

**DRAFT 2025
SOUTHEAST ALASKA
LANDSLIDE RISK REDUCTION
STRATEGIC PLAN**



Introduction

Southeast Alaska is known for its magnificent landscapes, its rich Indigenous cultures and vibrant communities. Yet, beneath its picturesque beauty lies a formidable natural challenge: landslides. This Southeast Alaska Strategic Plan for Landslide Risk Reduction is crafted to address the pressing need for a comprehensive regional approach to managing and mitigating landslide risks. *While we cannot prevent landslides, understanding and addressing their risks will help us protect the lives, livelihoods, and infrastructure that are integral to the communities of our region.*

The Need for a Landslide Strategic Plan

The unique topography and climate of Southeast Alaska make it particularly susceptible to landslides. Characterized by steep, rugged mountains, dense forests, and heavy annual rainfall, the region has been experiencing landslide events for thousands of years. In 1936, a landslide took the lives of 15 people in Juneau, and in 1993, a landslide took one life in Skagway. But since 2015, the number of deaths from landslides has steadily increased. Deadly landslides have taken lives in Sitka(2015), Haines (2020), Wrangell (2023), and Ketchikan (2024).These geohazards are having devastating impacts on the local populace, disrupting transportation routes, damaging homes and businesses, interfering with mental health, and posing significant threats to public safety. As changes to precipitation patterns continue to mean an increase in frequency of extreme weather events in Southeast Alaska, landslides are expected to increase in populated areas (Li, Zhe, Quing Ding, 2024) *Currently, we can't control the weather or the likelihood of more landslides, but we can control the likelihood of more tragedies.* This strategic plan is meant to formalize the needs of our local communities, municipalities and Tribes and then operationalize next steps for understanding landslides. It is an essential guiding document to proactively address these challenges and to utilize our resources efficiently as a region, so that we can effectively mitigate risks and respond swiftly and as consistently as practicable to incidents when they occur.

The Special Nature of Southeast Alaska

Southeast Alaska is home to a diverse array of communities, including Tribes with deep cultural ties to the ocean and the land. The region's economy and culture are heavily reliant on natural resources, like tourism, mining, logging and fishing, which are industries that are particularly vulnerable to landslide disruptions. The social and economic fabric of Southeast Alaska is intertwined with its natural environment, making the protection against landslide tragedy not only a safety imperative but also a crucial component of economic development and cultural sustainability. Additionally, because our communities are accessible only by plane or boat and most are not connected to one another, there is a unique need to share resources and connect with each other on how to monitor, plan, mitigate and respond to this particular type of natural disaster.

SLIPP - The Southeast Landslide Information and Preparedness Partnership

Landslide risk reduction requires a team of experts, agencies, and local knowledge. The idea of a formal organization that assists in creating a venue for communities and agencies to share knowledge was developed by communities in 2024 during a landslide meeting in Sitka. A working group was formed, and monthly meetings occurred. That group created the Southeast Alaska Landslide Information and Preparedness Partnership (SLIPP), which is facilitating this strategic planning effort.

SLIPP's mission is to reduce the risk of landslide disasters in Southeast Alaska by sharing and coordinating local knowledge, current research and mitigation through communication, advocacy, engagement and response.

SLIPP's vision is to create a sustainable and active hub of landslide information for Southeast Alaska. This organization will blend the interests and goals of agencies, Tribal and local communities and all those with a stake in landslide disaster prevention by raising awareness, training, sharing resources, and coordinating efforts.

Who is putting this Plan Together

This plan is a product of Southeast Alaska Landslide Information and Preparedness Partnership (SLIPP), an organization that has been in development since 2015 and formalized in 2024. SLIPP is made up of state, federal, academic, local, and Tribal partners including:

Central Council Tlingit Haida Indian Tribes of Alaska(T&H),

U.S. Geological Survey (USGS),

U.S. Forest Service (USFS),

Sitka Sound Science Center (SSSC)

NOAA, National Weather Service (NWS),

University of Alaska Fairbanks (UAF),

State of Alaska Division of Geological & Geophysical Surveys (DGGS),

State of Alaska Department of Transportation & Public Facilities (DOTPF)

State of Alaska Alaska Division of Homeland Security & Emergency Management (DHSEM),

Southeast Conference (SEC)

Academic partners at University of Oregon, Scripps Oceanographic, RAND Corporation and University of Alaska

Community Collaborators Inc.

Community members, city planners and Tribal members in Sitka, Hoonah, Juneau, Ketchikan, Yakutat, Klukwan, Klawock, Craig, Skagway, Petersburg and Wrangell.

The Goals of this Plan

The Southeast Alaska Landslide Risk Reduction Strategic Plan is designed to prioritize efforts to protect life and property from landslides by encouraging:

1. Mapping and Understanding: Conduct thorough geological surveys to identify areas prone to landslides, including slope stability analysis and soil type evaluations. Develop maps that show the likelihood of landslides occurring in specific areas, aiding in land-use planning and infrastructure development. Evaluate the potential impacts of landslides and landslide-induced tsunamis on people, property, infrastructure and historic and cultural protection and preservation to prioritize mitigation efforts. Understanding also includes answering new research questions (posed by community members, agencies and scientists) that will further our knowledge of landslides in Southeast Alaska and reduce the risk of landslide tragedy down the line.

2. Early Warning Systems (EWS): *Monitoring Systems:* Implement monitoring systems to track rainfall, soil moisture, and slope deformation, which can indicate impending landslides. *Predictive Models:* Develop models that predict landslide events based on environmental factors and historical data. *Alert Systems:* Establish communication channels to alert communities about potential landslide risks and provide timely evacuation instructions.

3. Planning and Mitigation: Making community-based choices in planning and zoning that protect life and infrastructure from landslide risk. Recommend engineering measures to stabilize slopes, such as: retaining walls. Construct retaining walls to prevent soil erosion and slope failure. Drainage systems: Improve drainage systems to reduce water saturation in slopes, which can trigger landslides. Vegetation Management: Plant and maintain vegetation on slopes to enhance soil stability and reduce erosion. Design and maintain roads to accommodate drainage and retain hillslope integrity.

4. Response and Recovery: Landslide response and recovery includes search and rescue, which is locating and rescuing people trapped by landslides; damage assessment; repairing damaged roads, utilities, and buildings. Psychosocial support: providing support to individuals and communities affected by landslides; rebuilding and relocation by assisting families in rebuilding their homes or relocating to safer areas.

5. Community Awareness and Preparedness: *Public Education:* Educate communities about landslide risks, prevention measures, and emergency response procedures. Work with the Alaska Youth Stewards program and other existing community groups to educate and facilitate relevant local workforce development fostering community safety. *Community Engagement:* Involve local communities in landslide risk management issues like planning, and training.

STRATEGIC PLAN PRIORITIES

The below ACTIVITIES have been developed by agencies, Tribal staff, community leaders, and municipal planners and prioritized by the SLIPP Steering Committee.

The WHO section lists partners who are willing to assist in getting the activities accomplished. The WHO section can be expanded and revised to include entities that have resources and the will to assist. Actions will be tracked through time and reported out at the annual meeting.

1. Mapping and Understanding Landslides in Southeast Alaska

Mapping and interpreting past landslides improves forecasting and prediction of future landslides. Local landslide processes are examined through field work, landslide mapping, and measuring environmental drivers of landslides, such as rainfall, soil moisture, and pore water pressure. This knowledge informs landslide susceptibility, hazard and risk mapping, which are critical tools for enhancing situational awareness, mitigating landslide impacts, and developing response and land use plans

ACTIVITIES:

1 to 3 Years

- Develop specific landslide inventory maps WHO: DGGS, SSSC, Local communities, municipalities and Tribes, USFS, community elders (Traditional Knowledge)
 - Landslide inventories record the location of known landslides; effort needs to be made to identify the timing of known slides so that precipitation levels can be associated with specific events. USFS has an inventory of landslides within the Tongass National Forest and is currently working on time stamping as many slides as possible. The Kuti project was able to locate and identify the timing of several hundred slides on Prince of Wales Island. Kuti in conjunction with the Chilkat Indian Village is recording the timing of slides above the 23 mile slide on the Haines Highway. DGGS has acquired data from the Tongass National Forest and is constructing a statewide landslide inventory and has developed a reporting app.
- Advocate for increased capacity for landslide work at DGGS WHO: SLIPP
 - SLIPP has been advocating in Juneau and DC for funding to support landslide research and risk reduction in Southeast Alaska. Sen.

Murkowski has introduced a bill reauthorizing the National Landslide Preparedness Act, which will continue funding for landslide research in Alaska.

- Use SLIPP as a mechanism to connect partners with each other including academic, state and federal agencies in regards to research. (see 3. Technical Assistance for Community Land Use Planning and Mitigation in Southeast Alaska below). [WHO: SLIPP](#)

3 to 5 Years

- Support and network the existing landscape observers in Local Communities/Municipalities/Tribes [WHO:T&H, Indigenous Guardians, Local communities, municipalities and Tribes, SLIPP](#)
 - A critical part of SLIPP is a group of local observers who are deeply conversant with landslide-related issues in their Local Communities/Municipalities/Tribes. Ideally, these are people employed by municipalities or Tribal governments. Funding to train and support observers is a long-term goal of SLIPP.
 - They are instrumental in developing local questions and identifying data needs.
- Develop community and area-specific Lidar for each community and region. [WHO: DGGs, USGS, USFS, Local communities, municipalities and Tribes.](#)
 - LIDAR is critical to mapping landslide initiation and runout. This work is ongoing and requires funding.
 - Inventory of lidar from USGS, DGGs, Local Communities, municipalities and Tribes

5 Plus Years

Below are important research questions. The answers will help refine our understanding of how, when and where landslides occur in SEAK. Because these questions require research projects to answer, completing them will take time. WHO: This work will be completed by partnerships between academic entities and USGS and DGGs.

- Understanding colluvium (loose material) and geology on hillsides in each community using field data, existing tools, and AI modeling [WHO: Academic Partners, SSSC, DGGs](#)
- Evaluate geology and geomorphology contributing to areas being monitored for soil processes and characteristics [WHO: USFS](#)
- Conduct surveys to better understand the geomorphology specific to each community and the water movement (drying and wetting) through the rocks and soil. [WHO: USGS, DGGs, Academic Partners, SSSC](#)

2. Landslide Risk Dashboards in Southeast Alaska

ACTIVITIES:

Development of warning systems or risk dashboards requires knowing when and where landslides occur (see **Mapping and Understanding Landslides in Southeast Alaska** above), understanding what conditions trigger landslides, monitoring for those conditions, and communicating this information to the public. There is a sequential aspect to the activities below. Critical thresholds for landslide initiation cannot be identified without data describing when landslides occur and the coincident meteorological and hydrological conditions. Hence, monitoring is needed before predictive models can be constructed. Similarly, you cannot construct warning systems or dashboards without knowing where hazards pose risks and the values of critical thresholds. Risks are defined by constructing maps that relate runout to infrastructure and defining risk is fraught for municipalities. Some locations in SEAK are further along this path than others. In addition, there are some locally observed thresholds that can provide communities with things to watch for.

Monitoring Systems:

1 to 3 Years

- Identify landslide hazards for communities in Southeast Alaska
Construct risk maps including initiation and potential runout, to help to identify areas of concern. [WHO: DGGs, Kutí, Local communities, municipalities and Tribes.](#)
- Time-stamp landslides in Tongass Landslide Inventory so slides can be associated with specific storms. [WHO: USFS](#)
- Develop a regional strategy for instrumentation that supports scientific monitoring for each community. [WHO: DGGs, USGS, NWS, USFS, T&H, SLIPP Technical Team.](#)

The strategy should address:

- Data Sharing needs to include getting data to the NWS via Synoptic or MADIS (Meteorological Assimilation Data Ingest System) so that it can be incorporated in forecasts.
- Ensuring that people know how to access the data including meteorological soil moisture. [WHO: USGS, NRCS, DGGs, other entities that work with instrumentation](#)
- Working on developing a uniform set of specifications for devices across the region. Doing so will simplify long-term maintenance; local experts can help each other when issues arise. This is challenging because

many different groups want to start recording data, but researchers and forecasters cannot use the data unless it has long-term stability and reliability. Moreover, different locations are likely to have different data needs. Instrument packages can be quite expensive to deploy and consistent maintenance is critical to quality data. [WHO: SLIPP Technical Team, T&H](#)

- Developing a training program so that instruments can be maintained locally. Note it takes a long time to gain familiarity and facility in maintaining, troubleshooting, and repairing instruments. Sensors and electronics are very technical in nature; the care and maintenance requires dedicated effort. [WHO: SLIPP, T&H, DGGS, USGS](#)
- Develop a long-term maintenance plan for instruments to ensure consistent data availability. The plan should include visiting sites multiple times per year for routine inspection and maintenance [WHO: SLIPP, USGS, DGGS, Local communities, municipalities, and Tribes, T&H, utilities, phone or power companies](#)
 - Should include commitments from partners to fund and maintain instrument function

3 - 5 Years

- Build out the regional instrumentation strategy and maintenance plan: [WHO: DGGS, USGS, USFS, NRCS](#)
- Install more high altitude weather stations (2-3 per year) [WHO: USGS, DGGS](#)

Predictive Models (Element thresholds):

1-3 Years

Develop **regional** rainfall intensity thresholds (possibly based on soil classification) for rainfall intensity and durations. [WHO: USGS, Academic Partners, Community Collaborators, and NWS](#). In addition there are existing return intervals in the NOAA Atlas14 data set. These have been developed from NWS forecasts and atmospheric models.

- Aggregate and distribute “Rules of Thumb” magnet for evacuating places like the Port St. Nicholas Rd on POW (that includes things that homeowners can look for in order to make a decision to evacuate). [WHO: Local communities, municipalities and Tribes, T&H, SSSC, Kutí](#)

- Use historical landslide and storm event data to identify landslide-inducing storms and establish rainfall intensity thresholds for interesting partner communities. WHO: [Kutí](#)
- Begin research into important questions regarding landslide initiation and propagation including [WHO:USGS](#), [DGGs](#), [NWS](#), [USFS](#), [Academic Partners](#), [SSSC](#)
 - Identification of the role of other meteorological/hydrological parameters such as wind, soil moisture in landslide initiation.
 - Identification of human factors such as roads, timber harvest, and infrastructure that might contribute to landslide risk.

3-5 Years

- Analysis of correlation between mesoscale weather model prediction and landslide occurrence. Get from atmospheric rivers, need another postdoc to look at this. [WHO: Academic Partners](#), [SSSC](#), [NWS](#), [USGS](#)
- Better define soils types so they can be considered in risk maps

5 Plus Years

- Evaluation of distributed hydrologic model (NW) estimates for soil moisture in Alaska. [WHO: Academic Partners](#), [SSSC](#), [DGGs](#), [USGS](#)
 - Not possible till NWS's national water model is in Southeast AK - Several years from now
 - Requires paired obs of events and weather data
- Construct re-analysis models to develop spatially extensive data [WHO: Academic partners](#), [SSSC](#), [Kutí](#)
- More sophisticated hazard and runout mapping to be continuously developed and offered in accordance with Tribal and community needs and priorities. [WHO: SSSC](#)

Alert Systems:

1- 3 Years

- Development of local dashboards. [WHO: Local communities, municipalities and Tribes, Kutí, Community Collaborators](#), collaborate with [NWS](#), [USGS](#), [DGGs](#)
 - Local dashboards that improve situational awareness can begin development now in some communities. Important elements of a

dashboards include uninterrupted real-time data displays, ensuring the public has timely and easy access, the information is simple to interpret, and there is a commitment from the community to maintain the dashboard and associated infrastructure over time. Currently, Kūtí is developing a dashboard for partner communities of Prince of Wales. *One product of this effort is a protocol (including costs) that can be adapted for other communities.*

- Dashboards should include local risk maps (see Risk Map Development section) that depict where there is a higher likelihood of landsliding, and potential runout paths. [WHO: Kūtí](#)
- Conduct public education programs to assure community buy-in that highlight landslide risk and how to interpret dashboard data. This includes highlighting communication channels in each community to alert community members about potential landslide risks and provide timely evacuation instructions. SEE COMMUNITY ENGAGEMENT SECTION [WHO: Kūtí, Local communities, municipalities, and Tribes](#)

5 Years Plus

Future alert systems should be tailored to community needs and driven by Tribal and community entities. Possible alert systems can maintain features of the dashboards including local financial support, an integrated system for communicating the risk throughout the community, incorporation of the system into disaster planning, and/or pushing alerts via cell phones. These features are in addition to developing forecast landslide risk over some predefined or more granular spatial areas. [WHO: Local communities, municipalities and Tribes, Kūtí, Community Collaborators, NWS, USGS, DGGS](#)

3. Community Land Use Planning and Mitigation in Southeast Alaska

Land use planning and mitigation for landslides is an area in need of growth for this region. Most Southeast communities voiced concern over the lack of the engineering expertise and the planning expertise available to assist in laying out new developments or mitigating existing developments in landslide-prone areas. Since 2000, through the Disaster Mitigation Act (DMA), Hazard Mitigation Plans (HMP) have been required by the federal government through the Federal Emergency Management Agency (FEMA) for states, Tribes, and local governments to become eligible for a host of assistance and grants for non-emergencies and disasters, including planning for landslides. Southeast Alaska communities need increased awareness about the requirements and value of HMPs, but they also need assistance

with the technical requirements and other activities involved in land use planning and mitigation for landslides.

Annual:

- Present on landslide research and its application to emergency response planning at the Alaska Chapter of American Planning Association / State of Alaska Emergency Management Conference [WHO: SLIPP or T&H](#)
- Hold an annual workshop (or seminar, virtual meeting, training session, etc.) to educate community leaders and planners on landslide loss risk reduction strategies and mitigation opportunities. [WHO: UAF's CASC and Sustainable Southeast Partnership, Local community, municipal and Tribal planners.](#)

1-3 Years

Foundational Development, Support, and Coordination of Hazard Mitigation Plans (HMPs)

1. Gather Tribal staff, municipal/community leaders, constituents, and planners together in Southeast to share information about landslides and provide landslide planning education annually [WHO: T&H, SSSC, USGS, NWS,USFS](#)
 - Requirements, benefits, and process of Hazard Mitigation Planning
 - Engage and invite local community, municipal and Tribal leaders and state leaders in Oregon and Washington to share their landslide-based experiences with us/communities
 - Share examples of previously approved and adopted Hazard Mitigation Plans that include landslides.
 - Strategies and resources that are available
 - Develop resource inventories
 - Facilitate development of Multi-Jurisdictional HMPs (MJHMP) (eg., POW)
 - Assist communities in developing debris removal plans
 - Maintain a real-time inventory of heavy equipment, shelters, food/water supplies, and fuel caches per community.
 - Suggest developing agreements for equipment-sharing or mutual aid between nearby towns (especially on POW; they want a coordinated response plan).
2. Develop a framework or workflow for communities to create HMPs (perhaps based on existing tools). Create guidance to help communities navigate the process, identify existing resources, and connect with funding resources to support development of HMPs. [WHO: State of Alaska Homeland Security,FEMA Tribes and Local communities, municipalities and Tribes](#)
3. Advise on how to engage planning commission/community leaders on how to use HMP effectively [WHO: FEMA, State of Alaska, Local communities, municipalities and Tribes.](#)

4. Develop landslide planning and risk reduction guidance and training materials to help inform community leaders, land managers, and decision makers across Southeast Alaska about:
 - The importance, use, and implementation of landslide hazard risk assessments and susceptibility mapping.
 - The applied use of landslide hazard and risk databases to inform land use and zoning decisions
 - Landslide loss reduction strategies such as restriction of development in landslide-prone areas; codes for excavation, grading, landscaping, and construction; physical measures (drainage, slope geometry modification, structures, etc.) to prevent or control landslides; and development of warning systems. [WHO: SLIPP, Southeast Conference, T&H and Local communities, municipalities and Tribes](#)
5. Encourage review of existing Southeast Alaska community hazard mitigation plans to identify plans that do not include landslide hazards or need to be updated to reflect the current state of practice. Engage these communities and advocate for updates while connecting the communities with resources to support updating their plans. [WHO: Local communities, municipalities, and Tribes and T&H](#)

3-5 Years

1. Bring in mitigation experts to help communities evaluate their most pressing issues in existing neighborhoods built in risky areas. [WHO: SLIPP, Southeast Conference and T&H](#)
2. Engage Southeast Alaska community leaders, land managers, industry specialists and decision makers to develop boilerplate/template zoning codes and ordinances that can be adopted by individual communities to help reduce landslide losses. [WHO: SLIPP, Southeast Conference, T&H](#)

5 Plus Years

Communities: Review and rewrite Hazard Management Plans

Ongoing

1. Identify funding for hazard planning, plan implementation and plan updates
2. Training on how to identify and incorporate nature-based mitigation solutions

4. Response and Recovery in Southeast Alaska

Encourage collaborative response and recovery efforts that foster partnerships among local governments, Indigenous Tribes, state agencies, and federal partners to ensure a unified and effective approach to landslide response and recovery.

- ACTIVITIES:

Annual

- Sharing annually lessons learned from communities for response [WHO: SLIPP](#)
- Coordinate annual or semi-annual response drills simulating different landslide scenarios with local governments, Tribal organizations, state and federal agencies. [WHO: State of Alaska Homeland Security](#)
- Educate the importance of evaluation and update of community response protocols based on drill results. [WHO: SLIPP, Local communities, municipalities and Tribes, State of Alaska Homeland Security SOA- Garrett Brooks](#)

1-3 Years

- Maintain a rotating, on-call roster of landslide experts during high-risk seasons that can be called on for assistance during a landslide [WHO: State of Alaska Homeland Security](#)
- Provide annual regional trainings for landslide response with [WHO: National Guard, Southeast EMS, T&H and Partners](#)
 - Year one - develop materials
 - Year two - implement course / annual training
- Host Conversation around embedding trained mental health professionals into response to support communities/responders during and immediately after landslide events. [SLIPP invites -State of Alaska Homeland Security, Southeast Alaska Regional Health Consortium, Crisis K9s, and Academy of Traumatology](#)
- Work with communities to identify alternate routes or marine transportation options if roads are blocked. [WHO: Transportation Long Range Planning](#)
 - Coordinate with the Alaska Marine Highway and local operators for emergency boat transport.

3-5 Years

- Develop a Southeast Alaska Landslide strike team of experts who can quickly assess slope stability, access routes, and infrastructure damage post-landslide to guide response and recovery [WHO: John Pennington - \(UAF\)](#)
- Aim to have a Small Community Emergency Response Plan (SCERP) in each Southeast Alaska community, with focus on a coordinated response plan for POW - [WHO: Local communities, municipalities and Tribes](#)

5 Years Plus

- Investigate the idea of developing a regional Landslide Emergency Response App or Portal(Local Communities/Municipalities/Tribes.) [WHO: SLIPP and Local communities, municipalities and Tribes.](#)

5. Enhancing Community Awareness and Preparedness

Enhance local readiness by providing education, training and resources to communities, ensuring they are equipped to respond effectively to landslide events.

ACTIVITIES

1-3 Years

- Public service announcements(public radio and social media) reminding people to listen to National Weather Service, and to locate evacuation alternatives to prepare for landslide warning messages or prepare in a way that the community has decided upon.
 - Using community systems for this - [WHO: SLIPP, Local communities, municipalities and Tribes](#)
- Hold monthly meetings for the region to share landslide information so the broadest audience possible understands a breadth of landslide issues [WHO: SLIPP](#)
- Develop SLIPP facebook page to relay information of landslide research, education, emergency response and planning [WHO: SLIPP](#)
- Update regional Environmental Monitoring Map [WHO: SSSC \(Western Washington\)](#)
- Update data base/spreadsheet about other landslide research [WHO: Arctic T-Slip and SLIPP](#)
- Maintain regular communication with Tribes, community members, responders and agencies through emails, phone calls and social media about what is being learned about landslides and how to prepare [WHO: SLIPP and Tribes](#)
- Set up a buddy system asking people to bring new collaborators/partners to the monthly meetings [WHO: SLIPP Steering Committee, Local communities, municipalities and Tribes](#)
- Connect with T&H communication department to assist with communication about landslide preparedness in communities [WHO: SLIPP](#)
- Create online surveys to get feedback and increase community engagement [WHO: T&H](#)
- Present at Southeast Conference about landslide information and preparedness [WHO: SLIPP](#)
- Present to the State Legislature about landslide information and preparedness - [WHO: SLIPP](#)
- Present on landslide risk, SLIPP and Kutí at the Southeast EMS conference [WHO: SLIPP or Committee member](#)

- Help promote NWS weather ambassador program through email, radio and news [WHO: SLIPP](#)
- Provide annual community presentations about landslides, risk and preparedness in several communities each year [WHO: SLIPP](#)
- Connect with Culture Clubs for landslide education [WHO: T&H](#)
- Investigate working with SEARHC or counselors about helping people with landslide anxiety. Help communities gather more mental health information about relationship between landslide risk and mental health (panic, anxiety, and then after response and recovery) [WHO: Red Cross, and SLIPP](#)
- Pull together local construction businesses to discuss landslides [WHO: Local communities, municipalities and Tribes, and Southeast Conference](#)
- Offer training for outside researchers to work with local Tribal governments in order to build trusted relationships and engage in culturally-relevant ways. [WHO: SSSC](#)

3-5 Years

- Present at State Emergency Management Conference - [WHO: SLIPP](#)
- Work closely with each Tribe so they are aware of the geohazard environmental monitoring that is going on in their area.
 - Advocate for Landscape Observer in every community - to oversee data collection in their area and make decisions on additional instrumentation needs and data use. [WHO: T&H, Local communities, municipalities and Tribes, SLIPP](#)
 - Local Tribes Data Sovereignty
- Promote a family-based emergency response plan to [WHO: T&H](#)
- Flyer in backpack
 - Neighborhood safety next
- Mount Edgecumbe engagement
- Work with Tribes on pooling historical knowledge of Indigenous people's relationship to landslides [WHO: T&H, Tribes](#)

5 Plus Years

- Increase landslide awareness region wide thru social media and regular media - continuous
 - Work with communications experts to develop effective risk communication [WHO: Academic Partners](#)
 - More strategic planning needed here from Communications in SLIPP
- Investigate interest in a "Landslide Ready Program" [WHO: SLIPP and Local communities, municipalities and Tribes](#)

https://docs.google.com/spreadsheets/d/1rf3RLg9Y_YuiHYIWMhcula67ensw2zAC/edit?usp=sharing&ouid=108594760997881481980&rtpof=true&sd=true

Roles and Responsibilities

SLIPP is a group of state, local, federal, Tribal, municipal, non-profit, and academic organizations that together share their skills and expertise for the safety of the region. Each primary organization has its unique roles and responsibilities.

Southeast Communities, Municipalities and Tribes

The idea of organizing a hub for landslide information and preparedness came from needs expressed by communities and Tribal organizations in Southeast Alaska. For SLIPP, communities and Tribes are responsible for providing local knowledge and local expertise on community needs and capacity. This can be done through formal or informal landscape observers, first responders, municipal planners, Tribal leaders and environmental monitoring technicians or anyone deemed by the community to represent them or provide information to the hub. Municipal planners want assistance planning community development and Tribes have said they want funds for geohazard local observations and monitoring personnel. Tribes and Municipal governments who participate in SLIPP are putting in staff time and investing in technical and expertise resources to monitor, mitigate and respond to landslides.

Central Council Tlingit and Haida Indian Tribes of Alaska (T&H)

Ray Paddock Environmental Director, rpaddock@tlingitandhaida.gov Sabrina Gubitz, Public Safety Manager, sgrubitz@tlingitandhaida.gov

T&H is the largest federally-recognized regional tribe in Alaska and provides support services throughout Southeast Alaska. It provides SLIPP coordination and administration as well as community-based environmental monitoring technical assistance. T&H works closely with 19 Tribes across Southeast Alaska supporting Tribes through funding, coordination and providing outside expertise when it's wanted. T&H through a cooperative agreement with USGS is a leader in SLIPP coordination holding regular meetings and providing communication between agencies, Tribes, researchers and other experts. Also, T&H has the largest mutual aid program in the region providing emergency management services and responders in a variety of ways to Tribal communities that request assistance. Emergency services can be personnel, food, supplies, human power and specialty services needed during a landslide response and recovery.

Sitka Sound Science Center (SSSC)

Contact: Luka Silva, silva@sitkascience.org, Nick Mathews, nmathews@sitkascience.org, Lauren Bell, lbell@sitkascience.org. Sitka Sound

Science Center is a non-profit dedicated to research and education for coastal Alaska and works throughout Southeast Alaska. SSSC is a hub for geoscience research in the region and partners communities and academics to pursue research questions relevant to geohazards and their risks. As part of their work SSSC trains researchers from outside the region in how to best work with local and Tribal communities to build trusted relationships and communicate and engage with communities in culturally appropriate ways. SSSC also coordinates research, helping to locate funding and creating teams of experts to work with Tribes, municipalities and communities on issues important to them.

United States Geological Survey (USGS)

Dennis Staley, Research Physical Scientist, dstaley@usgs.gov Anchorage office

Under the National Landslide Preparedness Act, USGS works in Southeast Alaska and Prince William Sound with federal, state, and local partners to:

- Conduct data collection and analysis to develop a site-specific landslide hazard assessment
- Provide recommendations to support a long-term monitoring strategy
- Develop an emergency system to alert of an impending or actual landslide that could result in a tsunami

USGS operates the National Landslide Hazards Program, dedicated to understanding landslide initiation and mobility processes. The USGS Landslide Hazards Program is the only Federal program dedicated to landslide hazard science. The program conducts targeted studies to understand landslide initiation and mobility processes. This understanding is used to: develop methods and models for landslide hazard assessment, develop and deploy systems and people to monitor threatening landslides where there is a federal role and develop methods and tools for landslide alerting, surveillance and situational awareness.

USGS maintains a U.S. Landslide Inventory and Interactive Map, a web-based tool for accessing landslide data. In addition, the USGS directs the National Landslide Hazard Risk Reduction Working Group (NLHRR) that creates a common platform that 1) leverages expertise from different agencies, 2) communicates best practices, 3) develops collaborative projects, and 4) provides input for a grant program. The NLRB has monthly national meetings online and ten working groups that meet quarterly

US Forest Service (USFS)

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The Forest Service is the largest landowner in Southeast Alaska and manages the Tongass National Forest. As a majority landowner in Southeast Alaska, many landslides in the region initiate on land managed by the US Forest Service. The USFS

contributes to landslide hazard assessment by inventorying landslides, maintaining a road condition database, and utilizing best practices when implementing management actions on steep slopes. The USFS does geologic, hydrologic and landform mapping, and utilizes GIS, models, and technical expertise to mitigate risk of landslides on forest service lands. In some communities in Southeast Alaska, the USFS works with tribes and through forest partnerships, to identify and mitigate risks on other land ownerships. Land use practices on the Tongass require resource expertise when managing steep slopes for activities like timber harvest, trail building and road construction. In addition to forest management activities, the USFS includes the Pacific Northwest Research Station, a research entity employing a variety of scientists.

NOAA National Weather Service (NWS)

Contacts: Jeff Garmon | Meteorologist in Charge, jeff.garmon@noaa.gov
Nicole Ferrin | Warning Coordination Meteorologist, nicole.ferrin@noaa.gov
Aaron Jacobs | Senior Service Hydrologist/Meteorologist, aaron.jacobs@noaa.gov

The National Weather Service (NWS) provides forecasts and alerts related to weather, hydrologic, and climate conditions that can lead to an increased risk of landslide impacts and alerts the community of such conditions. This is done by mentioning landslides in flood products as an impact from other meteorologic/hydrologic conditions when forecasted values exceed criteria. NWS also issues forecasts of heavy rainfall (atmospheric rivers) which often trigger landslides.

In addition, the NWS issues various products like Special Weather Statements, Flood/Flash Flood Watches, and Areal Flood Warnings to alert the public. Satellites, radar, and ground observations are deployed to monitor heavy/extreme rain events. NWS is also working on new models that involve atmospheric river consequences. Also, NWS partners with USGS, USFS, and local emergency management agencies. Emergency officials and community leaders can receive customized text messages and email alerts for National Weather Service products with InteractiveNWS (iNWS) Mobile Alerting: <https://inws.ncep.noaa.gov/>. Region-specific landslide hazard data can be found on the National Weather Service website: <https://www.weather.gov/ajk/>.

Alaska Department of Transportation & Public Facilities (AKDOT)

Contact: Travis Eckhoff | Southcoast Region Materials Engineer,
travis.eckhoff@alaska.gov,

The Alaska Department of Transportation and Public Facilities' (DOT&PF) manages landslides that impact Alaska's transportation infrastructure through its Geotechnical Asset Management (GAM) Program. Data used to inform the GAM program, including Unstable Slope Management Program ratings and landslide event inventory, is publicly facing and available online through the Alaska DOT&PF GeoHub. DOT&PF's Geohazard Response Team supports landslide emergency response. The team consists of geotechnical engineers, engineering geologists, and technical staff specializing in geohazard evaluation and risk assessment. The team is a deployable Strike Team that

can be requested through the State Emergency Operations Center (SEOC) if a catastrophic landslide event occurs.

DOT&PF partners with the Division of Geological & Geophysical Surveys (DGGS), university teams, and federal agencies to map and assess unstable slopes and landslide-prone corridors. DOT&PF conducts ongoing slope and weather monitoring, detecting bank erosion during heavy rainfall. DOT&PF's South Coast Region Materials Section often is among the first on site. After the deadly November 2023 Wrangell landslide, DOT&PF Materials staff deployed drones and GIS teams to support search and rescue, debris mapping, and recovery and mitigation.

Alaska Division of Geological & Geophysical Surveys (DGGS)

Contacts: Jillian Nicolazzo, Acting Landslide Hazards Program Manager, Geologist
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Cheryl Cameron, Geologic Hazards Section Chief, Geologist.
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The Alaska Division of Geological & Geophysical Surveys (DGGS) is a state agency within the Department of Natural Resources. Their mission is to determine the potential of Alaskan land for production of metals, minerals, fuels, and geothermal resources, the locations and supplies of groundwater and construction materials, and the potential geologic hazards to buildings, roads, bridges, and other installations and structures (AS 41.08.020). This statutory mandate guides DGGS's work in geological and geophysical surveys, resource assessments, and hazard evaluations throughout Alaska. Their mission supports informed decision-making for resource development, infrastructure planning, and public safety. When called upon by the State Emergency Operations Center, DGGS responds to geohazard events such as landslides.

Division of Military and Veterans Affairs Division of Homeland Security and Emergency Management (DHS&EM)

Contact: Jeremy Agne, jeremy.agee@ak-prepared.com

The operations team responds in-person to severe incidents, assisting communities in establishing or supporting their Emergency Operation Centers (EOCs). They help coordinate resources needed for response and recovery efforts, and are actively involved in community activities as requested by local leadership. This includes speaking at meetings, conducting interviews, helping with disaster assistance forms, gathering assessments, setting up shelters, and activating Mass Care services for both humans and animals. The team works closely with outside agencies and VOAD organizations such as the Red Cross, Salvation Army, and religious groups to coordinate resources and volunteers. They also collaborate with the Disaster Assistance team to establish Disaster Assistance Centers (DACs),

provide case management, and facilitate the collection of necessary documentation for individuals and households dealing with disaster recovery. Additionally, they prepare and submit state and federal declaration packages and follow up with FEMA for large-scale events.

Besides immediate response activities, the team is involved in planning, mitigation, and grants management to prepare for future disasters and reduce risks. They help develop exercises and response plans for various scenarios, assist with grants to support preparedness, and guide mitigation efforts in affected areas. The logistics and finance functions ensure the delivery of resources to communities in need, while administrative support handles travel arrangements for disaster response teams and manages disaster-related paperwork and payroll. Furthermore, the team promotes preparedness by sponsoring training events aimed at educating individuals, communities, and partners, to enhance overall readiness for emergencies.

University of Oregon (UoO)

Contact: Josh Roering, Professor of Geology, jroering@oregon.edu

The UO Earth Surface Processes Laboratory focuses on hillslope geomorphology, particularly landslide processes and hazards, soil weathering and transport, carbon cycling, and landscape evolution. Roering's group uses an array of tools, including field observations, laboratory experiments, geochemical analyses, computer simulations, environmental sensors, high-resolution topography, and remote sensing to investigate the influence of tectonic, climatic, and anthropogenic forces on landscapes over a wide range of temporal and spatial scales. U of O has been a geologic resource to many communities in Southeast Alaska through NSF-funded projects, SeaGrant funded post doctoral fellows and working with individual Tribes and municipalities. Roering is also member of the federal National Landslide Advisory Committee.

University of Alaska Fairbanks (UAF) Alaska Climate Adaptation Center (AK CASC)

Contacts: Allison Bidlack, Research Associate Professor, Alaska Climate Adaptation Science Center (AK CASC) albidlack@alaska.edu

Annika Ord, Climate Adaptation Catalyst, Alaska Climate Adaptation Science Center (AK CASC) and Sustainable Southeast Partnership alord3@alaska.edu

Established in 2010 as a partnership between the University of Alaska and the United States Geological Survey, the Alaska CASC is Congressionally mandated to meet state and federal needs around climate impacts, adaptation, and resilience. Hosted by UAFs

International Arctic Research Center with a USGS-hosted office in Anchorage, the Alaska CASC provides scientific information, tools, and techniques that resource managers and communities can use to adapt to climate change. The AK CASC: creates and uses high-resolution climate models and derivative products to help forecast ecological responses at national, regional, and local scales; integrates physical climate models with ecological and landscape response models; develops methods to assess vulnerability of species, habitats, and human communities; and develop standardized approaches to modeling, monitoring, data management, communications, and decision support. The AK CASC supports SLIPP by offering climate science and regionally relevant data, communications research, organizational assistance, and community connections.

University of Alaska Fairbanks (UAF) - Center for Arctic Security & Resilience (CASR) / Master of Security & Disaster Management Program

Contact: John Pennington - Deputy Director and Assistant Professor:
jpennington@alaska.edu

Dr. John E. Pennington is a Certified Emergency Manager (CEM) and distinguished leader in emergency and disaster management. He has led response and recovery to 31 federally declared disasters, including four major landslides. He holds a PhD in Indigenous Studies and a Master's in Emergency & Disaster Management. In the university's graduate Emergency Management degree program, he integrates rigorous academic training with hands-on community resilience strategies. Building on his extensive federal experience as a former FEMA Regional Director, Dr. Pennington applies his expertise in hazard mitigation and Indigenous government relations to coordinate landslide monitoring efforts, community education initiatives, and preparedness planning across Southeast Alaska's diverse cultural and geographical landscape. His leadership ensures that local communities are empowered with the knowledge, tools, and collaborative frameworks necessary to reduce landslide risk and respond effectively.

Community Collaborators

Contact: Adelaide Johnson, johnson.adelaide@gmail.com, owner.

Dr. Adelaide Johnson conducts a range of coordinated hydrology efforts and community education in Southeast Alaska. Adelaide (Di) has a PhD in Environmental Studies, two landslide-related Master's degrees, and 30 years experience as a Professional Hydrologist with the USDA Forest Service, Pacific Northwest Research Station in Juneau. Di served on the Sitka Landslide Taskforce, worked to update Alaska DNR Forest Harvesting practices guidelines, and has numerous landslide-related publications. Through her current freelance contracts and grants, she facilitates local community engagements and meaningful participation to enhance landslide awareness, reduce risk, and develop sound response strategies.

Natural Resources and Conservation Service (NRCS)

Contact: Daniel Fisher, daniel.fisher2@usda.gov

The NRCS Snow Survey Program provides mountain snowpack data and streamflow forecasts for the western United States and Alaska. Data is collected through automated weather stations (SNOTEL and SNOLITE), manual snow measurements (Snow Courses), and through partnering agencies and networks. Common applications of Snow Survey products include water supply management, flood control, climate modeling, recreation, and conservation planning. The Alaska Snow Survey operates over 80 automated weather stations that report data hourly through satellite transmission. Through the help of partners and cooperators, close to 200 manual snow measurement sites are measured during the winter. Four Snow Survey Reports detailing the state of the snowpack across Alaska are published in February, March, April, and May.

Southeast Conference (SEC)

Contact: Kaitlyn Jared kaitlyn@seconference.org

As the state and federally designated regional economic development organization for Southeast Alaska, Southeast Conference serves as the collective voice for advancing the region's economy. Southeast Conference has 180 member organizations representing 1,200 people from 32 regional communities. SEC's mission is to undertake and support activities that promote strong economies, sustainable communities, and a healthy environment in Southeast Alaska. As landslide information and preparedness has a significant impact on the region's economy, SEC will assist primarily by communicating out to communities through its regular channels, presentations when its appropriate and assisting with advocacy for landslide information and preparedness.

Additional Data and Map Resources

USGS Maps and Data

- U.S. Landslide Inventory and Interactive Map:
A web-based interactive map with a consistent set of landslide data. The searchable map includes contributions from many local, state, and federal agencies and provides links to the original digital inventory files for further information.
<https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=ae120962f459434b8c904b456c82669d>
- The USGS is actively trying to add some data sharing to the real-time plots. They aspire to add more hydrologic sites (staffing and funding dependent) for research purposes. USGS data and interpretive products go through various levels of review to ensure quality.
- GPS Data
<https://earthquake.usgs.gov/monitoring/gps/Alaska/ab42>

USFS

Tongass National Forest Landslide Inventory data is added to the USGS landslide database. Tongass Landslide Inventory: The landslide inventory of the Tongass National Forest Proclamation Boundary is updated yearly, or as new imagery or field data becomes available. Last updated in April 2020. This feature class is a polygon landslide inventory of the Tongass National Forest. The digital version of this inventory was started in the year 2000. The once-over inventory was completed in 2017. It includes both field and photo-interpreted landslides. The inventory includes all mass wasting features--including talus slopes, snow avalanche fields, and snow avalanche chutes.

<https://gis.data.alaska.gov/datasets/usfs::tongass-national-forest-landslide-areas/about>

Other GIS data include land types, streams, soils, contours, lidar

Non-GIS data include the following: Experience installing and managing field equipment, Geotechnical experts and evaluations, Protocols for assessing steep or unstable slopes for USFS land management activities like Timber harvest and Road building, Landslide rehabilitation and erosion control methods, Access and Travel Management Plan and road maintenance objectives, Research and technical guides for identifying hazards related to slope stability

DGGS

Published public data can be found on the DGGS website:

[Alaska Division of Geological & Geophysical Surveys Publications - Search | Alaska Division of Geological & Geophysical Surveys Maps & Data - Alaska Statewide Maps | Alaska Division of Geological & Geophysical Surveys](#)

They can also be searched for on the publications webpage

<https://dggs.alaska.gov/pubs/>

Alaska Dept of Transportation Maps and Data

Data are available online through the Department's ArcGIS website

<https://data-soa-akdot.opendata.arcgis.com/>.

- DOT&PF has an open data portal for public use. Information includes infrastructure data and current and future project data. Available data relate to landslide location, removal costs, and locations of unstable slopes. Anyone can download the raw data in various open formats including CSV, KML, ESRI Shapefile, and GeoJSON. The Alaska Department of Transportation & Public Facilities collaborates with agencies like SEOC, DGGS, UAF, and local communities on a project-by-project basis.
- <https://data-soa-akdot.opendata.arcgis.com/>

National Weather Service

- Region-specific data including hazards, forecast, satellite, radar, climate, and hydrologic information can be found on the National Weather Service website (weather.gov/Juneau)

- InteractiveNWS (iNWS) is an application suite that allows NWS partners to receive National Weather Service products in new and innovative ways, such as text messaging and mobile-enabled webpages. iNWS strives to fulfill the NWS mission of protecting life and property by using technology to reach out to customers (inws.ncep.noaa.gov)
- Push Notification email or text message available to:
 - Emergency Management
 - Community Leaders
 - Government Agencies
- NWS relies on a constellation of US and international satellites to build forecasts.
- Extreme rain forecasts include moisture at different altitudes, total moisture, and rainfall rate estimates.

References: Li, Zhe, and Qinghua Ding. "A Global Poleward Shift of Atmospheric Rivers." *Science Advances* 10, no. 41 (October 11, 2024): eadq0604. <https://doi.org/10.1126/sciadv.adq0604>.

FEEDBACK

This is a draft plan and your feedback is critical to realizing the needs within it. Please take a few moments and give us your thoughts via [this form](#).