Hazard Overview

Landslides are a chronic problem throughout Oregon, particularly in the western region of the state and in areas with steep slopes. On average, ODOT incurs about $4.5 million in costs each year due to landslides. Some landslide events are small and more quickly fixed, but major slides occur as well. Certain roadway segments are particularly prone to slides and need frequent repairs. Landslides can also result in major impacts to travel and on communities due to road closures, particularly in areas of Oregon with few good alternate routes. Landslide risk in Oregon is expected to increase in the future due to increased wildfire, extreme precipitation events, drought events, and sea level rise— all of which can destabilize slopes.

Quick Facts: 2019 Hooskanaden Landslide (Region 3)

- One-Quarter Mile
  Approximate length of US-101 that shifted

- 2 Weeks
  Length of time US-101 was closed

- $220,000-$440,000
  Estimated daily costs in time and operating costs, due to delayed traffic and commodity deliveries

- $100 Million
  Estimated cost to fully stabilize the slope

Impacts and Consequences on Transportation

- Short- and longer-term road closures
- Costly detours, particularly in instances where nearby similar routes are lacking
- Disruption of freight shipping and passenger travel
- Repeated repairs in landslide-prone areas
- Extensive and costly repairs for major slides
- Safety concerns for workers and travelers
- Impacts to nearby communities and local economies due to accessibility issues
How will Climate Change affect Landslides in Oregon?

Landslide risk is expected to increase in the future due to anticipated changes in climate factors that can destabilize slopes.

Projections indicate that extreme precipitation events may increase in frequency and intensity. This is particularly true during the winter months when, due to rising temperatures, more precipitation may fall as rain rather than snow in some areas. Heavy rain events occurring after drier summers, or after droughts—both of which are projected to increase in the future—can be particularly destabilizing.

Wildfire risk is also expected to increase throughout the state, creating looser soils. The combination of heavy precipitation following wildfire can be particularly conducive to slide events.

Sea level rise and more severe coastal storm events could increase coastal erosion, increasing the risk of slides in coastal areas.

Landslides are particularly a problem for ODOT’s system in the western parts of the states, in Regions 1 through 3. These are also the areas where extreme precipitation is anticipated to increase most notably. Wildfire is expected to increase in all ODOT regions, including Regions 1-3.

There is also notable landslide activity in the northern parts of Regions 4 and 5, although slides do occur in the southern parts of those regions too. Extreme precipitation events are anticipated to increase in these regions as well, although to a lesser degree than in the western part of the state. Wildfire risk is expected to increase in these regions too, particularly in the southeastern areas, perhaps making landslides a bigger risk in those parts than has traditionally been the case.

Making Oregon’s Highway System More Resilient to Landslides

Location-Specific

→ Engineering solutions focused on managing surface water runoff and stabilizing slopes, including:
  → Improving culverts, channels, and other drainage measures
  → Landslide dewatering methods
  → Retaining walls, ground anchors, shear piles, and other structural solutions
  → Shoreline armoring to mitigate coastal erosion
  → Bridges, realignment, and other solutions to completely bypass problem areas

Many of these solutions are very expensive, however.

→ Improved/expanded monitoring, including use of lower-cost technology such as remote monitoring.

→ Continued/improved maintenance and visual monitoring to quickly identify and repair small-scale events before they become more problematic.

System-Wide

→ Ensuring supplies/equipment stockpiled or otherwise accessible, given lack of good alternate routes and inability of some routes to handle truck traffic.

→ Improving approaches to funding to enable deployment of high-capital cost, but still cost-effective, measures. These approaches may include leveraging other funding sources, partnerships with other agencies/communities, or adjusting the way ODOT considers budgets to allow for a longer-term look at costs and benefits.

→ Developing a strategic approach to allow for “right-sizing” adaptation. In some cases, significant improvements can be made without full-scale stabilization. Slides might not be prevented entirely, but reduced in frequency or severity.

→ Creating a system-wide strategy to prioritize locations and level of response.

→ Improving response-planning to minimize impacts on a community.
Adaptation Barriers to Overcome

- Limited detour options in some areas, which not only affects passenger freight travel, but can make response and repairs more challenging.
- High capital costs of solutions make it difficult to fund projects within any single budget cycle—even when the project is cost-effective in the long run.
- High cost of even studying locations to determine appropriate solutions.

Sources Cited

The information in this fact sheet was primarily drawn from:


ODOT. (2019b). Hooskanaden Landslide Reconnaissance In Response To 2019 Episodic Movement; Oregon Coast Hwy (US 101) (Hwy. 9, M.P. 343.5), Curry County, Oregon. Geo/Environmental Unit. Oregon Department of Transportation (ODOT).


ODOT-sponsored analysis of climate change projections and interviews with ODOT staff.