WASHINGTON STATE DEPARTMENT OF
Natural Resources

DOUG SUTHERLAND
Commissioner of Public Lands

MEMORANDUM

To: Laura Vaugeois – Forest Practices
Karl Wegmann - Geology

From: Bill Lingley – Geology

Date: August 22, 2003

Subject: West Branch Little Spokane Watershed Analysis -- Review

Summary

Kirtland (1997) presents an adequate mass wasting analysis of the West Branch Little Spokane River watershed, considering the fact that this area is unusually stable. Kirtland was able to locate only one landslide during his review of aerial photography and twelve days of fieldwork. His report is accurate and should be sent out for final external review.

Introduction

This memorandum has been prepared as part of the Landslide Hazard Zonation project (Vaugeois and others, 2002) and follows the protocol for Priority #1 Watersheds review developed by you (Wegmann and Vaugeois, 2003). These reviews are spot checks covering watershed analyses that are nearly complete and address only State and fee lands within these watersheds.

The draft West Branch of the Little Spokane River Analysis (Boise Cascade Corporation, 1997) has been completed, except for final review. Jeffrey Kirtland (1997) of Pentec Environmental, Inc. developed the Mass Wasting and Surface Erosion Modules for this document. My analysis covers the entire watershed, as the only significant federal ownership is small parcels in northwestern part of the watershed.

Methods

Rule-identified unstable slopes such as inner gorges, bedrock hollows, and convergent headwalls were located using topographic mapping (i.e., U.S. Geological Survey, 1968a, b, c). Following this work, I reviewed DNR aerial photographic set NE-C-2000 covering about 70% of the watershed. I did not check all flatter areas, such as floodplains, or the highlands around Granite Peak, which include much federal land. The Mass Wasting Map Units were re-evaluated using interpretations from the photography and geologic mapping by Waggoner (1990).

Key Questions

1. *Are the majority of landslides in the basin adequately identified?*

Yes.

The watershed as a whole is remarkably stable. Kirtland has done a good job of defending this fact in spite of the handicap of access to only one set of aerial photography. These Boise Cascade photos were acquired during 1992. Using these data, Kirtland was only able to identified one landslide. In order to compensate for the dearth of images, he performed 12 days of fieldwork carefully checking for additional landslides, but found none. He did identify 44 sites with high surface erosion potential (i.e., rill and gully erosion).

I reviewed about 70 percent of the watershed using DNR aerial photo set NE-C-2000. These data reveal three other questionable to probable failures, two of which appear to post-date Kirtland's study (see attached Form A-1). Furthermore, two are small slides that deliver little or no sediment to the stream network. I also located three anomalies that might be failures, but require further evaluation. The increase in found failures is thought to result from the wet winters of 1996 to 1998, not from shortcomings on the part of Kirtland's work. Analysis of topography shows that low-angle slopes dominate the watershed and that rule-identified inner gorges, convergent headwalls, and bedrock hollows are not common (U.S. Geological Survey, 1968a,b, c). Waggoner (1990) identified one other deep-seated failure, which is discussed below.

2. *Do the Mass Wasting Map Units reflect reasonable assumptions based upon your review of the geology and landslides in the basin?*

Yes.

Kirtland identifies only two Mass Wasting Map Units that account for all of his unstable slopes; 1) inner gorges of Beaver and Buck Creeks, and 2) vegetated talus fields west and southwest of Horseshoe lake.

New failures B, C, and E are located in Mass Wasting Map Unit 1. A separate large failure mapped by Waggoner (1990) is in Mass Wasting Map Unit 2. All others are randomly distributed across the landscape and management related.

I note that both Mass Wasting Map Units are in well-bedded, moderately lithified metasedimentary rocks of the Belt Super Group. These ancient rocks are commonly thinly layered and composed of relatively weak rock types that tend to weather deeply and form thicker soils. Eocene and Mesozoic igneous rocks that are resistant to weathering and form a stable substrate dominate the remainder of the watershed.

3. *Are the hazard ratings assigned to the Mass Wasting Map Units reinforced by the distribution of landslides as shown in the Landslide Inventory for the WAU?*

Yes.

The delivery hazard rating for most of the watershed (Mass Wasting Map Unit 3) is given as NA [not applicable], which reasonably reflects the fact that so few failures are present that hazard ratings cannot be reliably determined. The delivery hazard rating for Mass Wasting

Map Unit 1 is moderate. The delivery hazard from Mass Wasting Map Unit 2 to the adjacent county road is rated as high. This study supports all three hazard ratings.

4. *Are there landforms that seem to have a large number of landslides, but no associated Mass Wasting Map Unit?*

   No

   However, I would recommend a slight increase in the east-west dimension of Mass Wasting Unit 2. Waggoner (1990) maps a long, narrow, relict landslide deposit (*sensu stricto*) along the western boundary of Horseshoe Lake (Sections 7 and 18, T30N, R43E), which has been included in our landslide hazard zonation GIS coverages. Kirtland maps the associated scarp as his Mass Wasting Map Unit 2 and recognizes it as an area with potential for rock topple and rock avalanches. I recommend combining the Kirtland and Waggoner interpretations and mapping the scarp and deposit as an enlarged Mass Wasting Map Unit 2 as shown on the attached map.

5. *Does the text describing the Mass Wasting Map Units do an adequate job in presenting the landform / geology information that a forester using this map would need to identify the features on the ground?*

   Yes.

   Note, however, that "*Watershed Analysis, Section 3.2.2 Talus*" on page A-9 under Kirtland's "*Areas of Mass Wasting Potential*" erroneously describes the area of Mass Wasting Map Unit 2 as being "east and southeast of Horseshoe Lake". His Mass Wasting Map Unit 2 polygon, the only county road in the area, and Waggoner's deep-seated landslide are all west and southwest of Horseshoe Lake.

6. *Are there additions to the mass wasting assessment products?*

   Yes.

   A map showing the three questionable and probable unstable features that I identified, the recommended expansion of Mass Wasting Unit 2, and a Mass Wasting Inventory Data spreadsheet (Form A-1) are attached.

7. *Should Forest Practices Division send this Mass Wasting Assessment out for final external review?*

   Yes

References

Kirtland, Jeffery, A., 1997, Appendix A – Mass Wasting Assessment, and Appendix B – Surface Erosion Assessment. *IN* Boise Cascade, Corporation. West Branch of the Little Spokane River watershed administrative unit 550101, watershed analysis; Draft: Boise Cascade, Corporation, 1 v.

U.S. Geological Survey, 1968a, Washington Elk quadrangle; U.S. Geological Survey Map, 1 sheet, scale 1:24,000.

U.S. Geological Survey, 1968b, Washington Fan Lake quadrangle; U.S. Geological Survey Map, 1 sheet, scale 1:24,000.

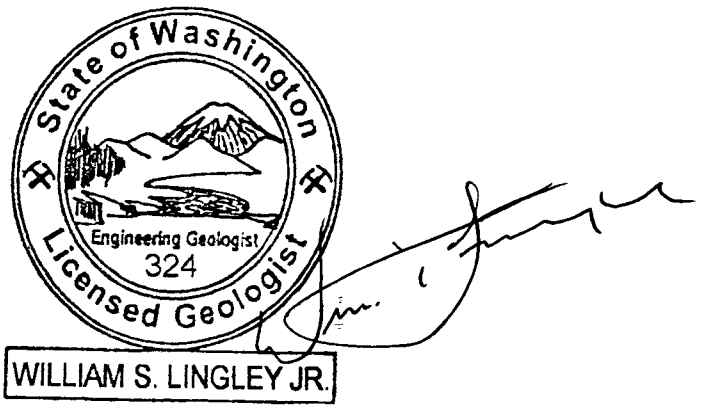
U.S. Geological Survey, 1968c, Washington Sacheen Lake quadrangle; U.S. Geological Survey Map, 1 sheet, scale 1:24,000.

Vaugeois, Laura, Dieu, Julie, Raines, Mary, 2002, Landslide Hazard Zonation – Project status report and proposal. Draft report submitted to the Cooperative Evaluation, Monitoring, and Research Committee, Washington Department of Natural Resources, 38 p.

Waggoner, Stephanie Z., compiler, 1990, Geologic map of the Chewelah 1:100,000 quadrangle, Washington-Idaho: Washington Division of Geology and Earth Resources Open File Report 90-14, 63 p., 1 plate.

Wegmann, Karl, Vaugeois, Laura, 2003, written communication, July 15, 2003 -- Landslide Hazard Zonation project, protocol for priority # 1 watersheds; Department of Natural Resources, Division of Geology and Earth Resources.

Respectfully submitted,



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