Dr. Ned Mamula

Director, U.S. Geological Survey

12201 Sunrise Valley Drive, Mail Stop 100

Reston, VA, 20192

Dear Director Mamula:

The National Volcano Early Warning and Monitoring System Advisory Committee (NVEWSAC) is charged with providing advice and recommendations to the Secretary of the Interior through the Director of the U.S. Geological Survey; outlining opportunities for coordination; and leveraging of resources between governmental organizations and academia to increase the efficiency of NVEWS implementation. In 2025, the NVEWSAC held a two-day virtual meeting on July 29-30, and two subcommittee meetings on December 03 and December 04, the outcomes of which were subsequently approved by the full advisory committee. Several of the NVEWSAC, including one of the co-chairs, left the advisory committee during the last year. Jennifer Wade (National Science Foundation) has joined Leif Karlstrom as co-chair, and replacement of vacated member positions is in progress with a Federal Request for Nominations notice posted on September 09. The attached report summarizes NVEWSAC recommendations that developed following discussions during our 2025 meetings. If any issues require clarification, please don't hesitate to contact us.

Sincerely,

The co-chairs of the NVEWSAC:

- Leif Karlstrom (University of Oregon)
- Jennifer Wade (National Science Foundation, Directorate for Geosciences)

Current Members of the NVEWSAC:

- Lauren Boyd, Department of Energy
- Nelia Dunbar, New Mexico Bureau of Geology & Mineral Resources
- Casey Hanell, Washington Department of Natural Resources
- Yvette LaDuke, California Governor's Office of Emergency Services
- Michael Manga, University of California Berkeley

- Matthew Pritchard, Cornell University
- Karen Shelton-Mur, Federal Aviation Administration
- Ariel Stein, NOAA Air Resources Laboratory
- Brian Terbush, Washington State Emergency Management Division
- Christy Till, Arizona State University
- Jeffery Williams, Fish and Wildlife Service, Alaska Maritime National Wildlife Refuge

NVEWSAC members who left the committee in 2025

- Douglas Howard (National Oceanic and Atmospheric Administration, Center for Satellite Applications and Research)
- Benjamin Phillips, National Aeronautics and Space Administration
- Steven McCabe, National Institute of Standards and Technology, Materials and Structural Systems Division
- Stephen Dornbos, Department of Defense, Global Resilience Policy
- Erin Campbell, Wyoming State Geological Survey

Cc: Jake Lowenstern, Acting USGS Volcano Science Center director

**Status of NVEWS at USGS Volcano Observatories.** A priority for the July NVEWSAC meeting was to hear from all USGS volcano observatory Scientists In Charge (SICs) about the status of NVEWS in their observatories. NVEWS-related instrumentation and planning have occurred at all five USGS Volcano Observatories in 2025, although there are still critical monitoring gaps that have yet to be filled on volcanoes deemed by the USGS to be Very High or High Threat, with continuing operation and maintenance costs of the observational networks that are critical for sustaining NVEWS. Continuing challenges for permitting of new instrumentation were reported at several observatories.

**NVEWS Full Implementation and phasing.** As of 12/16/2025, bill H.R. 3176 has passed the House of Representatives, was received in the Senate and read twice and referred to the Committee on Energy and Natural Resources. This bill would reauthorize NVEWS through FY2030, although the House and Senate versions currently have different proposed end dates.

*The Committee's primary recommendation is that the NVEWS program be fully implemented.* The Committee noted that the Watch Office and grants program components of NVEWS have been authorized but not appropriated funds.

The Watch Office can serve an important role in monitoring low-level activity with clear direction on when to alert Volcano Observatories directly if activity heightens. While some observatory staff respond to events 24/7, operational monitoring is not part of their role description and a Watch Office could professionalize that responsibility, and relieve a burden placed on existing watch centers (like NEIC) which feel less comfortable monitoring volcanoes at progressively higher alert levels. A transfer of responsibility to volcano experts may be more appropriate, and only possible via appropriation. Appropriated funds for NVEWS will be critical for the success of NVEWS and USGS goals. Discussions with observatory SICs during our July meeting highlighted that reliability and staffing limitations make maintaining a 24/7 Duty Scientist difficult. Some cross-observatory assistance exists, but duty scientist work generally requires local presence. Current staff are already stretched.

The grants program can serve to increase the impact and dissemination of data collected by NVEWS by soliciting participation from academic research institutions, thus leveraging USGS and expanding the reach of the Program. Specific areas where academic research can contribute are detailed in the subcommittee meeting reports below, and in our resulting recommendations to develop USGS White Papers outlining research and technology needs.

Academic researchers will contribute on issues critical to volcano monitoring such as threat level re-assessment and sensor network design, and explore emergent observational, data processing, and modeling techniques that can contribute to the success of NVEWS implementation. Academic engagement through a grants program will also benefit training, workforce development, and outreach efforts that are critical for maintaining NVEWS in the long-term and US leadership in volcano science and monitoring. The Committee recommends that the grants program be *prioritized*, which will immediately energize the academic community to contribute to NVEWS and aid in the parallel development of similar monitoring programs internationally.

**Subcommittee Meetings.** Two NVEWSAC subcommittee meetings were conducted following the July 2025 virtual meeting. These meetings facilitated discussion on particular challenges for NVEWS. 12/03/25 focused on distributed/hydrothermal hazards; 12/04/25 focused on USGS volcano threat level reassessment.

Because NVEWS was originally developed with an emphasis on stratovolcanoes, a number of important volcanic hazards are not effectively encompassed by the current monitoring and threat level assessment framework. These hazards include hydrothermal explosions and distributed volcanism but also 'cascading hazards' like lahars, water quality impacts (specifically raised as a concern during recent activity at Mount Spurr in Alaska), and long-term sedimentation impacts. For example, lahars from Mount Baker down the Nooksack River have caused the river to change course into Canada, creating international concerns. Such hazards are common enough to

warrant better monitoring, characterization, and (particularly for hydrothermal hazards) focused technology development. This would significantly benefit from academic research enabled by a NVEWS grants program, given limited USGS resources.

There are also unresolved challenges of communicating to stakeholders from public to private to government, as the threat level reassessment proceeds. When there are changes to the list/ranking of active volcanoes, there are downstream consequences both in terms of NVEWS monitoring efforts but also for state emergency planners and with respect to public perception of scientific credibility. For example, if a volcano is downgraded in its threat level that could be as significant as an upgraded threat level from the standpoint of emergency planners, due to resources already invested in the current list.

**NVEWSAC Recommendations.** Following three meetings in 2025, the NVEWSAC has the following recommendations:

1. Fully implement the NVEWS program.
2. Develop public-facing documents (e.g., 'glossary of events') that explain volcanic hazards and possible impacts in the specific area with historical context. For example, in the southwest United States, in the last 15,000 years there have been three lava flows that intersected the current location of I-40. If the southwest region was considered as a whole it would likely meet a Very High Threat ranking. Specific estimates of life-safety and economic impacts would be valuable to policy makers. This recommendation, while applicable to all US volcanoes, is particularly needed in the southwest region.
3. Develop documents accessible to the research community (white papers or reports) that outline key areas where academic research can aid NVEWS. If the NVEWS grant program proceeds, such documents could help focus this program. White papers also help PIs justify the impact of their research to other agencies such as NSF and NASA. Distributed volcanism and hydrothermal hazards, as well as cascading hazards stemming from volcanic activity not currently considered by NVEWS directly (detailed previously in this report), would be examples. New technologies and approaches - for example better integration of microphones and webcams into monitoring packages - are likely necessary for effective monitoring of hydrothermal hazards.
4. Develop USGS Scenarios (prior examples include those from the SAFER group and current FEMA efforts in Region 10) around less well understood hazards. There has never been a standalone table-top exercise for hydrothermal hazards, and there are questions about how best to integrate hydrothermal monitoring into NVEWS activities at current VHT volcanoes. There are also opportunities to better interface with geothermal industry with a NVEWS perspective (such as Mazama, currently in active operation at Newberry volcano).

5. The NVEWSAC would benefit from a member who is a social scientist, given potential challenges for public communication with the hazard reassessment and engagement with private and public entities tasked with communicating volcanic hazards.
6. The NVEWSAC would benefit from a tribal representative, given discussions about redefining volcanic fields in the ongoing Threat Level Reassessment.
7. NVEWSAC still needs representation from DOD, USFWS, and Wyoming Survey (DOE is unknown/pending). This list assumes that new NVEWSAC nominees are approved.

Leif Karlstrom

NVEWSAC co-chair

JENNIFER A WADE

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Jennifer Wade

NVEWSAC co-chair