

APPLICATION OF REMOTE SENSING TECHNIQUES TO DETERMINE THE  
KINEMATICS OF THE BULL LAKE CREEK LANDSLIDE,  
WIND RIVER MOUNTAINS, WYOMING

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**ABSTRACT**

Landslides are one of many natural hazards that impact human settlements. On average, each year landslides account for billions of dollars of property damage and claim thousands of lives around the world. Landslides are prevalent throughout the United States, and require constant monitoring and remediation. This abundance is a result of a combination of weak stratigraphic layers, extensive faulting and tilting, and a climate that allows for large amounts of snow melt to be input into the water table. It is therefore important to gain a better understanding of how and when landslides occur, not only to minimize damage in areas with currently active landslides but also to identify landslide prone areas in order to avoid developing infrastructure near them. In order to accomplish these goals it is important to understand the mechanics of mass movements and the variables that affect their activity. The goal of this thesis research was to determine seasonal kinematics of the Bull Lake Creek Landslide (BLCS) in the Wind River Mountains of Wyoming. Satellite-based L-band interferometric synthetic aperture radar (InSAR) data was utilized to monitor short-term movement of BLCS and was correlated to meteorological and stream discharge data provided by USGS gauging and weather stations in the Bull Lake Creek Valley. Cumulative displacements recorded by InSAR analysis were greater than 300cm over a 3 year time span, with maximum amounts of movement occurring during the months of May and June corresponding with peaks in stream discharge. For longer-term variations, aerial photos over a 50 year time span were observed. Results from the aerial photo analysis show massive cliff failure events (~5 million m<sup>3</sup> of material) occur and that catastrophic mobilization of the slide occurs on decadal time scales with displacement of large (>20m) clasts up to ~2km, and destruction and entrainment of mature growth trees (60cm dia.). Since other slides located in the Wind River Mountains share a similar structure as that of BLCS, it can be inferred that they may also fail catastrophically. Therefore, a re-assessment of the hazard that they pose to human infrastructure (such as Bull Lake Reservoir) may be in order.