESAC commends the ShakeAlert team for using the incident to address long-term vulnerabilities of the system, hopefully avoiding such events in the future.

The USGS Hazards Development (HazDev) Team continues to support **rapid distribution of EHP scientific products** in response to growing domestic and global demand. As illustrated in Figure 2 (from analytics.usa.gov), the USGS earthquake.usgs.gov website now constitutes over 40% of all DOI web traffic (nearly double that of all the National Park Service websites combined). Spikes in demand follow significant domestic and international earthquakes, occasionally reaching over 120 million web requests/day. The HazDev Team has continued to expand resources devoted to real-time earthquake communication and has met major challenges in maintaining internet access during these peak access periods. However, as noted in the following section, the EHP HazDev group is facing unusual organizational and resource challenges that make it particularly vulnerable to future disruption.

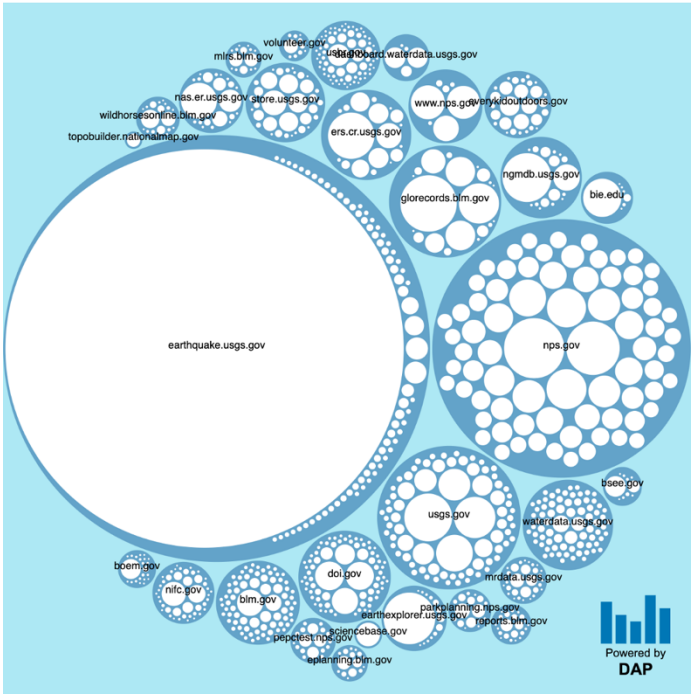


Figure 2. Graphic representation of web traffic on all Department of Interior websites. Note that the EHP website earthquake.usgs.gov is the single most widely used DOI portal, accounting for over 40% of DOI web traffic. (http://analytics.usa.gov)

Despite major organizational disruptions, the EHP has expanded its contributions to **post-earthquake response to both domestic and international earthquakes**, including major international earthquakes this year in Colombia, Venezuela, Indonesia, and Japan and a domestic earthquake in Hawaii. The Earthquake Disaster Assistance Team (EDAT)[xvi] has been reorganized and is now supported by a new collaboration with the Department of State's Bureau for Disaster and Humanitarian Response and international response has been supported

by DoS personnel and resources. This year, the EDAT team has contributed directly to international response activities and collaborations in Colombia, Venezuela, Central America, the Southwest Pacific, as well as long-term post-earthquake investigations in Türkiye, Morocco, and Nepal. **These activities directly inform domestic hazard research, protect U.S. citizens, and align with U.S. national interests.**

Challenges & Opportunities

FY2026 has been a challenging year for the EHP—marked by uncertainty in funding, loss of key senior personnel, hiring freezes, and political and judicial processes that have left many program activities in limbo. Modest in size, yet with an outsized impact on the lives and livelihoods of U.S. citizens, an already stressed Earthquake Hazards Program is particularly vulnerable. These barriers to the work of the EHP can emerge as life-or-death issues and severe economic burdens for U.S. citizens living or working in earthquake zones—here in the US or in earthquake-vulnerable zones around the world. Below we address what we see as critical challenges that will undoubtedly affect the EHP during the coming year.

Challenge #1: Loss of Scientific and Technical Personnel. An overarching threat to the EHP mission is the long-term decline in research and technical personnel available to support its mandate to prepare for and respond to major earthquakes that threaten lives and livelihoods of American citizens. This decline is the result of ongoing retirements and resignations, accelerated by the administration's incentivized resignations and reassignment of key EHP personnel. At the same time, new hiring has, until recently, largely been frozen. The situation is exacerbated by disruption in the pipeline of scientific and engineering workforce talent discussed in the following section. A few notable examples include:

- The Congressionally mandated ShakeAlert project, a critical component of national earthquake preparedness, continues to report an EHP staff vacancy rate above 50%, with little improvement since last year. This shortage could constrain EHP's ability to maintain its existing infrastructure as well as to meet demands to expand ShakeAlert to other regions of the country, even with Congressional direction and funding.
- The loss of key personnel from the USGS Geologic Hazards Science Center, including two analysts for the National Earthquake Information Center, has created a mission-critical gap in personnel supporting its 24x7 operation.
- Three major West Coast earthquake monitoring networks—the backbone of the Advanced National Seismic System and the ShakeAlert early warning system—are under significant USGS staffing stress, threatening timely maintenance and continued operations. The Southern California Seismic Network (SCSN) is operating with less than 50% of its USGS staff and cannot hire needed field engineers, managers, or IT professionals, severely limiting network maintenance. The USGS component of the Pacific Northwest Seismic Network (PNSN) is 50% short-staffed in ShakeAlert IT and field technician positions, constraining mission-critical work. The USGS Northern California Seismic Network (NCSN) lacks sufficient sysadmin/IT and administrative support, bringing the network dangerously close to being unable to perform critical infrastructure functions. The USGS National Strong Motion Program (NSMP) similarly lacks field engineers, delaying projects and preventing it from meeting mission goals.
- Of particular concern is the reduction or retirement of key USGS personnel with mission-critical expertise and institutional knowledge, including in seafloor geodesy, structural engineering, strong-motion instrumentation, and societal hazard mitigation research.

- USGS personnel losses at the Geologic Hazards Science Center have also led to suspension of its Communication and Media Relations, Public Affairs, and Social Science (COMPASS) project following the departure of key early- and mid-career scientists. The COMPASS project focused on improving the effectiveness of USGS hazards and risk information delivered to the public and represented an important component of EHP's life-safety mission.
- While a small number of hiring waivers have been granted for USGS to start filling some of these long-open EHP positions, they fall far short of addressing mission critical staffing issues, and the hiring process remains ponderously slow and cumbersome. The personnel shortages described above seem unlikely to be substantively changed in the coming months without new and urgent action.

We are encouraged by recent DOI administrative support decisions that have established several hiring waivers that have allowed EHP to fill a small number of key vacancies, particularly in the Earthquake Science Center. However, we remained concerned that **the understaffing crisis has now reached the point at which EHP personnel may be unable to mount an adequate response to a high-impact domestic earthquake.** As summarized in our 2024 special letter to then-USGS Director Applegate, we concluded that "*staff deficits in critical scientific, technical, and administrative positions within EHP, which have been left open for extended durations, now threaten mission-critical research and monitoring projects*." **Since 2024, these conditions have worsened rather than improved.** If not corrected, USGS staffing issues almost certainly will negatively impact EHP routine operations, progress on implementing life-safety critical projects like the ShakeAlert earthquake early warning system, earthquake hazard mapping, and earthquake impacts research.

Recommendation 1: We strongly encourage EHP staff to work with the USGS Director and DOI administration to expand the hiring waiver program to backfill key positions vacated by retirements and resignations.

Challenge #2: Workforce Pipeline. The pipeline of future staff and collaborators for mission-critical EHP activities has been severely impacted by disruption of critical programs that have helped lead the EHP to its position of international leadership in earthquake science—such as the Mendenhall Postdoctoral Program and highly effective summer internship programs in earthquake science and engineering. The EHP external research grants program (see below) has also been **a key pathway for supporting students and post-doctoral researchers**, bringing the next generation of earth scientists and engineers into the constellation of USGS research—often leading to recruitment of many of the EHP's most talented scientific and technical staff. While there is a broad pool of talent available from America's academic institutions, the pathway from scientific training to viable USGS careers has become increasingly problematic. We believe that **an extended disruption of these key programs–combined with limitations on hiring young scientists and engineers from these programs into permanent positions–severely jeopardizes the future of earthquake science and engineering research at the USGS and in the US as a whole.**

Recommendation 2. We recommend that EHP develop and implement a long-range strategic hiring plan that focuses on strengthening the workforce development chain through revitalization of the EHP's internship program for promising undergraduate and graduate students, reinvigoration of the Mendenhall postdoctoral program, exploring creative mechanisms for recruitment of new scientific and technical staff, and ensuring continuity of training and professional development for USGS staff.

Challenge #3: IT Support of the EHP Mission. The occurrence of significant earthquakes—either here in the U.S. or those affecting U.S. interests overseas—produces intensive demands on the IT and web communications systems. These urgent situations require near-instantaneous response by technicians familiar with the complexities of NEIC communication and computational systems. **SESAC is particularly concerned about the impacts of agency personnel changes in the IT sector**. EHP requires specialized and round-the-clock IT resources for its unique operational demands, which include 24/7 monitoring and alerting. Program control of those resources is required for rapid response analysis, distribution of data products, and rapid communication during earthquake crises, as well as high-performance computing required for data analysis, modeling, and machine learning research. In response to Secretarial Order 3429, staff performing certain functions were consolidated into DOI to form "core support teams" that provide common services to DOI bureaus. This has come at a budgetary cost (since the EHP must pay for these employees, plus overhead to DOI for managing them) and, more importantly, has removed EHP authority over these employees. Critically, these core support teams are not routinely available outside of standard working hours, leaving the EHP without IT support over 70% of the time.

The partial consolidation of IT and communications functions into the Department of Interior presents significant new challenges to the EHP. Over the last two years, EHP lost at least eleven IT positions and one communications position to DOI consolidations. Because of EHP's unusually complex computational needs and life-safety mission, the IT consolidation is particularly concerning. Immediate IT response is essential for unplanned and out-of-hours outages, which have become a growing problem over the past several years. One prominent example was an August 2026 power outage at the Geologic Hazards Science Center, which houses the National Earthquake Information Center, combined with a mechanical failure of the backup power generators that put the NEIC facility offline for a short period. Rapid failover efforts moved the data acquisition and monitoring systems to a backup site in South Dakota, but with reduced computational capability until full operations were restored around 36 hours after the initial outage. While the outage itself was not the result of organizational changes, it did highlight vulnerabilities in staff coverage for critical IT systems support roles. Because the EHP no longer has direct management line authority over these employees, the EHP may not be able to direct the human resources required to meet its 24/7 operations and life-safety mission.

Recommendation 3. To ensure continuity and reliability of EHP service to the nation, we recommend that personnel and budgets providing core information technology (IT) support for operational, computational, and communication needs be directly associated with earthquake rapid-response and research and returned from DOI to EHP control.

Challenge #4. Threats to the External Research Program. The EHP external funding program has been a critical and highly cost-effective component of the National Earthquake Hazards Reduction Program since its establishment nearly fifty years ago. It provides a **critical link between the core research mission of the EHP and our nation's leading scientists at academic institutions and in the private sector.** The program aligns external research initiatives and earthquake hazard infrastructure to EHP research priorities. Since 2006, the external funding program has provided nearly 1400 grants, averaging $4.5M per year, to approximately 50-80 research teams annually. Their work has helped to innovate and advance the USGS earthquake hazard mission across ten major thematic areas and seismically hazardous regions of the country. The external funding program allows the USGS to leverage the talents of America's academic and private sector research base at modest cost to the government, permitting performance of work that would

not otherwise be possible. **Virtually every product of the EHP's Hazard, Risk, and Impact Information System**, illustrated in Figure 3, is the result of **collaboration between internal USGS research and external groups, supported by the external funding program.**

In 2026, the SESAC committee took the unusual step of issuing a special mid-year report[xvii] focusing on the precarious state of the USGS external funding program. At the time of this writing, the issues remain unresolved. Unless addressed in the coming year, we are concerned that **degradation of the external funding program represents an existential threat to this core element of the EHP's research mission**.

The near-elimination of the external funding program was a direct (but presumably unintended) result of funding directives in the FY2026 congressional Minibus appropriation. That legislation provided a modest ($2.25M) budget increase for the EHP relative to the previous year's budget, yet was combined with a number of unusually specific budget directives, notably a $6.25M increase for continued development and expansion of the ShakeAlert earthquake early warning (EEW) system in the western U.S. and Alaska and a $0.75M commitment to Subduction Zone Science initiatives. These laudable programs address important EHP priorities (including those highlighted in previous SESAC reports); however, formal adoption of these two ~$7M budget directives, supported with only $2.25M in additional funding, carries the consequence of forcing an effective ~$5M redirection in program funding. This funding redirection led **to the severe reduction of the EHP's highly successful external research funding program**.

This year, the vast majority of the proposals submitted—including those with very strong reviews and close alliance to EHP mission—have been rejected. The program was able to support only 13 grants, totaling $1.35M, nearly half of which was dedicated to ShakeAlert-related research. If this funding situation continues, the program may be forced to reduce its grant support for external partners to zero for the first time in its 48-year history.

Prominent examples of research supported by the external funding program include (1) basic research that led to the creation and implementation of the ShakeAlert Early Warning System; (2) the creation of seismic ground motion models and site amplification factors on which the National Seismic Hazard Model (NSHM) depends; (3) incorporation of new geodetic and strong motion seismic observations into the NSHM; (4) field-based research on the seismic hazard associated with active faults in U.S. Midcontinent, along with those in the western US and Alaska; (5) creation of ground failure models that assess in near-real time the likely distribution of secondary effects such as earthquake-triggered landslides and liquefaction; and (6) development of state-of-the-art earthquake simulation models that address the complex earthquake sources that may emerge from multi-fault ruptures (such as the devastating 2023 Türkiye earthquake and what might be expected along the San Andreas Fault system).

Recommendation 4. We strongly encourage USGS and DOI leadership to communicate the essential role of the external funding program in supporting the EHP and the hazard reduction mission of the USGS. It is essential to communicate the impact of unfunded budget directives to our congressional supporters, to ensure that the critical mission of the EHP is not further compromised in the FY2027 appropriation process.

Challenge #5: Sustaining the Core Research Mission. SESAC remains deeply concerned about long-term degradation of the Earthquake Hazards Program's (EHP) ability to meet its core research

mission. Virtually every landmark contribution to earthquake hazard mitigation represented in Figure 3 rests on decades of earthquake research by EHP staff and its academic and industry partners. Fundamental earth science and engineering research is essential to improving earthquake monitoring, advancing the National Seismic Hazard Model, and developing more effective hazard mitigation. Yet years of constrained budgets, loss of scientific expertise, staffing gaps, and congressional redirects have steadily eroded EHP's core research and hazard-assessment capacity. With monitoring now consuming roughly two-thirds of the EHP budget, this imbalance increasingly limits scientific progress and the development of the next generation of earthquake risk mitigation tools.

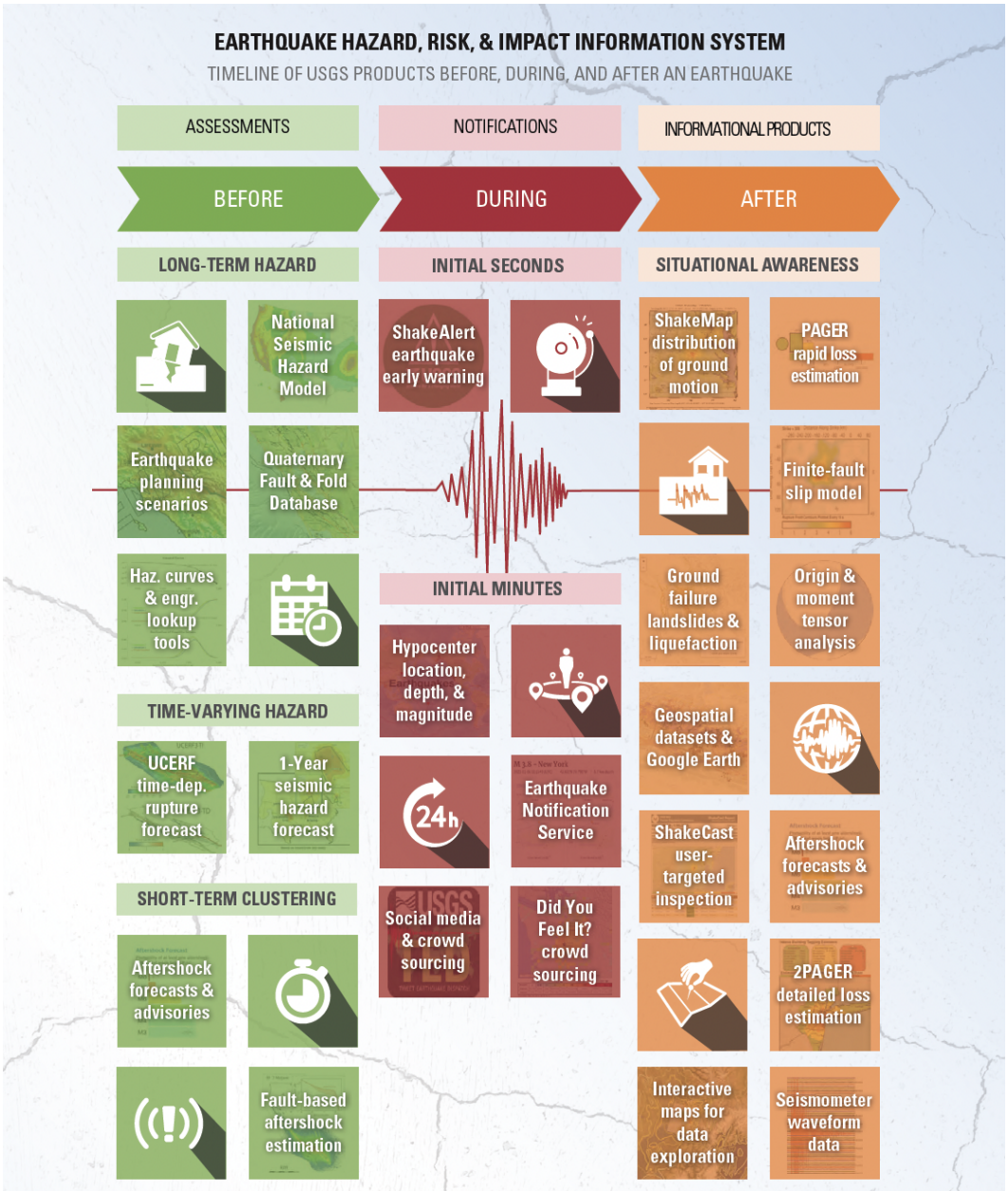


Figure 3. Products of the USGS Earthquake Hazard, Risk, and Impact Information System, shown in relation to the timeline of a significant earthquake. UCERF = Uniform Calif Earthquake Rupture Forecast; PAGER = Prompt Assessment of Global Earthquakes for Response. Image source: U.S. Geological Survey Earthquake Hazards Program Decadal Science Strategy, 2024-33.

SESAC recommends restoring core research and hazard assessment as a central EHP priority. New monitoring initiatives—and advances in ShakeAlert infrastructure in particular—should not come at the expense of core research, and EHP should work toward roughly equal investment in monitoring and earthquake research. Reversing the decline in research funding is especially urgent given major new initiatives supported by NSF, NASA, and other federal partners, including SCEC[xviii], CRESCENT[xix], SZ4D[xx], the Cascadia CoPes Hub[xxi], and NASA's NISAR[xxii] mission. **These programs offer a time-sensitive opportunity for USGS to strengthen its leadership in U.S. earthquake science and leverage substantial academic and federal investments with relatively modest USGS resources.**

Core research is mission-critical to USGS's contribution to NEHRP and underpins emerging priorities identified in the EHP decadal science strategy[xxiii], including induced seismicity, earthquake rupture forecasting, urban seismic hazard, earthquake sequence analysis, and integration of geodetic data into the National Seismic Hazard Model. **Sustained investment in core science is essential to the future of the EHP and to meaningful progress in earthquake hazard reduction.**

Recommendation 5. SESAC urges EHP to devote at least 50% of its effort to core research and hazard assessment and to account explicitly for the research impact of long-term operations and maintenance costs when planning new monitoring activities.

The issues documented above underscore a **systemic fragility** that threatens both current and future operations of the Earthquake Hazards Program. **A large and destructive earthquake close to home is inevitable.** The USGS will be called upon to provide its unique essential, critical, and urgent information, advice, and support in advance of, during, and after such a likely devastating event. Active stewardship of this invaluable American institution must be a priority.

While the Committee remains impressed by the ongoing and substantive contributions of the Earthquake Hazards Program, the issues described above present daunting challenges to the long-term sustainability, impact, and success of the program.

Emerging Issues

In addition to the current challenges identified in the report, the committee identified several important issues that we highlight for future consideration and discussion by SESAC. These include:

(1) Efforts to reinvigorate research that combines geoscience and public communication and response research that can help ensure that the USGS hazard mitigation programs–and the ShakeAlert system in particular–are effectively communicated with users;
(2) Engagement with other, newly developed hazard advisory groups (e.g., USGS volcano hazard and landslide hazard advisory committees);
(3) Changes to international engagement through the EHP's new collaboration with the State Department's Bureau of Disaster and Humanitarian Response;
(4) Use of artificial intelligence/machine learning in understanding earthquake processes and anticipating their hazards, including assessment of AI/ML for earthquake forecasting and prediction.
(5) Exploring the impact of private organizations' entry into the Earthquake Early Warning arena (e.g., Google Android's Earthquake Alerts System) and its potential impacts on the ShakeAlert system.

We hope that some of these issues can be addressed in SESAC meetings in the coming year.

We are grateful for the open and constructive communication and collaboration with EHP scientific staff and the support of USGS personnel in supporting our committee's work. We are especially grateful to USGS Director Mamula for taking time to meet with our group, and we hope this tradition will continue into the coming year's meetings and beyond. We believe that our current mode of operation with one in-person/hybrid meeting and one online meeting each year supports our activities effectively, especially when complemented by the option for spontaneous meetings as the need arises.

Submitted on behalf of the SESAC Committee, September 30, 2026
Dr. Michael Hamburger (Chair, Indiana University), Dr. Ramon Arrowsmith (Arizona State University), Dr. Maureen Long (Yale University), Dr. Timothy Melbourne (Central Washington University), Dr. Anne Meltzer (Lehigh University), Dr. Michael Oskin (University of California Davis), and Dr. Aaron Velasco (University of Texas, El Paso)

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