

LiDAR Program Development at the Division of Geology and Earth Resources

**Abby Gleason, LiDAR Manager
2016 Washington URISA Conference**

5/25/2016



Division of Geology and Earth Resources

- The Division of Geology and Earth Resources (DGER) is the Washington State Geologic Survey, and is a part of the Department of Natural Resources (DNR)

- Mining, oil and gas regulation
- Geologic mapping
- Geologic hazards
- Geothermal exploration
- Library and publications

LiDAR is a foundation dataset to support all of this work



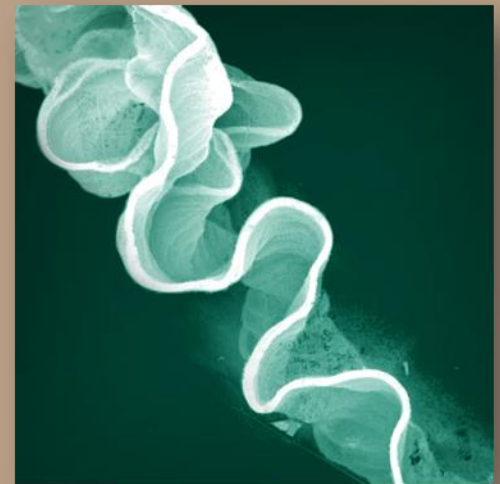
DGER LiDAR Program Background

- RCW 43.92.025, 2015: The geological survey must conduct and maintain an assessment of hazards in Washington. The geological survey must acquire and process new LiDAR data or update deficient data and create and maintain an efficient, publically available database of LiDAR data
- Funding for LiDAR collection lasts until 2021 (3 biennium periods)
- Two dedicated positions created to support LiDAR collection and distribution
- 3 additional positions dedicated to landslide hazards – all since January 2016



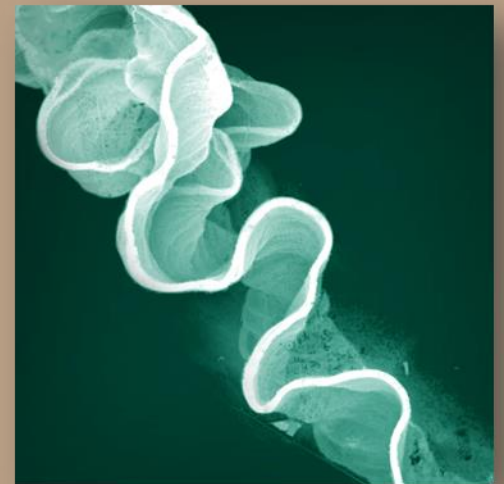
DGER LiDAR Program Mission

- Improve understanding of geologic hazards across the state
- Collect high quality, consistent LiDAR datasets that can be applied to a wide variety of applications
- Create a centralized LiDAR database available to public
- Provide outreach to inform, educate, and assist with LiDAR collection and interpretation

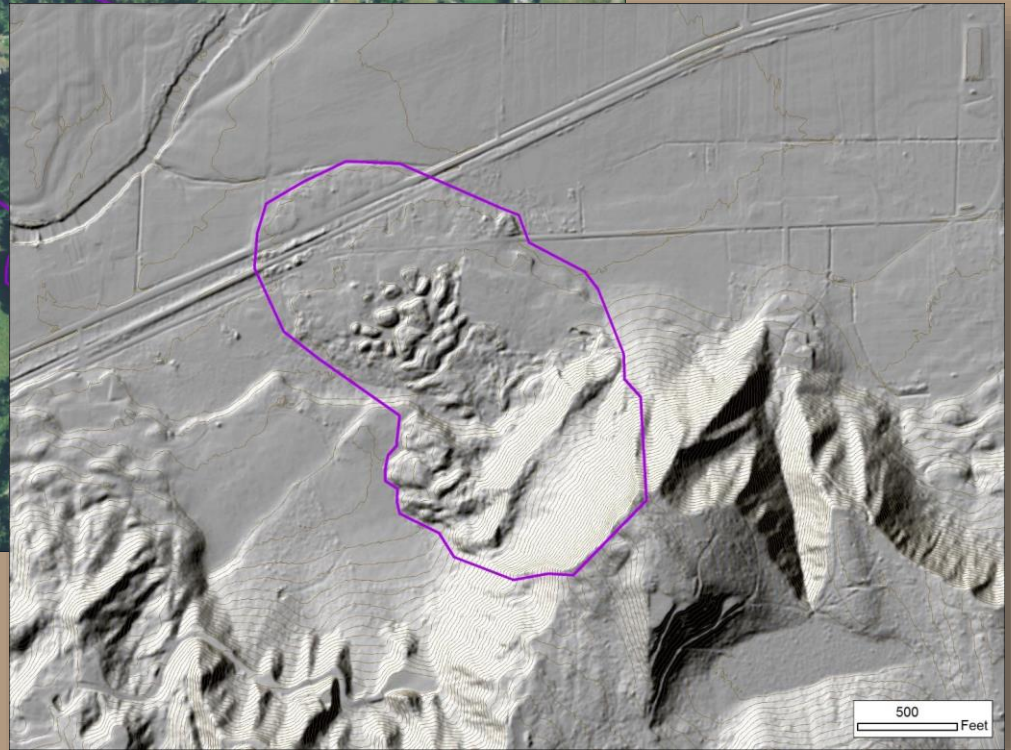


DGER LiDAR Program Mission

Geologic Hazards



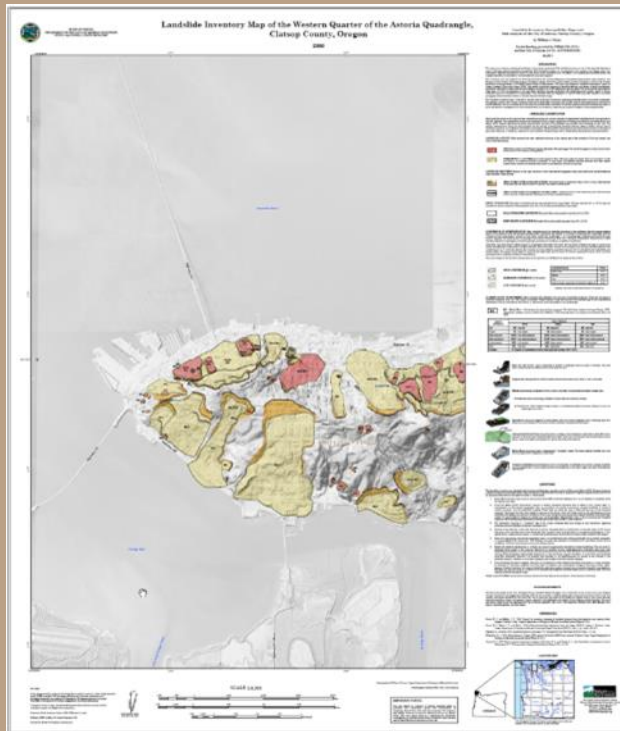
LiDAR and Hazard Mapping



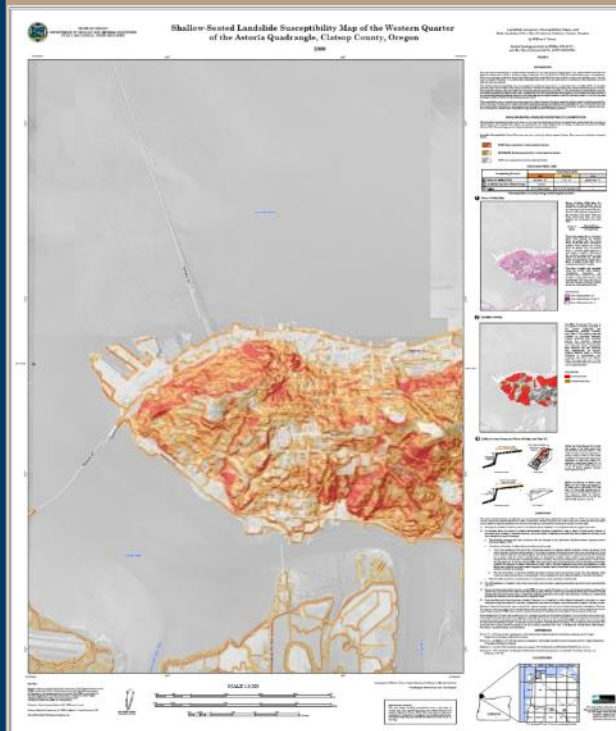
LiDAR and Hazard Mapping

Facts from the past

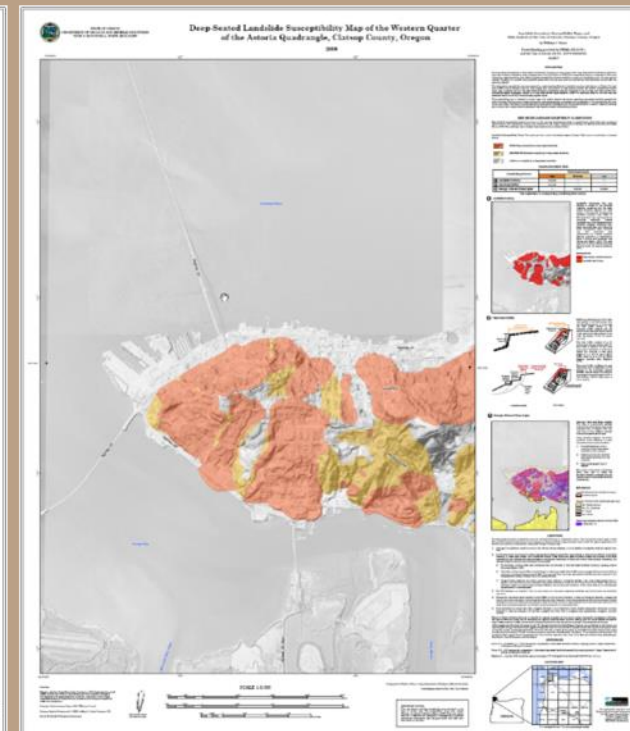
Models that try to predict the future



Inventory
Map of Existing Landslide
Deposits



Shallow-Landslide
Susceptibility
Maps of Places Likely to have Landslides in the Future



Deep-Landslide
Susceptibility
Maps of Places Likely to have Landslides in the Future



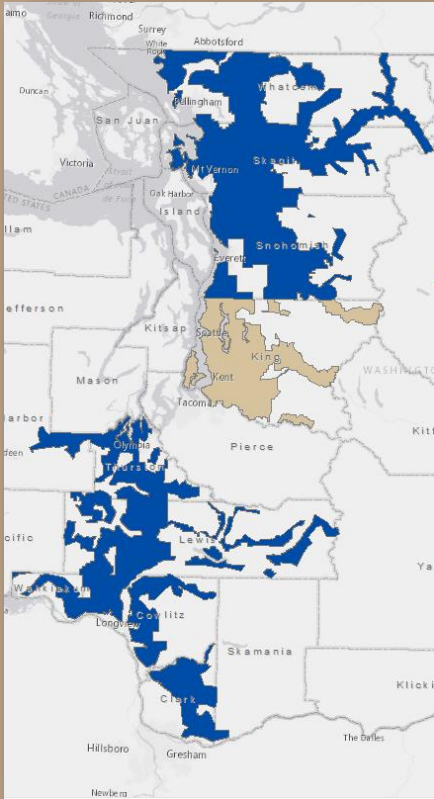
Ongoing LiDAR Projects

- King County

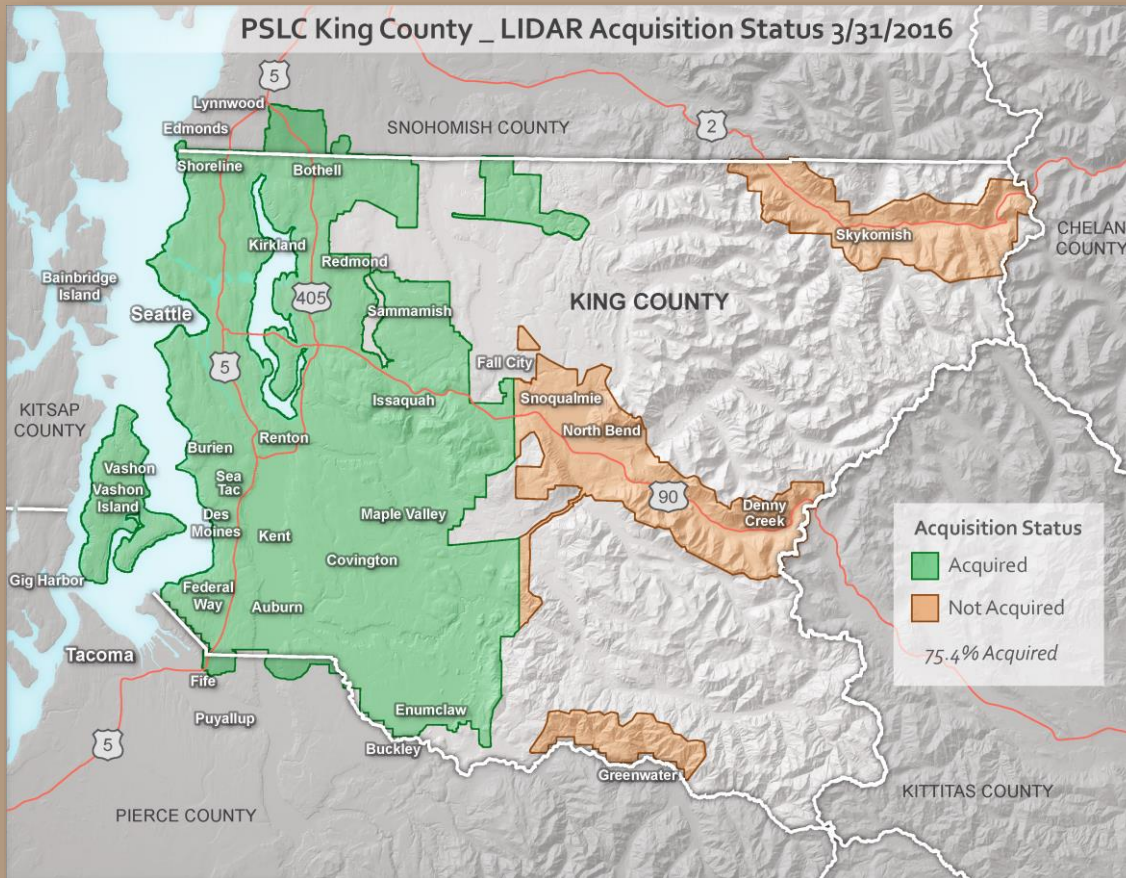
- Partnership with the county and many of the cities, through the Puget Sound LiDAR Consortium
- Will continue hazards mapping, in particular landslide mapping, into King County

- 3DEP

- USGS 3D Elevation Program, Geospatial Product and Service Contracts (GPSC)
- Partners: Skagit, Snohomish, Whatcom, Lewis Counties, Sierra Pacific Industries, the Swinomish Tribe, Seattle City Light
- Focused on partner requirements and hazard mapping
- Updates and acquires new data with higher quality and broader utility



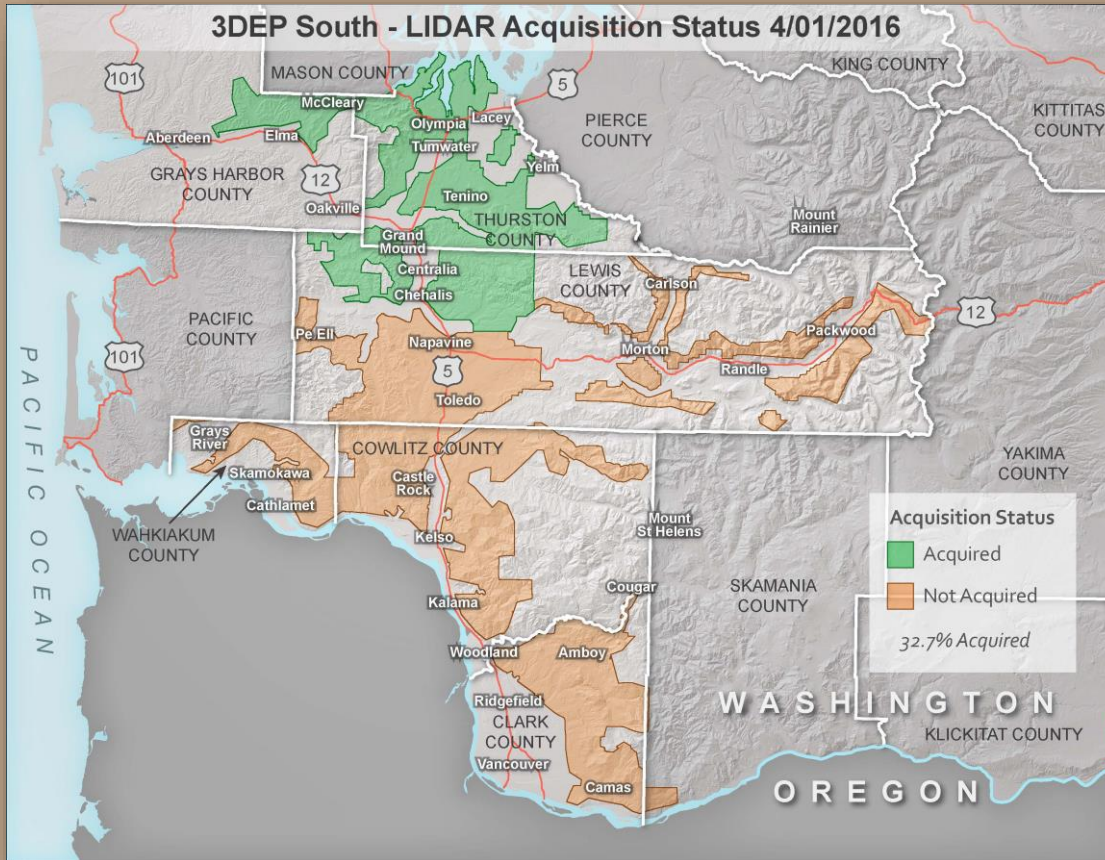
King County Project



- Vendor is Quantum Spatial Inc.
- Contract through PSLC
- Collected primarily in leaf off conditions at 8 points per square meter (ppsm)
- Portions delivered this summer



3DEP Project

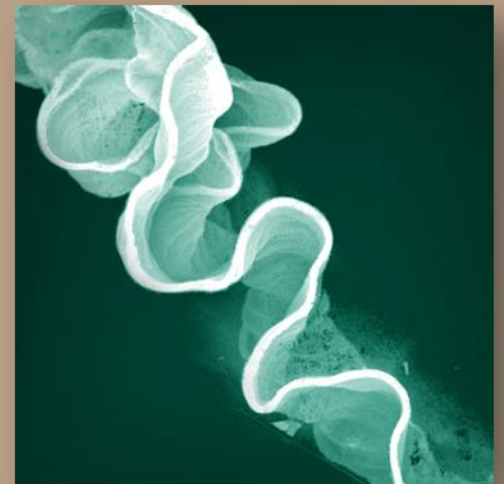


- Vendor is Quantum Spatial Inc.
- Contract through GPSC
- Collected primarily in leaf off conditions at 8 ppsm
- Deliveries beginning next summer



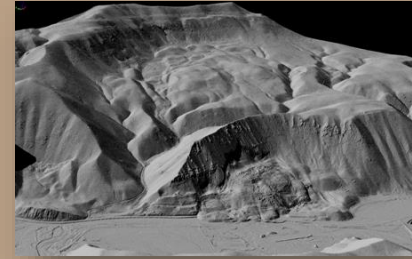
DGER LiDAR Program Mission

LiDAR Collection



LiDAR Applications

Geologic hazard mapping
including landslides,
faults and susceptibility

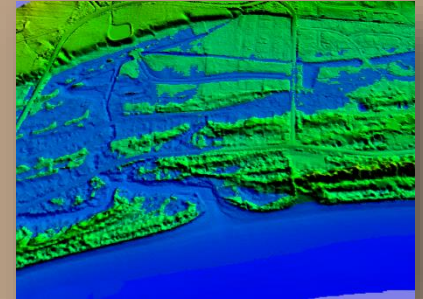


Urban planning, infrastructure
mapping, transportation



Change
detection

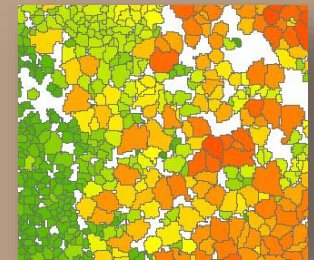
Flood modeling, delineation of
inundation zones



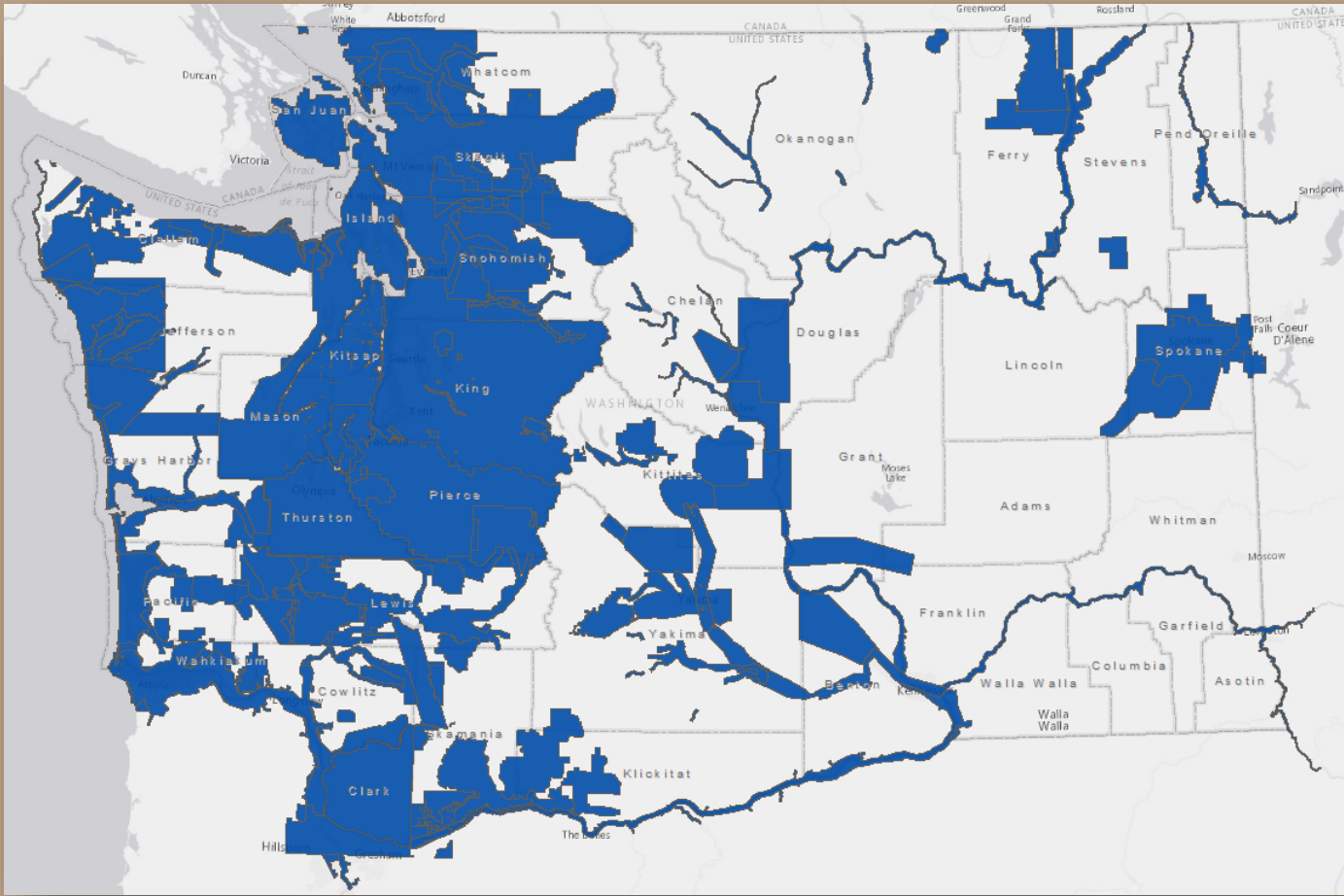
Agricultural applications
including field drainage,
sun-angle analysis



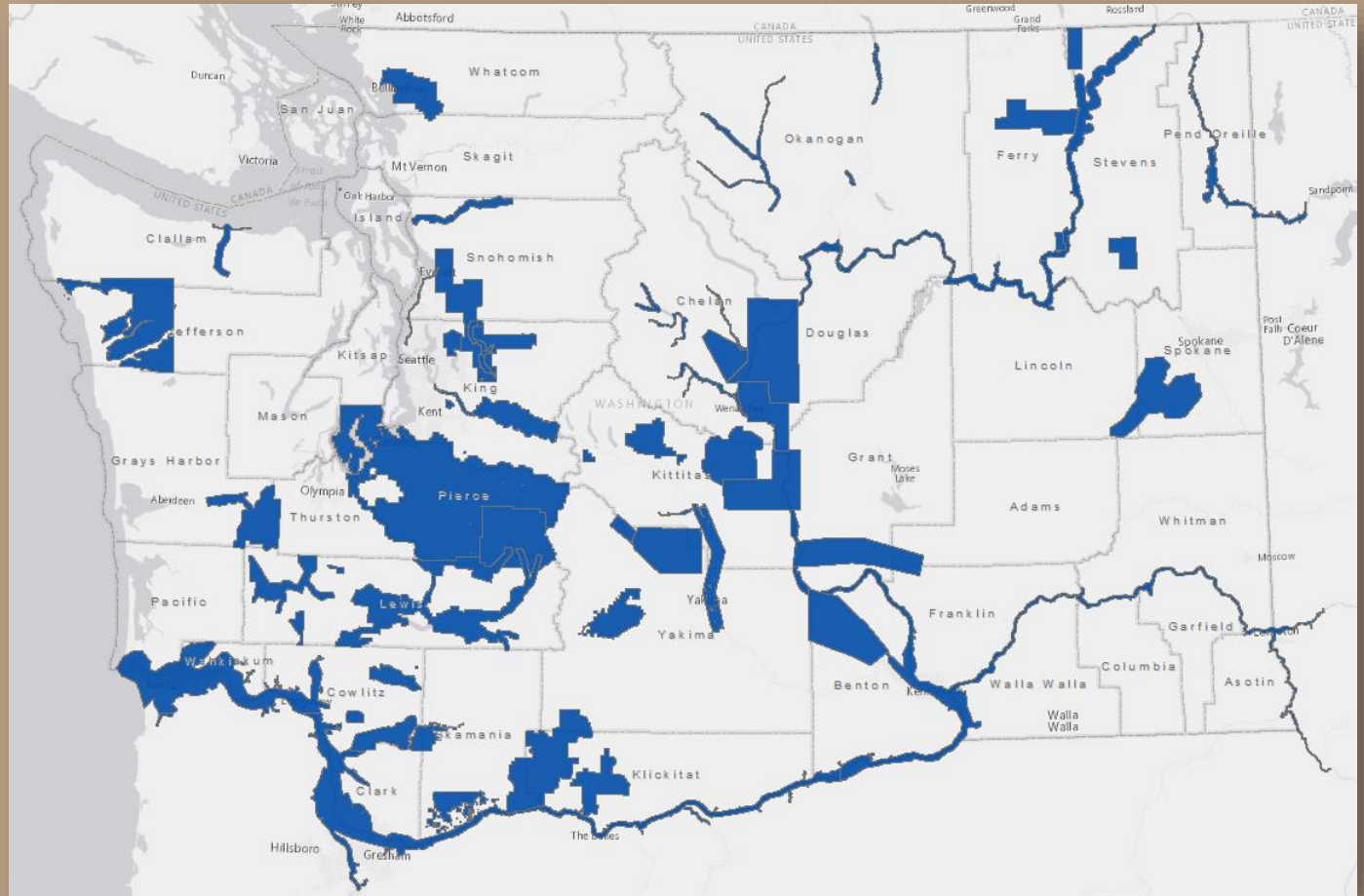
Forestry and
Environmental
Monitoring



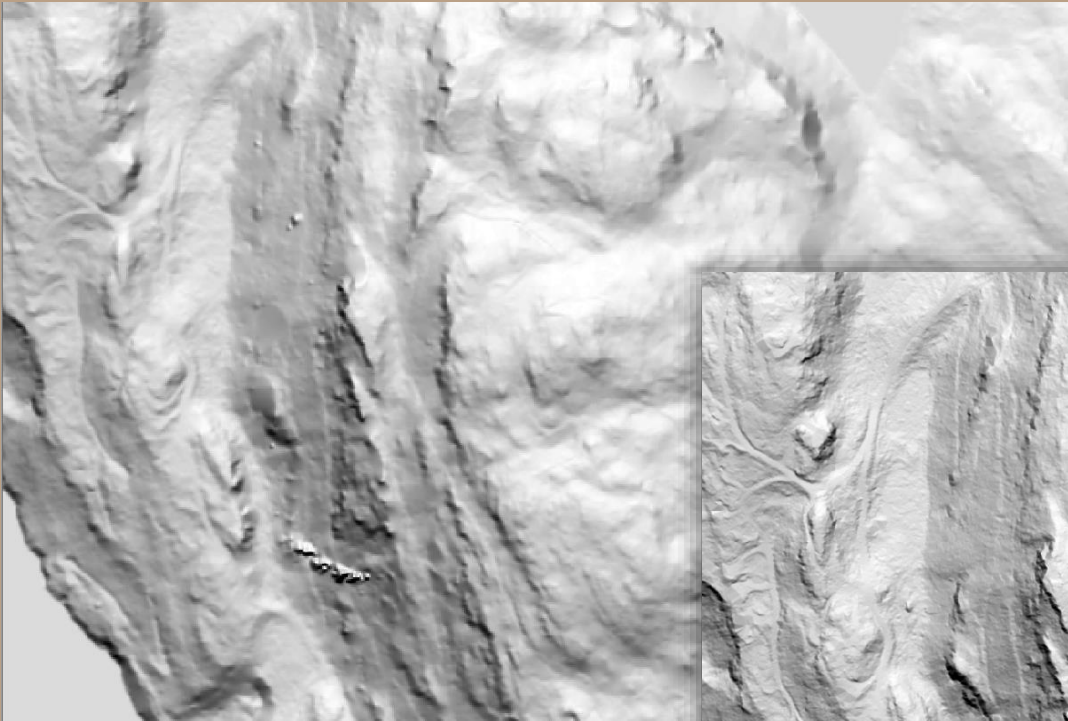
Current LiDAR Data....



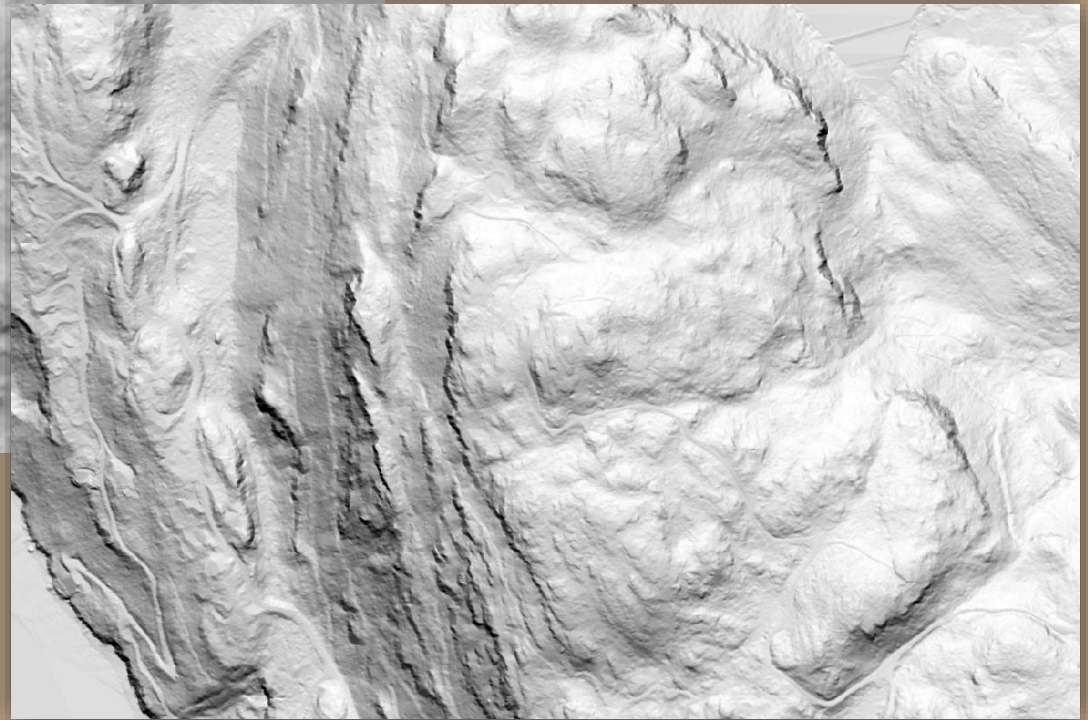
...Depends on Application...



...And Quality



2013 6ft LiDAR



2009 3ft LiDAR



Challenges of LiDAR Collection

- Weather!
- Diverse environments



- Range of applications
- **Cost**
- **Time**



Goals for LiDAR Collection



- Consistent high quality that will support multiple applications
- Acquired in uniform, efficient blocks
- Economic use of funding and pool resources
- Statewide collection



LiDAR Contracts



- PSLC
- GPSC
- New options:
 - State contract through Department of Enterprise Services, coming soon
 - DGER RFP in the works



LiDAR Contracts



- PSLC
 - Expertise, longevity
 - Emergency response is more challenging
 - Contract renewal?
- GPSC
- New options:
 - State contract through Department of Enterprise Services, coming soon
 - DGER RFP in the works



LiDAR Contracts



- PSLC
- GPSC
 - Process in place
 - QA and delivery may take longer
- New options:
 - State contract through Department of Enterprise Services, coming soon
 - DGER RFP in the works



LiDAR Contracts



- PSLC
- GPSC
- New options:
 - State contract through Department of Enterprise Services, coming soon
 - Any state or local government
 - Low overhead costs
 - Will allow for flexibility in environment and application
 - DGER RFP in the works



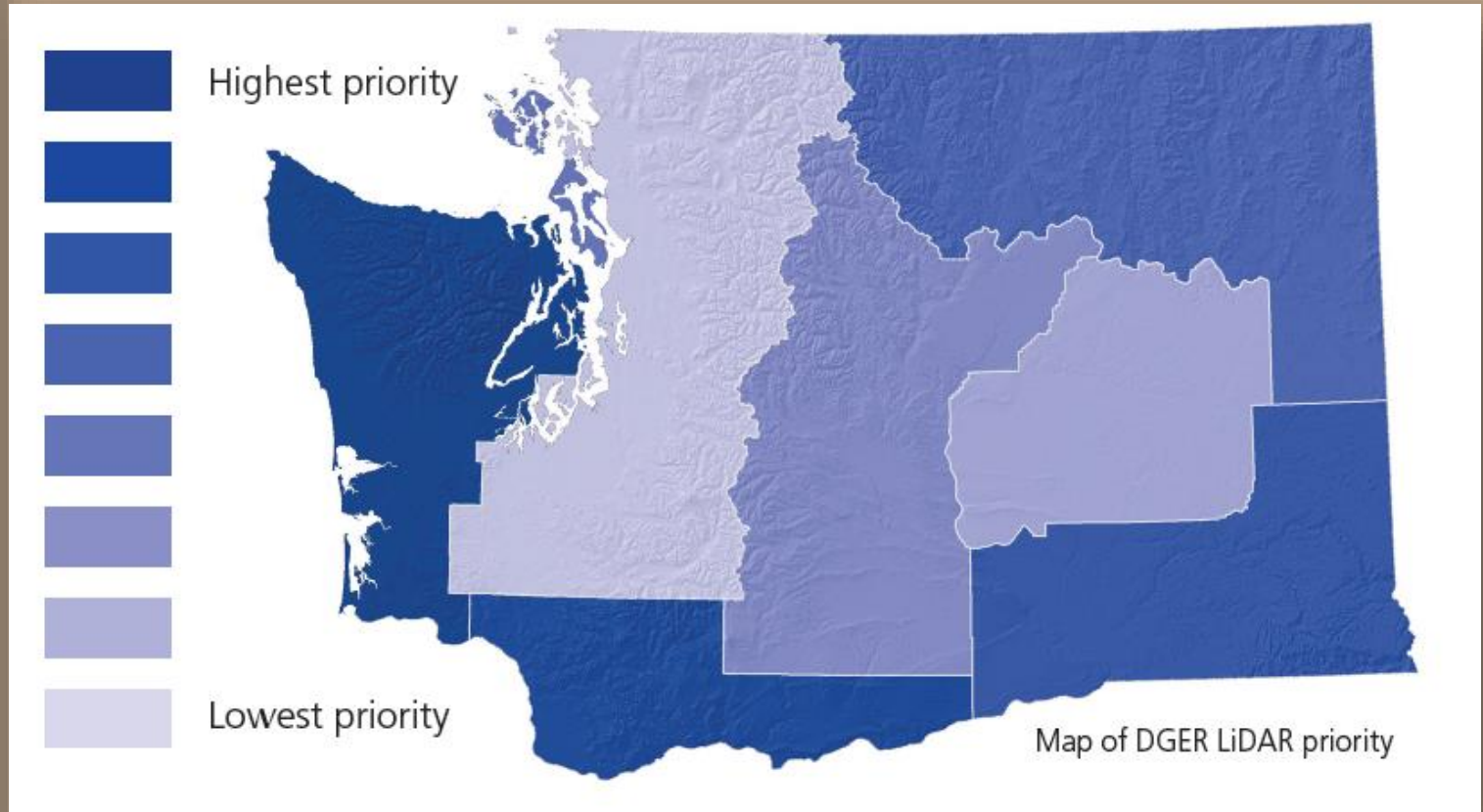
LiDAR Contracts



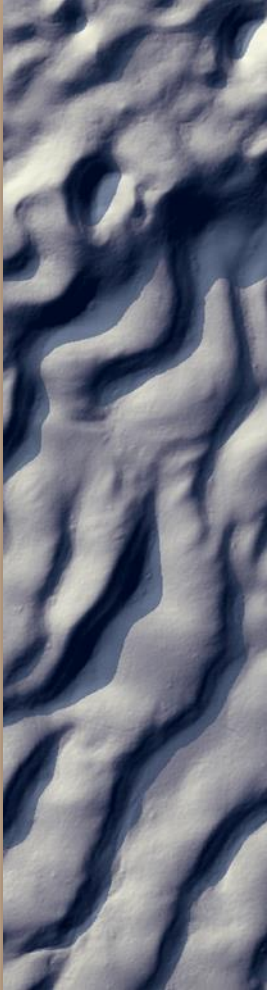
- PSLC
- GPSC
- **New options:**
 - State contract through Department of Enterprise Services, coming soon
 - DGER RFP in the works
 - Any state, local, or private entity
 - No overhead cost
 - Will allow for flexibility in environment and application
 - Based on PSLC to maintain continuity with previous datasets
 - QA completed by DGER dedicated LiDAR staff
 - Emergency response
 - Designing with partnerships in mind



LiDAR Priorities



LiDAR Priorities



- Currently based on amount of high quality LiDAR coverage, landslide potential, population centers
- Each biennium, 2.4 million in legislative funding until 2021
- Priorities are flexible
 - Trying to accomplish a lot in a short time!
 - Partner requirements will help determine collection priorities and coverage



LiDAR Partnerships



- Extends coverage and resources
- Expands utility for multiple applications
- Access to more data for emergency management and response
- Allows for more flexibility (timeline, budget)
- Successful partnerships and acquisitions are a good case for legislative renewal



Other Ways to Partner with DGER

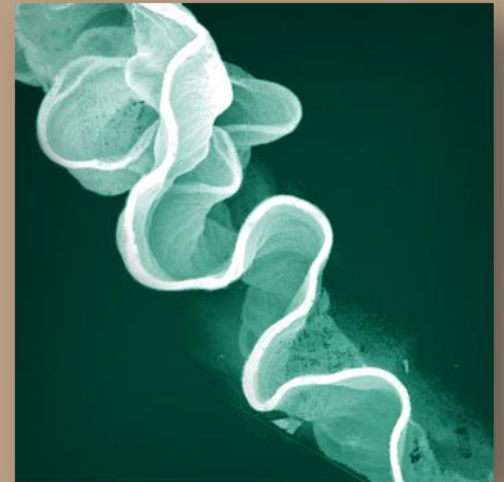


- DNR is also responsible for wildfires, forest management, aquatics
 - Any data contributions would go a long way to helping understand Washington ecology and emergency preparedness
- Building a Quality Assurance program
 - Two dedicated LiDAR positions
 - Experience in QA and data management



DGER LiDAR Program Mission

LiDAR Database



Future LiDAR Portal



- RCW 43.92.025, 2015: create and maintain an efficient, publically available database of LiDAR data
- Big data challenge
- Desired Capabilities:
 - Distribute LAZ files, DEMs, derivatives (hillshade)
 - Allow users to download based on AOI, choose products
 - Intuitive user interface



Future LiDAR Portal

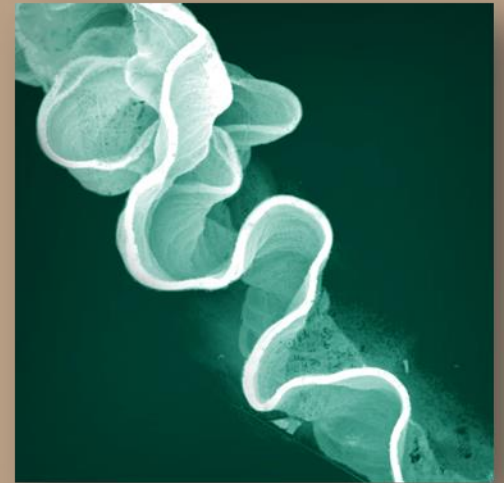


- Two ongoing portal projects
 - Alaska Division of Geological and Geophysical Surveys
 - Quick deployment, model in place
 - Will satisfy all requirements
 - Temporary solution, but can be built upon
 - Esri pilot
 - Cloud storage and server, optimized for viewing
 - Additional capabilities including image services
 - Will satisfy all requirements
- Ultimately, DGER is gaining experience in storage and dissemination solutions



DGER LiDAR Program Mission

Resources



DGER LiDAR Resources



WASHINGTON STATE DEPARTMENT OF **NATURAL RESOURCES**
PETER GOLDMARK | COMMISSIONER OF PUBLIC LANDS

Translate

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PROGRAMS AND SERVICES ABOUT

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Washington Geologic Survey
Publications Catalog

GIS Data and Databases

Presentation Archive

Lidar

Landslide within

In 2015, the Washington State Department of Natural Resources Division distributes detailed LiDAR data to help identify landslide-prone areas, both inside and outside of National Forest and State Parks.

CURRENT PROJECTS

New Projects How do I become a partner?

Map of Washington showing project areas: North Puget Lowland, King County, and Southwest Washington.

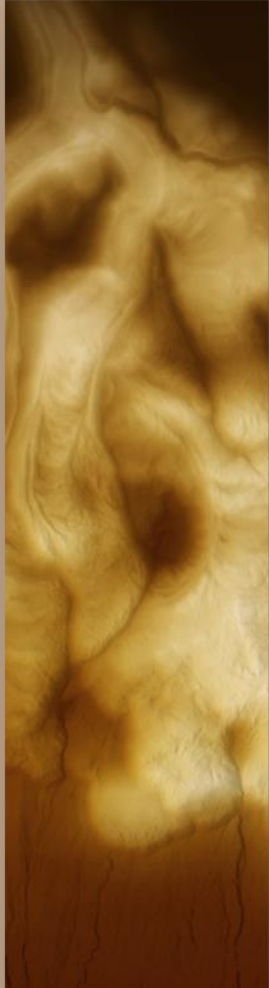
Project: King County
Year: 2015-2016
Area: 1,025 square miles
Partners: King County, City of Seattle, WA DNR, and 38 other partners

Planned lidar project areas by the Division. Click on a button to see information about the projects.

<http://www.dnr.wa.gov/lidar>



DGER LiDAR Resources



- Two experienced, dedicated LiDAR staff
 - Quality Assurance
 - Consultation
 - Analysis
 - Training and outreach
- Contract Services
- Data storage and dissemination
- LiDAR and Geology awareness



Summary – ‘Snapshot’ of LiDAR at DGER



DGER will be collecting LiDAR data over the next few years for geologic hazards, but also for wide area coverage to satisfy multiple applications and partner requirements



DGER is developing storage and public access solutions to disseminate LiDAR data and derivative products



DGER has several LiDAR resources available and planned, including partnership planning tools, contract services, QA, and outreach



What else you can find at DGER...

Geology and Earth Resources



The Division of Geology and Earth Resources is Washington state's geological survey and contributes to the safety and economic well-being of Washington's citizens.

Left: Digital elevation model of the channeled scablands in the Columbia Basin.



Geologic hazards



Geologic maps



Energy, mining and minerals



Publications and data



Washington geology library



Explore popular geology



Licensing

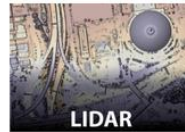


Contact Us

CONTACT US

For General Questions and Information:
Washington State Division of Geology and Earth Resources
360-902-1450

RELATED PAGES



Geology in the Public Interest Fact Sheet



SURFACE GEOLOGY

Data File Contents	Format	Date	Info	Map Service
1:24,000 scale	file gdb	Oct. 2014	html	Service
1:100,000 scale	file gdb	Jun. 2010	html	Service
1:250,000 scale	file gdb	Jun. 2010	html	Service
1:500,000 scale	file gdb	Jun. 2010	html	Service

HAZARDS AND ENVIRONMENTAL GEOLOGY

Data File Contents	Format	Date	Info	Map Service
Seismogenic Features (Faults and Earthquakes)	file gdb	Apr. 2016	html	Service
Simplified Volcanic Hazards	file gdb	May 2016	html	Service
Landslides and Landforms	file gdb	Feb. 2016	html	Service
Ground Response	file gdb	Jun. 2010	html	Service
Tsunami Inundation	file gdb	Jun. 2010	html	Service
Tsunami Evacuation	file gdb	Jun. 2015	html	Service
Hazardous Minerals	file gdb	Jun. 2015	html	Service

GEOHERMAL GEOLOGY

Data File Contents	Format	Date	Info	Map Service
Thermal and Mineral Springs	file gdb	Oct. 2014	html	Service
Geothermal Direct-Use Sites	file gdb	Oct. 2014	html	Service
Geothermal Wells	file gdb	Oct. 2014	html	Service
Volcanic Vents	file gdb	Aug. 2013	html	Service
Geothermal Favorability Model	file gdb	Oct. 2014	html	Service

GEOCHRONOLOGY AND ROCK GEOCHEMISTRY DATA

Data File Contents	Format	Date	Info	Map Service
Geochronology	file gdb	Apr. 2016	html	Service
Rock Geochemistry	file gdb	Oct. 2014	html	Service



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Left: Digital elevation model of the channeled scablands in the Columbia Basin.



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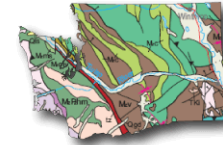
Geology in the Public Interest Fact Sheet



INTERACTIVE MAPS

Washington Interactive Geologic Map

Geologic mapping interactive map, with mapping data at multiple scales and other geologic layers



Washington Interactive Geologic Map

Layers include:

- 1:24,000, 1:100,000, 1:250,000, and 1:500,000-scale geologic map layers
- seismicogenic features
- ground response
- landslides and landforms
- tsunami inundation
- geophysical data
- volcanic vents
- geochronology
- rock geochemistry
- minerals databases

Seismic Scenarios Catalog

Interactive map provides loss estimates for a suite of earthquake scenarios on various faults. Each of the twenty scenarios has additional Hazus and Summary reports for viewing or download.



Seismic Scenarios Catalog

Layers generally include:

- projected damage to buildings and infrastructure
- injuries and fatalities
- displaced households
- building economic loss
- statistical population information

- Natural Hazards
- Tsunami Evacuation map
- Geothermal Resources
- Subsurface Geology
- And more!



What else you can find at DGER...

Also check
out the
blog!!



The screenshot shows a WordPress blog page for "Volcano Preparedness Month" in May 2016. The header features a large image of Mount St. Helens at sunset with the text "Volcano Preparedness Month" and a volcano icon, followed by "May 2016". Below the header are navigation links for "Home", "About", and "Image Gallery". The main content area displays the title "Volcano Profile: Mount St. Helens" and the date "Posted on May 16, 2016". A large image of Mount St. Helens is shown with the text "ST. HELENS" overlaid. To the right of the main content are several widgets: a search bar, a "SUBSCRIBE BY EMAIL" section with a link to "Get email alerts about new posts", a "RECENT POSTS" section listing "Volcano Profile: Mount St. Helens", "The Ring Of Fire", "Volcano Profile: Mount Baker", "Volcano Profile: Mount Rainier", and "Types of Volcanoes"; an "ARCHIVES" section with a "Select Month" dropdown menu; a "BLOGROLL" section listing "Ear to the Ground: DNR blog", "Northwest Geology Field Trips", and "The Landslide Blog: AGU"; and a "FOLLOW @WADNR ON TWITTER" section.

<https://washingtonstategeology.wordpress.com/>



Questions?

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