



SR 530 LANDSLIDE COMMISSION DRAFT REPORT

NOVEMBER 28, 2014

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The SR 530 Landslide Commission

DRAFT Report

November 28, 2014

The members of the SR 530 Landslide Commission are pleased to submit this final report to Governor Jay Inslee and Snohomish County Executive John Lovick. The Commission has endeavored to understand the multitude of perspectives regarding the event and the collective response to the SR 530 Landslide, identify lessons to be learned from that event, and translate those lessons to recommendations. Each Commissioner expresses his or her heartfelt sadness for the 43 family members whose lives were lost in this catastrophic event. The Commission also salutes the courage and perseverance of the Stillaguamish Valley communities and others that came together, against the odds, to respond to the event, rescue those who could be rescued, and ultimately recover all 43 of those fatalities.

Table of Contents

ACKNOWLEDGMENTS	i
EXECUTIVE SUMMARY	ii
I. INTRODUCTION & BACKGROUND	1
II. THE SR 530 LANDSLIDE	3
A. EMERGENCY RESPONSE TIMELINE	3
B. COMMUNITY IMPACT	3
III. LESSONS LEARNED & RECOMMENDATIONS	9
IV. CALL TO ACTION	34
A. CRITICAL FIRST STEPS	35
B. BEST & PROMISING PRACTICES	35
C. RESPONSIBILITY MATRIX	35
V. APPENDIX	37

Acknowledgments

The report represents the insights and lessons learned derived by the SR 530 Landslide Commission from a review of existing reports and presentations, and from a broad range of people, each with a unique perspective on the incident and events which followed. Their input was obtained either through one-on-one interviews, in small groups or because they were presenters at eight of the ten Commission meetings. The Commission spoke with and listened to: victims, victims' families, professional and volunteer first responders, local volunteers including loggers, contractors, mill workers and others, formal and informal community representatives, and representatives of the broad array of emergency management professionals. Among the entities, groups, and individuals who should be acknowledged for contributing to this effort include:

The living victims of the slide, their families, and the families of the 43 individuals who perished in the slide.

Governor Jay Inslee and Snohomish Executive John Lovick

The SR 530 Landslide Commissioners

The Darrington Community Center

The Everett Community Resources Center, Operated by the Everett School District

The Everett Herald

Local Emergency Management, Fire, Search, Rescue & Recovery Personnel

Local Leaders and Community Representatives

The Oso Fire Station

Participants and Speakers in the Commission meetings

The William D. Ruckelshaus Center

Executive Summary

UNDER DEVELOPMENT

In July 2014, Washington Governor Jay Inslee and Snohomish County Executive John Lovick appointed a joint commission in response to the SR 530 Landslide. The SR 530 Landslide Commission (Commission) was tasked with reviewing the landslide and the collective response to it, including the initial emergency search and rescue, recovery of victims, community efforts, incident management, and coordination among local, county, state, tribal and federal governments. By no means 'all inclusive, the Commission has reviewed the myriad and sometimes conflicting perspectives to identify lessons to be learned and translate those lessons into the recommendations provided in this report. Preparedness for future disasters depends largely on the lessons learned from this and other disasters and the collective willingness to plan, prepare, and budget for the unimaginable. These lessons must be leveraged if we hope to make the citizens of Washington State safer in the future.

- 1. Washington State has Few Adequate Landslide Hazard, Risk or Vulnerability Maps:** 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 the State. Employ known best practices for risk mitigation during development.
- 2. Safely Engage and Embed Local Volunteers in Incident Response:** The Stillaguamish Valley is home to many skilled loggers, contractors, natural resource specialists, scientists and community volunteers. They had a significant impact in the success of this response. Other communities will offer different skills and expertise; the challenge is to understand and rapidly embed skilled volunteers into the response. In any significant regional event, such as a 9.0 earthquake, our emergency management systems will demand the sorts of innovations witnessed during this disaster.
- 3. Local Capacity to Respond to Significant Events is Critical and Needs to be Augmented:** Small rural communities depend on volunteer local fire districts and law enforcement to respond immediately to disasters. These front-line entities need robust mutual aid agreements and strong relationships with County and regional assets to adequately respond to overwhelming needs during a disaster.
- 4. Reinforce Local First Responders as Quickly as Possible (especially in 0-24 Hours):** The most critical time for leadership is also the most chaotic. Lifesaving response efforts must occur in the earliest possible hours after an event. Rapid reinforcement of our front line command and control elements is critical. The SR 530 first responders, once in it, were dedicated to the mud for up to 5 days or more. It was an extraordinary confluence of regional capacity and coincidental operations that made reinforcements from the air available within one hour of the initial slide to team with first responders and local volunteers for fifteen rescues. This cannot be relied upon elsewhere without attention to the availability and mechanisms to deploy such reinforcements.

5. Take Action as Early as Possible to Fully Understand the Magnitude of the

Disaster: Even small events can be catastrophic. The magnitude of this event was not fully comprehended for several hours. Even with helicopters in the air within an hour, those ‘eyes in the sky’ were immediately dedicated to rescuing survivors and could not communicate to others the gravity of the situation. Efforts to deal with the flooding of the Stillaguamish River and to mitigate the risk of flooding downstream of the landslide also detracted from the rapid development of overall situational awareness. Mechanisms to quickly establish and communicate situational awareness regarding the magnitude and resource demands of emergency events need to be identified and deployed.

- 6. Leverage Relationships across Perceived Boundaries, Before the Next Disaster:** Each after action report highlighted the power of the bonds that exist within specific responder communities, between individuals, and across jurisdictions. These bonds are often informal and ad-hoc, and in this case, were at least as important as the formal linkages. Efforts should be made to encourage and reinforce such linkages everywhere in the state.

Washington contains some of the most rugged and beautiful landscapes in the United States. However, those same landscapes present hazards from natural disasters, including earthquakes, routine small and larger landslides, annual flooding and wild land fires. On February 28, 2001, an earthquake registering 6.8 on the Richter scale triggered a number of landslides in King County, toppled and damaged brick masonry buildings in Pioneer Square and caused considerable damage to the Seattle Viaduct. That earthquake triggered many more landslides in Pierce, Thurston, and Mason counties. A 9.0 earthquake off the Washington coast could cause widespread regional landslides and a broader emergency response need.

To better understand the risks posed from potential natural disasters and to enhance capacity across the state to respond to such events, the SR530 Commission recommends the following as a Call to Action:

Critical First Steps

- 1. Conduct a Statewide Landslide Hazard Mapping Program:** Use LIDAR (Light Detection and Ranging) mapping to target high priority hazard areas including heavily traveled transportation and rail corridors. Evaluate and recommend hazard reduction/risk mitigation measures for high-risk sites. Mapping should include slide initiation and runout zones.
- 2. Provide Legislative Clarity for Fire Service Mobilization in order to Reinforce and Support Front Line Responders:** State fire service 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.
- 3. Study and Monitor the SR 530 Landslide, the Debris Field and Adjacent Landslides:** Ongoing investigations are focused on characterizing the stratigraphy and groundwater conditions above the scarp. Additional work and funding of up to \$2 million is required for

the next phase consisting of: geotechnical drilling, monitoring and analysis of the March 22nd landslide mass, its stability, and potential threat to the valley.

- 4. *Integrate and Fund Washington's Statewide Emergency Management System(s):***
- 5. *Exercise Washington's Command and Control Structure for Catastrophic Events:***
- 6. *Regulate the impacts of Geologic/Landslides Hazards Using innovative Mitigation Approaches for Development:***

I. Introduction

On Saturday, March 22, 2014, at 10:37 a.m. a historic landslide, one of the largest in state history occurred between the towns of Arlington and Darrington near the community of Oso in Snohomish County, Washington. Mud and debris slid down into the North Fork Stillaguamish River valley, covering an area of approximately one square mile in less than one minute.¹ The slide inundated State Highway 530, isolating the community of Darrington and blocked the flow of the North Fork of the Stillaguamish River. Forty-three people died and more than 40 homes and structures were destroyed.

Life-saving rescue operations were initiated within the first few hours. Fifteen people were rescued by helicopter. On March 22nd, Snohomish County Executive John Lovick declared an emergency and Washington State Governor Jay Inslee proclaimed a State of Emergency that same date. The Washington State Emergency Operations Center (EOC) was activated for 38 days, the longest activation in at least the last 30 years. On April 2nd, President Barack Obama issued a Presidential Disaster Declaration, making federal disaster aid available to supplement state, tribal, and local recovery efforts in the area. This assistance was in addition to the support provided under the Presidential Emergency Declaration granted on March 24, 2014.² More than 900 local, state and federal personnel and trained and untrained volunteers, contractors, families and neighbors were at some point involved in the search, rescue, and recovery operations.³



Aerial photo of the mudslide and backup of Stillaguamish River. Flickr/GovInslee - CC: BY-ND 2.0

1 Norman presentation to Commission September 30, 2014

2 <http://www.fema.gov/news-release/2014/04/02/president-declares-disaster-washington>

3 Ezelle Presentation to the Commission_9.10.14

In July 2014, Washington Governor Jay Inslee and Snohomish County Executive John Lovick appointed 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 for, prepare for, mitigate, and respond to similar events. The Governor and Snohomish County Executive jointly appointed the members of the 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.⁴

Additional information about the Commission is provided in Appendix A. Copies of the Commission's meeting materials, including meeting summaries and audio recordings can be found at www.bit.ly/sr530commission.

Report Structure

The rest of this report is divided into three sections, with additional information provided in appendices. The first section provides a brief overview of the SR 530 Landslide. The overview is not intended to be an exhaustive review of the landslide, its impacts, or the response. Rather, the Commission would like the reader to develop a sense of the power and the devastation of the landslide, as well as the extent of the response in order to more fully appreciate the conclusions, recommendations, and next steps discussed in this report. The second section begins with a brief review of Overall Lessons Learned, followed by the Emergency Response and Geologic Hazards and Land Use challenges, opportunities, and recommendations as identified by the Commission.

Finally, the Commission posts a Call to Action. This is a marshalling of the recommendations in terms of which are critical First Steps to be taken, work on Best and Promising Practices that can begin today, and a Matrix of the Commission's recommendations, identifying responsible parties to take action.



Photo: Messages of support hang inside the Oso Fire Department.
Flickr/Snohomish County CC: BY-NC-ND 2.0

⁴ The William D. Ruckelshaus 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 the University of Washington and Washington State University.

II. The SR 530 Landslide

Emergency Response Timeline

To better understand the collective emergency response to the SR 530 Landslide, the Commission was asked by the Governor and County Executive to review the incident and establish a timeline of events. The timeline is provided in Appendix B. The goal of the timeline is to inform, illustrate and support the observations and recommendations of the Commission.

Community Impact

In addition to fulfilling the request to provide a timeline of events, the Commission believes it is important to provide the human face of the SR 530 Landslide, to understand the event through the experiences of those who were there and lived it. The people of the Stillaguamish Valley experienced the incident in different ways. Rather than attempt to try to tell their stories and recreate what has already been written, the Commission has opted to provide the following article, courtesy of the Herald of Everett, which captures those stories.

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A hand-carved sign commemorates the date and time of the slide.

Flickr/Snohomish County - CC: BY-NC-ND 2.0

HeraldNet
Everett, Washington

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In Darrington, firefighter found a community of unshakable will

By [Rikki King](#), Herald Writer

DARRINGTON — Cheer for. Not against.

Something about that message, written on the wall of the Darrington High School gym, stuck with Gregg Sieloff.

Sieloff, 57, is the assistant chief of operations for the Lynnwood Fire Department. On April 7, he marked his 34th year as a firefighter.

Sieloff was called to the Oso mudslide the first day, March 22.

That night in Arlington, incident commanders made a plan for the next morning: Sunday, March 23. Day 2. People on the east side of the slide, in Darrington, needed resources.

Sieloff was sent to Darrington to work as the deputy incident commander. When he returned six days later, he'd seen a community pull together. Like others who experienced the destruction and the confusion of those first few days, he's trying to make sense of what happened.

What he saw, and who he met, changed who he was and what he believed.

At first, Darrington was like an island, he said. The phone lines, cable and power were out.

The emergency crews who responded on Day 1 were from Skagit County, the only option with Highway 530 blocked between Darrington and Arlington.

"We didn't know what we had," Sieloff said. "We didn't know what the access was."

People from Darrington were going into the debris field and trying to find survivors among their family, friends and neighbors. Officials weren't in the loop. Locals knew the logging and service roads that weren't blocked by patrol cars.

Sieloff and others arrived, and they were already behind, he said. The North Fork Stillaguamish River was blocked by debris, and the backup flooding was thwarting search efforts.

Sieloff met with Darrington Mayor Dan Rankin that Sunday. They were joined by a couple of others at first, including Mukilteo assistant fire chief Brian McMahan and folks from the county Department of Emergency Management and the U.S. Forest Service.

That Sunday night was the first public meeting at the Darrington community center, in the same gym used for high school sports. The room was packed. People were mourning. The only available route out of town, Highway 20, was more than 80 miles to Arlington.

It was time to get organized.

Sieloff was sent as part of a regional Incident Management Team. Traditionally, the team handles the administrative side of things, not operations.

Sieloff saw that sign on the wall: "Cheer For! Not Against!"

"It just stuck with me in the back of my head, that we needed to gather these people and get them to trust us," he said.

Many in the crowd had "mud up to their knees." It took Sieloff a few moments to realize why they were muddy — they'd been digging in the debris.

That original Day 2 plan they'd made the night before in Arlington wouldn't work. Not for this place, this time. Conditions were too uncertain.

On Monday, Day 3, a man dropped by City Hall. He showed pictures from the debris field where firefighters appeared to be standing around, holding equipment but not doing much else. The man also had pictures of locals digging. He held up both images. His words were barbed.

"He was clearly agitated with the progress of our work," Sieloff said. "We heard him out."

He asked a question: "Where are these people digging?"

Sieloff and others leading the search efforts went to the debris field. Locals were using a logging road to get to the south end of the slide.

One of them was Dayn Brunner, a Tulalip police officer, whose sister Summer Raffo was later found in the debris. The family grew up in Darrington.

Brunner pointed out to the firefighters where houses had stood. All they could see was busted-up siding, Sieloff said. He was providing good information the official searchers needed.

Around that same time, the officials got GPS coordinates for a body that had been found. Someone broadcast the coordinates over the radio. The firefighters didn't know who called on the radio, and the person didn't want to identify himself.

"In the beginning, there was no trust," Sieloff said.

The Darrington end of the slide still was covered in water. The south end was an area of devastation. It was clear to people there that it was unlikely they would find anyone alive.

"It was where the locals wanted to go because they were looking for loved ones," Sieloff said.

On that first Monday, Sieloff and others talked to the mayor for hours. They needed his help. The debris was threaded with downed trees.

They asked Rankin for a list of people in town with access to heavy machinery. Without that connection, they would have had to use the phone book.

Sieloff started calling the volunteer troops, "for lack of a better term, 'Rankin's Army.' "

"Once we talked and he started providing resources, they just came from everywhere," Sieloff said. "We needed to allow them access. We needed them, but we wanted to control the environment to make sure it was safe."

At first, it was a couple of small trackhoes, one belonging to Rankin. By Tuesday morning, they had seven machines of all sizes, "all local, all ready to go. It was phenomenal," Sieloff said.

They sent out 25 volunteers on Tuesday, in groups of five plus a firefighter. Ninety people signed up. They created rotating shifts. Priority was given to volunteers who had missing loved ones.

The firefighters had to acknowledge that people from Darrington were going to go into the debris no matter what. The firefighters figured they might as well be careful and work together.

One family whose basement was flooded provided their personal all-terrain vehicles to shuttle crews, Sieloff said. Volunteers even ran the volunteer sign-up sheets.

"I just couldn't be any prouder of a community that pulled together and did all the things that we did in such a short amount of time," he said.

By late Monday or early Tuesday, searchers had to decide whether to work at night, Sieloff said. Some people didn't have helmets. Some were in tennis shoes.

The locals volunteered to keep their machines going overnight to clear safe paths into the debris field.

Using volunteers in the field helped the community understand the conditions firefighters were up against, Sieloff said.

"Any lack of success wasn't based on a lack of effort," he said.

By Tuesday, Day 4, rain was falling hard. The dirt road they were using for access turned to mud.

A lot of the trucks were two-wheel drive with dual rear wheels. The trucks were fishtailing and couldn't make it over some of the hills. One hill's aggressive slope threatened to send people and machines tumbling.

They had to stop working. They met with Rankin again.

They needed a road. The loggers knew how to make roads.

Within an hour, volunteers arrived in dump trucks and road graders. They decided to create a route

between the east and west sides of the slide. From the edge of the slide in Oso to the edge of the floodwaters in Darrington was nearly two miles.

It's being called a service road, but to Sieloff, it was "Determination Road," he said.

There were problems at first communicating with the command center in Arlington. People didn't have each other's phone numbers. Some phone service carriers weren't working. They learned as they went.

Two women, Sieloff doesn't know their names, stepped in to manage the volunteers. Phone lists were created and shared.

Margo Powell, who owns a beauty salon in Darrington and serves on the Cascade Valley Hospital board, started keeping track of equipment serial numbers and driver's license numbers. After a few days, Powell said she needed to return to her business. She was told she would be missed. She was back the next morning.

They needed better maps. Amy Lucas, a map specialist in the county planning department, made it happen, working with the Forest Service and with command teams on both sides of the slide.

"She pulled off miracles," Sieloff said.

Other leaders in Darrington the first few days included Tom Cooper, the deputy Arlington fire chief who served as the slide east branch director, and Marysville fire battalion chief Scott Goodale, who served as east division supervisor.

After a few days, the Darrington Ranger District provided housing for the firefighters. Before that, Sieloff spent a night at the mayor's house, another in his car. Like others, he didn't have personal medications with him. Crews suffered headaches from the dehydration.

They had trouble getting shovels, hard hats, safety vests.

They had to adjust operations. Volunteers cut up the downed trees so machines could get in and move mud.

Someone was assigned to communicate with helicopters overhead.

While Sieloff was in Darrington, only two volunteers got hurt, and neither mishap was the fault of the volunteers, he said. One man was hit in the head by debris kicked up by helicopter rotor wash. Luckily, that man had a helmet, he said.

A second man, in his 80s, was bitten by a dog they rescued, one of three dogs and a cat they found alive.

Volunteers from Darrington provided the searchers with breakfast, lunch and dinner.

Eventually, the firefighters got decontamination sites set up, using brush trucks and hoses. That would have been one of the first things to happen at any other emergency, Sieloff said. The resources took longer to come together in Darrington after the slide.

There were concerns about people eating without washing the contaminated mud from their hands. People were told that if they got any open wounds, they would have to leave.

Those on the ground tried to address the problems with the tools they had, Sieloff said.

"We were operating on the edge of safety, but we were always safety-conscious," he said.

Eventually, a regional search-and-rescue team brought in doctors and decontamination supplies. Some of the volunteers were asked to keep working, even as state and national resources arrived, Sieloff said.

They never let him down.

It was "a phenomenal, unbelievable effort by the community," he said. "I can't express enough gratitude for all they did."

In Lynnwood, crews face all sorts of emergencies all day, every day. Darrington was different.

"We see things, but you don't come back the next day and see it again," Sieloff said. "Every day it was the same thing over and over."

When Sieloff got back home, he spent time with his wife, daughters and granddaughter.

He recognized the need to return to routine, to the life he had before.

On Monday, March 31, he was back to work in Lynnwood. Someone was complaining about a hole in a pair of pants.

The problem seemed so small. Sieloff has been thinking about what soldiers must go through during months of deployment.

He was in Darrington less than a week.

He knows he probably will never again face the same kind of stress, the same hour-after-hour of intense decision-making. He had to trust his bosses who picked him to go.

Sieloff wants to visit Darrington again. He didn't get to say goodbye and thank the people who helped in so many ways.

He remembers what the locals said as they fought the mud:

"Logger Up."

"Make It Happen."

If he ever faces another tough situation, those words will be there.

He learned that in Darrington.

"We tried to stay as positive as we could, and we wanted them to 'Cheer for us, not against us,' just like the sign said in the gym," he said.

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III. Lessons Learned & Recommendations



The Commission was tasked with reviewing the landslide and the collective response to it, including the initial emergency search and rescue, recovery of victims, community efforts, incident management, and coordination among local, county, state, tribal and federal governments. Preparedness for future disasters depends largely on the lessons learned from this and other disasters and the collective willingness to plan, prepare, and budget for the unimaginable. By no means 'all inclusive', the Commission has identified key lessons to be learned from the SR 530 Landslide and has translated those lessons into recommendations, discussed below. These lessons must be leveraged if we hope to make the citizens of Washington State safer in the future.

Successes - UNDER DEVELOPMENT

Lesson Learned:

Sufficient, sustainable funding and cross-jurisdictional coordination for emergency management efforts is vital

Sufficient and sustainable funding for state, county, tribal, and municipal emergency management efforts is vital. Improvements to emergency preparedness including sufficient staffing, adequate training and equipment, utilization of new technologies, hazard and risk assessment, development and implementation of programs, and public education require resources, yet local and state funding has been diminishing due to the recession and competing funding needs. Starting in 2001, federal grants through the Office of Homeland Security funded a variety of state and local programs, but this funding is now significantly reduced.

It is often difficult to prioritize funding for emergency preparedness and management when there are so many other immediate needs. Lessons learned from the SR 530 Landslide emphasize the critical importance of sufficient and sustainable funding especially given the budgetary limits of small municipalities and rural areas.

Washington will likely be faced with catastrophic disasters in the future, whether from landslides, earthquakes, wild fires, or extreme weather events. Our resilience will depend on foresight and preparedness, and our ability to adapt and improve our emergency preparedness and response systems as lessons emerge. An evaluation of how Washington State's emergency management and response system is organized and how the system



Members of the National Guard Assist with the Search and Rescue Operation. Photo credit: National Guard. Flickr/Snohomish County - CC: BY-NC-ND 2.0

is funded relative to state and local statutes is needed to identify where opportunities for improvements exist.

An example of such a re-evaluation was undertaken by the State of Florida in Following Hurricane Andrew in 1992. The Florida 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.

Integrate and Fund Washington's Emergency Management System

The Commission recommends the Governor convene a Task Force – made up of members from multiple jurisdictions, levels of governments, tribes, the private sector, and members of the public -- to develop recommendations to achieve a more sustainably funded, robust integrated statewide emergency management system to serve the future needs of the state in the event of major natural or other disasters.

- The SR530 event made clear that, despite the adoption and broad implementation of the Incident Command System (ICS) and the National Incident Management System (NIMS) model within the state, there is still need for substantially stronger funding in some areas and a general lack of both vertical and horizontal linkage across agencies and entities. Emergency managers and responders – particularly in Western Washington – have not had the incentive or opportunity to connect, train, and especially exercise across jurisdictional lines. Where such linkages have been formed, they have been crafted out of perceived necessity. To the extent such linkages contributed to the response to the 530 landslide, they were a reflection of local initiatives that have not been broadly replicated elsewhere. These linkages, both formal and informal, are critical to the formation of the familiarity and trust which make it possible to effectively work together in emergencies or disasters. Emergency Management organizations can provide the nucleus of such efforts, and the State has an opportunity to formally encourage and support the formation of such linkages.
- Adequate funding is critical in order to fully benefit from any effort to improve horizontal and vertical integration, the participating emergency management (EM) entities must have sufficient capacity. The historic reliance on federal funding and recent reductions in those funding streams have contributed to a resource gap in

many EM and response organizations across the state.

- The Task Force called for in this recommendation should first take into account regional and statewide threats and hazards. Then evaluate existing EM programs, their funding and statutory authority, and requirements to determine resource gaps and needs, with reference to existing benchmarks such as Emergency Management Accreditation Standards. Adding to the capacity of the Task Force through association with existing research institutions should also be considered.
- Based on those assessments, the task force should then develop recommendations that initially address establishment of the necessary entity-level capacity through a sustainable funding model. Then address the creation of a state program to incentivize the formation of vertical and horizontal linkages across all traditional responder organizations, volunteer organizations, communities, and all levels of government through mechanisms such as common/joint training and exercising.
- The Task Force should report to the Legislature with recommendations to secure an adequate, appropriately funded EM structure across the state, and with recommendations for action to build a more robust system of responders through through state-sponsored cross-jurisdictional joint training and exercises.



Members of the National Guard Assist with the Search and Rescue Operation.

Courtesy of National Guard. Flickr/Snohomish County - CC: BY-NC-ND 2.0

Lesson Learned:

Clear parameters are needed for activating All Hazards 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 legal council's interpretation that state fire service mobilization resources and funding is only for fire disasters.

First response in a disaster is tasked with preservation of life and should not be confused with the role of comprehensive emergency management and policy making. Professional first responders have unique leadership skills of organizational expertise under crisis situations. When a request was made for a State Mobilization, the need for more assistance in the command and control function was critical. The Commission believes that All Hazards mobilization is the best answer for infrastructure for the first response and "search and rescue" leadership, while working in cooperation with, and parallel to, broader emergency management functions. It is imperative that we allow our fire and police professionals to 'run the scene' until the search and rescue work is finished.

There is a sense that in the SR 530 incident, there was a lack of appreciation for the differences in "first response" versus "comprehensive emergency management" needs. Disaster scenes are highly dynamic with a need for strong procedures and policy, yet not impeded by them. Response by all parties must be adaptive, creative, and innovative.

The Commission concludes that state mobilization is 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. An all-hazard state mobilization would have provided improved command and control by allowing for a Type II incident management team to arrive sooner and providing resources for first responders – providing technical rescue relief teams and equipment to assist. The Commission believes there is no viable way to interpret the 1995 amendments in a manner that excludes non-fire emergencies from the scope of events subject to fire mobilization.

Recommendation 2.

Provide legislative clarity for the definition of "all hazards" mobilization

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

- The Washington State Fire Marshall, an element of the WSP, has been advised by legal counsel that the state mobilization legislation prevents deployment of resources to non-fire disasters. The Commission believes the 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” in RCW 43.43.960(5) 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]ecause 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.

ALL HAZARDS MOBILIZATION

The Washington State Legislature adopted legislation (Substitute House Bill 1017; Chapter 391, Laws of 1995; Effective date 7/1/95) that codified a broader transfer of emergency management authorities from the Department of Community, Trade, and Economic Development to the Military Department. A portion of the law included a change to the definition of “mobilization” that changed the focus of possible responses from just fires to all hazard situations.

Subsection 5 of the 1995 law (now codified in RCW 43.43.960(5)) made the following changes: “Mobilization” means that fire fighting resources beyond those available through existing agreements will be requested and, when available, sent ((to fight a fire)) in response to an emergency or disaster situation that has ((or soon will exceed)) exceeded the capabilities of available local resources. During a large scale ((fire)) emergency, mobilization includes the redistribution of regional or state-wide fire fighting resources to either direct ((fire fighting)) emergency incident assignment or to assignment in communities where fire fighting resources are needed. . . .”

Subsection Section 6 (now codified in RCW 43.43.961) further stated: “Because of the possibility of the occurrence of disastrous fires or other disasters of unprecedented size and destructiveness, the need to insure that the state is adequately prepare to respond to such as fire or disaster the need to establish a mechanism and a procedure to provide for reimbursement to firefighting agencies that respond to help others in a time of need or to host fire district that experiences expenses beyond the resources of the fire district, and generally to protect the public peace, health, safety, lives, and property of the people of Washington”

- 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.”
- The three amendments suggested below are consistent with the 1995 amendments, and add clarity by confirming that fire services mobilization may occur for all hazards.

New Definitions (in RCW 43.43.960):

“Firefighting resources” means any personnel or equipment used to fight fires. For non-fire mobilizations, such resources may also be useful in response to an emergency or other disaster situation.

“Emergency or Other Disaster Situation” means any non-fire emergency that could benefit from the use of firefighting resources to protect the public peace, health, safety, lives, and property of the people of Washington.

Addition to RCW 43.43.961 (underlined would come before present text):

State fire services may be mobilized for fires or non-fire emergency or other disaster situations. Because of the possibility of the occurrence of disastrous fires or other disasters of unprecedented size and destructiveness, the need to insure that the state is adequately prepared to respond to such a fire or disaster, the need to establish a mechanism and a procedure to provide for reimbursement to state agencies and local firefighting agencies that respond to help others in time of need or to a host fire district that experiences expenses beyond the resources of the fire district, and generally to protect the public peace, health, safety, lives, and property of the people of Washington, it is hereby declared necessary to: . . .

Recommendation 3.

Establish Adequate Funding in the Disaster Response Account

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 that the need for additional funding to the Disaster Response Account (Fund 05H) is necessary to adequately prepare for unforeseen disasters. Currently, \$8 million is placed in the account per biennium and has been overspent for the past four biennia.

The Commission believes that funding should be increased to \$10 million per biennium. Disasters cannot be predicted and can overwhelm jurisdictions and resources immediately. Funding must be available to preserve life and public safety. 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.

Recommendation 4.

Pro-Active Preparations

The Commission also recommends county departments of emergency management take on the responsibility of 1) knowing about the State All Hazard Mobilization, 2) how to request it, and 3) pro-actively train and build trusting relationships with regional incident Management Teams.

Lesson Learned:

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

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 accomplished. 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. ICS and the NIMS provide the basic command structure and management system used to direct all operations at a scene.

The SR 530 Landslide was an extremely complex incident that simultaneously engaged every aspect of the fifteen incident management system essential functions (Federal Emergency Support Functions). There were at times as many as 30 different agencies in the County EOC, complicating effective coordination and leadership. Significant challenges emerged due to geographically separated communities and command structures. The interface of technical experts with the ICS had not been fully developed, yet their expertise was essential for understanding the risks.



Washington Department of Fish & Wildlife Police transport search & rescue teams to the 530 slide. Flickr/GovInslee - CC: BY – ND 2.0)

Delegation of authority between the responding Incident Management Team (IMT) and the Snohomish County DEM was initially unclear. This confusion carried over to the roles and responsibilities of the elected officials and other local leaders. This was the first time that the IMT and the Snohomish County EOC had worked together.

In Western Washington, many local jurisdictions are unfamiliar with engaging a Type 2 or Type 3 IMT during a response. Type 2 IMTs consist of a variety of federal, state, county, and local agencies that come together to manage all-hazard state incidents, but predominately manage wildfires. Type 3 IMTs consist of trained personnel from different departments, organizations, agencies, and jurisdictions within a region acting to support incident management at incidents. IMTs need to be effectively integrated into the response structure, coordinated with the EOC, and be scaled appropriately for the complexity of the incident.

Even though there were aspects of the command and control environment that were unique to this incident, many of the same agencies and similar jurisdictions will engage in future incident responses and be faced with complex interactions. It is important that statutory responsibility and delegation of authority be very clear. Roles and responsibilities need to be fully understood by all levels of emergency responders, elected officials, and technical experts. Conflicts between roles and responsibilities within jurisdictions and with all responding agencies need to be reconciled.

Recommendation 5.

Exercise Washington's Command and Control Structure for Catastrophic Events

The Commission recommends State and county emergency management organizations work with IMT personnel to develop guidelines and processes that define delegation of authority, resource allocation, and expectations for all-hazard responses between IMT's and counties during non-fire emergencies.

- All levels of the emergency management community can benefit from building relationships prior to events. Coordinated regional training will enhance opportunities for large and small jurisdictions to clarify responsibilities and build trust.
- Statewide response systems and capabilities need to be fully understood by all appropriate organizations, including representatives from such organizations as the Association of Washington Cities, Washington City/County Management Association, and Washington State Association of Counties.
- Develop a unified statewide process for requesting, tracking, and demobilization of resources. Develop agreements between IMTs and Urban Search and Rescue Teams (USAR) to ensure specialized equipment, personnel, and other resources are rapidly deployed. This work can be accomplished as part of expanded statewide quarterly 'all hands' training and exercise programs that include IMTs.

Lesson Learned:

Large incidents with multiple fatalities can overwhelm the capacity of local coroners and medical examiners

Mass fatality planning and management response falls to the local jurisdiction, typically the coroner (RCW 36.24) or medical examiner offices (RCW 36.24.190). Coroners are elected; medical examiners are appointed. Most coroners are used to planning for and handling small incidents. Large incidents with multiple fatalities can overwhelm the capacity of local coroners and medical examiners. Mass casualty/fatality plans may exist, but practice in executing them may be limited in most jurisdictions. Mass fatality management planning must be made a priority.

During the SR 530 incident the Snohomish County Medical Examiner's Office was not staffed to handle this mass fatality event. In the early hours, there was confusion regarding which agency had the responsibility of maintaining missing person lists. This resulted in a number of responding organizations and volunteers making their own lists. Family members were in the uncomfortable position of repeating information as they attempted to file a missing person's report, identify loved one's remains, or provide personal information. This was described to several commissioners as 'cruel'. While law enforcement has the statutory authority for missing persons, they may not always be in the best position to accomplish the task.

The Snohomish County Health District went forward with the Medical Examiner's Plan to establish a Family Assistance Center (FAC), without a firm understanding of the trigger points for establishing a FAC. Excessive time and effort was spent trying to acquire location(s) and staffing for a FAC. This was further complicated by the separation of the communities - Arlington, Oso, and Darrington.⁵

Effective response will require enlisting the cooperation and assistance of other agencies, municipalities and counties. This could include identifying a medical examiner from another part of the state, or county to oversee the overall mortuary component of the response, allowing local medical examiners and coroners to focus on ongoing county specific workload. This will require establishing mutual aid agreements and multicounty plans well in advance of a disaster so that resources can be rapidly deployed in an actual event. FACs could provide a vital service and central location for families and friends to gather to get assistance in locating their missing loved one(s).

Recommendation 7.

Prioritize Mass Fatality Management Planning Statewide

The Commission recommends the State Department of Health convene a representative group of county health departments, Tribes, and Medical Examiners/Coroners Offices

⁵ Snohomish County Health District SR 530 Mudslide and Flooding Event, After-Action Report/Improvement Plan. July 1, 2014.

to develop a statewide mutual aid agreement structure for medical examiners and coroners.

The Commission also recommends the State Department of Health work collaboratively with Tribes, County Health Departments and Medical Examiners/Coroners Offices to identify opportunities for improvements to planning for and managing mass fatality incidents, including establishing Family Assistance Centers.

- The Commission recommends Tribes, county health departments and Medical Examiners/Coroners Offices work together to ensure an operational plan exists and to conduct practice drills together for multi-county mass fatality incidents, including incidents which involve federal response resources. The Commission encourages Snohomish County to share their lessons learned and recommendations from the SR 530 Landslide.
- The Commission also recommends county health departments' partner with law enforcement to ensure appropriate plans are in place for addressing the missing persons' count.
- "One Form for Missing Persons" must be developed and shared among the 'need to know' agencies so that families don't have to repeat personal information about their missing loved ones multiple times to multiple agencies.



Heavy Equipment Assisting with the Search. Flickr/
Snohomish County - CC: BY-NC-ND 2.0

Lesson Learned:

Disaster assistance after an event needs a one stop shop in order to help families navigate the various aid systems.

Multiple NGO's partnered to provide services to SR 530 landslide survivors and their families. Snohomish County Division of Housing and Community Services has a well-established 'navigator program', consisting of individuals (referred to as "Navigators") who are professionally trained in a variety of disciplines to help support the wellbeing of their constituents; mostly homeless families/people within Snohomish County. On March 22nd, Executive Lovick asked the County Department of Emergency Management to take the lead on mobilizing the human services response to impacted individuals and families. DEM called

upon the Human Services Department as the lead for Emergency Support Function (ESF) 6 and Behavioral Health under ESF 8 to mobilize the navigators to help families.

There were many professionals and volunteers on the ground organized by a variety of agencies, including 'navigators,' disaster case managers, disaster outreach services staff members, and volunteers. There was some confusion among those in need about where to go for services and frustration was expressed with support agencies that repeatedly asked for the same information. Coordination among the entities providing services is necessary and this issue is currently being addressed in Snohomish County.

Recommendation 8.

Develop a Navigator Program for Emergency Management

Although the Snohomish County "Navigator" system was originally established to assist with the issue of homelessness, the program was highly effective in managing survivor needs following the SR530 landslide. Therefore, the Commission recommends the State develop a Navigator program for Emergency Management that will include training of teams on a regional level. Given that Snohomish County successfully created and managed the Navigator system, the commission recommends Snohomish County document their processes and findings as a guide for the State to create a statewide Navigator system.

- The teams could be activated much like the IMTs are in emergencies and disasters
- Training and establishment of regional Navigator teams should be a priority.

Lesson Learned:

It is important to coordinate with Tribes prior to and during an emergency event

Due to the location and impact of the landslide a number of concerns arose that are specific to each of the three Tribal Nations in the Stillaguamish Valley. The Sauk-Suiattle, Stillaguamish, and the Tulalip Tribal Nations were impacted in different ways during this event. For example, the Sauk-Suiattle Tribe lost telephone service immediately. Transportation was costly and difficult particularly for the Tribal elders and other vulnerable tribal members and families.

The Stillaguamish Tribe provided technical resources to help de-water flooded areas adjacent to the river. Large amounts of new sediment and the force of the landslide changed the direction and depth of the Stillaguamish River creating a new configuration that may be too shallow and narrow to carry floodwaters. The river was a spawning ground for Chinook salmon and it is unclear how the changes in river topography and ecology from the landslide, in combination with other pre-existing environmental pressures will impact this run's

production. By implication, changes to the river's Chinook production may affect tribal treaty fishing rights.

Situational awareness and incident response and recovery efforts need to be informed by Tribal knowledge and actions need to be sensitive to Tribal concerns. Prior to and during an incident, it is important to understand the needs of impacted and neighboring Tribes as well as to understand the resources and assistance Tribes can provide to the response and recovery efforts.



Local Assistance with Search Efforts.

Flickr/Snohomish County - CC: BY-NC-ND 2.0

Recommendation 9.

Deploy liaisons from state and county government to coordinate with each impacted Tribe throughout an emergency.

- ***Liaisons*** will be responsible for confirming Tribal information is included in situational awareness.
- 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 in the region.
- Liaisons also need to be ICS trained and knowledgeable in all resources available (such as disaster case managers and the Navigator program).
- Liaisons need to be incorporated into the emergency management structure.

Lesson Learned:

In emergency events, effective communication is challenging. Issues fall into the categories of infrastructure, interoperability, content, and strategy

This dynamic is a common element in incident after-action reports across the state. The SR530 landslide was no exception and it provides timely examples of opportunities to improve

communications at all levels. 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 development of shared situational awareness difficult. Different operational frequencies used by some of the responding organizations made communication difficult for some. Critical and timely information was not always available to impacted communities.. When regular and cell phone service is disrupted, alternate forms of communication must be relied upon. Therefore, it is critical that communication strategies which include redundant forms of communication exist in advance of an event. For example, community volunteers who can aid in communications, such as Ham radio operators, were an invaluable asset, particularly in Darrington and need to be more fully incorporated into the response network.

Generally, the reported issues fall into the categories of infrastructure, interoperability, content, and strategy. The inability to effectively share information vertically and horizontally contributed to reduced situational awareness and a lack of a common operating picture among responders, the emergency management community and the affected communities.



An Excavator Working in the Debris Field near Oso. Photo courtesy of WSP. Flickr/Snohomish County - CC: BY-NC-ND 2.0

Recommendation 10.

Activate the First Responder Network

Washington's elected officials, emergency management and responder communities should 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 and funded the First Responder Network Authority ("FirstNet"). FirstNet is mandated to build a separate robust nationwide wireless data 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: While FirstNet will not directly address voice communications or supplant land mobile radio, it is designed to provide robust data-sharing capacity. Access to informational systems such as FirstNet, especially with the added information

to be developed from adoption of the Geologic Hazards and Land Use Planning recommendations, would have significantly aided recovery efforts.

Recommendation 11.

Update the State Communication Interoperability Plan

The State Interoperability Executive Committee (SIEC) update the State Communication Interoperability Plan (Plan) to include formal certification of Communications Leader (COML) and Communications Technician (COMT) response positions and maintaining a State listing for use by Incident commanders during a major disaster.

- The Plan should also include inventories of communications assets available to responding agencies such as handheld radios, specialized communications vehicles, deployable antennas and base stations. This effort should also include specific training and exercises for communications personnel, and the creation of a Field Operations Guide (FOG) for the State which includes and lists all the radio frequencies, assets, communications personnel and other resources available to manage a disaster in each county or region of the state.
- The SIEC has issued a draft report concerning communications during response to the SR530 Landslide. That report highlights a number of observations and recommendations – all of which comport with the assessment of the Commission and should be heeded. Specifically, while restoration of basic communication capacity occurred fairly quickly, and there were a number of official and unofficial communication mechanisms available throughout much of the critical stages of the event, they were not managed, coordinated or leveraged to maximum benefit. One critical component of this was the lack of awareness of those resources. Another was insufficient capacity to integrate the many disparate modalities in a coherent fashion.

Recommendation 12.

Establish Joint Information Centers Early

Jurisdictions establish a Joint Information Center (JIC) as early as possible to provide early, accurate and updated information to those directly affected by events as well as the general public, especially in rural areas without robust redundant communication capacity.

- Clear, helpful and timely communication and release of information requires coordination and consistency. In this case, and in many others, the sharing of critical information between responders, the notification of victims and families, and updating the public all could have been improved with the establishment of a single point of accumulation and distribution of information, managed strategically for

maximum benefit. To disseminate technical information to the media and public, a technical information officer should be available.

Recommendation 13.

Improve Situational Awareness

The State should explore ways to improve situational awareness and to create a common operating picture within the incident emergency management structure for complex events.

- The interdependent tasks of developing an understanding of situational awareness and sharing that understanding with all responders to foster a common operating picture were challenged particularly in the first 24-72 hours of the landslide. Without both elements command, control and effective response are hampered. Special attention should be given to areas with reduced communication infrastructure and limited internet service.

Lesson Learned:

Local residents, contractors, loggers, business owners, officials, and many more were invaluable to the rescue effort

Each day of the initial response involved the use of local resources such as chain saws, helicopters, bulldozers, and responder support services such as food and lodging. Local responders to the landslide were instrumental in accessing the area by alternate routes and pinpointing the locations of residences that had disappeared in the landslide. Loggers brought essential expertise and equipment for log and debris clearing. Loggers and contractors from Darrington reinforced an access road around the slide that reconnected Darrington to Oso within 36 hours from the time they began. The access road significantly reduced the four hour round trip to the Arlington Emergency Operations Center (EOC).

Over the course of the response effort, a large number of outside volunteers also joined the response and rescue effort. There was a range of skill and training levels among volunteers. Working with the hundreds of local volunteers significantly highlighted the need for pre-certifying volunteers and their equipment.

In the first moments of a catastrophic event, it will be local community members that respond to an event and they may be critical to the effectiveness of a response effort. The Stillaguamish valley exemplifies the collaboration that is possible within a community. The SR 530 landslide event highlights potential leveraging of local volunteers and certain aspects merit attention and improvement to effectively use community volunteers quickly and possibly proactively. Whether it be in rural or urban areas of Washington, there is an untapped resource which could be made available by developing statewide systems to effectively

coordinate volunteers and to possibly proactively establish groups of volunteers with their skills and resources.

The functionality of the coordination and its effectiveness relies on a foundation of trusting local relationships. While there is no one way to quickly build these types of relationships, there are basic structured systems that can be developed and used to initiate the conversations that may lead to these types of relationships.

Recommendation 14.

Improve Volunteer Process

The Commission recommends the emergency management agencies and organizations that make up Incident Management Teams work collaboratively to develop a process to evaluate and improve both the pre-incident and rapid onsite identification, registration, credential verification, training, and engagement of volunteers.

- This process should be informed by input from representatives from tribal, county, and city emergency management departments.
- Volunteer information should be updated yearly and held at an accessible centralized location.
- The Commission also recommends expanding the “Map Your Neighborhood” program to include the business community, volunteer skills, and an inventory of equipment for use in cases of emergency 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.

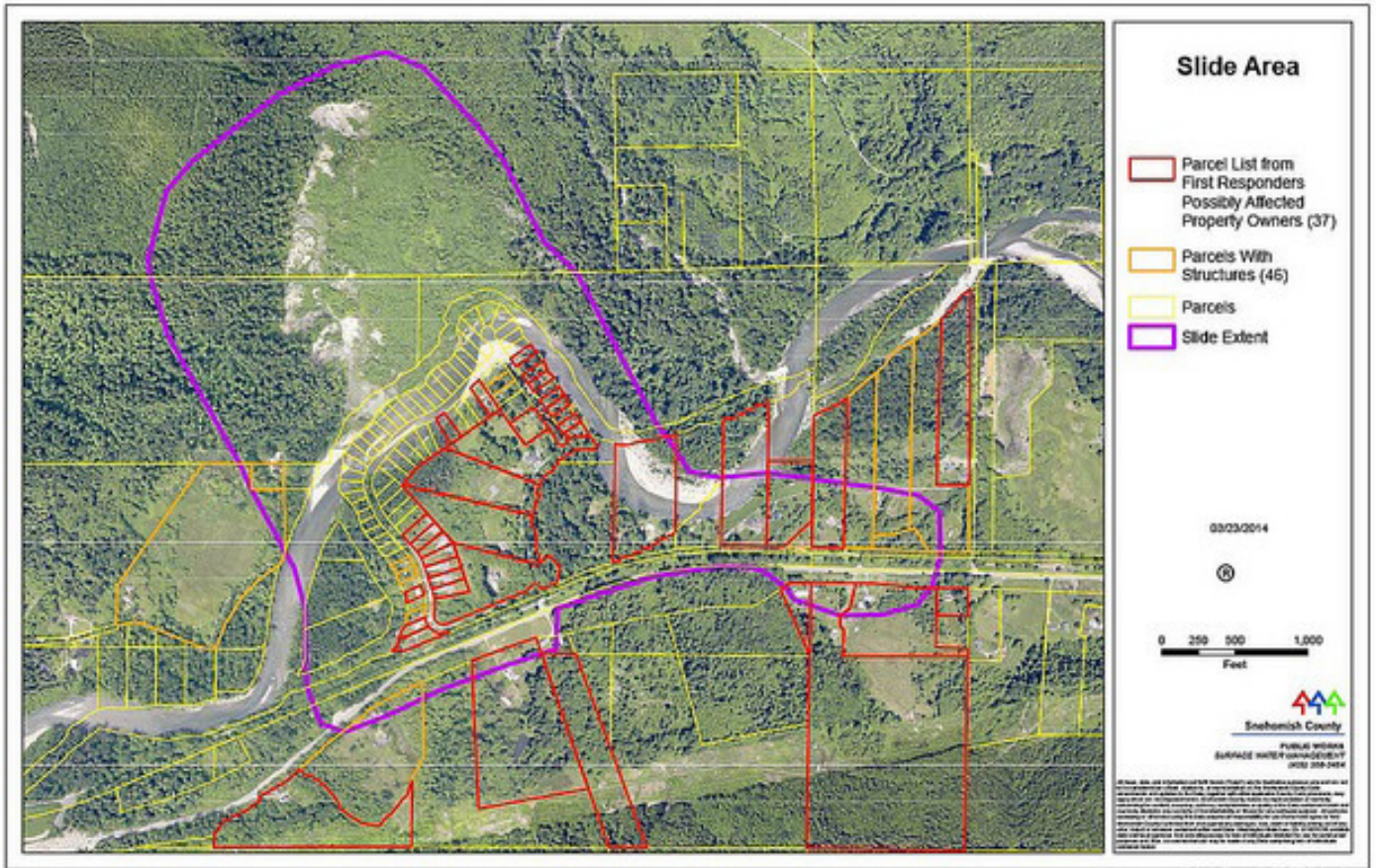
MAP YOUR NEIGHBORHOOD

The Map Your Neighborhood (MYN) program was implemented statewide by the State of Washington’s Emergency Management Division (WA-EMD) in 2006.

The program has been effective as with the Nisqually Earthquake on February 28, 2001, in which 92% of 460 organized neighborhoods effectively responded to the earthquake utilizing the 9-Step Neighborhood Disaster Response Plan. In 2012, WA-EMD received an award in Innovative Training and Education Programs for its MYN program. More than 50 counties and cities in Washington State today are in various stages of implementing MYN.

MYN provides guidance under the premise that in a disaster, traditional 9-1-1 and First Responder capabilities such as fire, police, medics, and utility personnel will be overwhelmed and unable to immediately assist individuals. Neighbors will likely be the first ones to offer assistance. “Neighbors that are prepared are more effective in their response to a disaster and have an increased capacity to be self-sufficient for the first 72 hours after a disaster.”

The Washington Military Department has a website where community groups can begin their Preparedness Plans (<http://www.emd.wa.gov/myn/index.shtml>). The website offers tools to organize your neighborhood, plan meetings, lead discussions, etc. The website is available in English and six additional languages.



Map of the slide area (via Snohomish County). Flickr/GovInslee - CC: BY-ND 2.0

Lesson Learned:

Washington State has few adequate landslide hazard, risk, or vulnerability maps

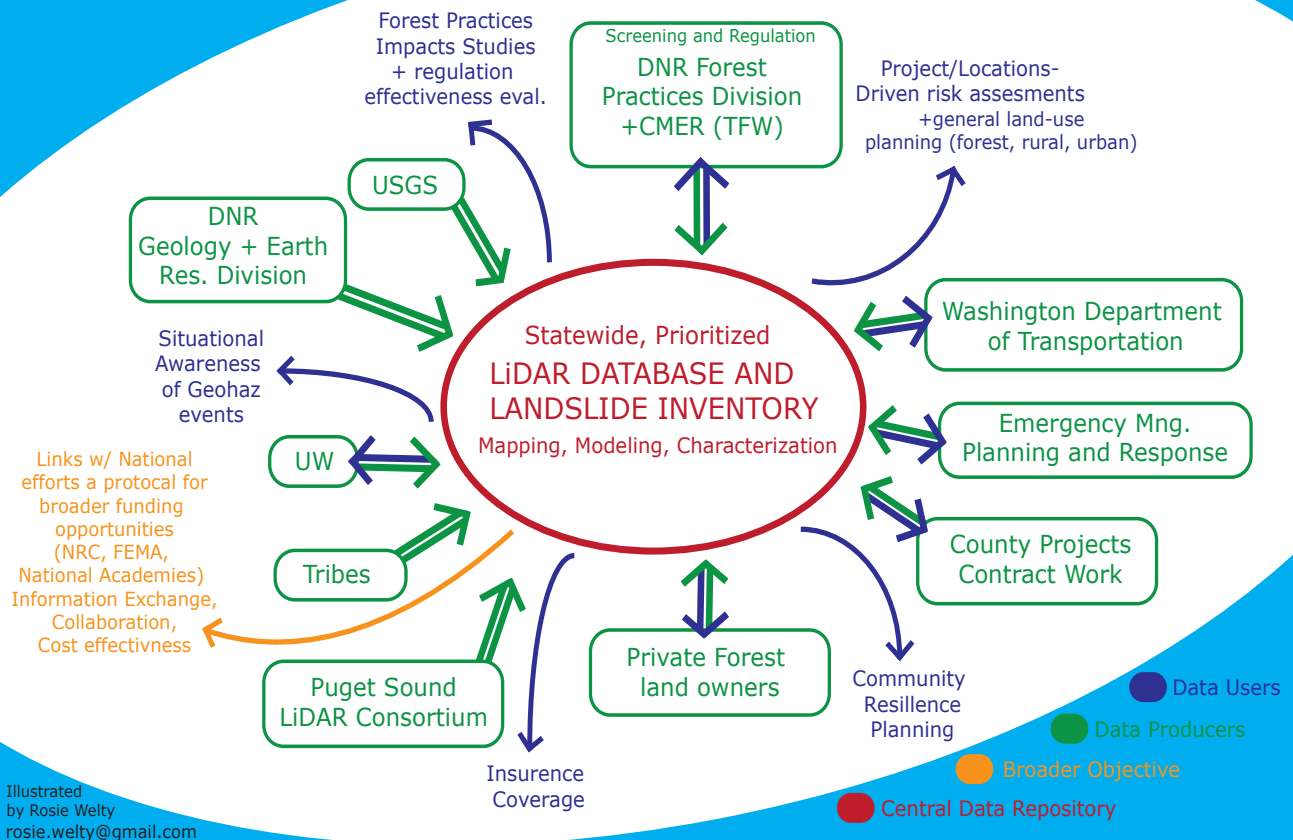
The most important and immediate need to prevent the loss of human life and property from future landslides, both along the Stillaguamish River valley west of Darrington and elsewhere in Washington State is to investigate and understand the reasons for the March 22 landslide. Protecting human life and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

The scale necessary for evaluating landslide hazards is at a ratio of 1:24,000. Geologic mapping at this scale 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 funded such efforts; however, few if any adequate landslide hazard, risk, or vulnerability maps exist within the state. The history of landslides along the North Fork of the

Stillaguamish River had been reported on previously. There had been no landslide-specific risk assessment conducted to help guide 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. Mapping and assessment results will help inform land-use planning and regulations.

Geologic maps and articles are frequently published yet geologic hazard information is not easily accessible to end users. Land-use planners require enough guidance to incorporate these products into decision-making and regulatory tools. Geohazard workshops typically target urban populations, limiting opportunities for outlying and rural communities to participate and be provided with information on the nature and warning signs of geologic hazards likely to impact them.

LANDSLIDE HAZARD MANAGEMENT IN WASHINGTON STATE



Recommendation 15.

Develop a Statewide Landslide Hazard Mapping and Risks Assessments Program

The Commission recommends the Governor convene a Task Force comprised of technical specialists including geologists, GIS specialists, and land-use planners to develop and coordinate a Statewide Landslide Hazards/Risks Mapping Program. Tasks include, but not limited to:

- Identify mapping priority areas and high-resolution LiDAR coverage needs in Washington.
- Secure LiDAR data acquisition and establish statewide mapping criteria. Review and learn from existing programs carrying out hazard, risk, and vulnerability mapping, such as those found in Oregon, Ohio, Colorado, British Columbia, New Zealand, Norway and Switzerland (see Appendices for more detailed information).
- Conduct hazard and risk mapping; initially in identified priority areas, including transportation corridors, such as the Everett-Seattle rail line and the trans-Cascades highways, and expand efforts as funds are appropriated. In addition to existing and past landslides, mapping should also include potential landslide initiation and runoff zones.
- Evaluate and recommend hazard reduction/risk mitigation measures for identified high-risk sites.
- Obtain third-party reviews for projects of state-wide geologic and land-use planning significance.
- Recommend a protocol for transferring locally generated information and data on geologic hazards and risks and mapping into a publically accessible, statewide GIS platform (e.g. a common platform) that allows identification of parcel boundaries.

Recommendation 16.

Establish Hazards Resilience Institute

The Commission recommends establishing a geologic hazard/resilience institute to address education, outreach, and research needs, professional practice guidelines, and other geologic issues impacting Washington communities. The institute could work with members of state, local, tribal, non-profit, academic, and private industry specialists to align efforts and identify opportunities for collaboration. Additional areas where such an institute could provide assistance include:

- Assisting state and local governments to establish programs and staffing to address local geologic hazards.

- Providing accurate information on geologic hazards and risks relevant to land use planners as well as to the general public.
- Identifying training needs for geo-hazard specialists; for example, ICS training and other training that assures successful emergency response.
- Establishing public information response protocol for emergencies.
- Enhancing public education and awareness programs and partners.
- Identifying long-term research and education/outreach funding partners.

Lesson Learned:

Continue to Study & Monitor the SR 530 Landslide Debris and Adjacent Landslides

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

- The stability of the landslide mass on the slope is unknown. Landslide reactivation could block the river channel and divert flow toward the highway, as well as destabilize the existing headscarp, causing another large-scale, long-runout slope failure.
- The March 22nd 2014 landslide filled the river valley with sediment which significantly increases the likelihood of: flooding, channel migration, transport of sediment/debris downstream, and habitat degradation.
- Prehistoric landslides of comparable size and runout are present for several miles on both sides of the valley. These landslides could be reactivated or new ones initiated through river erosion or severe weather. The recurrence period of these catastrophic landslides is unknown.
- Groundwater conditions in the undisturbed sediments are known



Flood Waters. Flickr/Snohomish County - CC: BY-NC-ND 2.0

to contribute to slope instability and are not well understood. Building a 3D model of subsurface geology and groundwater conditions through proper characterization of sediments and aquifers will contribute understanding to continued risks along the SR 530 corridor and in similar geologic settings across the state.

Landslide investigations are required to characterize and quantify these risks and will continue to be coordinated with the on-going investigations.

Recommendation 17.

Conduct Landslide Investigations

The Commission recommends that landslide investigations be conducted to characterize the mechanisms that activated the landslide and to understand the stability of the landslide mass.

- The current investigations funded by WSDOT, DNR, Snohomish County, the Tulalip and Stillaguamish Tribes, USGS and UC Berkeley are focused on characterizing the stratigraphy and groundwater conditions above the scarp. Not included in this investigation is necessary: drilling, monitoring, and mapping along the SR 530 corridor adjacent to the landslide. Additional work and funding of up to \$2 million is required for the next phase consisting of: Geotechnical drilling, monitoring, and analysis of the March 22nd landslide mass, its stability, and potential threat to valley. [This can only be completed next summer once the ground has dried and equipment access is possible]
- Using empirical data from the geotechnical investigation, model conditions that led to the March 22nd landslide including its devastating runout distance and speed; identify where similar conditions may exist or could occur elsewhere in the valley that could put additional lives, property, infrastructure, and habitat at risk. Geologic and geomorphic mapping, including radiometric dating, of prehistoric large runout deposits and associated fluvial terraces in the valley to determine ages and recurrence periods.

Lesson Learned:

WAC Guidelines for designating geological hazard areas and assessing risk are permissive, due in part to the lack of statewide geologic and geohazard mapping

The Growth Management Act requires cities and counties to prepare critical area regulations to classify and designate geologically hazardous areas, wetlands, frequently flooded areas, aquifer recharge areas, and fish and wildlife habitats in their Comprehensive Plans.

The Washington Administrative Code (WAC) includes a set of guidelines for local governments to use when classifying and designating 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 geologic and geohazard mapping. However, before local governments can effectively regulate land uses in geologically hazardous areas, it is imperative to know where such hazard areas are and what relative risk exist. In comparison to other recognized critical areas, state subdivision laws allow disapproval of land subdivisions due to flooding but are silent on regulating proposed subdivisions affected by geologic hazards.



Recommendation 18.

Update the WACs

The Commission recommends updating the WACs related to Critical Area Regulations to require counties and cities to identify, classify, and regulate land uses in geologic hazard areas based on up-to-date geologic information and risk mapping as available. (Note: amend WAC 365.190.080 and .120).

- In addition, the Commission 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 identified geologic hazard areas.

Lesson Learned:

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 and sellers are 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 and lack of ready access to such mapping products.

Recommendation 19.

Develop Public Awareness Initiatives

The Commission recommends local governments develop public awareness initiatives to inform property owners (e.g.; through property tax assessment notices) and the general public of designated geologic hazard areas once these hazards are identified from local, regional or statewide mapping programs.

Recommendation 20.

Expand Real Estate Curriculum

The Commission encourages the Real Estate Commission to include natural hazards awareness in their “core” curriculum that licensees must take every two years.

Recommendation 21.

Develop Public Educational Programs

The Commission supports the development of educational programs specific to local community issues to raise awareness of natural hazards and risks from landslides, debris flows, flooding, volcanic eruptions and earthquakes.

Lesson Learned:

Development Regulations to Mitigate Geologic Hazard Impacts

Land use planning processes allocate lands between potentially competing or conflicting uses, in order to secure the rational, orderly, sustainable and environmentally sound development of land. Land-use planning seeks to accommodate these needs within a technical and spatial framework. The Growth Management Act 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 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 government’s responsibility to promote public safety.

Recommendation 22.

Consider Innovative Development Regulations

The Commission encourages counties and cities to adopt and use innovative development regulations and practices to enable development and use that promotes public safety and respects personal 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, and acquisition by public land trusts, and grading ordinances.
- Local jurisdiction concerns related to property values adjacent to or in landslide hazard areas should be incorporated in planning around the following:
 - o Economic impact – simply put, real estate worth is determined by what income it produces or its perceived value to an informed purchaser.
 - o Scientifically – the key impacts on value is verifiable and repeatable truth (science) regardless of who is impacted. It is also true that mitigation may be possible at a cost.
 - o Politically – The body of government regulations in place (or lack thereof) reflects dominant political science as much or more than pure science.
 - o The Practical – the ability to understand, document and benefit from the mix of the first three elements for any challenged property is what will determine the movements in property values. These elements also contribute to one’s ability to make informed judgments that may keep property owners out of harm’s way.

IV. Call To Action



SR 530 Slide April 10. Flickr/Snohomish County - CC: BY-NC-ND 2.0

A. Critical First Steps

UNDER DEVELOPMENT

The Commission has endeavored to identify the “top recommendations related to the SR 530 landslide that, if implemented today, would make us safer tomorrow.” The Commission has identified three items as important first steps towards that safer tomorrow: 1. Development of a sustainable funding model for emergency management, 2. Conversion of the current “Fire Mobilization” process to an “All Hazard/All Resources Mobilization” process, and 3. The Development and dissemination of landslide risk maps. These are Recommendations (INSERT FINAL NUMBERING HERE), and are those which should be addressed first. Mapping (landslide risk) will improve public awareness and inform individual-level prevention, mitigation and preparedness decisions. It will also drive local and state government attention to risk, prevention, mitigation, preparedness and response strategies. Both will result in improved public safety. Legislative action to assure that the current statutory scheme for fire mobilization becomes a true “all hazards” and “all resources” mobilization framework,

supported by adequate funding, will mean that outside resources may more easily and more quickly be brought to bear to assist and augment local resources when significant events occur. Adequately funding, and by doing so maximizing the force multiplier and leveraging benefits of a well-networked, well-equipped and well-trained statewide system of emergency management will likewise provide both a much-enhanced response capacity and generally-expanded capacity to increase public safety. Other recommendations address best practices and efforts which can be accomplished by agencies and jurisdictions. These three recommendations, which provide the most promise, require leadership from the State.

B. Best & Promising Practices

UNDER DEVELOPMENT

Some of the recommendations contained herein are being actively implemented by the agencies which were involved in the SR530 Landslide response, and can be implemented at the agency level with only encouragement and perhaps funding support from the State. Included in this group are the following: INSERT FROM FINAL LIST HERE. Other recommendations will require more centralized, formal, or structured effort, or a higher funding commitment, to achieve. Chief among these are: INSERT FROM FINAL LIST HERE.

C. Responsibility Matrix

UNDER DEVELOPMENT

In an effort to provide guidance on not just what ought to be done to improve public safety in Washington, but how and led by which entity, the Commission has developed a matrix which identifies the locus of action for each recommendation.

Appendix A.

The Joint SR 530 Landslide Commission CHARTER

Purpose

Governor Jay Inslee and Snohomish County Executive John Lovick are working together to form a joint commission in response to the SR 530 landslide of March 2014.

Operations

The Governor and the Executive have agreed the Commission's operations should:

- Operate independently from the state and county executives
- Be led by a commission of 12 members
- Be thoughtful, fair, compassionate and credible
- Be transparent and abide by open meetings and public records laws
- Produce a report of prioritized recommendations by December 15, 2014

Scope

One of government's preeminent roles is to promote public safety. To that end, the Commission will focus its work on identifying the top recommendations related to the SR 530 landslide that, if implemented today, would make us safer tomorrow.

- The Commission will 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.

Executive Director

An Executive Director will be appointed who is an experienced people and project manager, and can be an objective leader who will effectively help the Commission fulfill its mission. The Executive Director will serve as the non-voting Chair of the Commission. The Executive Director will also manage the Commission's budget, and will be tasked with working with non-profits and the private sector to raise any additional funds, in-kind and pro-bono resources to complete the Commission's mission.

Facilitation

The Commission will be staffed by a facilitator and researcher/writer. The Executive Director must approve of the choice for facilitator, and can opt to replace the facilitator at any time.

Legal

Appointed commissioners are immune from civil liability for any discretionary decision or failure to make a discretionary decision within their official capacity. (RCW 4.24.470)

Commissioners

All Commissioners will be jointly appointed by the Governor and Snohomish County Executive.

In order to preserve the Commission's independence, those who were directly involved in the landslide response and recovery efforts are not eligible to serve on the Commission.

The Governor and Snohomish County Executive are committed to appointing a diverse, talented and dedicated group of people. The Commission should include representatives from the following categories: Geologists and/or Hydrologists; Emergency management experts; Land use experts/County planners; Current or retired public safety experts; Tribal and Citizen representatives; Elected/former elected officials.

Meetings and Time Commitment

Commissioners will be expected to contribute 10 to 12 hours per month for the duration of the Commission's work (not including travel time).

The Commission will meet at least once a month for a minimum of two hours. The Commission is encouraged to hold these meetings in Snohomish County. Other potential subcommittee work, field work, community work, preparation and research may require Commissioners' additional attention and time.

Final Report

The Commission will provide the Governor and Snohomish County Executive with a report of prioritized recommendations by December 15, 2014. The Executive Director and Commissioners may be asked to periodically present and explain recommendations to the media, legislature and other audiences beyond this deadline on a pro-bono basis.

Community Engagement

The Commission is encouraged to engage the Stillaguamish Valley community in meaningful ways throughout its work, and particularly as it prepares to submit the final report.

The Commission will share a draft report of prioritized recommendations with the Governor, Snohomish County Executive by November 15, 2014 and consult with the following local leaders: Sauk-Suiattle Tribal Chair Norma Joseph; Stillaguamish Tribal Chair Shawn Yanity; Tulalip Tribal Chair Herman Williams Sr.; Darrington Mayor Dan Rankin; Arlington Mayor Barbara Tolbert and Oso Fire Chief Willy Harper.

Decision-Making

The Commission will practice consensus decision-making. That is to say, the Commission will seek general agreement and an acceptable resolution that can be supported by the group, even if it's not the favorite of each individual. The Commission's ultimate decisions are advisory only, and may inform the future policy choices of the State of Washington or Snohomish County. The Commission itself has no other decision making authority.

Ethics and Public Records

All Commissioners will abide by the ethical and professional expectations set by the state and county, and they will be required to complete online ethics and public disclosure training.

To maintain a single repository for public record keeping, Commissioners and staff will Cc the following email address on all correspondence related to the Commission: SR530commission@gov.wa.gov

In accordance with the open meeting rules, the Executive Director will post meeting agendas and materials on a Commission webpage.

Appendix B.

Timeline

Under Development

