



WASHINGTON STATE DEPARTMENT OF
Natural Resources

MEMORANDUM

To: Laura Vaugeois – Forest Practices
From: Karl Wegmann – Geology
Date: November 18, 2003
Subject: Howard Hansen Watershed Assessment Unit–Landslide Hazard Assessment — Review

Summary

Reynolds and Paulson (1999) present a detailed analysis and discussion of landslide hazards in the Howard Hansen watershed administrative unit. They recognize spatial relations among shallow landslides and hillslope geomorphic units as well as forest management practices. In my review of the landslide inventory and mass wasting map units, I found an additional 24 landslides. The mapped distribution of identified landslides within the watershed appears to adequately support the assigned hazard ratings for Mass Wasting Map Units and sediment delivery potential. This report should be sent out for 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 watershed review developed by Wegmann and Vaugeois (2003). This is an office-based review of the draft mass wasting assessment performed by Reynolds and Paulson (1999) and pertains only to the State and fee lands within this watershed.

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

Methods

The landslide inventory and Mass Wasting Map Unit (MWMU) delineations of Reynolds and Paulson (1999) were compared with geologic mapping of the area by Tabor and others (2000) along with the mass wasting assessment review for the adjacent Smay Creek watershed (Lingley, 2003). A slope/convergence map (SLPSTAB) of the watershed was used to predict areas of potential shallow-rapid slope failure (Vaugeois, 2000). A slope-percent map derived from a USGS 10-meter digital elevation model of the watershed aided in review of the MWMUs. Aerial photograph stereopairs covering the entire watershed, with the exception of Sections 29, 20, and 17 of Township 20 North, Range 9 East (Department of Natural Resources aerial photographic set NW-C-01, scale 1:12,000, color) were viewed using a mirrored stereoscope with 3x magnification. Suspected landslides, containing distinct geomorphic features such as

head scarps, lack of vegetation along slide paths, hummocky or benched topography, ponded water bodies (sag ponds) and lateral margins were identified and mapped directly on the aerial photographs. Landslides identified in the aerial photo review were digitized freehand utilizing 2000 DNR digital orthophotos in an ArcGIS environment (Plate 1). Bill Lingley performed an internal peer-review of this analysis (Lingley, 2003b) for quality control and assurance purposes. The recommendations of Lingley (2003b) are incorporated into this report.

Key Questions

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

Yes.

Reynolds and Paulson (1999) identified 276 shallow and 48 deep-seated landslides within the combined Howard Hansen / Smay Creek watershed administrative units using nine aerial photograph sets between 1942 and 1996. Their analysis indicates that the preponderance of shallow landsliding is related to forest management activities. I identified twenty-four additional landslides not included in the Reynolds and Paulson (1999) inventory (Table 1). Ten of the twenty-four are shallow landslides which appear to post-date the Reynolds and Paulson study. Fourteen of the additional landslides are deep-seated rock slides and/or earthflow complexes. In many cases, these additional deep-seated landslides are located in recently logged areas. The large number of identified landslides in the Howard Hansen and Smay Creek watershed administrative units is an indication that these watersheds contain many large areas of slope instability.

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 potentially unstable slopes including units that reflect the current Forest Practices Rule (WAC 222-16-050(1(d(I(A-E))))).

In my opinion, the deep-seated earthflows that are shown as comprising Mass Wasting Map Units (MWMU) 4, 5, 6, and 66 (Map 4A-2, Reynolds and Paulson, 1999) should be included in the landslide inventory for the watershed, rather than their current designation as “landforms” within the mass wasting map unit map. Inclusion of these landslides within the landslide inventory will present a more realistic portrayal of the spatial distribution of landslides across 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.

Most of the watershed is rated at “moderate” to “high” hazard, an assessment that is supported by the distribution and large number of identified landslides within the watershed. The authors do a good job of supporting their MWMU hazard rating assignments with detailed discussions the sensitivity of the MWMU to forest practice activities, sediment delivery potential and criteria for each MWMU, as well as landslide triggering mechanisms specific to each MWMU.

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.

The text and data analysis for the Howard Hansen and Smay Creek WAUs is well organized, easy to read, thorough, and informative.

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

Yes.

1. The twenty-four landslides identified during this review should be added to the landslide inventory for the Howard Hansen watershed (Plate 1 and Table 1).
2. Several large deep-seated landslides identified by Tabor and others (2000), that are included in the current version of the Washington State Landslide Inventory (Vaugeois, 2003), should be added to the external review landslide inventory maps produced for the Howard Hansen watershed.
3. All of the earthflows mapped by the authors as MWMUs 4, 5, 6, and 66 should be added to the external review landslide inventory maps produced for the Howard Hansen watershed. Adding these large deep-seated earthflows to the landslide inventory will provide a more complete picture of landslide hazard areas within the watershed.

7. *Is this mass wasting assessment: (1) acceptable as is, (2) acceptable with revisions, or (3) not acceptable?*

This mass wasting assessment of the Howard Hansen watershed is acceptable with revisions (additions) as stated above in statement 6, and should be distributed for external review.

References

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Respectfully submitted,



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11/18/03

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