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: September 15, 2003

Subject: Smay Creek Watershed Analysis -- Review

Summary

Reynolds and Paulson (1999) present a detailed discussion of landslide hazards in the Smay watershed. They identified numerous debris flows and recognize important relations among shallow failures, management, and the scarps and toes of deep-seated features. These relations are critical to reducing the impact of management on this watershed, which has a large number of damaging landslides relative to others I have studied. Their report 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 primarily address State and fee lands within these watersheds.

The Smay Creek Watershed Analysis (Caldwell and Associates, 2003) has been completed, except for the external review and prescriptions. Little significant federal ownership is present in the Smay watershed, so my review covers the entire watershed.

Methods

Findings from the Landslide Hazard Assessment for the Howard Hansen and Smay Creek WAU (Reynolds and Paulson, 1999) were compared with interpretation of DNR Color Photo Set NW-C-01 covering 90% of the watershed. This set was acquired after completion of the Reynolds and Paulson work and after the wet winters of 1996 to 1998. However, one key image, NW-C-01, 49-77-92, was unavailable. Additional rule-identified unstable slopes including some inner gorges, convergent headwalls, and bedrock hollows were identified using topographic mapping (U.S. Geological Survey, 1986, 1989a, b, c) and a slope/convergence map (SLPSTAB) of the area produced by Laura Vaugeois. Following this work, I reviewed geologic mapping of the watershed (Tabor and others, 2000) and compared the mass wasting map units and mapped landslides with geologic units.

Key Questions

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

Yes.

Reynolds and Paulson (1999) identified about 120 debris torrents and shallow rapid landslides and about 20 deep-seated failures using nine photo sets acquired between 1942 and 1996. They indicate that the preponderance is management related. In addition, I identified 27 questionable to probable failures, 21 of which appear to post-date the Reynolds and Paulson study. The large number of slides reflects the fact that Smay Creek is a fairly unstable watershed.

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

Yes.

The authors do a good job of delineating areas with potentially unstable slopes including units that reflect the current forest practices rule (WAC 222-16-050(1(d(I(A-E)))).[1]

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.

Most of the watershed is rated as "moderate" to "high" hazard, an assessment that is at leastly partly supported by the fact that so many new slides occurred since the Reynolds and Paulson study was completed. (Note that most of these new slides are very small.) However, the high and moderate hazard ratings assigned to the headscarp and body of a very large landslide in Sections 27-30, T21N, R10E and Sections 31-34, T20N, R10E may be somewhat aggressive as this feature probably predates the Fraser glaciation and retains little of its original morphology and because most slides off its headscarp generally do not deliver sediment to typed waters. In contrast, three similar large earth slump/flows further to the west may be periodically reactivated and at least one has been locally reactivated by management (Laura Vaugeois, DNR, 2003 oral commun.) Tabor and others (2000) also mapped these large earth slump/flows.

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

No

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.

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[1] For future watershed analysis protocols, I suggest mapping deep-seated earth flows and earth slumps as "landslides" rather than the current method that allows mapping these features as "landforms" or "mass wasting units".

The text and data analysis for this watershed are easy to read, thorough, very interesting, and informative.

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

Yes.

A map showing the 27 questionable and probable unstable features I identified 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

Caldwell and Associates, draft Howard Hansen – Smay Creek watershed analysis module reports, Olympia, 1 v.

Reynolds, P., Paulson, K., 1999, Draft landslide hazard assessment, Howard Hansen and Smay Creek watershed administrative units, Green River basin, King County, Report prepared for Muckleshoot Indian Tribe Fisheries Department, Auburn, 34 p., 2 maps, 14 tables, 9 figs. *IN* Caldwell and Associates, draft Howard Hansen – Smay Creek watershed analysis module reports, Olympia, 1 v.

U.S. Geological Survey, 1986, Washington Nagrom quadrangle; U.S. Geological Survey Map, 1 sheet, scale 1:24,000.

U.S. Geological Survey, 1989b, Washington Cougar Mountain quadrangle; U.S. Geological Survey Map, 1 sheet, scale 1:24,000.

U.S. Geological Survey, 1989c, Washington Findley Lake quadrangle; U.S. Geological Survey Map, 1 sheet, scale 1:24,000.

U.S. Geological Survey, 1989a, Washington Lost Lake quadrangle; U.S. Geological Survey Map, 1 sheet, scale 1:24,000.

Tabor, R. W.; Frizzell, V. A., Jr.; Booth, D. B.; Waitt, R. B., 2000, Geologic map of the Snoqualmie Pass 30 x 60 minute quadrangle, Washington: U.S. Geological Survey Geologic Investigations Series Map I-2538, 1 sheet, scale 1:100,000, with 57 p. text.

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.

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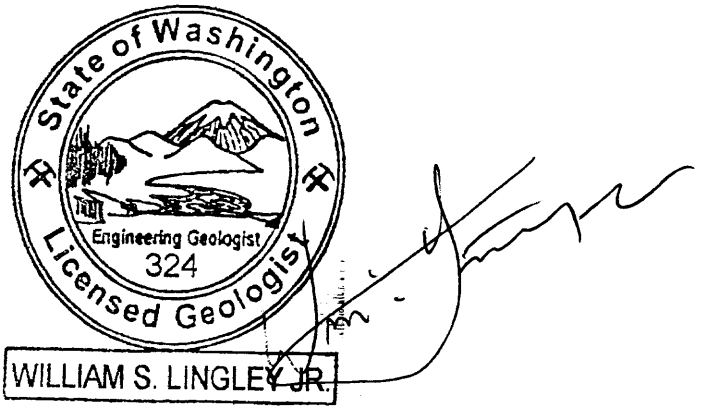
Respectfully submitted,



William S. Lingley, Jr.

Cc Dave Norman – Geology
Nancy Sturhan – Forest Practices