Field Verification and Remote Sensing Interpretation: A Comprehensive Approach to Landslide Inventories and Sediment Delivery Analysis

Anne Fehrenbach, Green Diamond Resource Company, P.O. Box 68, Korbel, CA 95550; (707) 668-4494; Anne.Fehrenbach@Greendiamond.com

Scott Kirkman, Green Diamond Resource Company, P.O. Box 68, Korbel, CA 95550; (707) 668-4494; Skirkman@Greendiamond.com

Landslides are prevalent sculptors of the landscape within the Coast Ranges of Northern California. They are a naturally occurring process and can be exacerbated as a result of land uses such as forest management activities. Landslides have the potential to contribute large amounts of sediment to streams, which can result in the degradation of aquatic habitat. Identifying, mapping and mitigating landslides and landslide prone areas are essential components of current timber harvesting plans (THPs) implemented on Green Diamond Resource Company (GDRCo) property in order to comply with our Aquatic Habitat Conservation Plan (AHCP).

Aerial photography is commonly used to remotely identify landslides. A more comprehensive method involves field mapping and verification and where available utilizes LiDAR (Light Detecting And Ranging) digital elevation models. As part of THP preparation and a mass wasting assessment project associated with GDRCo's AHCP, staff geologists have been conducting landslide inventories utilizing a combination of aerial photography and field-based surveys. We evaluated the differences in landslide detectability, erosion, and estimates of sediment delivery. The number of landslides discovered during field surveys was nearly seven times higher than those observed using aerial photography when surveying the same area. The field identified landslides, although generally smaller than those observable in aerial photographs, account for over half of the total volume of sediment that delivered to streams. We also evaluated different methodologies in estimating the amount of sediment that delivered from the landslide to the adjacent watercourse. We found that the rapid-assessment of using ocular delivery estimates made during field surveys were, on average, much closer to calculated delivery estimates made from detailed cross-sectional field measurements than those estimated from aerial photography. It is important to note that ocular field estimation requires some degree of experience and calibration with the detailed cross-sectional field measurements to achieve consistent and accurate estimates.

In our review of landslide data collected from aerial photography and in the field, we have found that a combination of aerial photo interpretation and field verification provides a higher level of accuracy and resolution in estimating erosion and sediment delivery.