The Mass Wasting Prescription-Scale Effectiveness Monitoring Project

An examination of the landslide response to the December 2007 storm in Southwestern Washington

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Mass Wasting Effectiveness Project

Developed by the Upslope Processes Scientific Advisory Group (UPSAG)

- Scoped in 2005
- Study Design in 2006
- CMER and ISPR approval completed in 2007

Objectives

1. Evaluate the effectiveness of Forest Practices Rules at reducing sediment delivery to public resources.

2. Identify prescription-scale management-related factors that might be used to improve unstable slope identification and mitigation efforts.

Study Outline

Compare landslide rates under different management scenarios.

- Did not evaluate administrative components: FPA classification, geotech reports, SEPA, etc.

Requirement: A population of landslides in an area subject to Forest Practices Rules

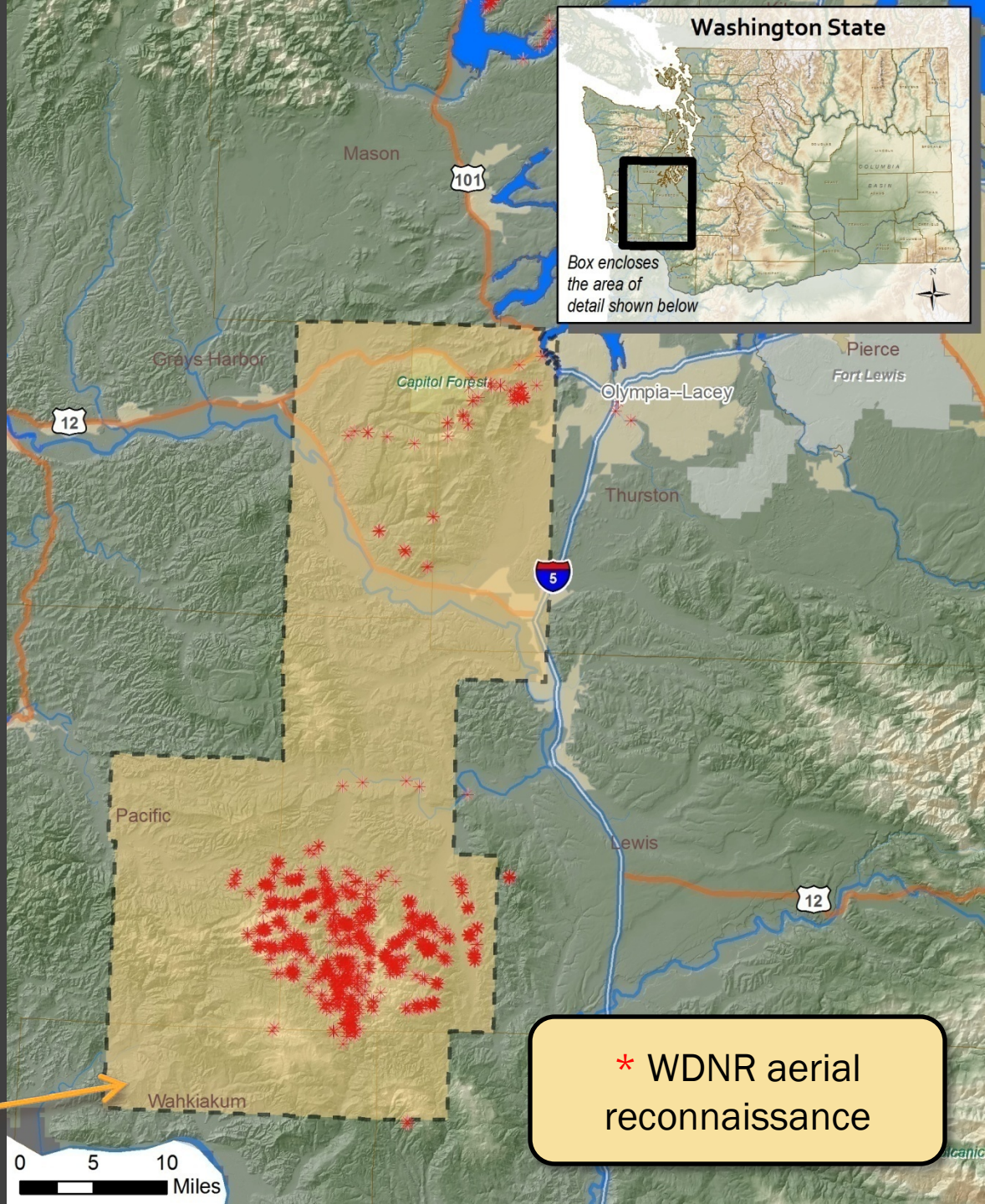
December 2007 Chehalis storm

Elaine Thompson
The Associated Press
Source:
http://blog.oregonlive.com/oregonianextra/2008/11/remembering_the_big_storm.html

Aerial reconnaissance

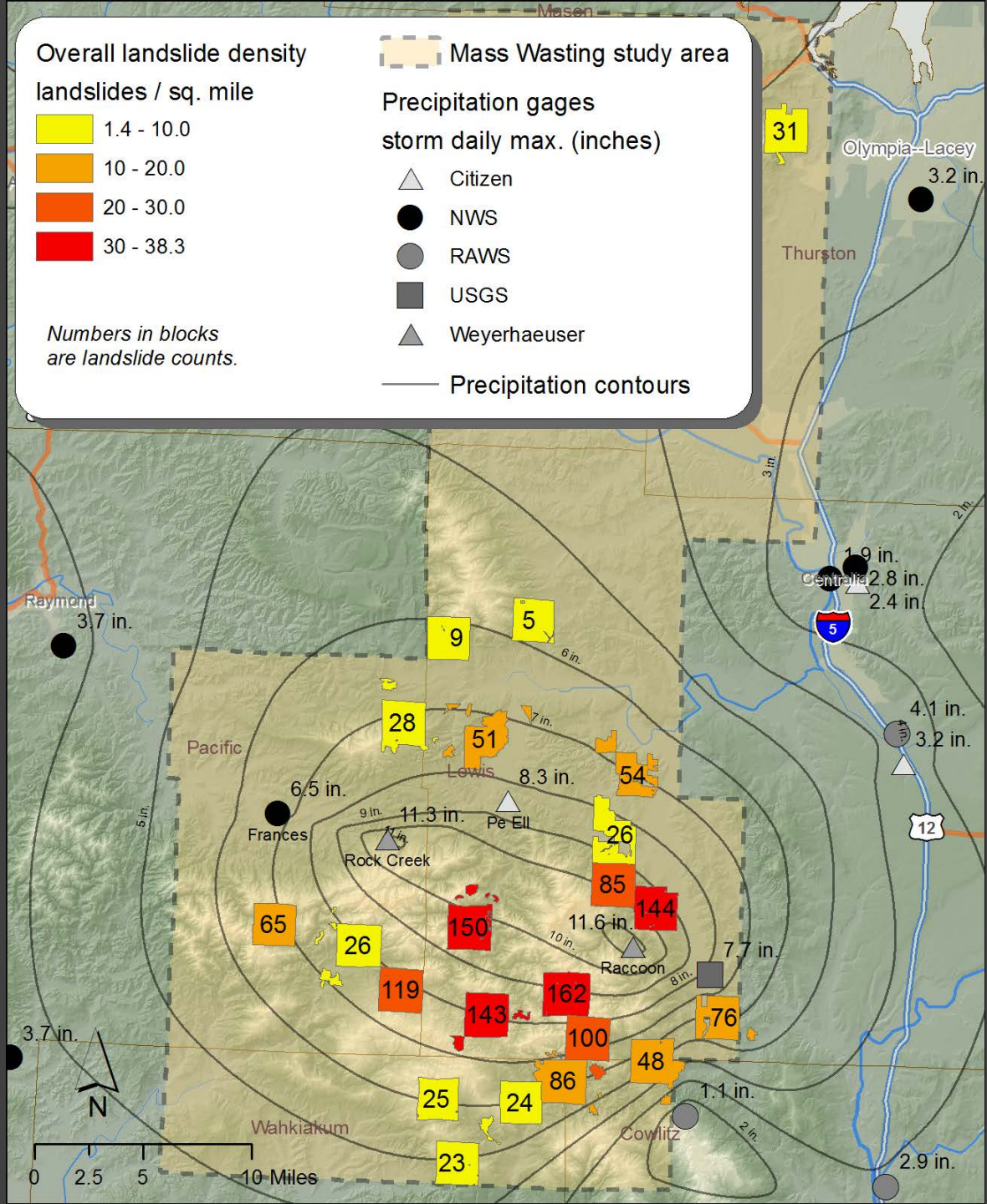
Study required at least one landslide per sq. mile.

Mass Wasting Effectiveness study area



Range of rainfall intensities

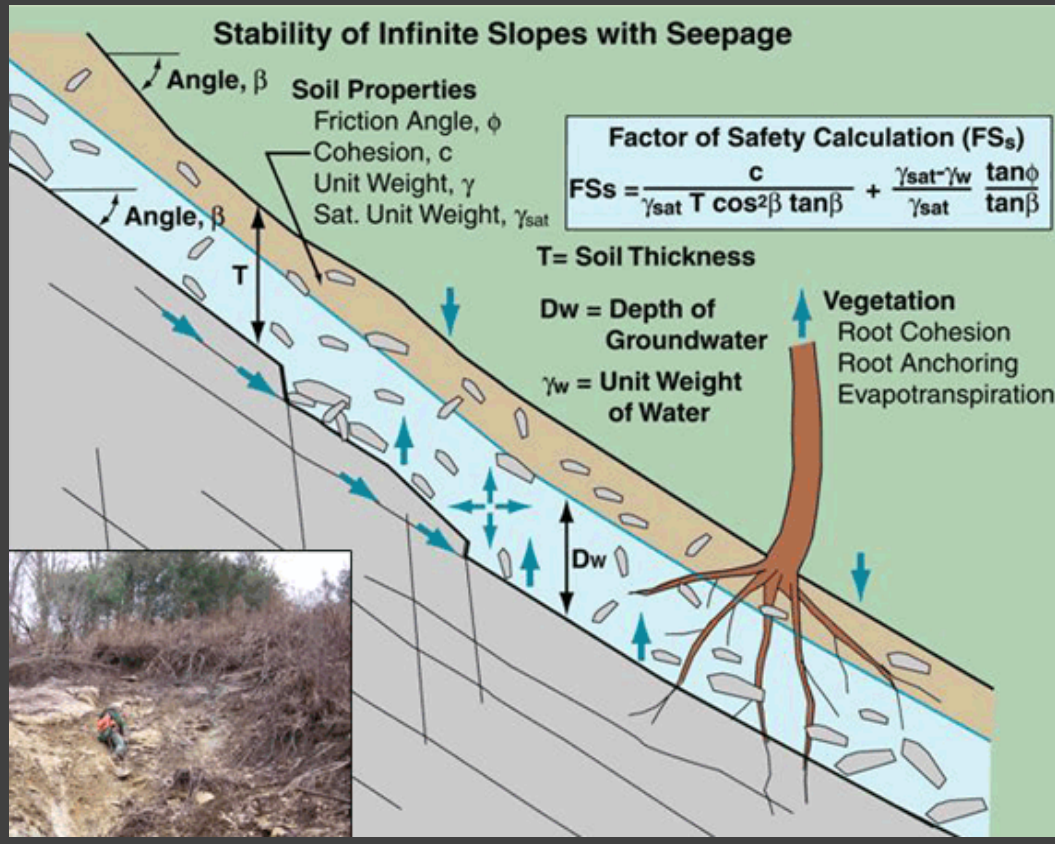
Snow followed by 4 – 11 inches of rain in 24 hours.



Why we used a block design

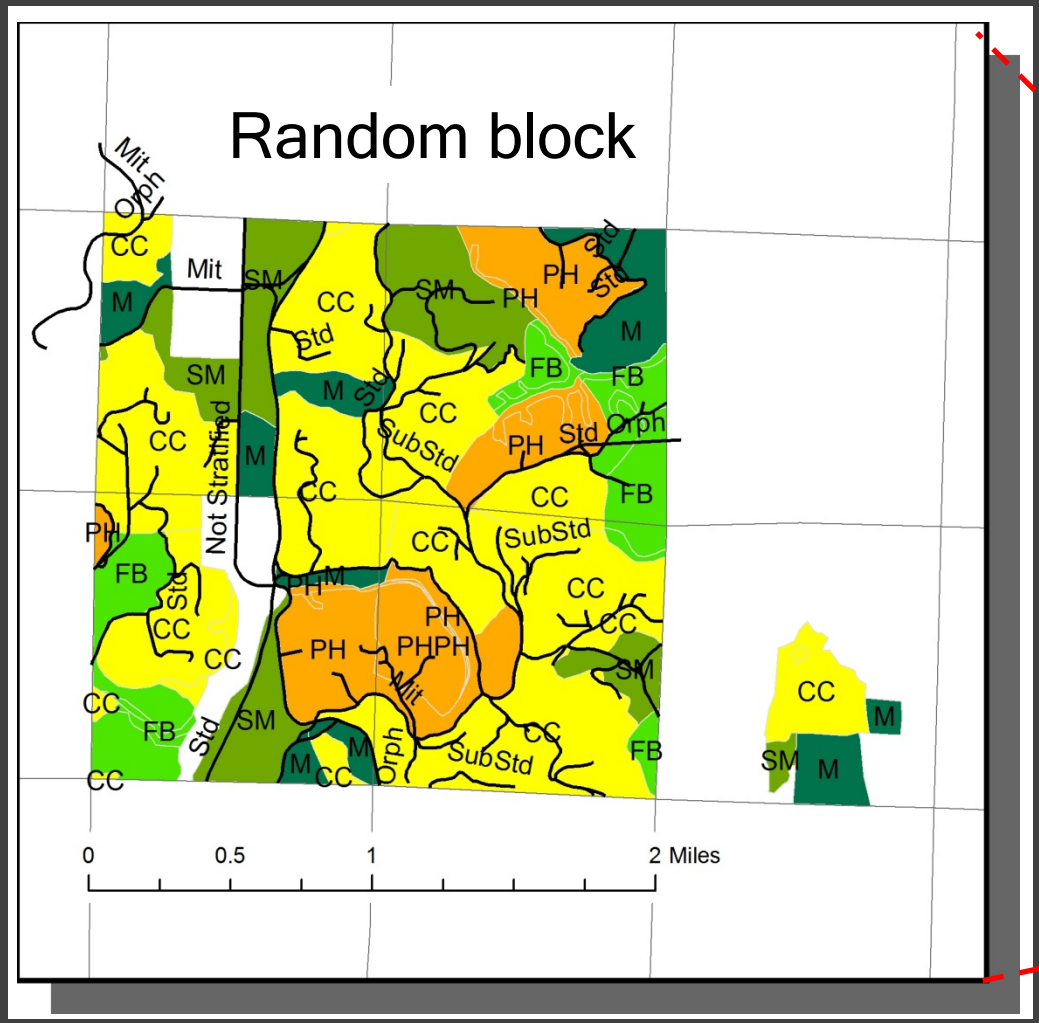
Factors affecting slope stability

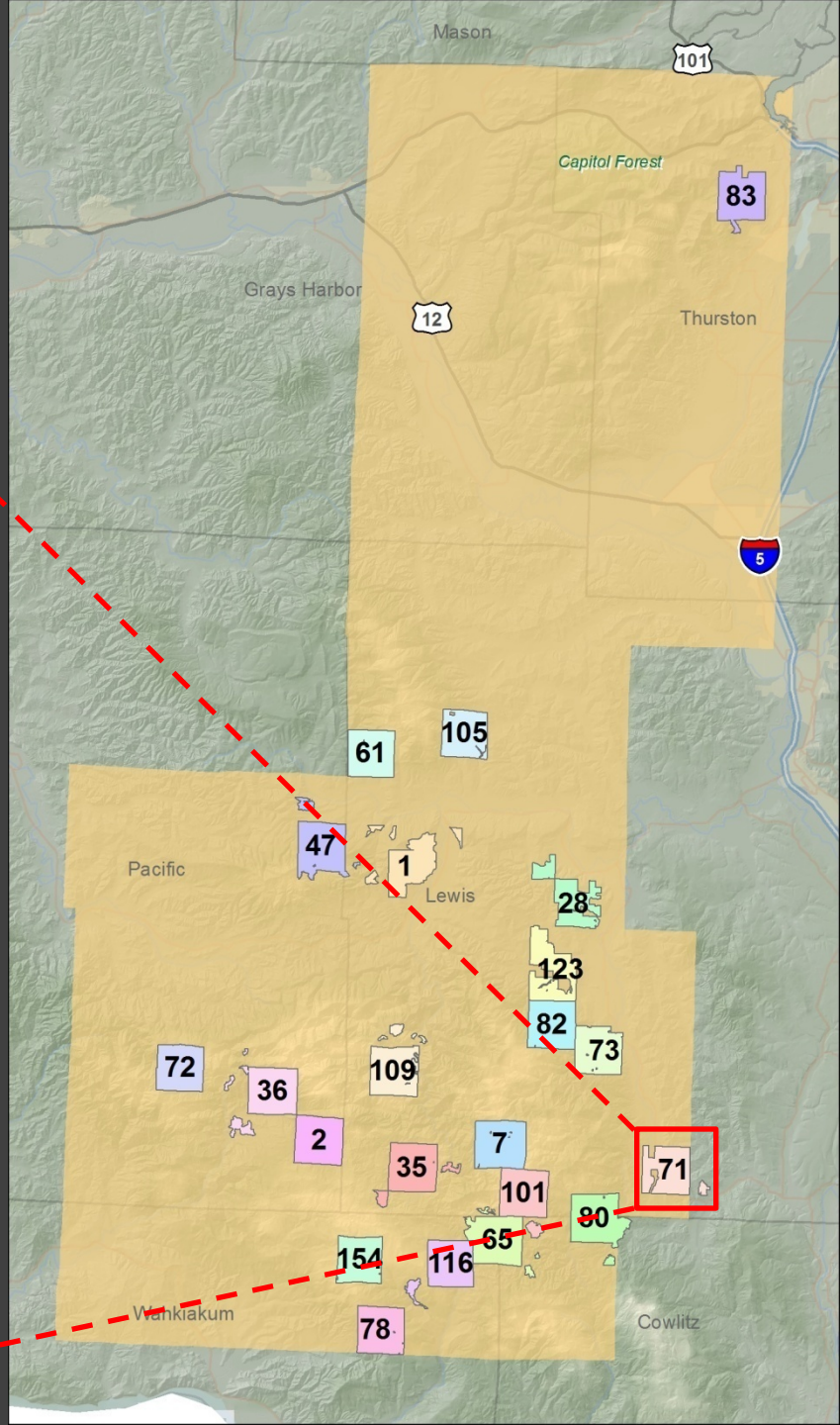
- Slope
- Precipitation
- Lithology/Soil
- Management / Vegetation
- Others



Source: http://www.geology.enr.state.nc.us/Landslide_Info/Landslides_background.htm

Comparisons within randomly selected blocks





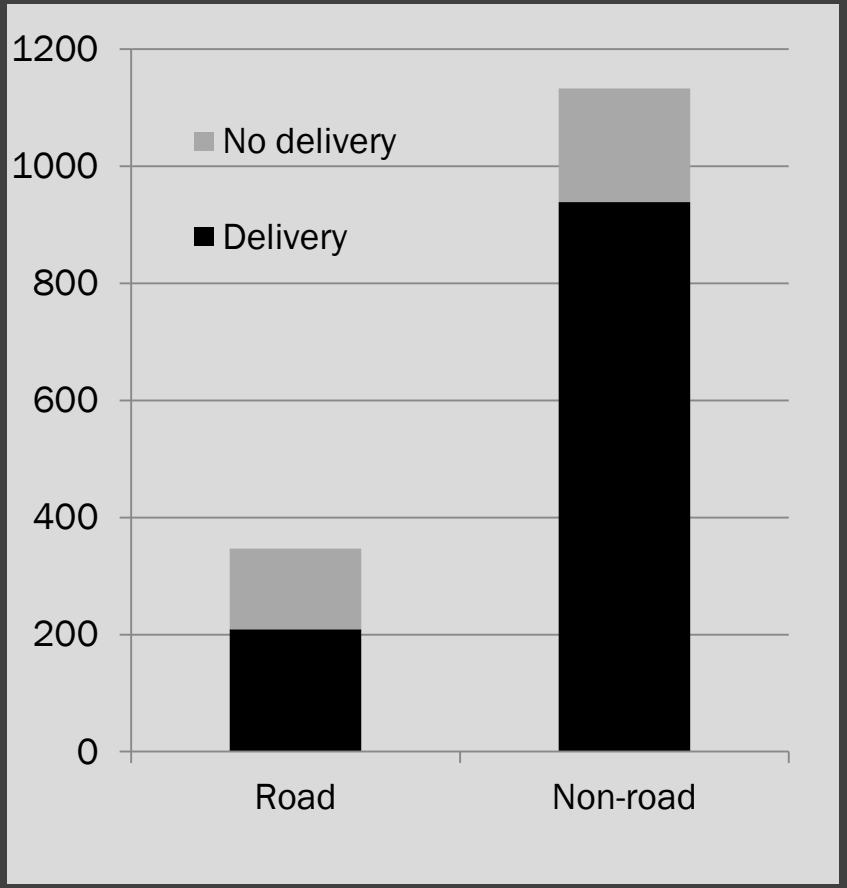
Landslide detection

Field survey of all landslides in the sample areas that delivered to streams, and all road-related landslides.

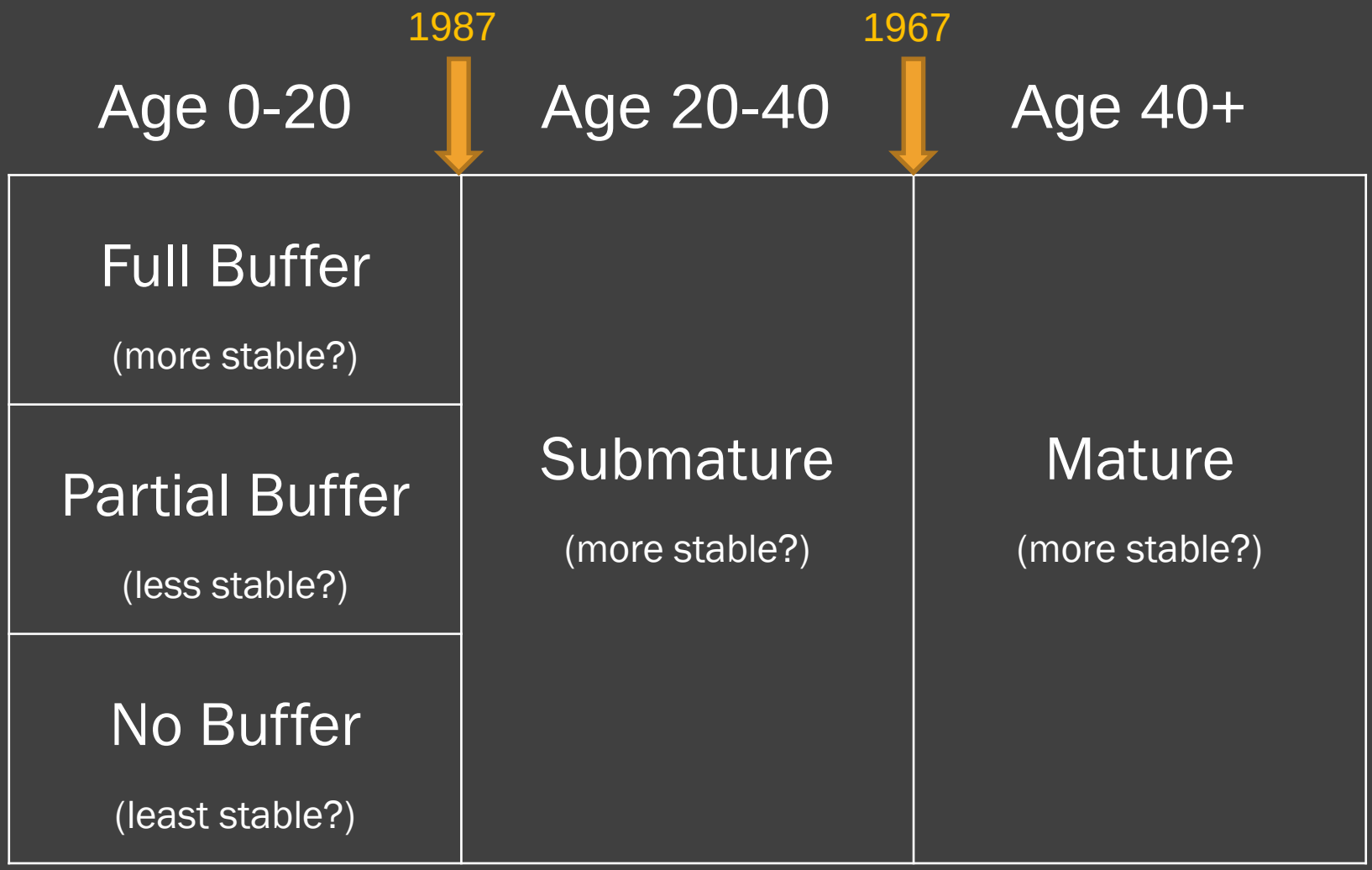
Other landslide initiation points were counted when encountered.

Landslide Inventory

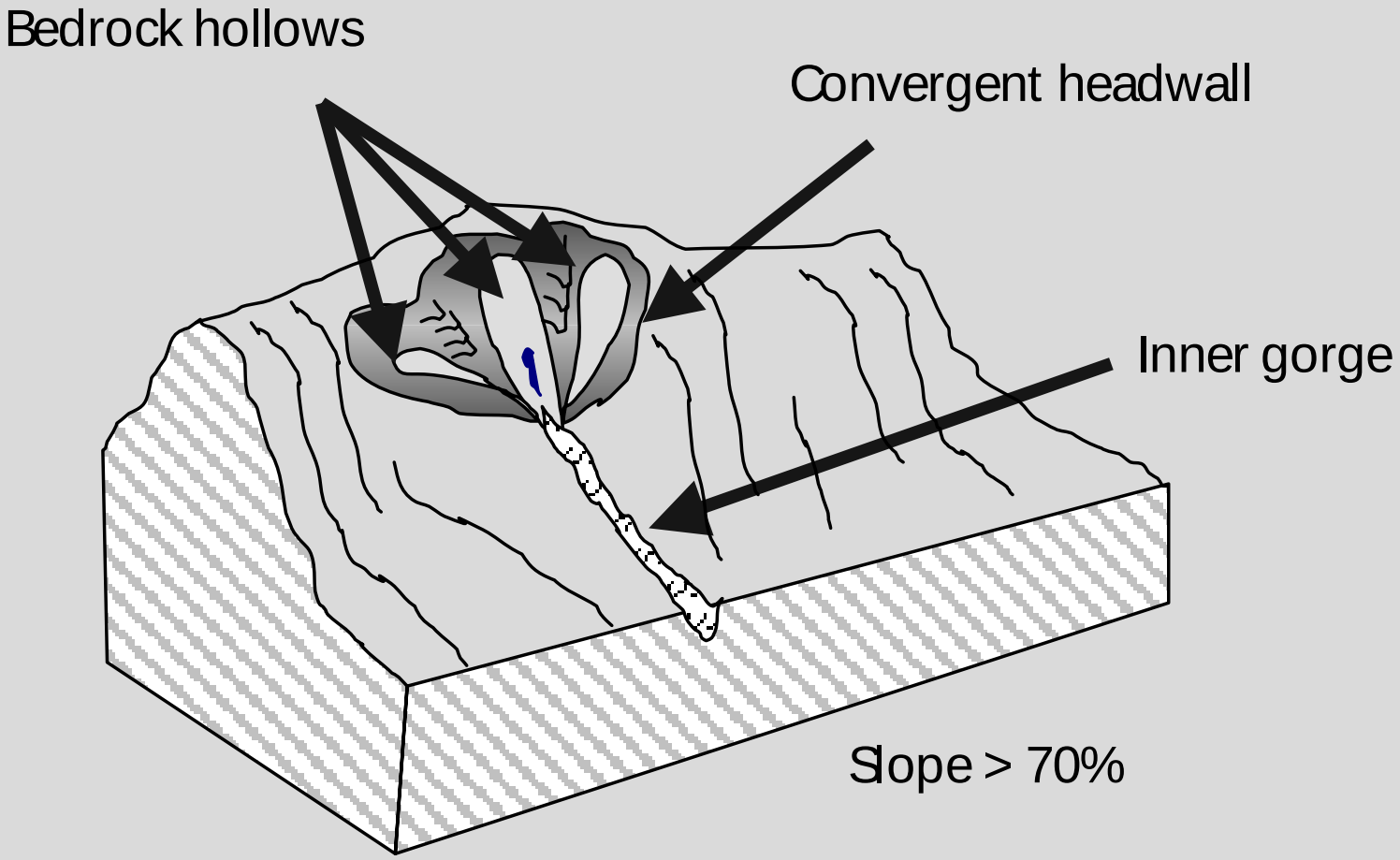
- 91 sq. miles of managed forest and 555 miles of road.
- Most of the landslides (96%) were debris slides or debris flows.
  - No glacial deep-seated landslides.



Harvest Treatments



0-20 treatment based on buffering of RIL



Drawing: Jack Powell, DNR, 2003

Full Buffer (FB 0-20)

Harvest units in which trees on RIL (if present) were not harvested

Partial Buffer (PB 0-20)

Harvest units where some harvest and some buffering of RIL occurred

No Buffer (NB 0-20)

All RIL, if present, were clearcut

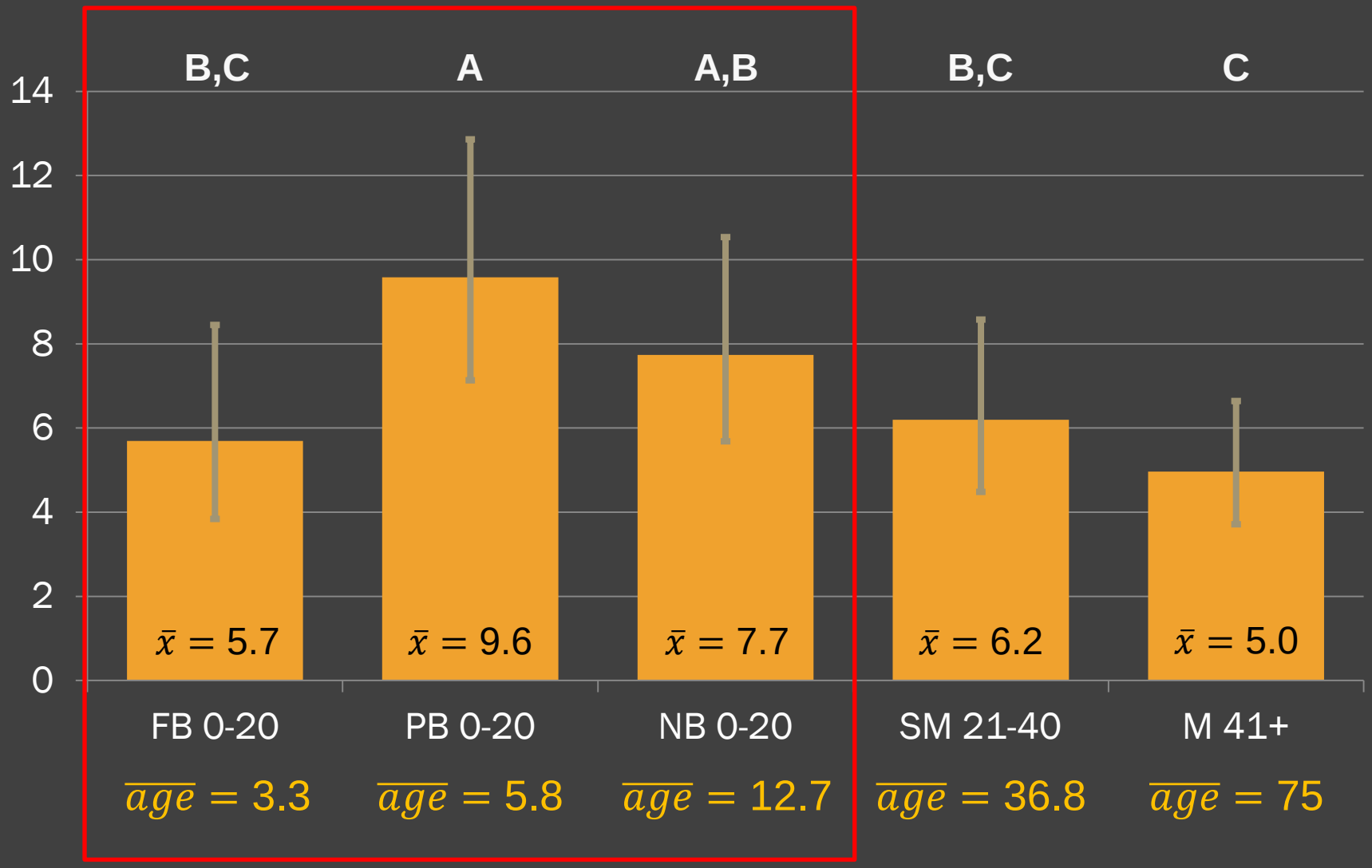
Submature 21-40 (SM)

Forest stands between 21 and 40 years old

Mature 41+ (M)

Forest stands greater than 40 years old

Harvest treatment results



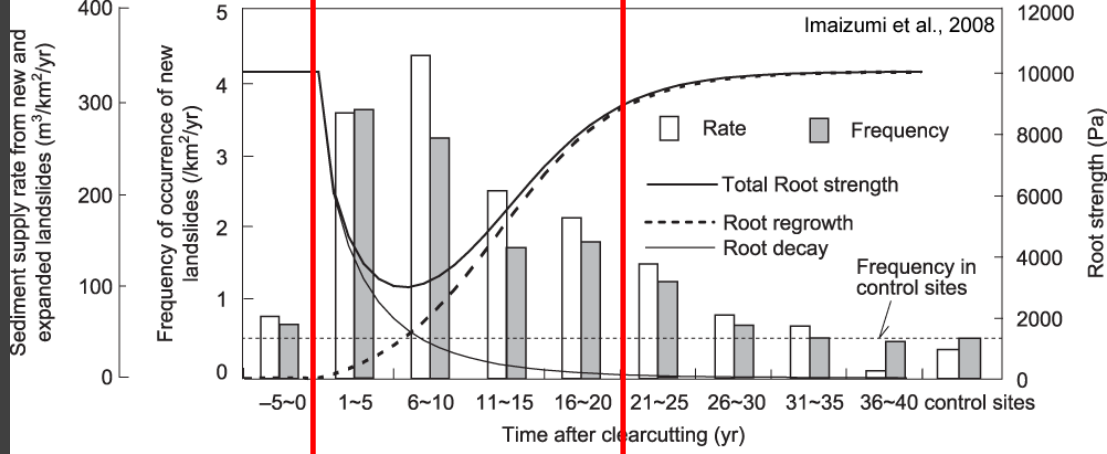
Letters indicate statistically significant differences at α=0.1 . Error bars are 90% CI.

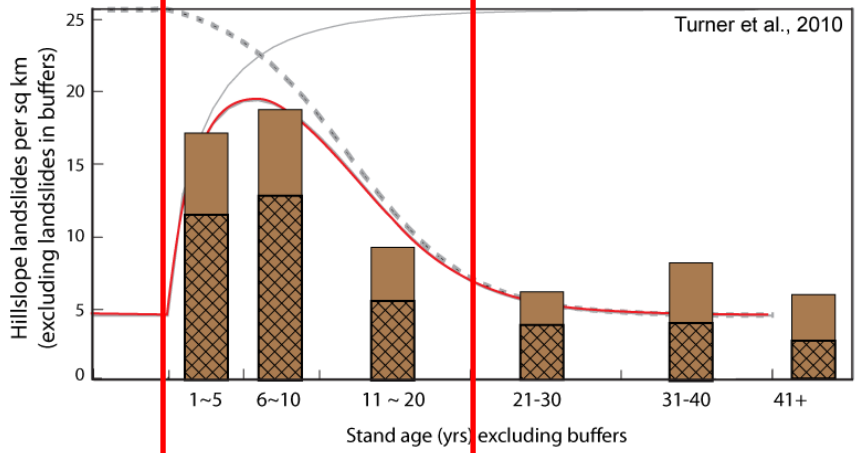
Did we get as many landslides in Full Buffer (FB) as we would have expected?

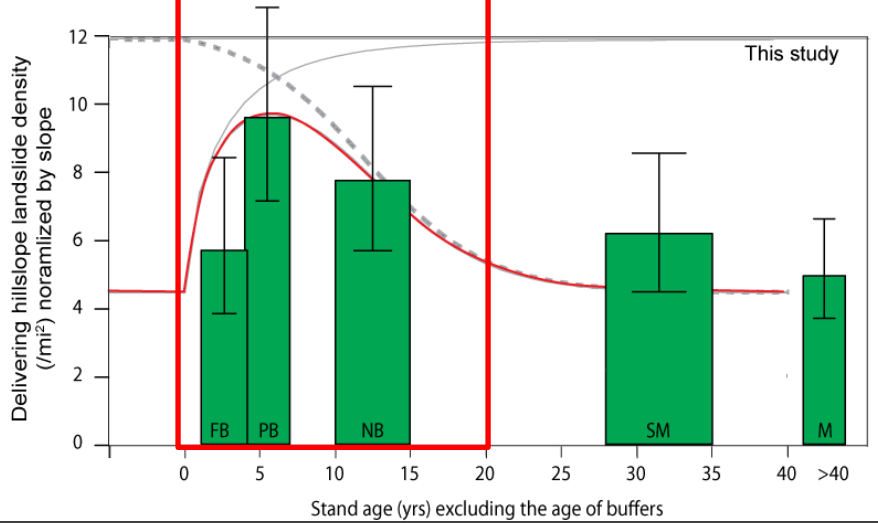
No

Conclusion

"Results support the hypothesis that the avoidance of clearcut harvest on unstable terrain reduces the density and volume of landslides."

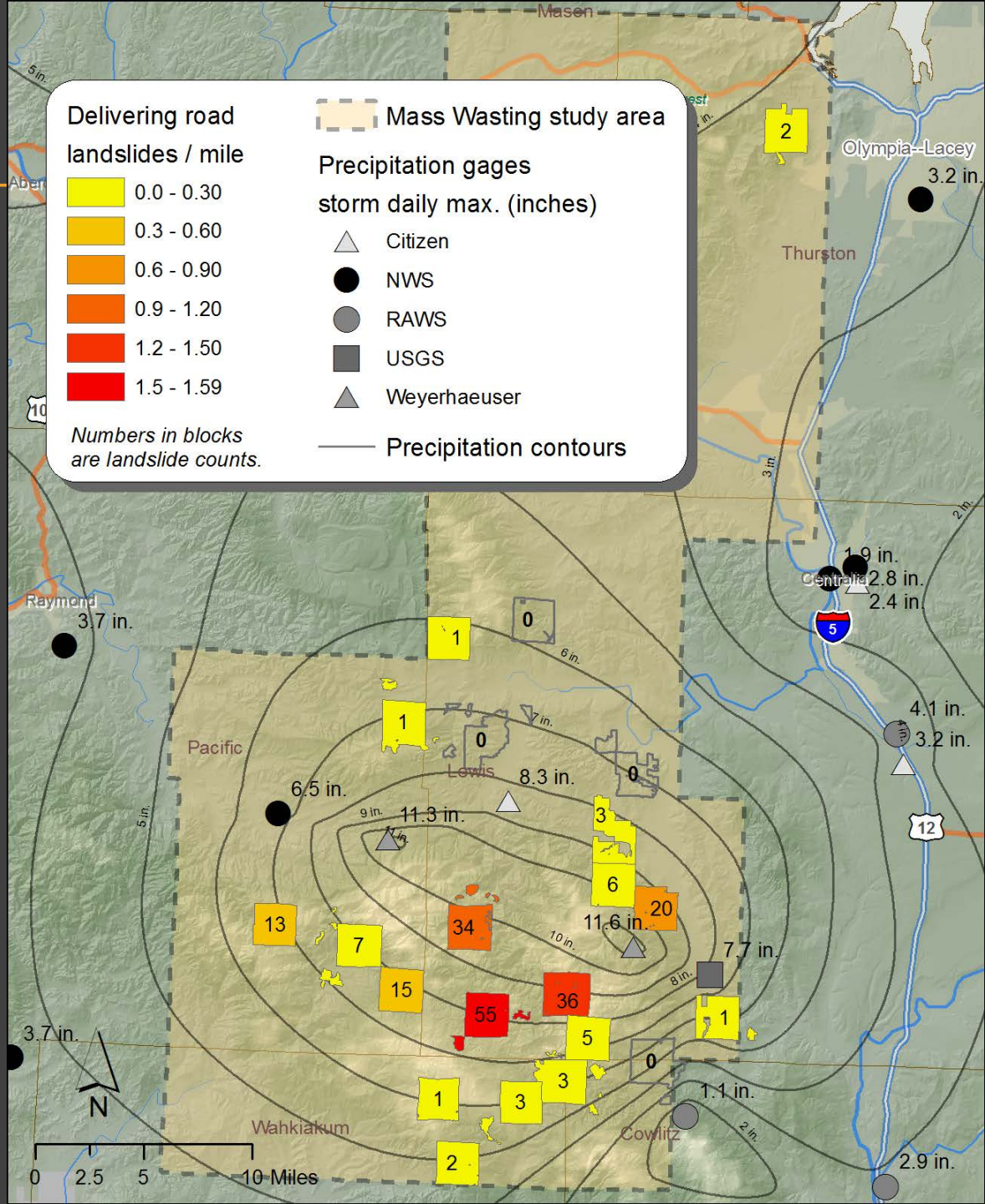






Roads

Road results were largely inconclusive.



Formal abandonment

Road abandonment did appear to be effective at reducing landslide volume.

Other notable findings

- A sizable proportion of delivering landslides originated from terrain that did not fit the definition of any named RIL.

Other notable findings

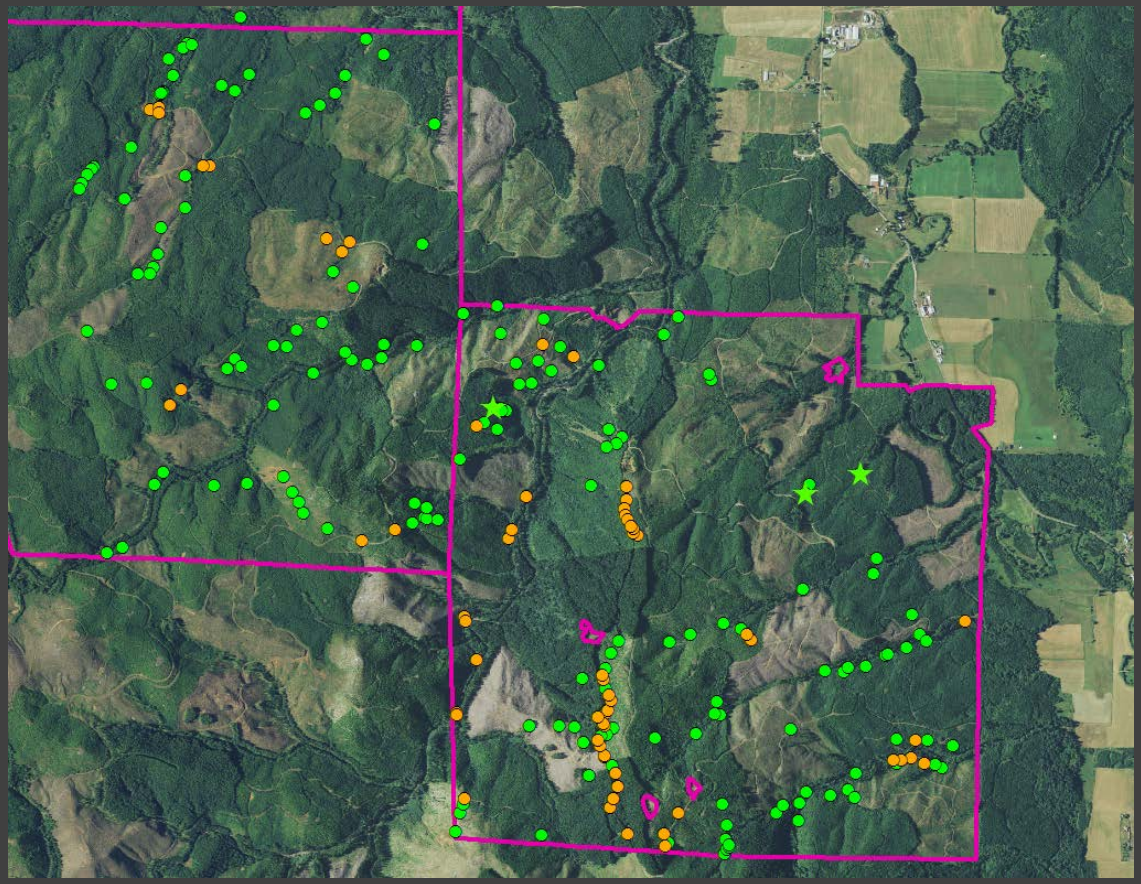
- Field crews identified contributing factors at only a few landslide initiation sites.

- Landslides originating in buffers delivered significantly more LWD than landslides outside of buffers.

Note: Public Resource vs Public Safety

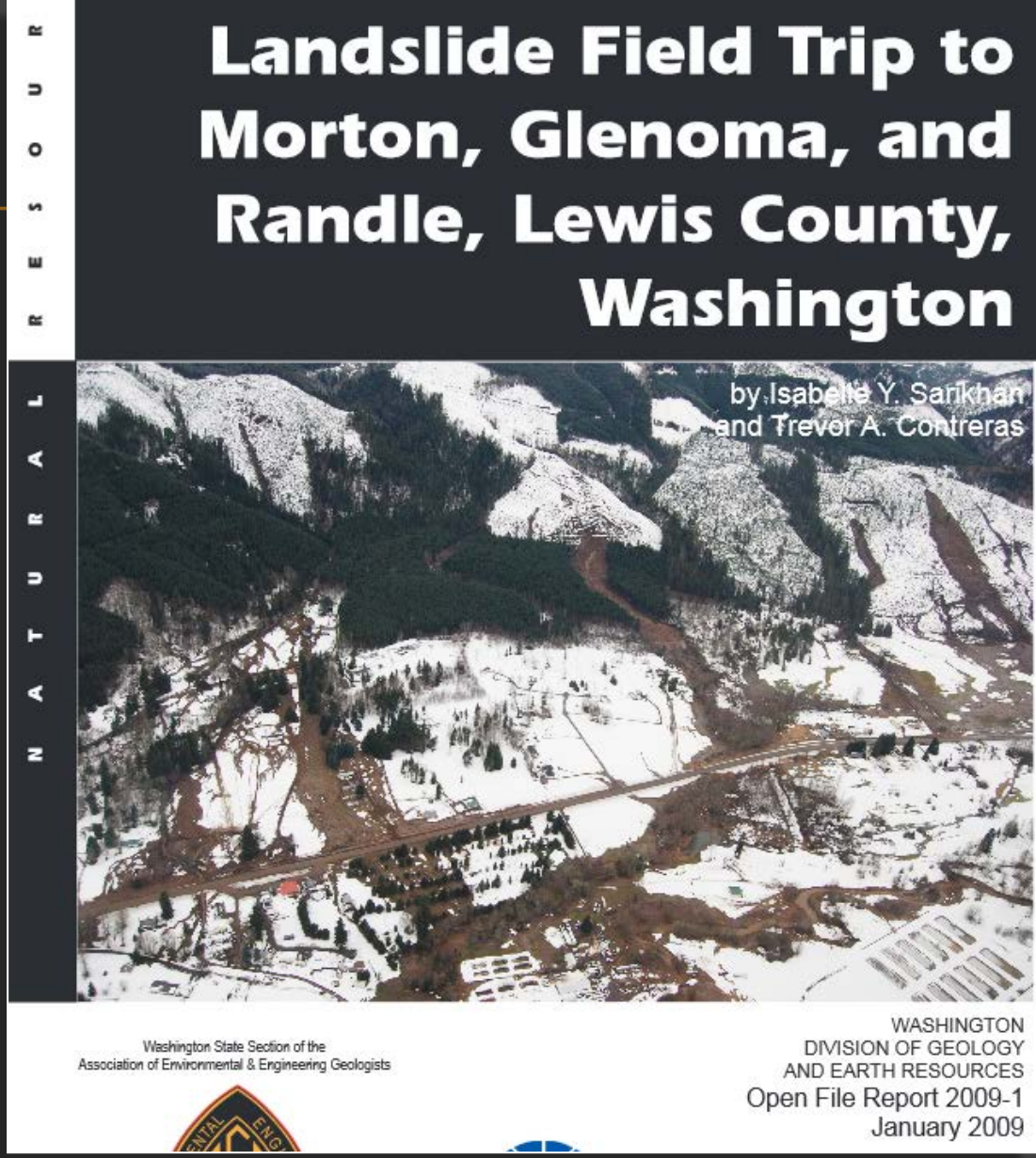
Study blocks were largely commercial forest.

- Low potential for public safety issues.
- Study focused on initiation, not run-out.



Public Safety

There are better data for evaluating the effect of landslides on public safety.



Source: www.dnr.wa.gov/Publications/ger_ofr2009-1_landslide_field_trip.pdf