Overview of projects in the Unstable Slopes Rule Group

Past, Present, and Future

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Knowing where unstable slopes
are located is key for monitoring

Evolution of Screening Tools

- Soils
- WSA-Mass Wasting Module
- TFW#118 (Comparison of Models)
- SLPSTAB (modeled slope stability)
- Regional Landform Identification Project
- Landslide Hazard Zonation Project

First screening tool: SOILS

- Static dataset
- Collected for forest production needs
- Extended to include unstable calls
- Limited extent
- Approximately 60% ‘accurate’

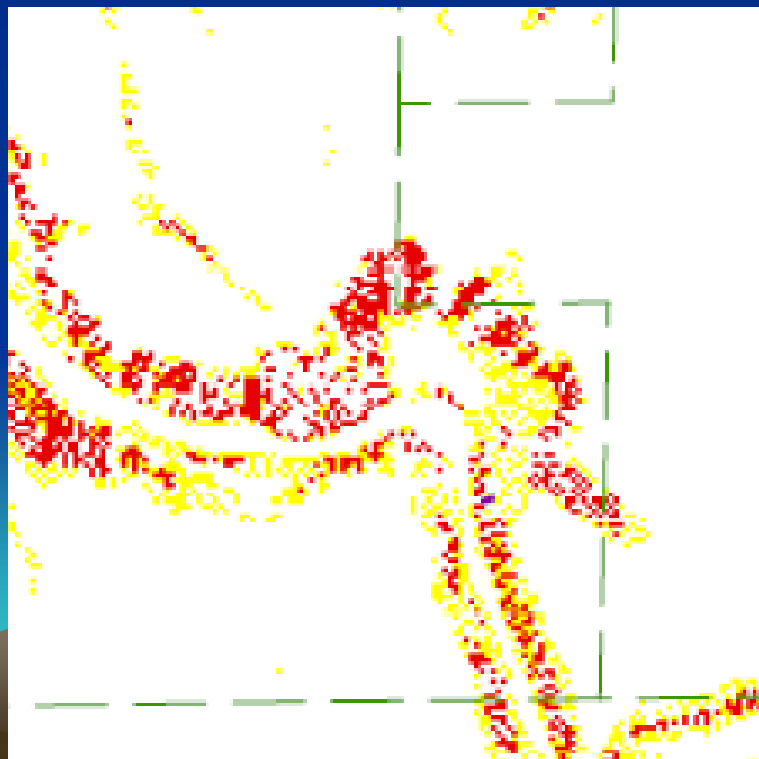
Watershed Analysis-Mass Wasting Module

- Excellent tool
  - locating unstable slopes
  - determining cumulative effects
- Expensive & time-consuming
- Significant variation in data quality and methods

- After a few dozen, learned enough to make new rules (FFR)

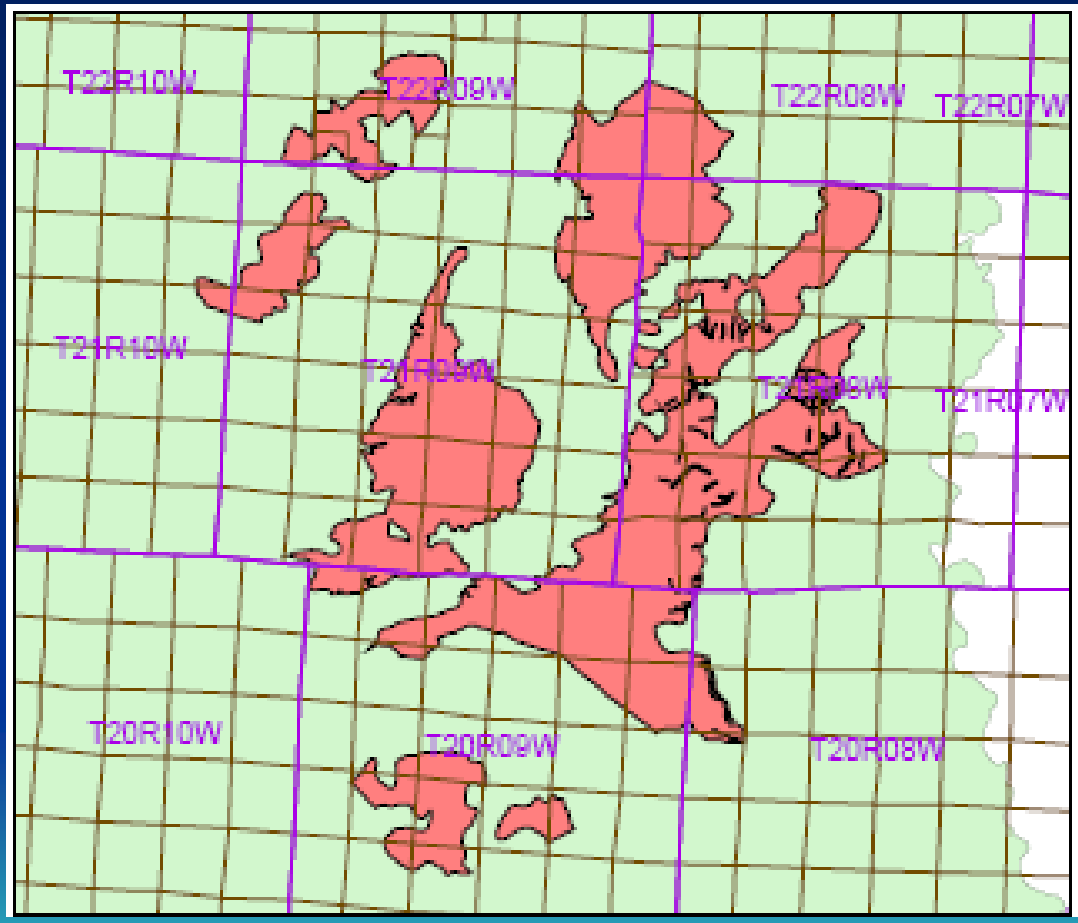
TFW#118 and SLPSTAB

- TFW#118 Prior to current CMER and during FFR negotiations
  - Compared several models
  - Speed, understandability of output, accuracy
- Created SLPSTAB screen
  - All of western WA
  - Low (80%), mod, high (13%)
  - 90% accurate for shallow LS
  - FFR identified project
  - Completed 1999



Regional (Unstable) Landform Identification Project

- FFR-identified project
- Completed 2004
- Limited areas of instability beyond FFR rule



The purpose of these products is to assist foresters and land managers in identifying unstable slopes and their triggering mechanisms

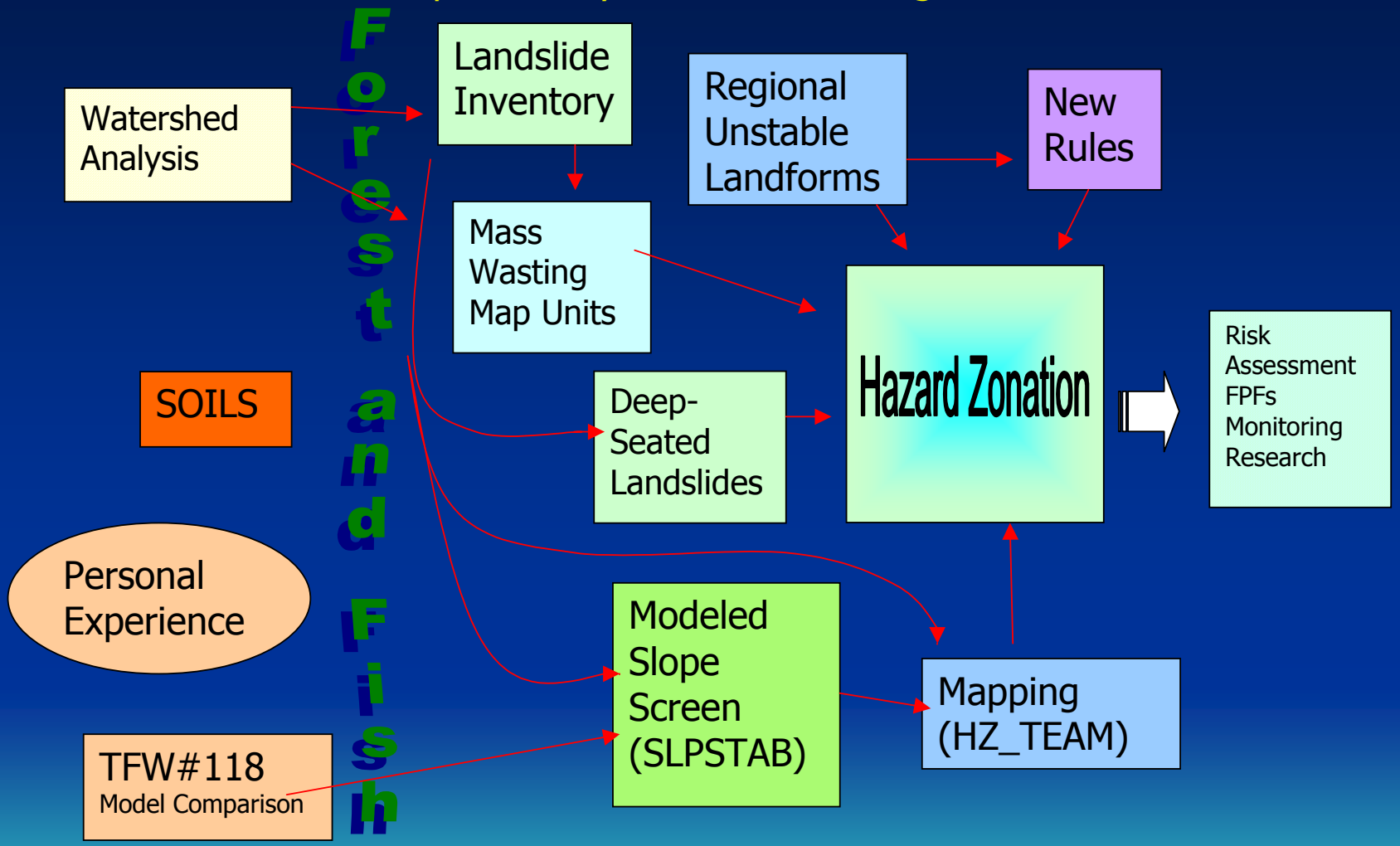
Landslide Hazard Zonation

FFR identified project

- FFR Goal: Prevent or avoid an increase or acceleration of the naturally occurring rate of landslides due to Forest Practices

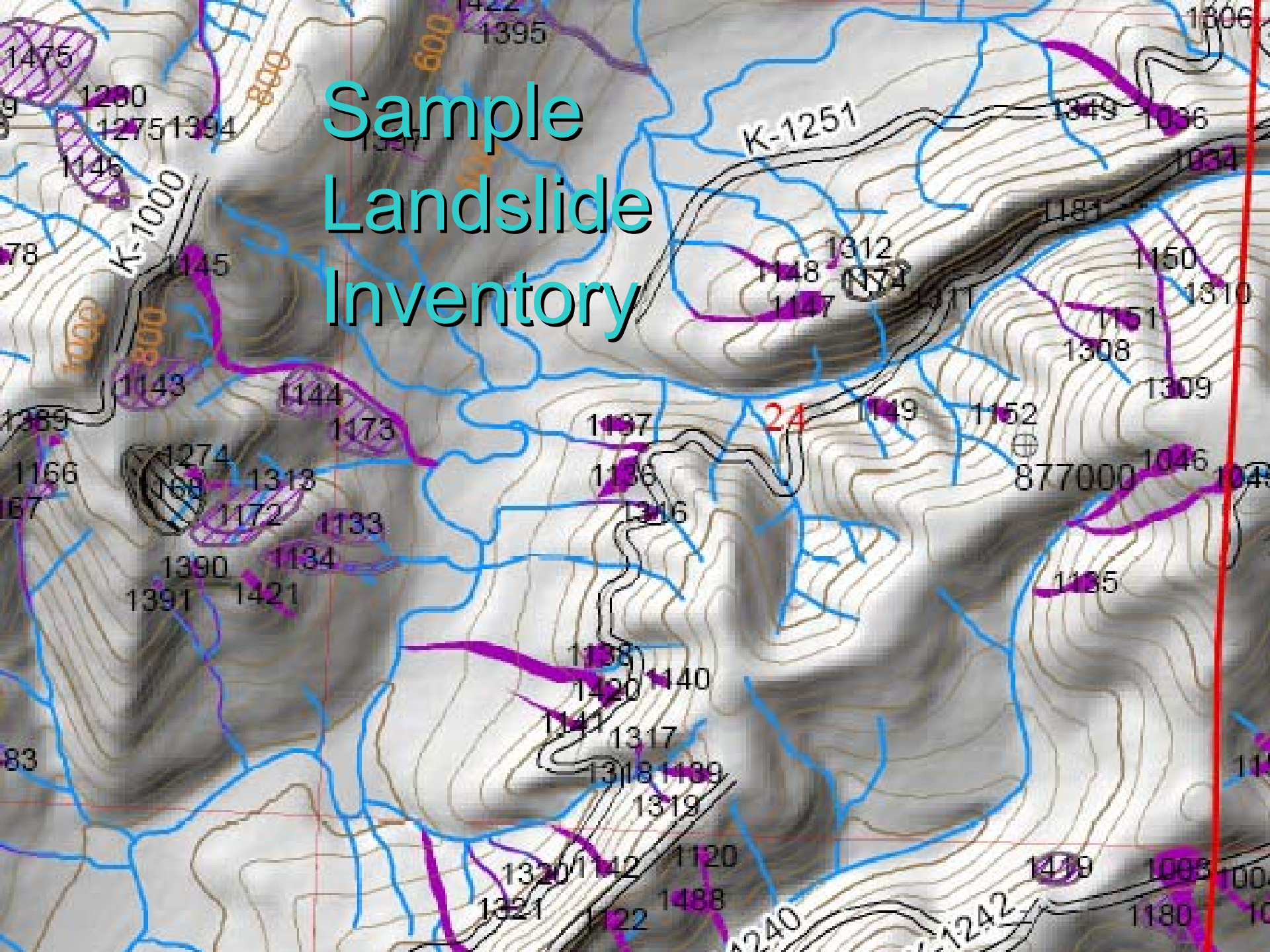
- Ongoing mapping project started 2003

The Evolution of Slope Stability tools toward the goal of Hazard Zonation



LHZ Products

- Report
  - Watershed review
  - Hazard unit descriptions & triggers
  - Individual landslide data
- Map A-1 (Landslide Inventory)
- Map A-2 (Landslide Hazard Units)
  - Map includes partial descriptions of units


Sample
Landslide
Inventory
K-1251
K-1000
877000
1475
1280
1275
1394
1395
1422
1145
1143
1144
1173
1274
1313
1172
1133
1134
1390
1391
1421
1166
1389
1312
1148
1147
1150
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1151
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1046
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1156
1316
1135
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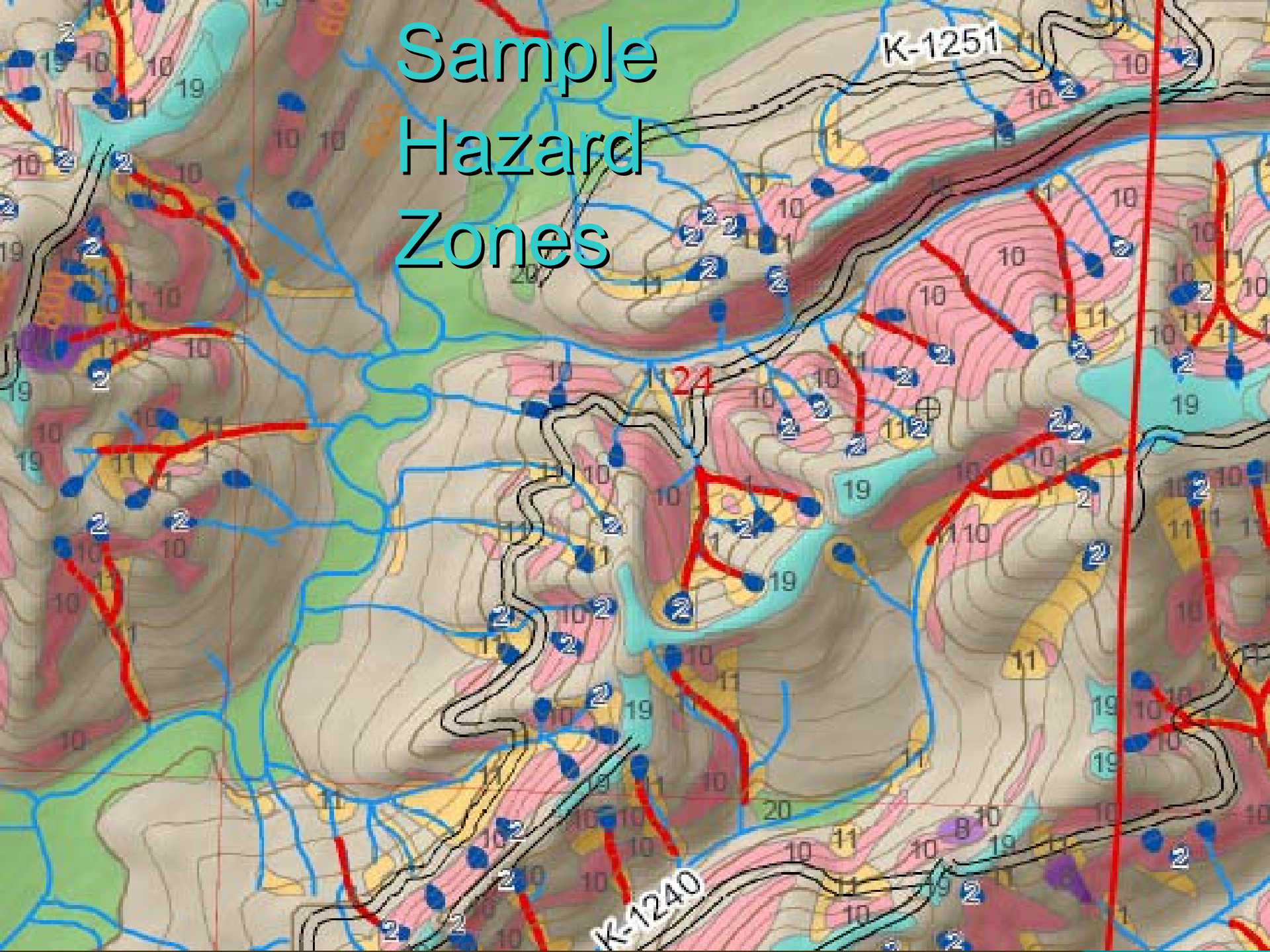
1488
1122
1180
1242
1240
600
800
24


Sample
Hazard
Zones
K-1251
K-1240

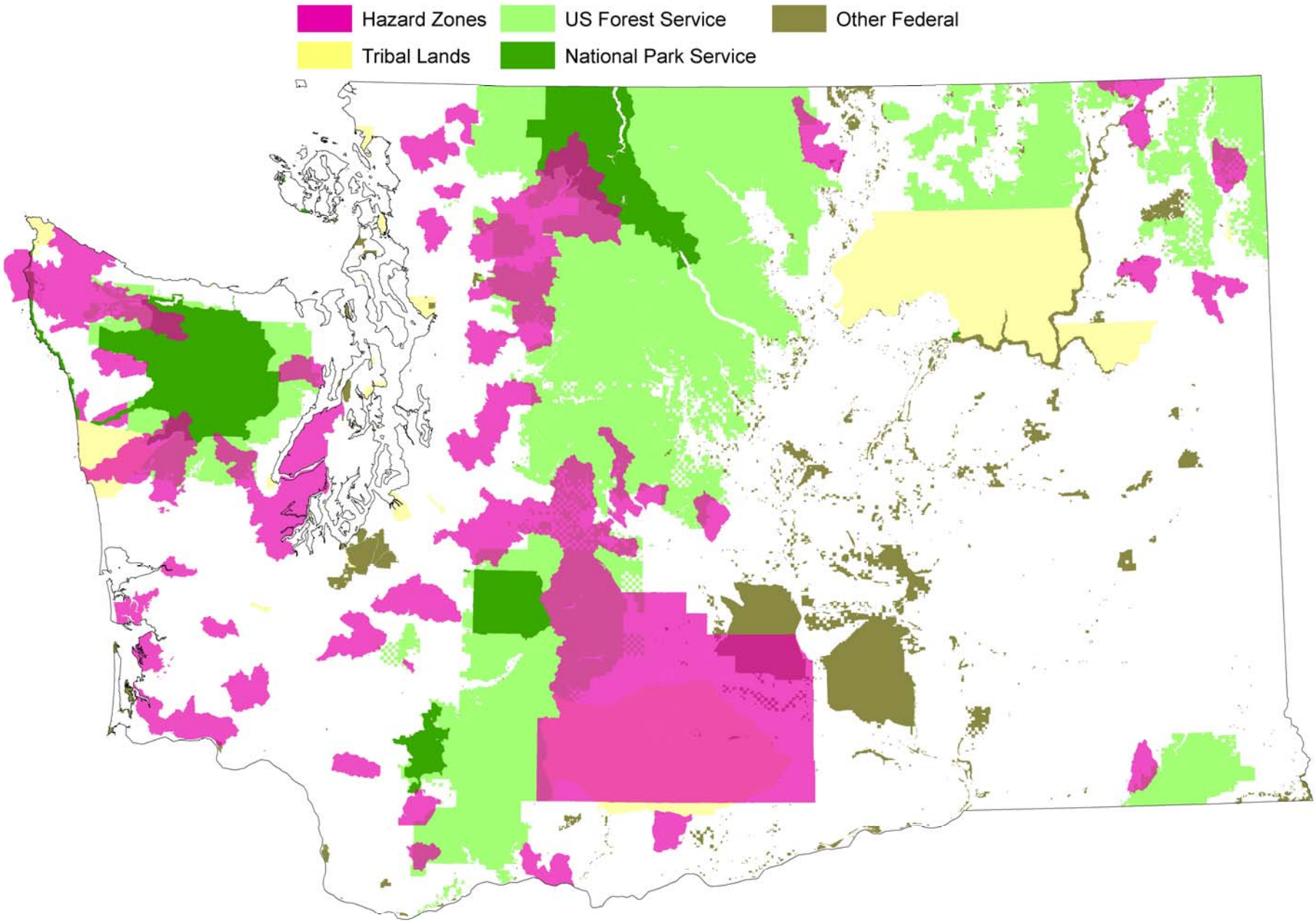
LHZ Project Goals

- **Describe and map potentially unstable slopes in priority watersheds**
  - **improved screening tool**
  - **eliminate error of omission**
- **Use existing data where appropriate**

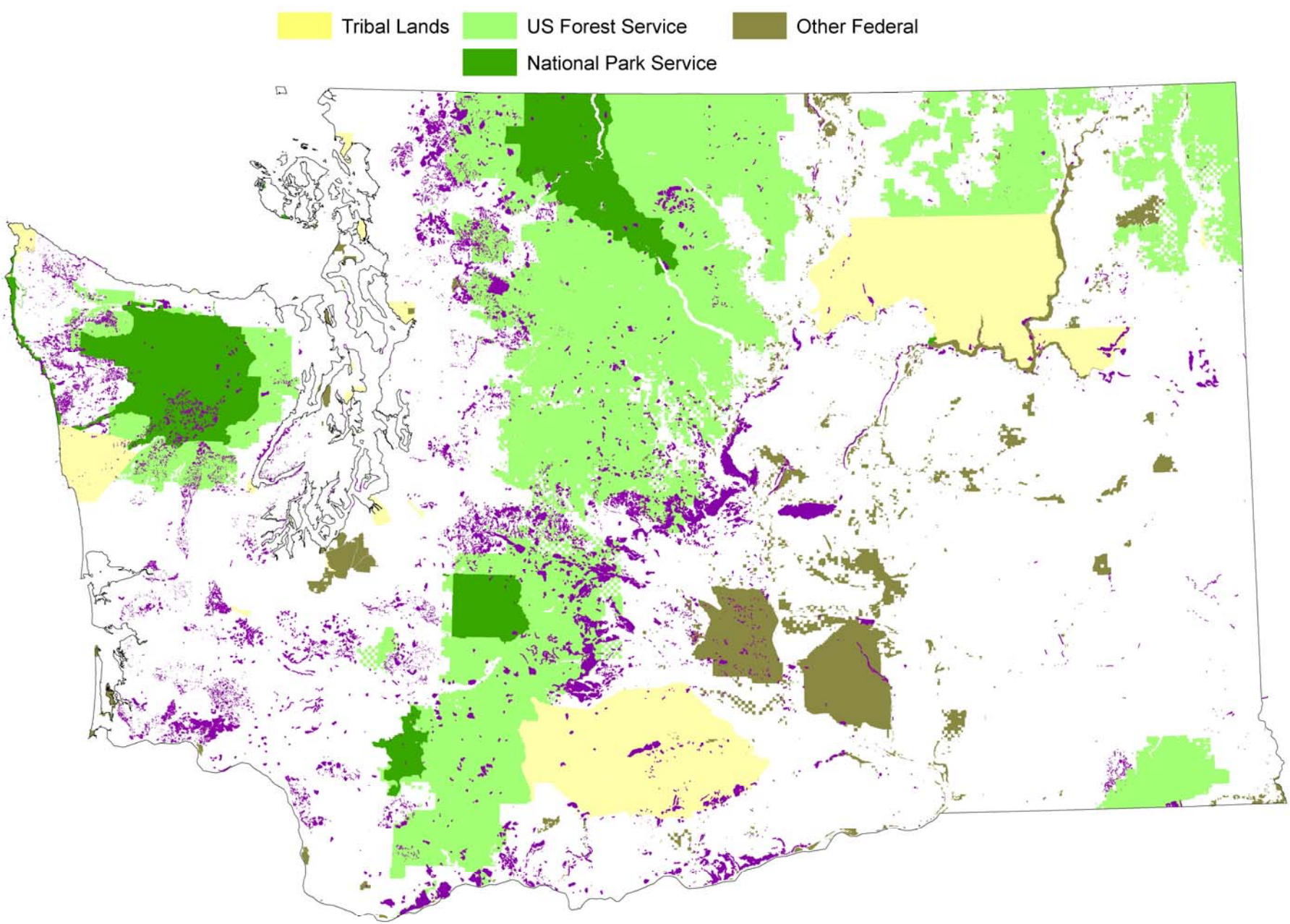
LHZ Project Goals, Con't.

- Follow standardized, established mapping protocols
- Have these data complete and available as soon as possible (web distribution)

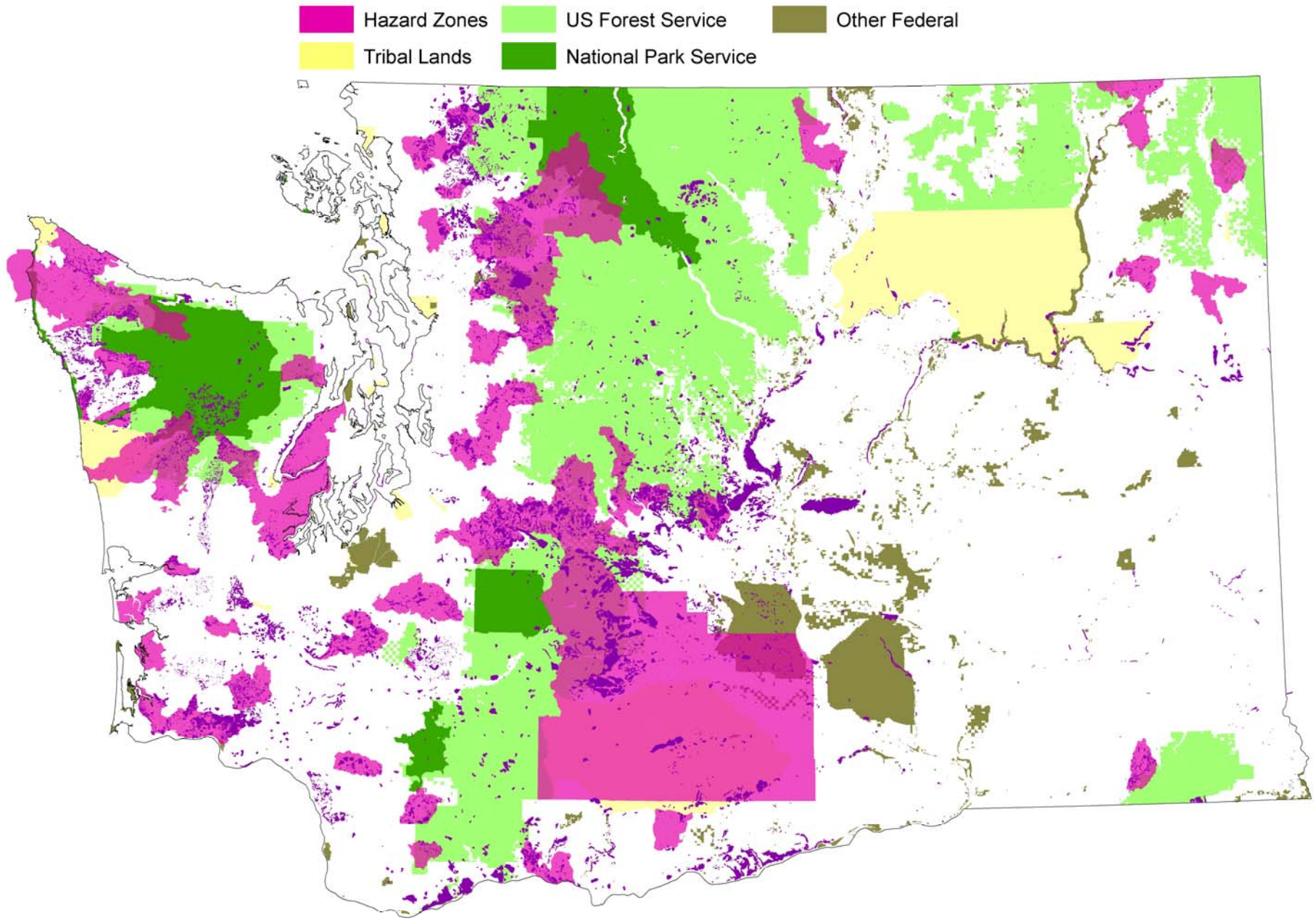
LHZ: Landslide Hazard Zone Compilation Status, February, 2008



LHZ: Landslide Compilation Status, February, 2008



LHZ: Landslide and Hazard Zone Compilation Status, February, 2008



Accessing LHZ Products

- Download individual assessments from website (PDFs)
  - www.dnr.wa.gov/forestpractices/lhzproject
- Download compiled landslide inventories and map units (GIS data)
  - www.dnr.wa.gov/forestpractices/data

Data Contributors

- WADNR: Regulatory, Proprietary, and Geology
- Boise Cascade
- Skagit System Cooperative
- Weyerhaeuser
- Muckleshoot Tribal Nation
- The Nature Conservancy
- Colville Confederated Tribes
- Tulalip Tribal Nation
- Nooksack Tribal Nation
- Rayonier
- Nisqually Tribal Nation
- Plum Creek
- Stillaguamish Tribal Nation
- US Forest Service
- Quinault Tribal Nation
- UW (Masters Theses)
- WWU (Masters Theses)
- WADOT
- WADOEcology
- Yakima County

UPSAGs Near-Term Mass Wasting Monitoring Program

- Groundwater Recharge to Glacial Deep-Seated Landslides
- Accuracy of Unstable Landform Identification (Accuracy & Bias)
- Landscape Scale Effectiveness
- Mass Wasting Prescription-Scale Effectiveness Monitoring (Post Mortem)

Evapo-Transpiration Model for Groundwater Recharge

- Completed 2003
- Results Suggest:
  - May be effects from timber harvest
  - ET up to 40” ET/year
  - response to changing water availability may be dependent on permeability of the subsurface materials
- Scoping future research now

Accuracy of Unstable Landform Identification

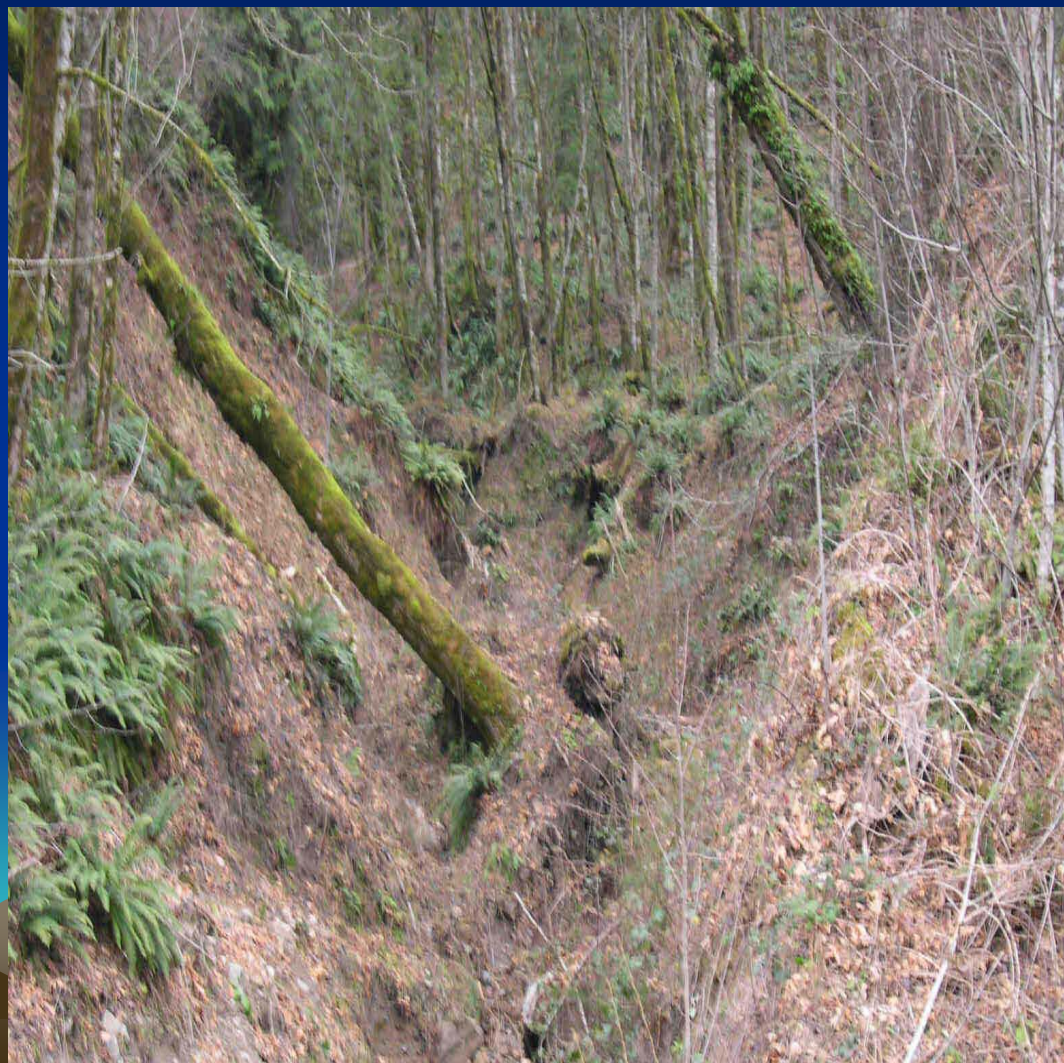
- L-1 Priority Research: "Test the accuracy and lack of bias of the criteria for identifying unstable landforms in predicting areas with a high risk of instability."

Critical Question

- Are unstable landforms being correctly and uniformly identified and evaluated for potential hazard?

Accuracy and Bias: Objectives

- Degree of recognition
- Degree of accurate delineation
- Factors contributing to differences in delineation



Strategy Overview

1) Quantify variability among qualified experts (QEs)

2) Quantify variability in landform identification and delineation in Forest Practice Applications (FPAs)

3) Determine whether the variability between QEs and FPAs is statistically significant

Mass Wasting Landscape-Scale Effectiveness Monitoring

- UPSAG will initiate the development of this study design as we have time around the implementation of Accuracy & Bias and Post-Mortem.
- It will concentrate on the determination of natural background and on the long-term trends in rates of landslides from forest practices.
- As the Post-Mortem made so much progress towards full landscape-scale, we believe that this study may be 1 or more add-ons to Post-Mortem (that will require additional peer-review).

Mass Wasting Prescription-Scale Effectiveness Monitoring