

## **MOUNT WOW ROCK FALL PRELIMINARY FINDINGS**

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### **Summary:**

On Thursday, May 15, 2014 at about 10:30 AM, approximately 8,500 cubic feet of Oligocene-age (~30 ma) Ohanapeosh Formation andesite slid off the east face of Mount Wow at about the 4,000-foot level (Figure 1 and 2). The rock fall traveled approximately one-quarter-mile down a steep talus and scree slope, and deposited large boulders on the West Side Road parking area at the 2,800-foot level (Figure 3). An NPS owl crew further up the West Side Road heard the rock fall, allowing the timing of the event to be determined. A visitor's vehicle was totaled by a large rock and the parking area sustained impact crater damage from the boulders. No eyewitnesses directly observed the event itself and there were no injuries sustained. The largest of the craters in the road/parking area is approximately 8 feet wide by 3 feet deep. Numerous boulders were deposited on the scree field between the source and deposition areas, including a boulder that is roughly 30 feet wide by 20 feet long by 5 feet high. About 45 boulders with a diameter greater than 1 foot reached the parking area, with an estimated combined volume of 4,345 cubic feet. It is estimated that at least this much additional material stopped short of the parking area and is deposited on the scree field above the road. Therefore, we estimate the size of the rock fall to be approximately 8,500 cubic feet (315 cubic yards; or 31.5 dump trucks worth of material).

Within hours of the rock fall, the road was closed to all traffic and geologists Paul Kennard and Scott Beason were informed of the event. A reconnaissance site visit occurred on May 16 with Geologists Paul Kennard and Ellen Hudson-Heck. A more detailed field review occurred on May 19, 2014, composed of Geologists Scott Beason, Paul Kennard, Laura Walkup, John Russell, and Ellen Hudson-Heck. These and subsequent surveys documented volume of rocks, photographs of the site, and GPS coordinates of the rocks. Post-rock fall site photos were compared with previous photos of the area to determine a source. The source area is a tan- to buff-colored surface identified in the field, and confirmed by photos taken from the ground as well as a 0.5-meter satellite image acquired on May 22, 2014. Geologists Scott Beason and John Russell were flown to the area on June 4, 2014 and accomplished visual inspection and photo documentation of the entire east face of Mount Wow. A Go-Pro camera was also used during the half hour helicopter flight to further document the event (Figure 4).

In the weeks following the event, no additional boulders were noted in the parking areas. Additional rock fall could have potentially fallen from the source area to the scree field before the parking lot, but this is undocumented. There were several rain events that occurred during this time frame as well, some with moderate rainfall intensity rates, none of which triggered further rock fall that made its way to the road. This indicates that there was little to no additional rock fall after the main event and that the slope is in a quasi-stable configuration at this time. Our geologic assessment and available evidence suggests that the rock fall hazard at the West Side Road parking area does not appear to be elevated above background hazard levels due to the May 15, 2014 event.

It is likely that the root cause of the event is cumulative freeze-thaw cycles, which, over time, weakened a fracture plane within the rock face. The exact trigger for the rock fall is not known. Post-event flight

photos show that there is one large (~10-15 foot) rock still on the east face at the upper extent of the rock fall and several loose rocks near the bottom of the face that could potentially fall (Figure 5 and 6). Slope aspect suggests that if these rocks do fall, it is unlikely they will reach the West Side Road, and if they do reach the parking lot, they would likely be split apart due to impact forces as they tumble down the scree field. The lower part of the initiation face does have some roughness to it, and what appear to be a several small zones of seepage, which could be a potential future source area. The presence of the scree field is telling about the history of rock fall in the area. It should be anticipated that we will see another similar size – or even larger – event in the future.

The current parking area should only be used in the interim until a better-placed parking lot can be located. An interdisciplinary team should complete a full study of the new parking area. We recommend that the new parking area be moved south of the current parking area, before Dry Creek. This is so that future rock falls and debris flow/flooding hazards upstream by Fish Creek will not trap vehicles. We recognize that there are other logistic considerations in parking lot placement that may over ride this consideration and that a full assessment of the area with all park divisions should be consulted for the final location.

Mount Rainier geologists received outside assistance from the United States Geological Survey, Yosemite National Park, and Western Federal Lands Highway Division of the Department of Transportation. All parties have been consulted on methods to document the event, ways to mitigate hazards and steps to take to proceed with opening the road.

A final, more detailed report about this rock fall is forthcoming, and the findings and recommendations in this preliminary report will be incorporated into the final report.

**Photos:**



**Figure 1:** Photo of the east face of Mount Wow from 6/10/2011 (NPS/Laura Walkup). White arrow points to area of interest for source of the rock fall (See Figure 2).

5/19/2014 13:47



Photo: NPS/Scott Beason

**Figure 2:** Photo of the east face of Mount Wow from 5/19/2014 (NPS/Scott Beason). Note the tan- to buff-colored scar at the white arrow (compare with Figure 1).



**Figure 3:** View facing south of the West Side Road parking area, including damage to an NPS gate and a visitor vehicle (NPS/Scott Beason).



**Figure 4:** Go-Pro screen grab of helicopter view of source area (center of photo) and downslope debris fan (lower right) (NPS/Scott Beason).



**Figure 5:** Helicopter view of the source area for the Mount Wow rock fall (NPS/Scott Beason). White arrows point to potential loose rocks.



**Figure 6:** Detail view of the upper source area of the Mount Wow rock fall (NPS/Scott Beason). Visible at the top of the image (and unfortunately slightly clipped at its upper extent) is the potentially unstable boulder still present in the initiation area.