

## **National Landslide Hazards Reduction Program Advisory Committee on Landslides (ACL)**

April 1<sup>st</sup>–2<sup>nd</sup>, 2025, Department of the Interior, Washington, D.C.

### **Attendees**

#### ACL Members

- Jennifer Bauer, Appalachian Landslide Consultants, PLLC
- Bill Burns, Oregon Department of Geology and Mineral Industries
- Bill Haneberg, William C. Haneberg, LLC
- Casey Hanell, Washington State Department of Natural Resources
- Kelly Hubbard, Santa Barbara County Office of Emergency Management
- Lorna Jaramillo Nieves, University of Puerto Rico at Río Piedras
- Leslie Jones, Alaska Division of Geological & Geophysical Surveys
- Nina Oakley, California Geological Survey
- Josh Roering, University of Oregon
- Gabriel Taylor, Washington State Department of Transportation
- Joe Wartman, University of Washington

#### Agency Representatives

- Jonathan Godt, U.S. Geological Survey (Designated Federal Officer)
- Jenny Riker, U.S. Geological Survey
- Sarah Hall, U.S. Geological Survey
- Stephen Slaughter<sup>1</sup>, U.S. Geological Survey
- Corina Cerovski-Darriau<sup>1</sup>, U.S. Geological Survey
- Tricia Light, U.S. Geological Survey

#### Speakers and Guests

- Stephen Hughes<sup>1</sup>, University of Puerto Rico at Mayagüez
- Dennis Staley<sup>1</sup>, U.S. Geological Survey

Meeting materials, including presentation slides, are available on the [Advisory Committee for Landslides](#) website.

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<sup>1</sup> Virtual attendee

## ACL Meeting Minutes—Day 1

April 1<sup>st</sup>, 2025, 9:00 a.m.–5:00 p.m. EST

### 1. Welcome

Jonathan Godt, Designated Federal Officer (DFO) of the [Advisory Committee on Landslides](#) (ACL, or Advisory Committee) and USGS Program Coordinator for Landslide Hazards, opened the meeting at 9:00 p.m. EST. Jenny Riker, Associate Program Coordinator for Landslide Hazards, welcomed Advisory Committee members, discussed meeting logistics, and reviewed the meeting agenda and goals.

### 2. Advisory Committee on Landslides member introductions

Advisory Committee members gave brief presentations to introduce themselves, their organizations, and their interests in serving on the ACL. Each member had 10 minutes to present and answer questions.

**Joe Wartman** described his work as a Professor of Civil Engineering and Director of the RAPID Natural Hazards Reconnaissance Facility at the University of Washington. Wartman has previously collaborated with the USGS Earthquake and Landslide Hazards Programs and was involved in efforts to craft the National Landslide Preparedness Act.

**Gabriel Taylor** described his work as the Assistant State Engineering Geologist at the Washington State Department of Transportation and his experiences with emergency response, geotechnical design, and landslide inventorying and monitoring. Taylor is interested in bringing his perspectives on state agency capabilities and resources to the ACL.

**Josh Roering** described his work as a Professor of Earth Sciences at the University of Oregon and his experience in landslide-related research, tool development, and community engagement, particularly in Southeast Alaska. Roering emphasized his strong interest in improving translation of science for risk mitigation in landslide-prone communities.

**Nina Oakley** described her work as a Geohazards Climatologist at the California Geological Survey and her experience using weather information to inform decisions related to landslides and debris flows hazards. She aims to bring an interdisciplinary perspective to the ACL's work and guide the application of landslide science to protect life, property, and infrastructure.

**Leslie Jones** described her work as the State Geospatial Information Officer for the Alaska Division of Geological & Geophysical Surveys (DGGs), where she coordinates across organizations to optimize the useability of spatial data and imagery, including hazards applications. Jones is also involved in implementation of the Geospatial Data Act. She brings a perspective on state interests outside of the continental U.S. to the ACL and can advise on investments in, applications of, and infrastructure for geospatial data.

**Lorna Jaramillo Nieves** described her work as a Professor at the University of Puerto Rico, Río Piedras, where she conducts teaching and research related to geologic and other natural hazards. She has a long history of collaboration with the USGS on geologic hazards monitoring, preparedness, and response efforts in Puerto Rico. Jaramillo is interested in using hazard science to support public safety and served as an expert advisor to the Government of Puerto Rico during the 2019–2020 seismic sequence.

**Kelly Hubbard** described her work as the Director of Emergency Management for the County of Santa Barbara, California, where she supports mitigation, preparedness, response, and recovery efforts for a range of hazards, including wildfire and debris flows. On the ACL, Hubbard wants to help fill gaps in landslide hazard and risk information and improve science coordination for public safety.

**Casey Hanell** described his work as the State Geologist and Director of the Washington State Geological Survey, where he oversees the development and delivery of geological information for the state. Washington has a long history of damaging landslides, including the deadliest landslide in U.S. history at Oso in 2014. Hanell brings expertise in geomorphology, hazard communication, and actionable hazards science to the ACL.

**Bill Haneberg** described his work as a Geological and Geohazard Consultant for William Haneberg, LLC. Haneberg has over 40 years' experience in landslide hazards science and previously served as the State Geologist of Kentucky and Assistant Director of the New Mexico Bureau of Geology & Mineral Resources. He brings cross-sectoral perspectives and a strong interest in science-based policy decisions to the ACL.

**Bill Burns** described his work as the Landslide Team Lead with the Oregon Department of Geology and Mineral Industries (DOGAMI), where he leads efforts in landslide risk reduction, inventory development, and outreach. Burns has previously collaborated with multiple USGS hazard and mapping programs. On the ACL, Burns is interested in advancing national landslide inventory and hazard assessment development and tools and approaches for risk reduction.

**Jennifer Bauer** described her work as the Co-owner and Principal Geologist of Appalachian Landslide Consultants, PLLC, where she supports landslide mapping, monitoring, and evaluations for state agencies, private landowners, and various commercial clients in and around western North Carolina. Bauer supported state and national responses to Hurricane Helene in North Carolina. She has seen how landslide information can save lives and hopes to help the USGS scale up that capacity through her work with the ACL.

### **3. National Landslide Preparedness Act reauthorization**

Godt reviewed the status of [National Landslide Preparedness Act](#) (NLPA) reauthorization for the Advisory Committee, noting the recent introduction of revised legislation ([H.R. 2250](#)) that

resolves differences between earlier reauthorization bills introduced in the House and Senate. Key changes include new language on atmospheric rivers and extreme precipitation events, a focus on defining data-poor areas and areas of need, addition of Native Hawaiian Communities to lists of partners and stakeholders throughout, and expansion of landslide grants recipients to include Institutions of Higher Education. The bill further directs the Secretary of the Interior to establish regional partnerships to coordinate landslide research and align interagency landslide monitoring efforts. Additionally, the draft reauthorization proposes several housekeeping measures, including adding NASA to the ICCLH, extending NLPA authorization to 2029, and increasing budget authorization for the USGS to \$35 million.

#### **4. Regional landslide partnerships and monitoring**

The ACL invited presentations from two successful, USGS-supported regional landslide observation and monitoring efforts to frame a discussion of regional landslide partnerships.

**Stephen Hughes**, Professor of Geology at the University of Puerto Rico at Mayagüez, briefed the ACL on island-wide landslide monitoring efforts in Puerto Rico established and operated in collaboration with the USGS and National Weather Service. Puerto Rico experiences multiple types of landslide hazards, including rockfalls, debris flows, and deep-seated landslides, and was the site of the [deadliest landslide in U.S. history](#) in 1985. In 2017, Hurricane Maria triggered over 70,000 landslides in Puerto Rico. Following this widespread and damaging event, UPR and USGS collaborated to update the territory's previously hand-drawn landslide susceptibility map and strengthen landslide monitoring capabilities across the island.<sup>2</sup> This effort evolved into the current [Puerto Rico Landslide Hazard Mitigation Office](#), which aims to advance research and monitoring of landslide hazards in Puerto Rico.

After Hurricane Maria, recognition that antecedent moisture influences landslide susceptibility in humid tropical soils prompted the development of soil monitoring stations to track how hillslopes respond to rainfall. The now island-wide network now has [18 monitoring stations](#) hosting a variety of sensors in a range of soil types. Each station telemeters near-real-time data that are made available on a public website. During Hurricane Fiona in 2022, this monitoring data enabled Hughes to notify emergency managers when landslides were expected. Combined with rainfall forecasts, the monitoring array has the potential to enable landslide forecasting in Puerto Rico 1–2 days out, and advancing this capability is a focus of current efforts. Challenges include keeping stations operating in a harsh, tropical environment, anticipating power and communication failures, delivering landslide alerts vs. forecasts, reaching target audiences, determining the right number of stations for situational awareness, and maintaining data and reports. Continuity of operations is also a challenge—the Puerto Rico Landslide Hazard Mitigation Office is not a state agency. It works closely with community partners and collaborators to achieve its goals.

- The Advisory Committee asked if rainfall thresholds had been established prior to Hurricane Fiona to inform landslide alerts, and whether runout assessments are available for

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<sup>2</sup> [Map Depicting Susceptibility to Landslides Triggered by Intense Rainfall, Puerto Rico \(Open-File Report 2020-1022\)](#)

Puerto Rico. Hughes explained that alerts during Fiona were based on past experience with observed soil moisture level rather than thresholds. Current susceptibility maps for Puerto Rico show where landslides are likely to initiate, not where they will travel, though colleagues have created runout models for specific municipalities.

- The Advisory Committee asked how UPR would sustain funding for landslide monitoring efforts. Hughes confirmed UPR has funding support through 2026 and will do their best to secure additional support for work beyond that date.
- The Advisory Committee was impressed by UPR's work with local communities and asked how they solicit community engagement. Hughes stressed the need for persistence. Puerto Rico is small, so they work through personal connections and show up at people's doors. [Tsunami Ready](#) is well-established in Puerto Rico, and UPR is starting a [Landslide Ready](#) initiative targeted to the island's interior municipalities.
- The Advisory Committee asked how best to leverage regional partnerships for local capacity and workforce development, especially of trained cadres likely to stay in the area. Hughes explained students are essential to their program, and many community connections come through students. Some students go on to work for the USGS, Natural Resource Conservation Service (NRCS), National Oceanic and Atmospheric Administration (NOAA), etc. Through Landslide Ready, UPR also works to strengthen the capacity of local emergency managers.
- The Advisory Committee asked how specific monitoring sites were chosen—were they representative, or canaries in the coal mine? Hughes answered that they chose sites representative of larger geographic areas. Land ownership, power supply, cell service, ease of access, and distance from other stations were also important factors in site selection.
- An Advisory Committee member noted similar siting considerations in Alaska, where they train community members to support maintenance and tracking of remote monitoring stations.
- An Advisory Committee member suggested a collaborative model for monitoring partnerships where multiple groups contribute and get what they need (e.g., different types of sensors). Cost sharing increases the probability of sustaining sufficient resources to maintain operations.

**Dennis Staley** of the USGS Landslide Hazards Program and Alaska Volcano Observatory spoke to the Advisory Committee about ongoing, collaborative, USGS-led efforts to monitor landslide hazards in Alaska. Over the past 4 years, this work has focused on the slow-moving Barry Arm landslide, which has potential to accelerate and cause a local tsunami in Prince William Sound and the harbor town of Whittier. In 2021, Congress directed the USGS to work in Prince William Sound to develop a site-specific landslide hazard assessment and recommendations to support long-term monitoring. Together with partners at DGGs, National Oceanic and Atmospheric Administration (NOAA) National Tsunami Warning Center (NTWC), Alaska Earthquake Center (AEC), and Alaska Department of Homeland Security and Emergency Management (DHSEM), the USGS now monitors deformation of the slide using a variety of geophysical,

ground-based, and remote sensing techniques. A USGS-led landslide-generated tsunami hazard assessment indicated a worst-case ~2 m wave in Whittier. Building on these efforts, the USGS, NTWC, and City of Whittier are developing an experimental tsunami warning system using tidal gages at different distances from the landslide. The system could issue a warning as early as 8 minutes after landslide failure, about 20 minutes before a tsunami would hit Whittier.

Interest in landslide monitoring has since grown across the state. Surveillance techniques piloted for Barry Arm can also be applied to other slow-moving landslides in the region; an initial USGS inventory found 90 large, slow-moving landslides near Prince William Sound alone. The USGS is also actively working to expand landslide monitoring capabilities in Southeast Alaska. Challenges to that expansion include regional variability, monitoring site representativeness, data availability, and access to field sites.

- The Advisory Committee asked when glacial formations are or are not part of a landslide. Staley clarified that the Barry Arm glacier is not part of the Barry Arm landslide, but it can contribute to the instability of the adjacent slope.
- The Advisory Committee asked what type of warning the prototype Barry Arm system issues, whether the system had been used, and how well it worked. Staley explained the warning is for tsunami, not landslides; the warning is binary and issued if a tsunami is detected near the landslide source. There have not been any landslides large enough to trigger a warning since the prototype system was put in place, though the system has detected several wave-producing glacial calving events. Another Committee member clarified that the NTWC is ultimately responsible for issuing tsunami advisories. They send advisories to local Weather Forecasting Offices, who release wireless emergency alerts as appropriate. The local community is still responsible for communicating protective actions (e.g., evacuation) or activating warning sirens.
- An Advisory Committee member asked how to transition tsunamigenic landslide monitoring from research to operations, noting DGGs has mapped tens of thousands of landslides in glacial terranes in Alaska. How can we bridge the gap between landslide maps and landslide risk assessments that can inform decision making? Staley noted that only some large, slow-moving landslides have the potential for major impacts, and the USGS and partners are working to prioritize operationalization for high-threat slides.
- An Advisory Committee member asked what had been done to understand the triggering mechanism of Barry Arm-type landslides—critical to assessing probability—and if mitigation had been considered. They noted you can “fix” some landslides but only monitor others. Staley responded that mitigation is not practical at Barry Arm, and certain types of field assessments are not safe to undertake. However, the USGS can evaluate what is driving acceleration and how failure might occur using multiple data sources and techniques, including shear tests of samples.

## **Discussion**

Godt and Riker invited a discussion of regional partnerships for landslide observation and monitoring with the following prompts:

- How should regions be defined for purposes of landslide monitoring?
- How should the USGS prioritize new monitoring efforts for risk reduction?
- What does a successful regional landslide partnership look like?
- How could observation efforts be structured, sustained, or scaled?

The Advisory Committee asked about the status of [regional interest groups](#) established under the USGS-led [National Landslide Hazard and Risk Reduction Working Group](#). How are those groups different from the proposed regional partnerships, and how do they feed into this objective? Godt clarified that the interest groups are spaces for practitioners to share information and best practices, rather than conduct USGS-supported operations. Sarah Hall noted that interest groups are just getting started and articulating their work plans for the year.

The Advisory Committee asked about Congressional intent in establishing regional partnerships. Are they focused on particular geographic hotspots? Godt and Riker explained that Alaska features prominently in budget report language. The National Landslide Hazard Reduction Program is also national in scope, and draft reauthorization language emphasizes data-poor and poorly monitored areas. Alaska is one area of focus as the USGS supports expansion of landslide monitoring capacity region-by-region.

Advisory Committee members suggested multiple criteria that could be used separately or in combination to define regions, including geography and physiography; jurisdictional boundaries; landslide triggers (e.g., rainfall, earthquakes, permafrost degradation); risk, vulnerability, and/or resilience; state of hazard and risk knowledge and tools; and the scale, cost, or level of effort required to reduce risk.

The Advisory Committee asked for a definition of “interagency” in the context of regional partnerships. Godt explained LHP interprets the term broadly to include any organization that can contribute to landslide monitoring and warning efforts, e.g., Federal, State, Tribal, territorial, local, non-governmental, etc.

The Advisory Committee asked how the draft legislation defines “monitoring” and the intended purpose or use of monitoring information, e.g., science, warning, mitigation? Riker explained that the reauthorization bill does not specify the purpose of landslide monitoring, but the USGS has a role in monitoring to support science and technological advancement (e.g., refining monitoring techniques; establishing rainfall thresholds) and to inform decision making (e.g., issuing landslide alerts; recommending protective actions). The USGS does not routinely issue landslide alerts. For weather-related landslides, the USGS works with NWS to issue alerts through existing warning products.

Advisory members shared examples of successful regional partnerships:



- The Alaska Mapping Executive Committee (AMEC), a model for regional cost sharing that could be implemented in other parts of the U.S. AMEC is a Federal partnership, but it allows each agency to bring their own capabilities to the table and facilitates more effective communication.
- A long-standing USGS-led regional partnership for volcano monitoring in Alaska, collaboratively funded and executed by the USGS Alaska Volcano Observatory, DGGs, and the University of Alaska Fairbanks.
- A successful collaborative effort to translate Portland State University and USGS research into lidar-derived maps used by DOGAMI for landslide risk reduction. The maps raised awareness of landslide hazards among the public, local government, and private sector partners.
- The [Southeast Alaska Landslide Information and Preparedness Partnership](#) (SLIPP), a regional community of practice that emerged from landslide hazards work in Sitka, AK. SLIPP early in the process of creating actionable products, but it has strong buy-in from local communities. They used external facilitation to provide necessary structure and to help build community engagement.

A member suggested regional partnerships could be leveraged in a response to bring partners together, as regions are impacted by the same types of events (e.g., after Hurricane Helene). A member suggested the ACL spend more time at their next meeting sharing examples of successful regional partnerships.

An Advisory Committee member stressed the importance of end user communication for effective warning and the need to engage social scientists in defining communication approaches. They gave an example from Kentucky, where many residents lack cell phone service. When asked about the most useful format for sharing hazard information, community members requested print outs that they could copy at public libraries and distribute. Godt commented on the limitations of cellular and mobile data communications during the Hurricane Helene response.

An Advisory Committee member distinguished between factors that could *define* regions, and factors that could help *prioritize* regions. Prioritizing communities that are ready to partner can be an efficient use of resources. For example: Does the region have an alerting program? Who is the alerting authority in the region? Who can direct protective actions? Is the region able to utilize monitoring information? For alerting to successfully reduce risk, a community needs to understand landslide risks, impacts, and actions to take. This can be challenging for communities where hazard assessments show uniformly high hazard.

Advisory Committee members suggested criteria for prioritizing regions, including community buy-in, community resilience, feasibility of risk reduction, existing partnerships, and availability of suitable decision support products.

An Advisory Committee member pointed to the need to consider what methods or procedures might look like in the future when building partnerships.



An Advisory Committee member reminded the ACL that communities are people who manage their own emergencies. It is important to know what regions can do currently, what they may or may not be able to do in a disaster, and to provide support to fill gaps in processes, training, etc. ahead of an event.

## **5. Cooperative Landslide Hazard Mapping and Assessment Grants**

Sarah Hall and Stephen Slaughter (USGS Landslide Hazards Program) provided an overview of USGS Cooperative Landslide Hazard Mapping and Assessment Grants Program and sought input on program priorities. In both FY24 and FY25, the program provided \$1 million in Federal assistance as competitive grants to eligible entities (State, Tribal, territorial, and local government organizations only). In FY24, applicants requested \$1.3M across 15 proposals, of which 9 were funded. In FY25, applicants requested \$3M across 26 proposals; 12 were funded. To date, the grants program has funded work in 14 states.

The program prioritizes projects that reflect National Strategy goals, provide a 50% cost match, and include acquisition of enhanced elevation data. All proposals must address at least one of three guidance criteria:

1. Landslide hazard mapping and assessment,
2. Planning and coordination, and
3. Education and outreach.

Most awards are for landslide mapping, including lidar-based mapping and landslide inventory development. Successful proposals addressing Guidance Criteria 2 have included working groups or needs assessments. Projects addressing Guidance Criteria 3 include outreach components as well as capacity building efforts. Some awards are narrowly focused on landslide hazard mapping and assessment, while others address all three prioritization criteria.

Hall recommended items for the Advisory Committee to consider in discussion:

- Modifying, streamlining, or emphasizing current guidance criteria
- Adding rotating guidance criteria with more prescriptive emphasis
- Linking proposals to LHP science priorities, e.g., post-fire debris flows
- Providing guidance criteria related to recent significant landslide events

## **Discussion**

The Advisory Committee questioned the rationale for the 50% match. Hall clarified the match is a criterion for prioritization as mandated by the NLPA, but not a requirement. Making the match a requirement could discourage applications, given that many applicants may not be able to match funds. Communities without matching funds may be most in need of funding support.

An Advisory Committee member suggested it would be easier for applicants to advocate for matching funds if they can say they are required. The program announcement could better emphasize how the match leads to prioritization and increases chances of success.

An Advisory Committee member suggested mapping projects be required to address Guidance Criteria 2 or 3, to encourage sharing of outputs. Hall and Slaughter agreed and explained awardees have been asked to share their findings with the National Landslide Hazard and Risk Reduction Working Group.

An Advisory Committee member asked if the evaluation matrix is public. Slaughter answered that it is linked in the [program announcement](#). LHP would appreciate advice on how to make the announcement more accessible, particularly to Tribes and municipal governments.

An Advisory Committee member suggested linking grant priorities to [3D Elevation Program \(3DEP\) Data Collaboration Announcements](#).

Several Advisory Committee members advised against a rotating geographic emphasis for grant calls. Narrowing geographic eligibility could negatively impact workforce development and capacity at state surveys, where many staff are on temporary funding arrangements. Another member noted a lack of local capacity to apply for grants during disaster response and recovery, arguing geographic calls in recently impacted regions could be counterproductive.

An Advisory member asked if eligible agencies could partner on grant applications, and how. Hall explained many applications involve multiple partners, and missed opportunities for partnership are flagged in the review process. The USGS can give more explicit guidance that partnerships are allowed and encouraged. Riker noted the ICCLH recommended that Federal agencies work to align Federal grant opportunities (e.g., FEMA [Hazard Mitigation Assistance Grants](#)) that could reinforce or amplify outputs of the landslide grants program.

The Advisory Committee discussed leveraging grants to promote standard, minimum schema for landslide mapping and inventory development. An Advisory Committee member recommended connecting to departments of transportation to help develop common minimum fields. Another member suggested the grants program go beyond schema to recommend mapping methodology. Riker shared that several ICCLH agencies have requested a baseline schema to ensure consistency of Federal landslide mapping efforts. Others suggested standard schema could promote development of datasets ready for machine-learning, encourage mapping of runout, document certainty of mapped landslide perimeters, and ease provision of information during responses. Several members suggested formalizing a working group to develop a standard schema and integrating schema use into grant prioritization criteria.

An Advisory Committee member asked if grants could provide rapid response resources. Slaughter explained that the grants program lacks capacity for rapid response at current funding levels, but this is something we would like to pursue in the future.

An Advisory member advocated for flexibility in grant priorities and evaluation, noting organizations have vastly disparate capacities. Lidar coverage is not complete in the U.S., for example. Some organizations have fraught relationships with state agencies. Being too prescriptive could discourage certain agencies from participating. Hall agreed and suggested regional partnerships could help to build trust between groups and assist local entities with proposals.

**6. Public comments**

No members of the public registered to speak.

**7. Adjournment for the day**

Godt thanked attendees for their attention and participation and adjourned the meeting for the day at 5:00 p.m. EST.

## ACL Meeting Minutes—Day 2

April 2<sup>nd</sup>, 2025, 9:00 a.m.–1:00 p.m. EST

### 8. National Landslide Hazard Reduction Program product overview

Godt provided an overview of current USGS Landslides Hazards Program (LHP) priorities and products. LHP is one of 6 hazards programs in the Natural Hazards Mission Area (NHMA) and has grown substantially since 2021. In FY24, LHP's enacted budget was \$14.4 million, \$10.2 million of which went to science centers to support project work, including a substantial portion dedicated to landslide hazards work in Alaska. LHP currently supports about 60 staff and would be able to sustain that level of staffing for several years under flat budgets.

LHP aims to increase public safety by providing landslide hazards science and information to reduce risk. Godt highlighted core products and lines of efforts, including:

- The [National Landslide Susceptibility Model](#).
- [Post-fire debris flow hazard assessments](#) and progress towards operational post-fire debris flow inundation assessments that show the likelihood of travel distance and path for different design storms. This includes a recent [user needs assessment](#) for the new inundation hazard products.
- Efforts to constrain nationwide landslide frequency to inform county-level risk assessment and support an update to [FEMA's National Risk Index for landslides](#). The in-progress update now utilizes USGS landslide susceptibility and frequency assessments, combined with a vulnerability calculation.
- The new Landslide Assessments for Situational Awareness and Response Research (LASER) project, and related efforts to improve Federal coordination before and during landslide response and develop [rapid post-event hazard assessments](#).

Godt explained that landslide hazards can't always be avoided, so landslide products and information need support early warning and protective action. The USGS relies on partnership with the NWS for landslide alerting, under their authority to issue weather-related warnings. A core objective of the National Landslide Hazard Reduction Program is to advance national capacity to get landslide information to those who need it (e.g., Federal partners, affected communities) in a coherent and useable way.

Riker asked the Advisory Committee for input on the current portfolio of LHP products in view of the objectives of the National Landslide Hazards Reduction Program. She asked what perspectives the USGS should consider when developing national-scale products, and how these should work alongside regional and local sources of landslide information.

### Discussion

Several Advisory Committee praised the suite of LHP products as impressive and appropriate. Discussion focused on a) integrating runout into hazard and risk assessments, b) advancing capabilities for landslide risk assessment, c) developing landslide forecast products, and d) assessing how users need and respond to USGS landslide information.

### Landslide hazard and risk assessments

The Advisory Committee made several suggestions to improve or guide development of hazard and risk assessments, such as including worst-case scenarios for debris flow inundation assessments to aid emergency planning; providing layperson user guides with susceptibility and debris flow products; and increasing the resolution of landslide risk information beyond the county or Census tract level, particularly in Alaska.

The Advisory Committee encouraged the USGS to move towards characterizing risk, noting planners need clear and objective standards to work towards to prioritize, for example, life safety. This type of information is better drawn from risk assessments than hazard assessments, and the National Risk Index does not necessarily provide what they need. Godt explained the USGS would likely need to take a broad view of landslide risk that is less engineering-focused and includes qualitative information. For example, the NRI for earthquakes is expressed as annualized loss and estimated from fragility curves and shaking probabilities. Similar information, e.g., on building performance, is not readily available for landslides.

The Advisory Committee highlighted the [Temblor app](#) and California Office of Emergency Services [MyHazards tool](#) as examples of public-facing hazard and risk assessments. For landslides, the bulk of some counties are designated as high hazard, and it is not possible to tell how the hazard level relates to specific landslide triggers (e.g., earthquakes vs. rainfall). This makes it difficult to use the assessments for emergency planning. Godt indicated that parsing landslide triggers in assessments is a goal, but this is challenging due to the current state of landslide science.

An Advisory Committee member expressed concern that rock fall may be underrepresented in the National Landslide Susceptibility Model and National Risk Index. Godt clarified that landslide types are lumped together in these models. Others pointed out that landslide types and terminology vary across agencies and sectors.

The Advisory Committee asked if USGS co-seismic landslide products are funded by LHP or the Earthquake Hazards Program (EHP). Godt explained the product is a joint effort by both programs. Riker added the product is widely used internationally for post-event situational awareness, as large earthquakes are relatively frequent globally.

Several members underscored the importance of establishing a standard schema to guide development of local landslide inventories. These are the foundational datasets from which national landslide hazard and risk assessments are derived.

### Landslide forecast and warning products

Advisory Committee members asked about the availability of national landslide forecasts. Godt explained there is no USGS landslide forecast product at this time, though that is an aspiration. NASA's [Landslide Hazard Assessment for Situational Awareness](#) (LHASA) model offers a coarse, worldwide landslide forecast based on global precipitation forecasts and landslide susceptibility. A member noted local pilot projects that use rainfall forecasts and susceptibility to generate landslide forecasts (e.g., in California) and suggested there may be opportunities to apply this approach elsewhere.

The Advisory Committee discussed how the USGS transmits landslide hazard information to support early warning, e.g., by NWS. Godt acknowledged it is difficult to forecast exactly where and when a landslide will occur. However, blanket landslide warnings, such as those about debris flow likelihood included in NWS flash flood products, are still useful for decision makers and individuals who want to take protective action.

The Advisory Committee asked whether landslide warnings were issued for Hurricane Helene. Godt and Riker explained that the USGS and NWS were aware of potential for catastrophic landslides, and NWS issued strong landslide warning language in North Carolina as the storm approached. The USGS did not have a landslide forecast data product in the days leading up to the event, though this information was requested by several Federal partners.

The Advisory Committee advised that science translation should be at the forefront of warning product development. Individuals ultimately need to know to leave their house if it rains hard enough for long enough. Easy-to-digest websites that link weather forecasts to landslide risk in plain language are valuable tools. For example, the [Sitka, AK, landslide risk dashboard](#) gives historical context relating current rainfall to past landslides and provides the data used to assess alert levels. Perhaps landslide susceptibility information could be integrated into local alerting tools like the [North Carolina Department of Transportation BridgeWatch app](#), which combines real-time monitoring data from multiple sources with bridge and road impact parameters.

Godt agreed that knowing when not to worry is useful for communities, i.e., distinguishing potentially harmful rain from rain not likely to be dangerous. The Advisory Committee commented on the risks of “negative predictions,” noting Italian [seismologists prosecuted for a false negative earthquake prediction](#) at L'Aquila.

The Advisory Committee recommended landslide products that highlight multi-hazard risk and package data in ways that enable users to use, repackage, and present it as they need. Products should clearly communicate uncertainties to aid prioritization of life and safety. Godt agreed that at the current scope and scale of the National Landslide Hazard Reduction Program, the USGS is focusing on providing landslide information that others can easily ingest.

### Landslide product communication and user needs assessment

The Advisory Committee queried the extent to which the USGS has engaged emergency managers in product development, and what the USGS understands about how they and other decision makers use the portfolio of products. Godt answered that LHP had recently hired a social scientist to advance landslide product development, building on approaches used to develop ShakeAlert and other USGS earthquake products. Related to this, Riker noted nascent efforts to develop a USGS-led social science community of practice focused on landslide hazard and risk.

The Advisory Committee was not aware of any efforts to engage local emergency managers (e.g., through [FIREScope](#) or [International Association of Emergency Managers](#)) in national-scale product development. A member with emergency management experience offered to walk through the decision-making process from an emergency management perspective at a future meeting.

The Advisory Committee commented on the importance of communicating the return on investment of landslide science and products to those outside the scientific community. Product users may not care how an assessment was built, but they care about hazard outcomes.

Riker alerted members to the new USGS Office of Risk and Resilience (ORR), which focuses on communicating hazard and risk information to those who need it in useable ways. She suggested that the Advisory Committee invite ORR, perhaps alongside end users, to share their work and perspectives on USGS landslide products at a future meeting.

An Advisory Committee member proposed a future discussion on how USGS products impact the economics of communities (e.g., real estate, insurance, infrastructure development) that face landslide risk.

An Advisory Committee member spoke to their experiences communicating hazard information in Puerto Rico. End users may struggle to find the information they need, or to act on information when confronted with incomplete datasets or large areas of high hazard. Others view risk as part of nature and feel unable to do anything about it. She asked the ACL to consider how the USGS might influence people's reactions to landslide hazard and risk information.

## **9. Open discussion**

To close the meeting, Riker and Godt invited open discussion of Advisory Committee functions and processes, the ACL's relationship with the ICCLH, meeting tempo, and future meeting topics. They welcomed questions and reflections from members.

### **Advisory Committee chairs**

Riker reminded the Advisory Committee that DFO Godt invited self-nominations for ACL Chair and Co-Chair in January. Several members have since come forward. Godt and Riker would appoint individuals to serve in the two positions.



### Advisory Committee functions and processes

Riker invited three members who had served on other Federal advisory committees to share their advice and experiences. They highlighted a need to structure committee activities around tangible outputs, such as recommendations. They recommended using subcommittees to advance work between official meetings and garner input from subject matter experts. They also stressed the need to balance actionable and aspirational recommendations, to leverage recommendations to elevate good work, and to consider how granular recommendations should be. Aspirational recommendations can help to nudge direction, while recommendations that are realistic and aligned with the objectives of the sponsoring agency are more likely to be adopted. For many reasons (political, budgetary, etc.), making recommendations doesn't mean they will be adopted.

Godt reminded the ACL that there are multiple audiences for ACL recommendations, beyond the ICCLH (e.g., Department, Administration, Congress, etc.).

An Advisory Committee member asked about the ACL's role in emergency response. Riker explained that the lead time needed to schedule official meetings is long (2–3 months) and would prevent the full Advisory Committee from meeting promptly. However, the ACL could appoint a subcommittee to undertake ad hoc committee work related to response, e.g., to solicit input.

### Interacting with the ICCLH

The Advisory Committee discussed how to interact with the ICCLH. Riker explained the ICCLH is comprised of 11 Federal agencies, nine of which are named in legislation, and only three of which (USGS, NSF, and NWS) are authorized funds under the NLPA. The USGS chairs the ICCLH, as delegated by the Secretary of the Interior.

The Advisory Committee expressed strong interest in meeting members of the ICCLH and discussed inviting ICCLH members to attend or speak at Advisory Committee meetings. They were especially interested in response, warning, and land management perspectives.

The Advisory Committee asked whether the ICCLH or the USGS is responsible for making decisions based on ACL recommendations. Riker explained the ACL submits recommendations to the ICCLH, and as the ICCLH Chair, the USGS will lead on responses in consultation with the ICCLH. The ICCLH also reports biennially to Congress on its implementation of ACL recommendations. Godt added that the USGS is still assessing the interagency vetting or clearance process for ICCLH responses.

The Advisory Committee asked how NSF spends its authorized funds and whether the Advisory Committee would make recommendations regarding NSF funding calls. Godt and Riker explained that while the NLPA authorizes funding for NSF, there is no appropriation for the National Landslide Hazard Reduction Program in the NSF budget, which is apportioned in broad thematic buckets. Through the ICCLH, NSF advises on opportunities to advance landslide hazard and risk reduction science primarily through existing NSF programs and calls. While the

Advisory Committee could choose to make recommendations to any ICCLH agency, the ICCLH is chaired by the USGS, and the ACL's recommendations will have the greatest influence on the USGS. To encourage action by another Federal agency, the ACL could consider recommending that the USGS work with that agency to advance a specific objective.

The Advisory Committee asked how far in advance the ICCLH needs to receive ACL recommendations. Riker explained that the [ACL charter](#) does not specify a timeline for reporting. The ICCLH generally meets in person each February or March, and it would be helpful for them to receive the ACL's recommendations several months in advance.

An Advisory Committee member recommended the ACL consider whether the priorities addressed by recommendations are short- or long-term, as this will help determine the necessary pace of reporting.

#### Meeting schedule and tempo

The Advisory Committee expressed an interest in setting a schedule for annual meetings as far in advance as possible. Riker explained that the DFO (Godt) and Chair and Co-Chair, once appointed, would meet and propose a schedule of meetings for the year.

An Advisory Committee member suggested a quarterly tempo for annual meetings, e.g.: Q1—decide priority topics and assign subcommittee leads; Q2—Gather information and develop draft recommendations; Q3—Review and decide on recommendations; Q4—Finalize written recommendations.

#### Bylaws

Riker clarified for the group that the Advisory Committee is not required to have bylaws, and the DFO does not intend to develop bylaws at this time. The ACL can revisit this decision if needed.

#### Priority topics for future discussion

The Advisory Committee made general recommendations about how to prioritize discussion topics. They suggested balancing discussion of science priorities and end-user needs by encouraging dialog between researchers and practitioners at future meetings. They also recommended the ACL be intentional about the sub-groups they set up and the priorities they pursue, to maintain focus and keep work moving forward.

The Advisory Committee also suggested topics for future ACL consideration, including:

- Regional partnerships
- Standardization of landslide inventories
- Guidance on forecasting and warning tools and their use
- Use of landslide hazard maps for planning

- Activities of the National Landslide Hazard and Risk Reduction Working Group

They concluded that synthesis of this meeting's discussion would be helpful before discussing priorities and recommendations further.

## **10. Adjournment**

Godt thanked attendees for their participation and adjourned the meeting at 1:00 p.m. EST.

*We hereby certify that to the best of our knowledge the foregoing minutes are accurate and complete:*

- Jonathan Godt, Designated Federal Officer, 8/1/25
- William Haneberg, Chair, 7/31/25
- Nina Oakley, Co-Chair, 7/31/25