

**Key points from the Geotechnical Extreme Events Reconnaissance (GEER) Oso  
Landslide Investigation  
(Excepted from Conclusions of GEER report, with additionally commentary)**

**1. Significance:** "The Oso Landslide claimed 43 lives, making it the deadliest landslide disaster in United States history. Washington State officials have estimated capital losses associated with the landslide to be at least \$50 million."

*Comment: This was a very significant natural disaster in terms of both human and capital losses. Although the extreme loss-of-life came as a surprise to public officials, the fact is that there are real and sometimes significant risks posed to individuals residing in this and the other similarly threatened parts of the nation.*

**2. This was not a one-time, highly unusual event:** "The geomorphic evidence in the valley reveals that the portion of the North Fork Stillaguamish River Valley in the vicinity of Oso Landslide has experienced multiple large landslides over at least the past six thousand years. Many of these ancient landslides have similar morphology to the 2014 Oso Landslide."

"It is highly probable that the intense 3-week rainfall that immediately preceded the event played a major role in triggering the landslide. The intense rainfall in the first three weeks of March at the nearest rain gauge was determined to be less than the 100-year event for this period of time"

"We found that the runout of this debris flow was indeed long (greater than 1 km); however, it was not exceptional for a landslide of its size."

*Comment: While the event was "rare" is as not truly extraordinary: (i) there is clear evidence that many similar massive landslides have occurred in the region, (ii) the apparent "trigger" - the high rainfall, was not off the charts (i.e., was less than the standard 100-year storm), (iii) landslide runout, which was the direct cause of casualties, was within the expected range for such a landslide. In moving forward, we should recognize that events such as these can and do occur.*

**3. Risk Assessments and Communication:** "Our assessment of the risk for fatalities due to landslides in this portion of the valley indicates that it is relatively high compared to guidelines for landslides in other developed countries. Currently there are no national or state guidelines in the United States concerning levels of risk due to natural landslides that warrant action."

"(We recommend that) the risk of landslides to people and property should be assessed and communicated clearly and consistently to the public."

*Comment: It is important that we begin to think about geologic hazards in the context of "risk" rather than "hazard." While these terms are often used interchangeably, there is a subtle but important difference: landslide hazard, which was well known in the region, tells us the likelihood that an event (e.g. landslide) will occur, whereas landslide risk tells us something far more important—the likelihood that human losses will occur as a result of an event (landslide). We have the analysis tools to do this.*