

# December 3<sup>rd</sup> Landslide Reconnaissance



WASHINGTON STATE DEPARTMENT OF  
**Natural Resources**

**Division of Geology and Earth Resources**

**Washington Geological Survey**

**Dave Norman**

**February 13 2008**

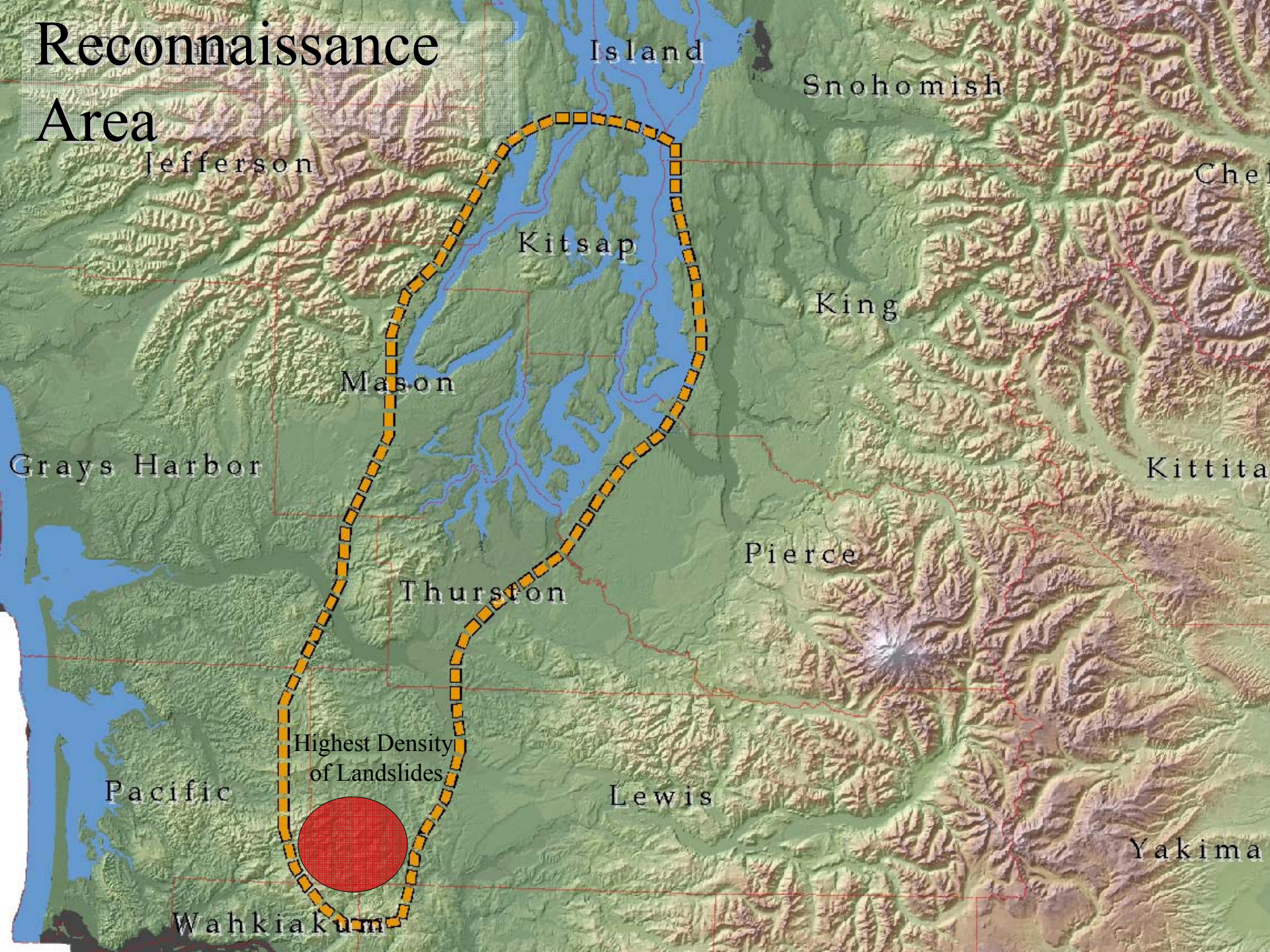
# 6 minutes 6 points

- Gathering geologic data after an event
- Our reconnaissance covered the Puget Sound and Willapa Hills
- Rainfall was highest in the Stillman Creek and Chehalis Basin and most of the slides occurred where it rained the most
- We mapped over 1000 landslides
- Most of the slides are debris flow type
- Geology matters



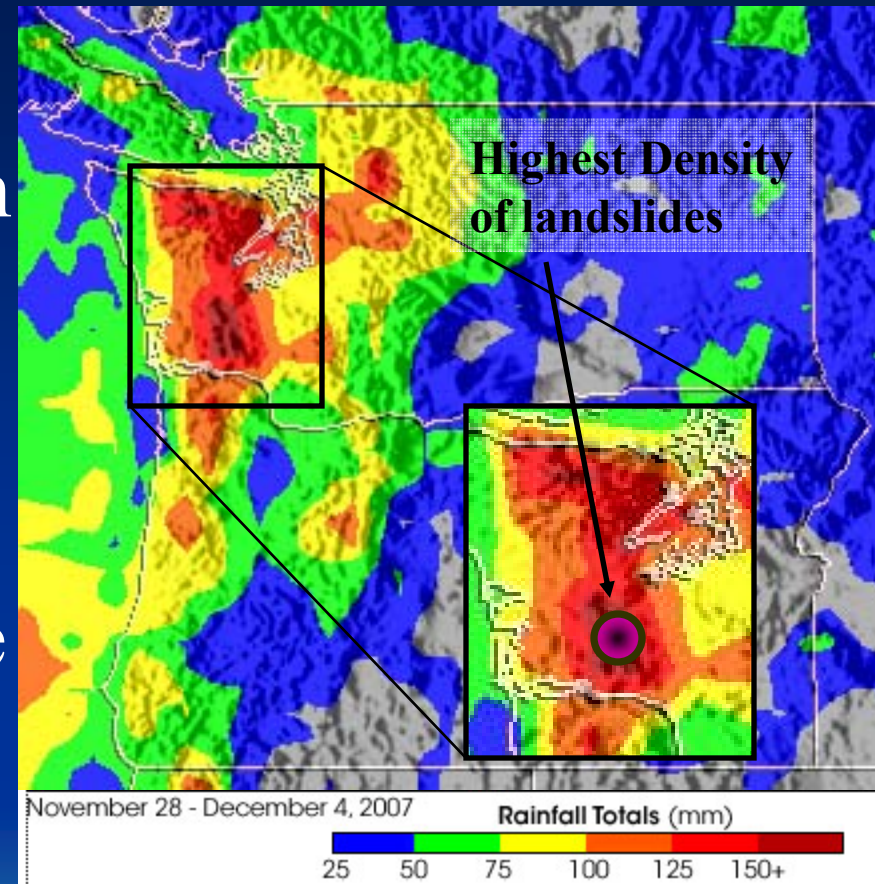
# Reconnaissance

## Area



# Landslides – Where did they occur and why?

- Hardest hit counties – Lewis, Thurston and Mason
- Correlates with storm rainfall intensity
- Almost all landslides were translational and had a slide plane of impenetrable substrate (bedrock)



# Characteristic Landslide



Spring

Thin Soils

Bedrock (aquiclude)

Soil and organics

# Highway 101 – Holiday Beach



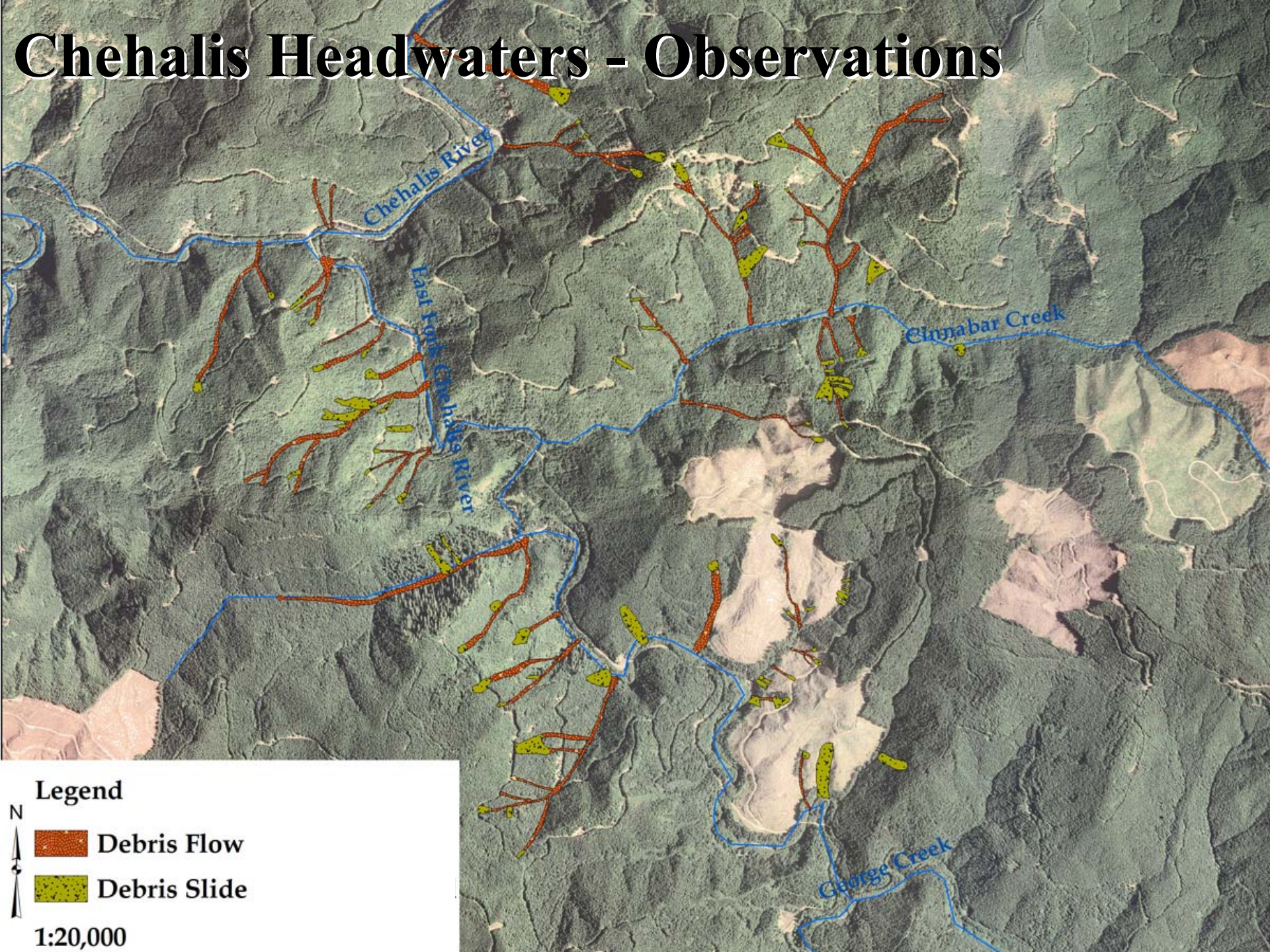
Run out

# Damage Report - Landslides




- **Over 1000 landslides mapped (~50% entered into GIS)**
- **At least 20 houses damaged or destroyed**
- **1 death**
- **At least 23 sections of highways and roads blocked or damaged**

# Chehalis Headwaters - Observations



## Legend



 Debris Flow

 Debris Slide

1:20,000



Of the ~500 slope failures  
entered in GIS

260 debris slides

160 debris flows – debris torrents

45 shallow undifferentiated  
landslides



Usually the debris slides  
transformed into debris flows.



# Debris Flows



Of the first 177 landslides inventoried:

62 either initiated in clear cuts or initiated at a road in a clear cut 0 to 5 years old

15 initiated in timber aged 5 to 15 years or at roads in timber 5 to 15 years old

96 initiated in timber 15 to 50 years old or at roads in timber 15 to 50 years old

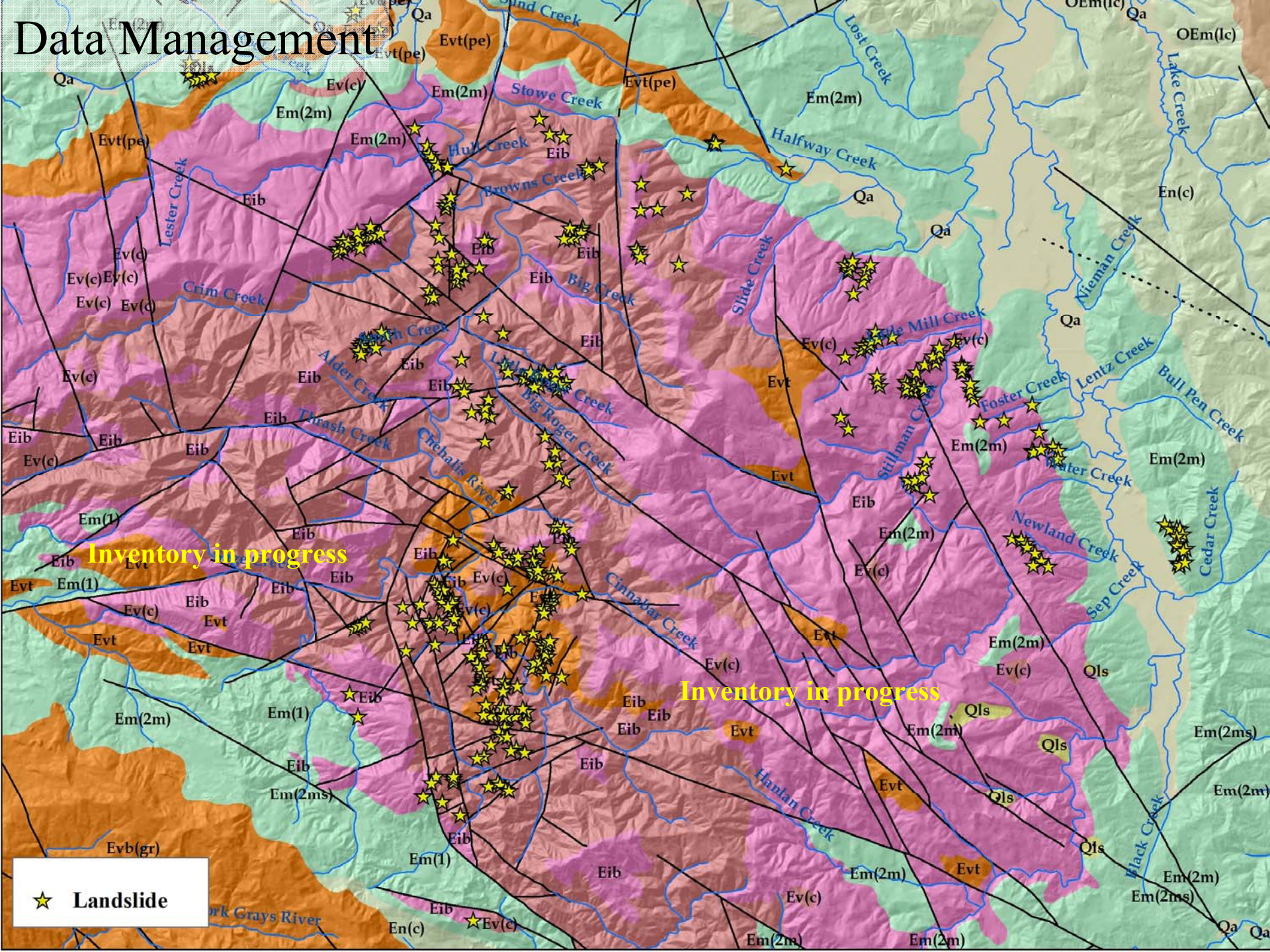


# Geologic Component

Bedrock and shallow soils  
key components of  
landslides in this event

Geologic mapping is a key  
component in  
understanding the basin  
and potentially best forest  
management practices





# Data Management

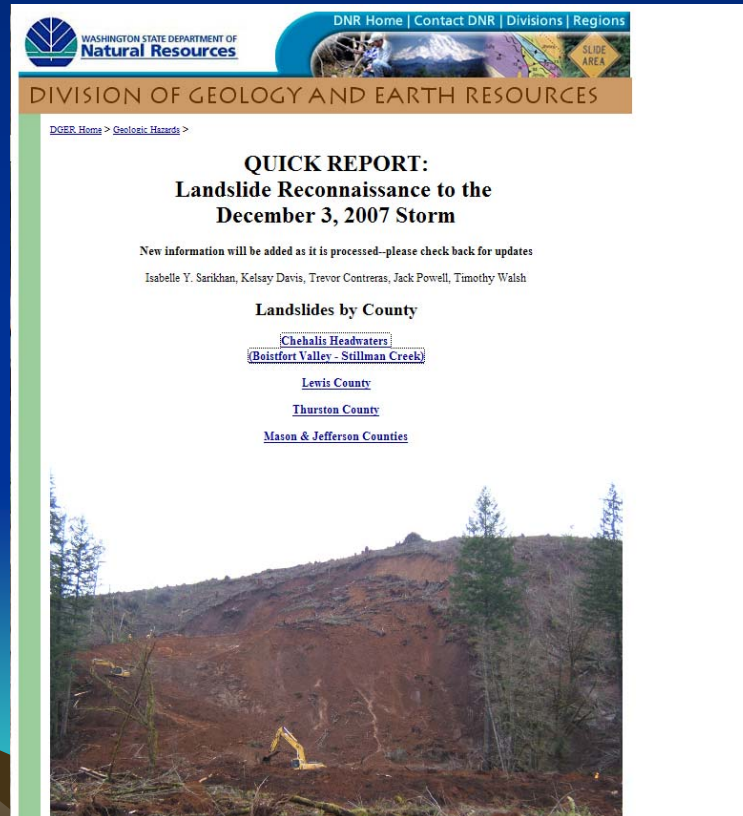
Inventory in progress

Inventory in progress

★ Landslide

# More Information?

- [www.dnr.wa.gov/geology](http://www.dnr.wa.gov/geology)



The screenshot shows the Washington State Department of Natural Resources (DNR) website. At the top, there is a navigation bar with links for 'DNR Home', 'Contact DNR', 'Divisions', and 'Regions'. Below this is the DNR logo and the text 'WASHINGTON STATE DEPARTMENT OF Natural Resources'. The main heading is 'DIVISION OF GEOLOGY AND EARTH RESOURCES'. A sub-heading reads 'DGER Home > Geologic Hazards >'. The main title of the report is 'QUICK REPORT: Landslide Reconnaissance to the December 3, 2007 Storm'. Below the title, it states 'New information will be added as it is processed--please check back for updates' and lists the authors: 'Isabelle Y. Sarikhan, Kelsay Davis, Trevor Contreras, Jack Powell, Timothy Walsh'. The section 'Landslides by County' includes links for 'Chehalis Headwaters (Boisfort Valley - Stillman Creek)', 'Lewis County', 'Thurston County', and 'Mason & Jefferson Counties'. At the bottom of the page, there is a photograph of a landslide site with a yellow excavator working on the debris field.