

Sliding Thought Blog

Washington's Landslide Blog

Lake Roosevelt Landslide/Seiche April 30, 2009

Trying to keep track of all of the landslides occurring in Washington State is a difficult task. Normally, I hear about most of the important ones via media reports, but this one escaped me, probably because of all of the activities following the January 7-8th storm.

National Park Service Morning Report (<http://home.nps.gov/applications/morningreport/>)

“On Friday, January 16th, a large landslide occurred adjacent to the Spokane River near Mill Canyon. Homeowners in the Mill Canyon area contacted the park and reported that their docks had been destroyed by a large wave. Responding rangers found that a section of hillside measuring approximately 17 acres in size had broken free across from Breezy Bay and that the subsequent landslide had fallen into the water, creating a wave that was about 30 feet high when it hit the southern shore about a thousand yards across the lake. The wave damaged or destroyed several private docks located at Breezy Bay, Moccasin Bay, Sunset Point and Arrowhead Point. Several vessels moored in the area were also swamped and left beached on land. The water reached one residence before receding and came just to the foundations of several others. The full extent of the damage caused by the landslide is not yet known. Damage to property was documented as far as a mile and a half downstream, and significant resource damage and erosion to the shoreline occurred as far as three miles downstream. The park has issued a general safety warning due to the debris in the water, which is making navigation difficult. Boaters in the area have been advised to use extreme caution when boating from Cayuse Cove to Breezy Bay on the Spokane River. Along with ice deposits in the lake, there are now large trees, dead heads, dock parts, and unknown sediment deposits that have made safe navigation difficult. Due to unknown conditions near the slide, visitors are also being advised to avoid going on land at the site, as the ground will be quite unstable for some time and sinkholes and falling debris may occur. [Submitted by Adam Kelsey, Acting Chief Ranger]“



(<http://media.spokesman.com/photos>

/2009/01

/24/24_LANDSLIDE_01-24-2009_39F7Q5C_t620.jpg?161ad8e426d1312361ed5892fdc121cdf327258d)

Lake Roosevelt Landslide?

I am attempting to contact Ranger Adam Kelsey in regards to the exact location and any additional information on the landslide.

A good friend of mine and coworker, Trevor Contreras, ran across this photo of the suspected bluff in Cruden and Varnes (1996) landslide processes paper:



FIGURE 3-37
Shallow dry sand
flow along shore
of Lake Roosevelt,
Washington State;
wave erosion or
saturation of
sediment by lake
water caused thin
skin of material to
lose support and
ravel off slope,
formed on older
terrace deposit
[Varnes 1978, Figure
2.25 (modified from
Jones et al. 1961)].

(https://slidingthought.files.wordpress.com/2009/04/lr_landslide.jpg)

Lake Roosevelt Landslide - Cruden and Varnes

This before photo clearly shows little debris at the base of the bluff. and gives an approximate idea of how large the landslide is in size.

Past History

Lake Roosevelt National Park has a long history of landslides. I recall a document by the Emergency Management Division of Washington Military Department regarding landslide histories in this [document \(http://emd.wa.gov/plans/documents/LandslideNov2007Tab5.6.pdf\)](http://emd.wa.gov/plans/documents/LandslideNov2007Tab5.6.pdf)

“ • 1944 to 1953 – Massive landslides generated a number of inland tsunamis in Lake Roosevelt in Eastern Washington:

• April 8, 1944 – A four to five million cubic yard landslide from Reed Terrace generated a 30-foot wave, 5,000 feet away on the opposite shore of the lake about 98 miles above Grand Coulee Dam.

- July 27, 1949 – A two to three million cubic yard landslide near the mouth of Hawk Creek created a 65-foot wave that crossed the lake about 35 miles above Grand Coulee Dam; people 20 miles away observed the wave.
- February 23, 1951 – A 100,000 to 200,000 cubic yard landslide just north of Kettle Falls created a wave that picked up logs at the Harter Lumber Company Mill and flung them through the mill 10 feet above lake level.
- April 10 – 13, 1952 – A 15 million cubic yard landslide three miles below the Kettle Falls Bridge created a 65-foot wave that struck the opposite shore of the lake. People observed some waves six miles up the lake.
- October 13, 1952 – A landslide 98 miles upstream of Grand Coulee Dam created a wave that broke tugboats and barges loose from their moorings at the Lafferty Transportation Company six miles away. It also swept logs and other debris over a large area above lake level.
- February 1953 – A series of landslides about 100 miles upstream from Grand Coulee Dam generated a number of waves that crossed the lake and hit the opposite shore 16 feet above lake level. On average, observed waves crossed the 5,000-foot wide lake in about 90 seconds.
- April – August 1953 – Landslides originating in Reed Terrace caused waves in the lake at least 11 different times. The largest wave to hit the opposite shore was 65 feet high and observed six miles away. Velocity of one of the series of waves was about 45 miles per hour.”

Some more history from Stevens County in **[chapter 5 of their Multi-Hazard Mitigation Plan](http://www.co.stevens.wa.us/landservices/documents/Chapter5-Landslides.pdf)** (<http://www.co.stevens.wa.us/landservices/documents/Chapter5-Landslides.pdf>)

- “• April 8, 1944 – A four to five million cubic yard landslide from Reed Terrace generated wave, 5,000 feet away on the opposite shore of the lake about 98 miles above Dam.
- April 10 – 13, 1952 – A 15 million cubic yard landslide three miles below the Kettle created a 65-foot wave that struck the opposite shore of the lake. People observed six miles up the lake.
- February 1953 – A series of landslides about 100 miles upstream from Grand generated a number of waves that crossed the lake and hit the opposite shore lake level. On average, observed waves crossed the 5,000-foot wide lake in about
- April – August 1953 – Landslides originating in Reed Terrace caused waves in the 11 different times. The largest wave to hit the opposite shore was 65 feet high and miles away. Velocity of one of the series of waves was about 45 miles per hour.”

So, what is causing all of these landslides? The USGS in their report on **[significant landslide events in the United States](http://landslide.usgs.gov/docs/faq/significantls_508.pdf)** (http://landslide.usgs.gov/docs/faq/significantls_508.pdf) summarizes:

“In summary the shores of Roosevelt Lake have been subject to several hundred landslides since the reservoir began to be filled during construction of Grand Coulee Dam during the 1930’s and early 1940’s. The greatest percentage of landslide activity occurred during initial filling of the reservoir, but many slope failures also have been caused by intermittent drawdown of the reservoir level. In addition, occasional slope failures have occurred as natural phenomena, related more to wet winters than to fluctuation of the reservoir.”

Static Liquification from water level changes and changes the surrounding hydrology probably does play a big roll in landslides, it is something that you can see in most of our major dammed lakes. There might be other triggers as well.

In eastern Washington, there are certain triggers when looking at landslides. Potentially, agriculture can play a role in landslides along bluffs and in the long-term, the watering of crops above these bluffs does play a role. Chances are, they weren’t watering in January. The area also had a huge amount of snow



<https://slidingthought.files.wordpress.com/2009/04/lake-roosevelt2.jpg>

Lake Roosevelt Landslide

this winter and January 16th was in that period where we had a warming trend. So, perhaps snow melt helped to increase the amount of water into the subsurface as well.

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