SR 530 Landslide Report & Recommendations

***Draft Report***

October 31, 2014

# INTRODUCTION

On Saturday, March 22, 2014, at 10:37 a.m. a major landslide occurred in the valley of the North Fork of the Stillaguamish River between the towns of Oso and Darrington, Washington. An estimated 10 million cubic yards of mud and debris, traveling nearly 60 mph covered an area of approximately 1 square mile, engulfing nearly 40 homes and other structures in an unincorporated neighborhood known as "Steelhead Haven”[[1]](#footnote-1). Forty-three people were killed.

In July 2014, Washington Governor Jay Inslee and Snohomish County Executive John Lovick established a joint commission in response to the SR 530 Landslide. The Governor and Executive agreed the SR 530 Landslide Commission (Commission) would operate independently from the state and county executive branches to review the incident, the collective response, and to provide recommendations to help plan and respond to similar events. The Governor and Snohomish County Executive jointly appointed the 12-member Commission and asked regional business leader Kathy Lombardo to serve as the Commission’s Executive Director. The Governor and Snohomish County Executive also asked the William D. Ruckelshaus Center to support and facilitate the operations of the Commission[[2]](#footnote-2).

## The SR 530 Landslide Commission

One of government’s preeminent roles is to promote public safety. Therefore, the Governor and Snohomish County Executive asked the Commission to focus its work on identifying the top recommendations related to the SR 530 landslide that, if implemented today, would make the people of Washington safer tomorrow. Specifically, the Commission was asked to:

* Perform a review of the incident and establish a timeline of events.

*Intent: To better understand the collective response and inform recommendations for the future that will guide policy makers.*

* Review of the emergency response to the slide may include the initial emergency search and rescue, recovery of victims, community efforts and coordination among local, county, state, tribal and federal governments.

*Intent: To inform recommendations for the future that will guide policy makers.*

* Recommendations may identify information gaps, lessons learned or technical needs, and they may also include proposed changes to policy, code or operational procedures.

*Intent: To improve planning and response for similar events.*

* The Commission will not determine liability, cause or fault.

*Intent: To not act as a substitute for the courts in any way.*

* The Commission will provide the Governor and Snohomish County Executive with a report of prioritized recommendations by December 15, 2014.

The Commission met 10 times in four months. Meetings were spent listening to presentations and gathering information from….

Given the tight timeline to review the incident and develop this report the Commission divided itself into two research groups, 1) Emergency Management and 2) Geologic Hazards and Land Use. The roles of the research groups were to:

* Identify what additional information is needed to gather and from who
* Identify key subtopics
* Gather information through interviews, questionnaires, reports, written testimony
* Review information and identify key challenges
* Identify key issues for the commission to consider
* Present research and preliminary recommendations to the commission

To gather feedback on preliminary recommendations, the Commission shared draft report of prioritized recommendations with the Governor and Snohomish County Executive by November 15, 2014, consulted with local leaders, community members and other interested parties.

## Report Contents

The rest of this report is divided into four sections. The first section provides a brief overview of the SR 530 landslide. The second section describes Emergency Management challenges, opportunities, and recommendations identified by the Commission. The third section describes Geologic Hazards and Land Use challenges, opportunities and recommendations identified by the Commission. The forth sections describes conclusions, recommendations, and next steps. Additional information is located in the appendices of this report. Copies of the Commission’s meeting materials, including meeting summaries and audio recordings can be found at www.bit.ly/sr530commission.

# THE SR 530 LANDSLIDE

## Complex Geologically – Significant Historically - Catastrophic & Deadly

# Emergency Management and Response

The reality of the 530 Landslide is that by most measures, emergency management worked, especially in terms of rescues, recoveries, and the fact that there were no additional fatalities or serious injuries. While some of that success was by the design of the emergency management system, a significant element of the success was the result of innovation and determination of those on the ground. Nearly 30 state agencies helped with the response. At one point, more than 900 local, state and federal personnel and trained and untrained volunteers, contractors, families and neighbors were involved in the search, rescue, and recovery operations[[3]](#footnote-3).

The Commission was tasked with reviewing the emergency response to the slide, including the initial emergency search and rescue, recovery of victims, community efforts and coordination among local, county, state, tribal and federal governments. Based on the Commission’s review, some key aspects of the emergency and the response must be understood.

* First responders and spontaneous volunteers on scene within minutes, simply because they were driving on SR 530 when the slide when occurred. Fortuitously emergency helicopter training in Snohomish County was in process making helicopter response almost immediate. “The first request for aircraft was made at 10:58 hrs. Awareness of the scope of the landslide was not fully realized until the first aircraft, SCSO “*SnoHawk 10*” arrive on scene at approximately 11:28 hrs.”[[4]](#footnote-4)
* All of the immediate responders were totally engaged with rescue, and rescue efforts consumed responders’ resources nearly exclusively for the first several hours of the response.
* Washington is a “home rule” state. This means that the emergency response is progressively tiered, and it starts with local responders, who in turn look to the County for help, then to adjoining communities and counties via mutual aid agreements, and then to the State and on to the federal system.
* It took the local Emergency Operations Center approximately eight hours to understand the magnitude of the landslide[[5]](#footnote-5). Responders were immediately consumed with rescue efforts, which delayed initial information gathering.
* The State Emergency Operations Center was activated for 38 days, the longest in at least 30 years.[[6]](#footnote-6)
* The emergency management system, in terms of depleting local resources and moving through the system to the various levels was inundated immediately.
* The commission is fully aware that the first 24-72 hours of a disaster is chaotic and that it takes time to gain situational awareness and to get the most appropriate systems of command and control, and rescue in place. In the case of the SR 530 Landslide the first responders and local volunteers, skilled *loggers, contractors and passersby* on scene were overwhelmed immediately and did their best to understand a developing emergency.

Provided below is a list of emergency management challenges, opportunities, and recommendations identified by the Commission.

## *Washington’s Emergency Management System is Complex and Underfunded*

Washington States’ emergency management and response system is complex and underfunded. Elements of the system must be updated, coordinated across jurisdictions, and sustainably funded. While it has successfully responded to a number of disasters over the years, times have changed. Washington’s population has grown, towns and cities are expanding, and more people are moving to less populated rural areas. Exposure to natural disasters is growing at the same time that weather patterns are increasing in intensity. Homeland Security historically funded most of the support for State and local programs since 2001. State and local funds were drastically reduced. These funds have yet to be replenished. An evaluation of how the system is organized, and how the system is funded relative to state and local statutes is needed to identify where opportunities for improvements exist. Sufficient and sustainable funding for state, county, tribal and municipal emergency management efforts is vital.

An example of such a re-evaluation was undertaken by the state of Florida in Following Hurricane Andrew in 1992. The governor established the Disaster Planning and Response Review Committee to evaluate existing statutes, plans and programs for natural and man-made disasters, and to make recommendations for improvements. The recommendations included improvements to plans and programs for responding organizations and a request for increased and sustained funding for emergency preparedness and recovery programs. In 1993 the Florida State Legislature voted to create the Emergency Management, Preparedness, and Assistance Trust Fund which provided funding through a $2 surcharge per homeowner’s casualty insurance policy and a $4 surcharge per commercial casualty insurance policy.

***Recommendation***

1. **The Commission recommends the Governor convenes a Task Force – with members from multiple jurisdictions, levels of governments, the private sector, and volunteers with special skills and equipment -- to evaluate the existing programs, their funding and their statutory requirements.**

* The Task Force will make recommendations to the Governor and Legislature to improvepublic safety with robust emergency management system to serve the needs of the state in the event of major natural or other disasters.

## *Command and Control – Miscommunications between Responding Agencies*

Establishing the most appropriate level of command and control as quickly as possible within the first hours of a large scale event provides the operational infrastructure from which the response is leveraged and funded. The challenge is to establish who is ‘in charge’ as quickly as possible. Once established – command and control – must operate and transition smoothly from one phase of the response to the next - so that leadership and management are seamless among and across responding organizations.

In Western Washington local jurisdictions are unfamiliar with the relatively newly developed Incident Management Team (IMT) structure. During the response and recovery efforts Delegation of Authority between the Incident Management Team (IMT) and the Snohomish County Department of Emergency Management (DEM) was initially unclear. This confusion carried over to the roles and responsibilities of the elected officials and other local leaders.

***Recommendation***

1. **The Commission recommends state and county emergency management organizations work with IMT personnel to develop guidelines that define the interface between IMT’s and counties during non-fire emergencies, including processes for clear delegation of authority.**

* A unified statewide process for requesting, tracking and demobilization of resources is highly recommended. Agreements need to be developed with IMTs and USAR Teams so that specialized equipment is available to ensure no delays in the deployment of these resources. This work can be accomplished as part of expanded statewide quarterly ‘all hands’ training and exercise programs.
* Training must include all appropriate organizations, including elected officials and local leaders so that the greater emergency management community clearly understands our statewide response systems.

## *Fatality Management –Current Statewide Mass Fatality Capability is Inadequate*

The Snohomish County Medical Examiner’s Office was not staffed to handle this mass fatality event. Most county Medical Examiners and Coroner offices have limited resources and are not prepared to respond to an event of this magnitude. Mutual aid agreements and multicounty plans must be in place well in advance of a disaster so that resources can be rapidly deployed in an actual event. Fatality management planning must be made a priority.

In the early hours of this event there was confusion regarding the responsibility of maintaining missing person lists, as a result responding organizations and volunteers began making their own lists. As a result inaccurate information led to unnecessary confusion, and angst among the victims’ families. Working with family members who attempted to file a missing persons report, identify loved ones’ remains, or provide personal information repeatedly was described to several commissioners as ‘cruel’. While law enforcement has the statutory authority, they may not always be in the best position to accomplish the task, especially given their focus on rescue and recovery during the slide.

***Recommendation***

1. **The State Department of Health should establish a work group with County Health Departments and the County ME/Coroners Offices to develop a statewide mutual aid agreement for MEs and Coroners.**

* In addition they should prepare strategies for managing multi-county mass fatality incidents that involve federal response resources. This could include identifying a medical examiner from another part of the state, or country to oversee the overall mortuary component of the response, allowing local MEs and Coroners to focus on ongoing county specific workload.
* The work group is advised to partner with law enforcement to discuss and resolve the question of how best to address the missing persons’ count and put appropriate plans in place before the next disaster.

## *Non-Governmental Organizations (NGOs) – Many Forms, Initial Confusion,-Now Clarity and Coordination Continues*

Multiple NGO’s partnered to coordinate fund raising and provide services to survivors and their families. Despite those efforts there was confusion among those in need about where to go for services. Frustration was expressed with agencies/organizations repeatedly requiring the same personal information be supplied when requesting assistance.

***Recommendation***

1. **Snohomish County implemented The Navigator program for the first time during an emergency. The Commission recommends it be evaluated and if appropriate shared with other jurisdictions.**

* Agencies/organizations should work towards developing a single form that is accessible by all appropriate organizations.

## *Communication and Coordination with Tribes is Vital*

The three Tribal Nations in the Stillaguamish Valley, Sauk-Suiattle, Stillaguamish, and the Tulalips were impacted during this event. Like many in the Darrington area, the Sauk-Suiattle, faced numerous transportation challenges including: medical, daily living and childcare needs. They too, lost their telephone system when the Frontier Cable was severed.

The Stillaguamish Tribe had environmental, cultural and Treaty Rights concerns. Environmental; the river configuration is too shallow and narrow to carry flood waters. Cultural; the slide area is a sacred site where their ancestors have been laid to rest and requires special treatment. Treaty rights and salmon; the river is a spawning ground for chinook salmon and the short term impact won’t be fully understood for 4-6 years. Salmon are constantly impacted from landslides, loss of estuaries and manmade controls.

***Recommendation***

1. **The Commission recommends liaisons from state and county government should be deployed to all impacted tribes during an emergency.**

* NGOs responding should also consider deploying liaisons. To avoid overwhelming a tribe, liaisons from all agencies/organizations should coordinate their activities with pre-event planning.
* Liaisons need to be allowed the time and resources to develop a trusting relationship and be known by all the tribes.
* Liaisons will also need to be ICS trained and knowledgeable in all resources available (such as disaster case managers and the Navigator program). Tribes must be included when understanding situational awareness.

## *Opportunities Exist to Review and Improve Communications*

There were numerous reports of communication challenges among both the first responders and members of the public, especially within the first 24-72 hours. Landlines and much of the cell service in Darrington and the surrounding area was disrupted making situational awareness and difficult. Different operational frequencies used by some of the responding organizations made communication difficult for some.

***Recommendation***

1. **The Commission recommends Washington’s elected officials, emergency management and responder communities must actively participate in the design of the FirstNet network for the state with the goal of being one of the first states to deploy this new nationwide network.**

* In 2012 Congress authorized the First Responder Network Authority (“FirstNet”) and funded it with $7 billion. FirstNet is mandated to build a nationwide wireless network for use by all responders with first responders having priority use. FirstNet is required to consult with responders in the state during development of a state specific design.
* Note: FirstNet will not address voice communications. It is informational only. Access to informational systems such as FirstNet, especially with the added information from the Geologic Hazards and Land Use recommendations, would have significantly aided recovery efforts.
* Part of the implementation will include hardening the system and providing redundant means of messaging so that informational access is not interrupted. For the foreseeable future this informational availability will supplement voice messaging via cell, radio and satellite systems.

1. **The Commission Recommends the State Interoperability Executive Committee(SEIC) be tasked with updating the State Communication Interoperability Plan to include formal certification of Communications Leader(COML) and Communications Technician(COMT) response positions (note: these positions are part of the ICS system).**
2. **The Commission also recommends the state should explore ways to improve situational awareness in the context of within emergency management and the affected communities and in rural areas where many of the standard communications systems have been disrupted.**

* Special attention should be given to areas with limited internet service.

*Opportunity for Community Volunteer and Individual Involvement in Incident Response*

Emergency management and Incident Response calls for community involvement, and in this situation that involvement was nothing short of remarkable. However there are aspects that merit attention and improvements needed to bring in community volunteers more quickly and possibly proactively.

***Recommendation***

1. **The Commission recommends a workgroup of the agencies and organizations that make up Incident Management Teams along with representatives from state and county emergency management should be established to develop a pre-incident process for engaging communities and prospective volunteers.**

* Registration of volunteers prior to an event is preferred and will allow them to contribute safely. If this is not possible, the workgroup should develop a process for expediting rapid onsite registration and credentialing of spontaneous volunteers.

1. **The Commission also recommends expanding the use of the Map Your Neighborhood Program and broaden it to include more of the business community in the overall response.**

* Include in it clear definitions of the roles and responsibilities of responding agencies and organizations and what impacted communities can reasonably expect from them.

## *Legislative Clarity Needed of the Definition of All Hazard Mobilization*

On March 23, 2014 the second day following the landslide, Chief Willie Harper, District 25 (Oso) made a request to Chief Eric Andrews, northwest regional coordinator for the Washington State Fire Defense Board for a mobilization of state resources. Chief Andrews assessed the situation per state mobilization guidelines and made a formal request to the Washington State Patrol (WSP) for state fire service mobilization under RCW 43.43.960 - -.964. This request was denied by WSP due to their interpretation that state fire service mobilization resources and funding is only for fire disasters[[7]](#footnote-7). Commission concludes that state mobilization is a significant tool to use in emergency incidents such as the SR 530 landslide. State mobilization is the only intrastate plan that has been used and exercised many times, and is a well-tested plan that has earned the faith and confidence of fire emergency responders. A state mobilization would have provided improved Command and Control by allowing for a Type II incident management team to arrive sooner and resources for first responders – providing technical rescue relief teams and equipment to assist.

***Recommendation***

1. **The Commission recommends to the State Legislature that legislative clarity be given for the definition of all hazards mobilization.**

* WSP Fire Marshall has been advised by legal counsel that the state mobilization legislation prevents deployment of resources to non-fire disasters. The Commission believes that legislature spoke quite clearly to the issue in 1995. The plain language reflects that mobilizations may occur for any “emergency or disaster situation that has exceeded the capabilities of available local resources.” Thus, the mobilization language should be interpreted to apply to ‘all hazards’ deployment.
* While some may see the term “firefighting resources” and believe that such resources can only be used in fires, the Commission believes that the types of resources to mobilize and the disaster events for which they may be mobilized are separately addressed in the “mobilization” definition. Moreover, “firefighting resources” (people, ladders, ropes, chainsaws, axes, certain heavy equipment, and the like) can often prove critical during non-fire emergencies.
* The next section of the 1995 bill clearly recognized the need to mobilize “[b]because of the possibility of the occurrence of disastrous fires or other disasters of unprecedented size and destructiveness…” (Substitute House Bill 1017; Chapter 391, Section 6, Laws of 1995; Effective date 7/1/95). Any further legislation attempting to explain these provisions would add unnecessary complexity to an already clear definition of appropriate mobilization process.
* Furthermore, the adopted Washington Fire Services Resource Mobilization Plan and the WSP website clearly outlines that mobilizations may occur for “fires, disaster or other event . . . within a local jurisdiction boundary, or imminently threatening the jurisdiction”.

1. **The Commission recommends the Legislature provide clarity in establishing adequate funding levels for all hazard deployments.**

* Recent attempts at clarity in legislation have also outlined the need for additional funding to the Disaster Response Account (fund 05H) is necessary to adequately prepare for unforeseen disasters such as fires, earthquakes, landslides, and other disasters. Currently, $8 million is placed in the account per biennium, and has been overspent for the past 4 biennia.
* The Commission believes that funding should be increased to $10 million per biennium. Disasters cannot be predicted. Funding must be available to preserve life. Funding verbiage should reflect the plain language of the “mobilization” definition’s scope, such that it pertains to mobilizations regarding any emergency or disaster situation that has exceeded the capabilities of available local resources.

1. **The Commission also recommends County DEM’s should take on the responsibility of 1) knowing what the State All Hazard Mobilization IS, 2) how to request it, and 3) Pro-actively train and build trusting relationships with regional incident management teams.**

# Geologic Hazards and Land Use

The most important and immediate need to prevent the loss of human life and property from future landslides, both along the Stillaguamish River valley west of Darrington and elsewhere in Washington State is to investigate and understand the reasons for the March 22 landslide. Protecting human life and property requires a state-wide program to map geologic hazards, assess risks and vulnerability, notify the public of potential hazards, and develop effective mitigation measures.

## *Landslide Investigations and Monitoring Needed to Characterize and Quantify Risks Posed by Remaining Debris*

Elevated winter/spring river and lake levels increase the risk of landslide remobilization, highway inundation, and flooded valley homes up and downstream of the March 22nd, 2014 landslide dam. These concerns remain unresolved.

Landslide investigations are required to characterize and quantify these risks and should continue to be coordinated with the on-going investigations of the “River/Lake Level Research Group” (WSDOT, USGS, UW, Snohomish Co., and others). Landslide investigations include:

* Geotechnical drilling, monitoring, and analysis of the geologic deposits and groundwater conditions behind the March 22nd landslide and not yet involved in landsliding. [An additional $25k to complete current activities]
* Geotechnical drilling, monitoring, and analysis of the remaining March 22nd landslide mass, its stability, and threat to valley. [~$600k]
* Using empirical inputs from geotechnical investigation, model the conditions that led to the devastating runout distance and speed of the March 22nd landslide; identify where these conditions may exist elsewhere in the valley that could put additional lives, property, infrastructure, and habitat environment at risk. [~$500k]
* Geologic and geomorphic mapping, including radiometric dating, of prehistoric large runout deposits in the valley to determine ages and recurrence periods. [~250k]

***Recommendation***

1. **The Commission recommends securing immediate funding to continue landslide investigation and monitoring.**

* Drilling is currently being carried out by WSDOT. Identify partnerships of stakeholders to build resources for current and continuing study. Potential partners with expertise to perform this work include WSDOT, DNR, USGS, UW/WWU, USACOE, Snohomish County; additional contributing partners could include Tulalip and Stillaguamish Tribes, Seattle City Light, FEMA, etc. (estimated costs above)

## *Statewide Geologic Mapping Needed at a Scale Commensurate with Landslide Hazard and Risk Assessment*

Geologic mapping at a scale of 1:24,000 currently covers approximately 13% of Washington State. A few small areas of Washington are covered by landslide inventory maps where local jurisdictions initiated and/or supported such efforts; however, few if any adequate landslide hazard, risk, or vulnerability maps exist within the state of Washington. The history of landsliding along the North Fork of the Stillaguamish River had been reported on previously, but there had been no landslide-specific assessment of risk associated with development of the valley. The SR 530 landslide highlights the need to incorporate landslide hazard, risk, and vulnerability assessments into land-use planning and to expand and refine geologic and geohazard mapping throughout Washington state, as well as incorporate mapping and assessment results into land-use planning tools.

Geologic maps and informational articles are generally published but often not easily accessible to the public or provided to land-use planners with enough guidance to be appropriately incorporated into decision-making and regulatory tools. Geohazard workshops for the most part target urban populations (e.g. Seattle), so that outlying and rural communities rarely have the opportunity to be educated on the nature and warning signs of geologic hazards likely to impact them. Early science education is particularly lacking in K-12 programs of public education.

***Recommendation***

1. **The Commission recommends the Governor convene a funded Task Force of key stakeholders (e.g. geologists, GIS specialists, land-use planners, educators, real estate professionals, etc.) to:**

* Identify mapping priority areas and LiDAR coverage needs in Washington state
* Establish statewide mapping criteria. Review and learn from existing programs carrying out hazard, risk, and vulnerability mapping (e.g. Oregon, Ohio, British Columbia, New Zealand, Norway, Switzerland, etc.)
* Establish a geologic hazard/resilience institute that includes members of state, local, tribal, non-profit, academic, and private industry specialists to address education, outreach, and research needs, professional practice guidelines, and other geologic issues impacting Washington communities
* Develop protocol for the transfer of locally-generated geologic data into a statewide GIS planning program (e.g.: a common platform )
* Advise and advocate on state and local resource requirements (staffing, software, etc.) needs to accomplish tasks
* Identify training needs for geo-hazard specialists; for example ICS training and other training that assures successful emergency response.
* Establish public information response protocol for emergencies
* Establish public education and awareness programs and partners
* Identify long-term research and education/outreach funding partners

## *Update WACs related to Critical Area Regulations*

The Growth Management Act requires all cities and counties to prepare critical area regulations to classify and designate wetlands, frequently flooded areas, aquifer recharge areas, fish and wildlife habitats and geological hazard areas in their comprehensive plans. The Washington Administrative Code includes a set of guidelines for local government to use when classifying and designating the above critical areas and preparing local development regulations. The guidelines for designating geological hazard areas and assessing risk are permissive, due in part to the lack of statewide geological mapping. However, before local governments can effectively regulate land uses in geologically hazardous areas, it is imperative to know where such hazard areas exist. Further, state subdivision laws allow disapproval of land subdivisions due to flooding but are silent on geologic hazards.

***Recommendations***

1. **The Commission recommends updating WACs related to Critical Area Regulations to require counties and cities to identify, classify and regulate land uses in geological hazard areas based on up-to-date geological information and mapping as available. (Note: amend WAC 365.190.080 and .120)**
2. **The Commission also recommends updating state subdivision laws to require new land development activities to conduct geologic risk assessment studies as part of development permit applications when located in geological hazard areas.**

## *Increase Public Awareness of Geologic Hazards through Notification, Education and Outreach*

Public awareness of the potential negative impacts to property caused by the existence of natural geologic hazards is important in ensuring the protection of the general public. Often, property transfers occur with little knowledge of the potential risks associated with living in existing or newly developed areas. Although, the real estate industry is required to disclose the existence of known natural hazards on Form 17, real estate professionals and the general public may be unaware of such hazards due to the lack of appropriate and adequate mapping.

***Recommendations***

1. **The Commission recommends local governments develop public awareness initiatives to inform property owners (e.g.; property tax assessment notices) and the general public of designated geologic hazard areas once geologic hazards are identified from local, regional or statewide mapping programs.**
2. **The Commission also encourages the Real Estate Commission to include natural hazards awareness in their “core” curriculum that licensees must take every two years.**

* Further, educational programs (e.g.: K-12) should be developed by and specific to local community issues to raise awareness of natural hazards and risks from landslides, debris flows, flooding, volcanic eruptions and earthquakes.

## *Development Regulations to Mitigate Geological Hazard Impacts*

Land use planning is a process by which land is allocated between competing and at times conflicting uses in order to secure the rational and orderly development of land in an environmentally sound manner to ensure the creation of sustainable human settlements. Land-use planning seeks to accommodate these needs within a technical and spatial framework. While houses must be built to accommodate the population as an example, they cannot be built in a swamp; or in areas that are unsuitable for housing development once the natural features are known (e.g.; terrain, soils, hydrology and vulnerability to natural or other disasters). The Growth Management Act recognizes this and provides counties and cities with the opportunity to implement their comprehensive plans using innovative approaches to regulate development throughout their jurisdictions.

The solutions and “best practices” presented below are a snapshot of the issues endangered communities across Washington State may be facing. As development continues to encroach on hillsides and otherwise unstable land, the risks and their effects will continue to impact housing, land use and regulation in ways that challenge our overarching mission; to keep Washingtonian’s out of harm’s way.

***Recommendation***

1. **The Commission encourages counties and cities to adopt and use innovative development regulations and practices to enable land development and use that ensures public safety and protects property rights in identified geologic hazard areas**.

* Examples of such practices include but are not limited to transfer of development rights, critical area buffer widths based on site –specific geotechnical studies, including: slope-density regulations, land banking, engineered building structures within potential unstable areas, conservation easements, acquisition by public land trusts, and grading ordinances.

# Priority Recommendations and Conclusion

1. Norman presentation to Commission September 30, 2014 [↑](#footnote-ref-1)
2. The Center is a neutral resource for collaborative problem solving in the state of Washington and the Pacific Northwest, providing expertise to improve the quality and availability of voluntary collaborative approaches for policy development and multi-party dispute resolution. The Center is a joint effort of Washington’s two research universities, the University of Washington (UW) and Washington State University (WSU). [↑](#footnote-ref-2)
3. Ezelle Presentation to the Commission\_9.10.14 [↑](#footnote-ref-3)
4. NWRA Combined After Action Report\_5.30.14 [↑](#footnote-ref-4)
5. Ezelle Presentation to the Commission\_9.10.14 [↑](#footnote-ref-5)
6. Ezelle Presentation to the Commission\_9.10.14 [↑](#footnote-ref-6)
7. See Appendix XXX for a list of All Hazards related materials reviewed by the Commission. [↑](#footnote-ref-7)