

Introduction to Landslide Mapping

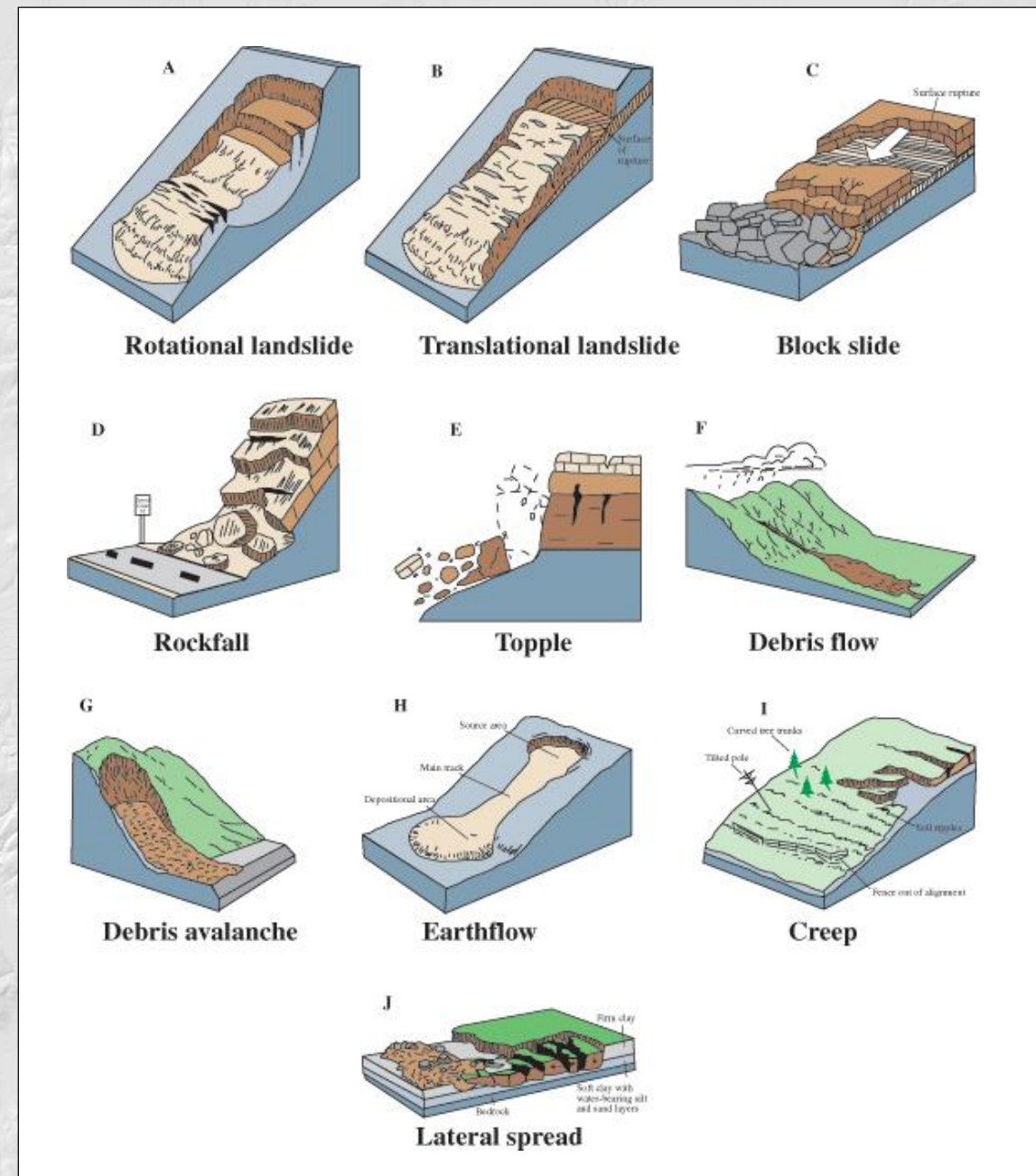
Prepared by Michael Bunn, Ben Leshchinsky, and Michael Olsen with support from U.S. Forest Service grant 17-CS-11015600-008



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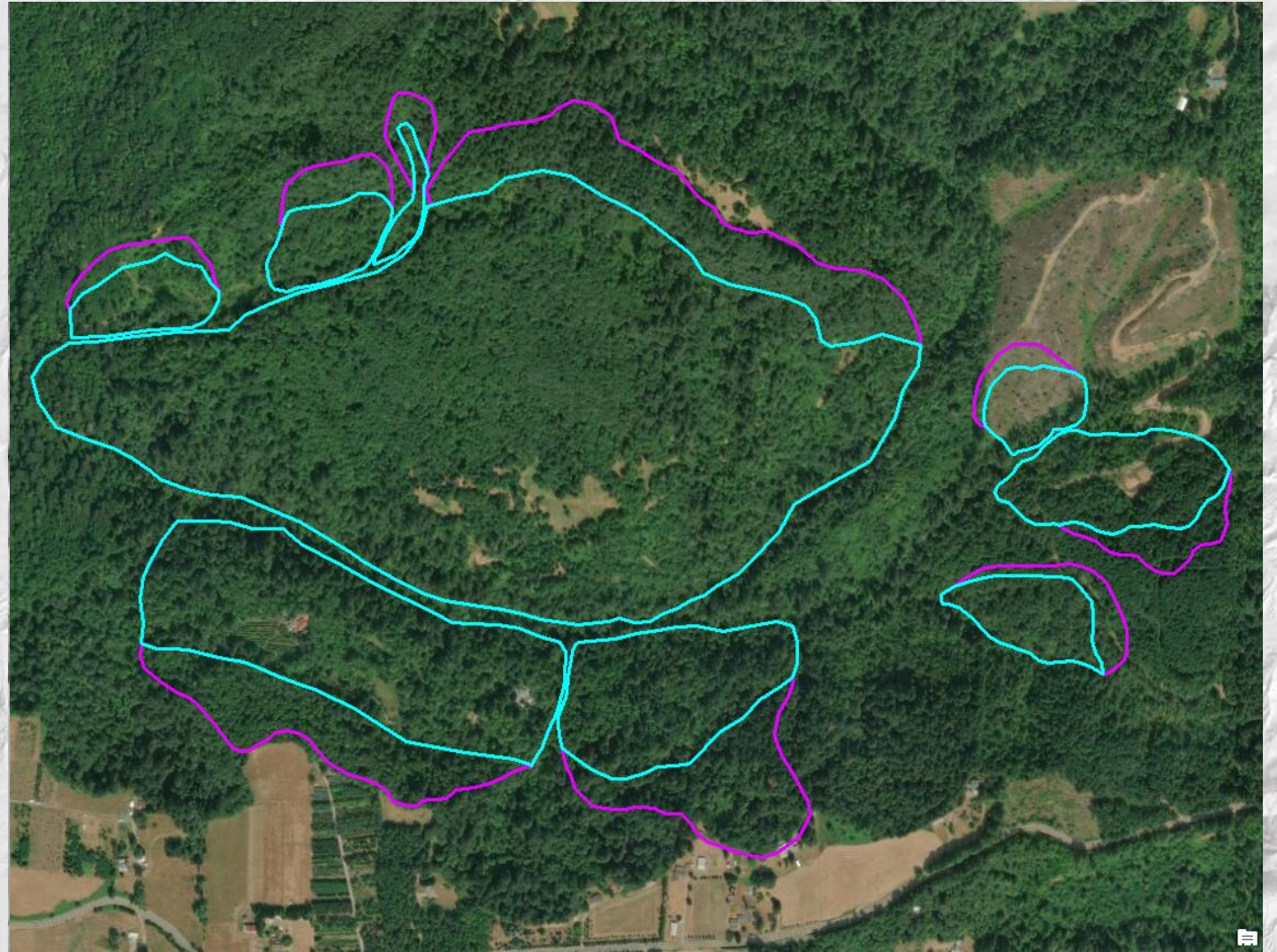
Landslide Overview

- Landslides are downslope movements of rock, earth, or debris
- The type of landslide is governed by material, topography, and water content
- Landslide deposits are generally weak and unconsolidated



Necessity of Lidar

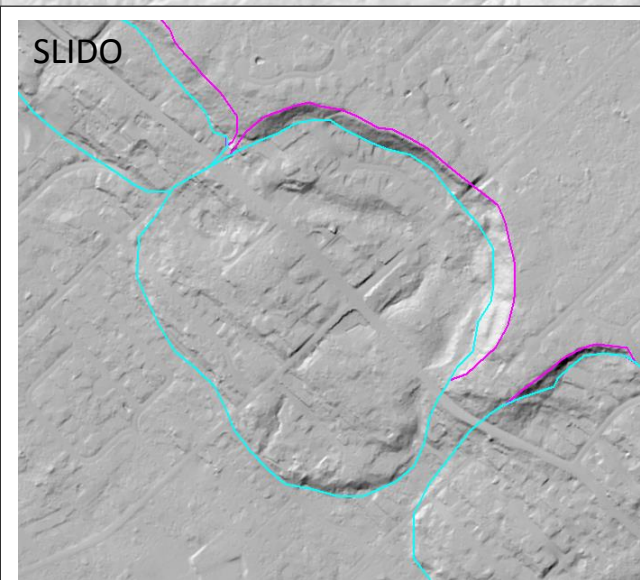
- Landslides may be difficult to identify in forested terrain and the built environment
- Lidar provides a good representation of the ground surface beneath these objects



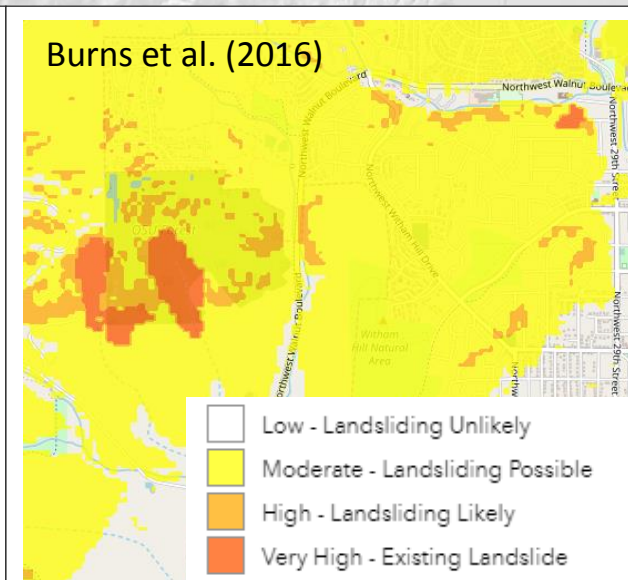
Types of Landslide Mapping

- There are 4 major categories of landslide mapping (Highland and Bobrowski 2008):
 - 1. Inventory mapping** – identifies the spatial extents of previously occurred landslides.
 - 2. Susceptibility mapping** – examines the factors behind failures on an inventory map, identifies the factors that contribute most to landslides, and then maps susceptible areas based on these factors
 - 3. Hazard mapping** - predict the extents of hazard exposure and the associated characteristics of a given hazard.
 - 4. Risk mapping** – predicts the cost of landslide occurrence.

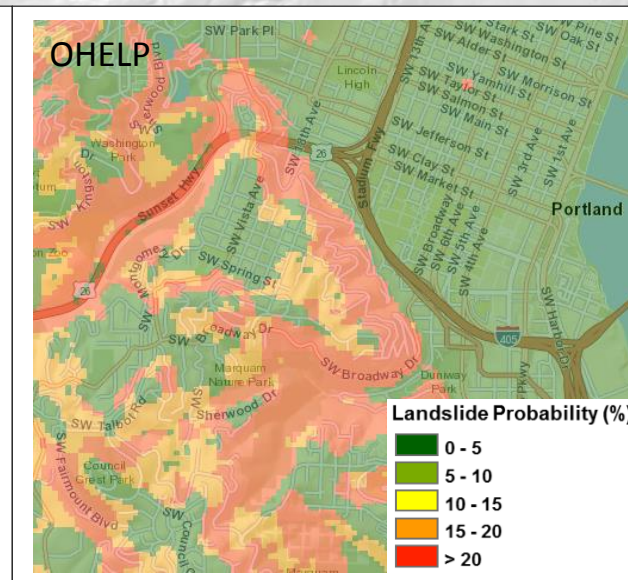
Landslide Map Examples



Inventory



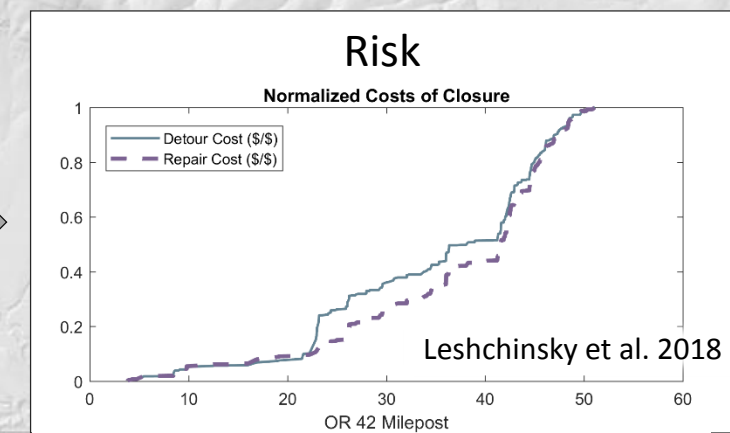
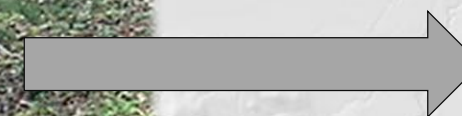
Susceptibility



Hazard



Built Environment



Landslide Inventorying

Manual, Expert-Based

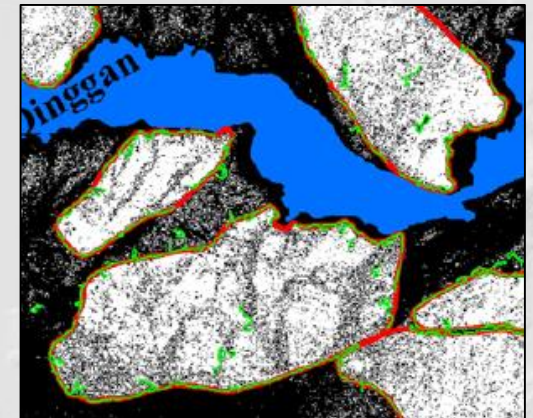
- Drawn by trained geologists through the interpretation of remotely sensed data – may be field verified
- Very accurate and time consuming
- Subjective – based primarily on an individual's interpretation



From Burns and Madin (2009)

Semi-Automated

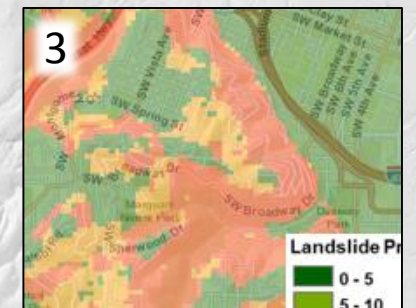
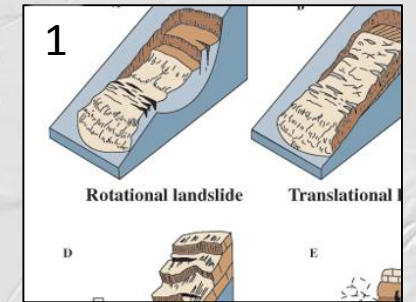
- Computer algorithms designed to replicate manual mapping
- Typically require small decisions by a human
- Somewhat accurate and time efficient



From Chen et al. (2014)

Recapitulation

1. Landslides are downslope movements of rock, earth, or debris, that come in many shapes and sizes
2. Lidar is an important resource for assessing landslides because it provides a glimpse at the ground beneath forests and around the built environment
3. Several types of landslide map exist: Inventory, Susceptibility, Hazard, and Risk
4. The method used to produce a landslide inventory typically dictates quality



Acknowledgements

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References:

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