TFW Policy's Responses to the Forest Practice Board's Direction to TFW Policy from May 13, 2014 Forest Practice Board Meeting

TFW Policy Co-Chair Draft
9-29-14

Dave Somers moved the Forest Practices Board direct the Adaptive Management Program to prioritize the mass wasting work as follows:
1. Complete the process review related recommendations resulting from the Mass Wasting Effectiveness study, including potential threats to public safety, and report to the Board at the August meeting.

Findings

- TFW Policy agreed that the level of documentation and transparency in the process used to avoid harvest on unstable slopes could be improved by changes to the Forest Practice Application Form. These changes have been completed and the form has been implemented.
- The Department of Natural Resources has documented the Forest Practice Application review process for unstable slopes. At this point in time, TFW Policy has no additional comments on the review process for the Department of Natural Resources' consideration with the exception of the ongoing board manual review topics.
- The Department of Natural Resources has issued guidance related to their review of Forest Practice Applications by two memos, the first issued on May 9, 2014 and subsequently updated on June 13, 2014. TFW Policy agrees that the memos provide appropriate direction to Department staff regarding; use of the new form, additional information requests, and how to identify public safety risks.
- Any findings related to the DNR Board Manual revision related to ground water recharge area delineation?
- Any findings related to the Rulemaking?

Outstanding Questions

- There are remaining process concerns expressed by some caucuses that relate to both public safety and public resources. These include the evaluation of delivery potential associated with all landslide types. TFW Policy Recognizes that the Department of Natural Resources is making changes to the Board Manual related to delivery potential. Until that work is completed, TFW Policy cannot agree that these changes will address all caucuses concerns.
- Any outstanding questions related to the BM revision and/or rule?

Recommendations

- At this point in time, TFW Policy does not have any additional recommendations related to the Forest Practice Application Review Process, beyond those already made and responded to, resulting from the Mass Wasting Effectiveness study, including potential threats to public safety specific to the Forest Practice Program.
- OR – additional recommendations related to the review process after review of GDSL Board Manual and rule language.

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In addition, make recommendations related to:
• Identification of potential gaps in information about location of glacial deep seated landslides and recommend measures to close gaps.

Findings

- There is a wide range of information sources used to identify glacial deep seated landslides (Appendix A).
    - The majority of the areas subject to GDSLs have adequate LiDAR coverage to help identify the location of GDSL and have been identified on the attached map (Appendix B).
- The use of these information sources varies widely based on the skill set of the landowner.
- The Department of Natural Resources also utilizes these information sources to ensure that landowners are identifying Glacial Deep Seated Landslides.
- Access to these information sources may be challenging for some landowners and external reviewers (specifically historic aerial photos).
- Regional and project specific mapping of glacial deep seated landslides is highly variable in terms of scope, accuracy, and precision and varies widely in its accessibility.

Outstanding Questions

- What are the processes and responsibility for updating information sources?
- With the new forms, how will DNR be collecting and tracking that data to improve the dataset and information on where GDSLs/GWRAs are and what techniques are used to identify the features?

Recommendations

- TFW Policy recommends that the following be included in the Board Manual revision:
    - listing existing information sources that can be helpful in identifying Glacial Deep Seated Landslides,
    - guidance to landowners on the appropriate use of these information sources and the need for soliciting advice from qualified experts, and
    - outlining the DNR review process for ensuring that Glacial Deep Seated Landslides are identified so that landowners and external reviewers clearly understand the process and the expectations for exchange of information.
- TFW Policy recommends that the quantity and quality of LiDAR coverage in areas that have potential glacial deep seated landslides be considered in the prioritization process for acquisition of LiDAR coverage.
- TFW Policy recommends that the Department of Natural Resources track data from new forms for how features are being identified and report back to TFW Policy and the Forest Practice Board.
- TFW Policy recommends that policies regarding access of stereo air photos be reviewed to attempt to accommodate agency, landowner, and public needs to access these resources to assist in identifying glacial deep seated landslides and their history.
- TFW Policy recommends the following related to mapping of glacial deep seated landslides:
    - DNR Department of Geology shall identify the existing sources of mapping of glacial deep seated landslides and also identify how they can be accessed and provide a concise summary of how they were identified and their relative precision and accuracy, and provide to TFW Policy.

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- Following this first step, UPSAG shall make recommendations to TFW Policy regarding who and how this information may be aggregated.
- After these have been completed, TFW Policy may use this information to help prioritize any additional mapping needs and make recommendations as to the process for completing that mapping.

• Evaluation of existing mitigation measures under current rule pertaining to groundwater recharge areas associated with glacial deep seated landslides.

Findings

- Under current rule, landowners must either avoid operations on ground water recharge areas and the associated glacial deep seated landslide or require and environmental checklist in compliance with State Environmental Policy Act (SEPA) and SEPA guidelines (WAC 222-16-050(1)).
- If the operations do not avoid ground water recharge areas and/or the associated glacial deep seated landslide, specific mitigation measures or conditions must be designed to avoid accelerating rates and magnitudes of mass wasting that could deliver sediment or debris to a public resource or could deliver sediment or debris in a manner that would threaten public safety (WAC 222-10-030(4)).

Additional information will be provided by the technical subgroup of Policy.

Outstanding Questions

Recommendations

Commented [AM1]: Not for decision on October 2, will be reviewed for consensus on October 10.

2. Begin the review of the existing mass wasting research strategy, including potential threats to public safety and the glacial deep seated landslide program, with an initial report back at the Board's August meeting.

Findings

TFW Policy recognizes that the existing CMER Workplan for ground water recharge areas associated with glacial deep seated landslides needs to be revisited.

The existing studies in the workplan were not pursued by UPSAG for several reasons. It was recognized that pursuing research involving hydrologic modeling would not add much certainty to the regulatory process and would be quite expensive. Proposals to categorize sub-types of deep-seated landslides and expand the Board Manual for unstable slopes have greater potential to improve rule implementation.

Recommendations

TFW Policy Recommends that UPSAG begin exploring the options outlined in the Technical Subgroup of TFW Policy proposal dated September 24, 2014.

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TFW Policy also recommends that UPSAG develop and execute a scope of work for a literature review including relevant, but not limited to, the studies identified by the DNR Board Manual Qualified Expert group. Funding will come from the $50,000 approved in this fiscal year for glacial deep seated research.

I further move that the Forest Practices Board direct TFW Policy Committee to complete the Type F assignments by the November meeting and report back to the Board at the August meeting on progress.

TFW Policy has not formally worked on water typing issues since we were re-directed by the Forest Practice Board to focus on these specific Board requests.

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Appendix A

Tool	Description	Item format	Access	Extent of Spatial Coverage	Scale/Level of detail	Website Link
Digital Elevation Models						
Lidar Digital Elevation Model (DEM)	Digital elevation model derived from laser and analysis of reflected light. Often processed to remove vegetation (aka bare earth) to derive modelled formats of hillshades, slopes, contours and other applications	GIS based product	In the public domain and accessible through Puget Sound Lidar Consortium; processed through various GIS products	Roughly 6,400 sq. mi. of 1-meter lidar and 18,700 sq. mi. for 2-meter lidar.	Provides for a 1 to 2 meter Digital Elevation model that can help resource managers clearly identify GDSLs. Some parts of the lidar data contains poor data collection through vegetation and can lead to coarseness in data (aka pyrite forests or crystalline forests)	http://pugetsoundlidar.ess.washington.edu/
10-meter Digital Elevation Model (DEM	Digital elevation model produced by the US Geological Survey through various formats, in which coarseness averages or estimates value of elevation over a 10 meter grid	GIS based product	In the public domain and accessible through various sources	Statewide	Moderate resolution, difficult to determine small features	http://gis.ess.washington.edu/data/raster/index.html
DNR Map Layer (GIS data, landslide hazard zonation, landslide inventory, mass wasting prescriptions…						
Landslide Hazard Zonation	The Landslide Hazard Zonation (LHZ) Project is to create a vastly improved screening tool by better describing and mapping all potentially unstable slope areas in priority watersheds. The purpose is to eliminate any errors of omission in the identification of unstable landforms during both harvest layout and permitting process. In addition to identifying areas of hazard for mass wasting, landforms and hazard classifications are linked to the degree of hazard and sensitivities to land management practices. The LHZ project also provides information useful for appropriate mitigation.	Reports, landslide and landform are in GIS format	Department of Natural Resources Website (Accessible by anyone)	Fifty-nine high priority watersheds	Contains mapped deep-seated landslide and can provide information on deep-seated landslide processes or potential sensitivities to landslide movement.	http://www.dnr.wa.gov/BusinessPermits/Topics/LandslideHazardZonation/Pages/fp_lhz_completed.aspx
Watershed Analysis; Mass Wasting Prescriptions	Watershed analysis is a biological and physical assessment of a watershed designed to address the cumulative effects of forest practices on specific public resources (fish, water, and capital improvements of the state) and on cultural resources. The Mass Wasting Prescriptions are specific to a landslide inventory and analysis of slope stability in relation to forest practices or general stability.	Reports; some landslide and landforms are in GIS format	Department of Natural Resources Website (Accessible by anyone)	Fifty-three watersheds	Contains mapped deep-seated landslide and can provide information on deep-seated landslide processes or potential sensitivities to landslide movement.	http://www.dnr.wa.gov/ResearchScience/Topics/WatershedAnalysis/Pages/fp_watershed_analysis.aspx
Washington State Landslide Database	GIS polygon dataset with attributions (slope morphology, gradient, landslide type, land use association, and others) of a conglomeration of data from various sources (LHZ, Watershed Analysis, Geologic Maps, DNR Reconnaissance of landslide producing storm events, various other datasets)	Online interactive map and GIS	Washington State Geologic Information Portal (Accessible by anyone)	Generally statewide, data is limited by data input sources and does not capture all landslides in Washington State.	Contains mapped deep-seated landslide in spatial polygon format with attributed data attached that could provide additional information on deep-seated landslide mechanisms	http://www.dnr.wa.gov/researchscience/topics/geosciencesdata/pages/geology_portal.aspx
Geologic Maps	Geologic maps show the types and ages of rocks that occur at or near the Earth's surface. They show the locations of faults and folds, landslides, glacial deposits, and other regional or local features, depending on the scale of the map. Geologic maps are the most fundamental and important tool of earth scientists.	Online interactive map, pdf reports and GIS	Washington State Geologic Information Portal (Accessible by anyone); Department of Natural Resources Website (pdf reports)	At a scale of 1:100,000, the entire state; Partial coverage at scale of 1:24,000; various other scales throughout the state	Contains areas of mapped deep-seated landslides and can provide stratigraphic data to help determine potential deep-seated landslide mechanisms	http://www.dnr.wa.gov/researchscience/topics/geosciencesdata/pages/geology_portal.aspx
Forest Practices Application Geologic Reviews/Reports	Geologic reports completed by qualified experts that accompany FPA's (usually Class IV specials or Class III) that analyze slope stability with accompanying forest management activities.	Online; pdf	In public domain through FPARS website.	Site specific for the area covered in the FPA	Analysis of deep-seated landslide (if existent) and will contain scientifically sourced information or professional opinion.	http://www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesApplications/Pages/fp_fpars.aspx
Field Visit	Field visits are conducted by a qualified expert with accompany of a forester, forestry engineer or related occupation to determine potential slope stability issues and delineation of features.	Field review	Accessible through permission of the land owner	Statewide	Field review of area helps to determine indicators of slope stability, potential level of activity and delineation of features.	
Stereo Photos	Aerial photos that can be overlapped and viewed through a stereoscope to create a topographic view of the aerial photos	Paper/photo	Limited public access (often through Universities); usually must be purchased.	Statewide in various years	Allows remote review analysis of an area; smaller features are more easily discernable when vegetation has been removed from the site	
Orthophoto (NAIP)	Data collected by the USDA Farm Service Agency, National Agriculture Imagery Program, consisting of aerial imagery that has been converted to digital files and spatially rectified for access mostly in GIS programs	GIS based product	In public domain through various websites	Statewide in various years	Allows remote review analysis of an area; smaller features are more easily discernable when vegetation has been removed from the site	http://wagda.lib.washington.edu/data/type/photography/

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Appendix B

Insert DNR Map of glaciation x lidar coverage

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Appendix C – Table of FPA Mitigations and associated summary figures.

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Appendix D

Unstable Slopes – Gl dsls, gwr study proposal 2014Sep24 Sturhan/Dieu/Sarikhan

Unstable Slopes – Glacial deep-seated landslides and their groundwater recharge areas

Considerations for the CMER Work Plan

By Nancy Sturhan (NWIFC), Julie Dieu (Rayonier), Isabelle Sarikhan (DNR)

Note that for expediency, this document has not yet received CMER or UPSAG review or consensus.

In May 2014 the Forest Practices Board requested a review of the CMER Work Plan Unstable Slopes Program. The recent Oso landslide event revealed a need for more information about the influence of forest practices on that type of landslide – a deep-seated landslide (dsls) in glacial material (gl), and its groundwater recharge area (gwra). The CMER Work Plan already includes some proposed work in this area, but pursuit of the potential studies had not been initiated due to concerns about their cost and fruitfulness. An alternative strategy is proposed here, as well as additional proposed study for CMER to consider adding to the work plan.

Critical Questions – Unstable Slopes – gwra, gl dsls

There is one critical question in the CMER 2015 Work Plan (page 130 , Table 24, Unstable Slopes Rule Group Critical Questions and Programs), which is still appropriate:

Does harvesting of the recharge area of a glacial deep-seated landslide promote its instability?

The approach currently in the work plan leads to improved understanding of how the groundwater recharge areas affect unstable slopes. There have been issues with that approach because of the complexity and variation among gl dsls and gwr areas, and the inability to acquire accurate local weather information to run the model that estimates water input to the soil under clearcut conditions vs. forested conditions.

This new proposal shifts focus away from further attempts to understand the underlying water and stability issues, in favor of attempting to classify sub-types of deep-seated landslides and look for historical evidence of when/where and under what conditions a gl dsls moved in conjunction with forest practices activity on the gl dsls and/or its gwra.

We propose adding an additional critical question to the CMER Work Plan that could be worded something like this:

Can relative levels of response to forest practices be predicted by key characteristics of gl dsls and/or their gwra's? (characteristics such as landslide type, glacial stratigraphy, and relative sizes of gwr harvest and gl dsls)

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This critical question addresses the potential that certain types of glacial deep-seated landslides are more and less responsive to forest practices, and that understanding these differences could lead to more accurate language in the rule and/or Board Manual. For example, current rule lumps together all landslides over about 10m in depth up to hundreds of meters in depth. These deep-seated landslides generally range in area from hundreds of square feet to a square mile or more. The landslide types vary and the stratigraphy (i.e. geologic materials) that they occur in is quite variable. It may be that smaller "gl dsls" behave more like shallow rapid landslides, being quite sensitive to forest practices, while the giant gl dsls may move more independently from forest practices. A study that examines the historic pattern of movement of the various sizes and types of gl dsls in relation to harvest activities could help us categorize the sensitivity of various gl dsls scenarios to forest practices. Weather information will be considered in conjunction with the forest practice activities because dsls motion is often related to long periods of excess precipitation.

Proposed Study Approach

A three-phased approach is described here.

Phase 1 – Complete a synthesis of the gl dsls literature

The purpose of this phase is to make sure we are using the best available science. A team of geologists was recently formed to write draft changes to the Board Manual for unstable slopes. That group was charged with gathering the latest relevant literature on forestry effects on gl dsls, and a body of literature has been gathered but not summarized. Someone needs to go through the articles, summarize the contents and note how each applies (or does not) to the effects of forest practices on gl dsls.

Phase 2 - compile and complete statewide mapping of known and potential gl dsls

The purpose of this phase is to provide a complete map of the likely locations for gl dsls to occur. Through efforts by Washington Department of Natural Resources (Geology Division), United States Geological Survey, TFW stakeholders conducting Watershed Analysis, CMER's Landslide Hazard Zonation Project and potentially others, extensive mapping of gl dsls has occurred across Washington State. These resources should be gathered together into one electronic layer. One, accessible layer would also be most useful to forest engineers, qualified experts and regulators screening for potential gl dsls and their gwra. Any gaps should be identified and new mapping of gl dsls should be done in those areas.

This mapped layer would form the basis for going forward into Phase 3, discussed below.

Phase 3 – Develop a system to classify different types of glacial deep-seated by sensitivity to forest practices

Part (a) would create some bins of gl dsls with similar features and Part (b) would examine history of harvest, weather, channel, slope gradient and movement

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Part (a) would be fairly similar to the Deep-seated Landslide Classification Project already scoped by UPSAG (page 136 of CMER 2015 Work Plan) in that it would bin gl dsls by landslide type (e.g., earthflow, rotational translational), by stratigraphic section, by size of gl dsls and size of gwra, and by proximity to the channel. These characteristics are likely to have differential responses to changes in gwr. Bins would need to be somewhat generalized – the objective would be to identify several bins into which most of the gl dsls in Washington State could be placed and then subsample these bins for part (b).

Part (b) would characterize sensitivity by selecting some landslides from each type to examine in detail the historic photos, reports and weather records to determine the relative scale of harvest, the weather conditions of the few years previous to harvest, stream channel actions, and movement of the landslide.

Possible Results

Phase 1 – Establish the best available science on forestry effects on gl dsls

Phase 2 - Produce a screening tool to inform foresters when they are in the vicinity of a gl dsls, and need to consider gwr, as well as preparing for Phase 3

Phase 3 – Part (a) would sort the types of gl dsls for further study. Part (b) may determine which kinds and sizes of gl dsls may be more or less sensitive to forest practices under which channel and weather scenarios.

Preliminary Budget & Schedule

Phase 1 – can be done concurrently with Phase 2

Summarize and describe relevance of articles from literature review.

Phase 2 – can be done concurrently with Phase 1

a. Putting together existing maps into one layer – shorter term; DNR has the materials and expertise to do this efficiently if they can assign someone to do it

b. Filling gaps with new mapping – longer term, to follow step 1 above; costs & timing depend on how much mapping is needed; should be able to complete within a few months and $100, 000.

Phase 3 - uses the results of Phases 1 & 2

a. Hire a consultant to go over the data and bin it according to UPSAG proposed categories and/or to propose categories/classification for different types of gl dsls. This should be able to be accomplished in a few months, at a cost of $75,000. Landslides to evaluate in Phase 3(b) would be chosen from these categories. Weather conditions need to be considered as part of the sampling scheme.

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b. Examination of photo, hydro, and other records, and field visits for each site will be examined to determine relevance of landslide activity to potential influences. The number of bins and sites to be examined will play into the costs. We won't know how this might look until 3(a) is complete. We may choose to focus on a few bins in order to have enough sites to develop results with reasonable confidence.

TABLE 1. Rough estimates of personnel, time and cost of revised research strategy. There is significant uncertainty on key elements, including how much original mapping is needed, how many landslide categories would be studied, how many samples, availability of DNR staff to do some of the work, etc. ESTIMATES DO NOT INCLUDE DNR CONTRACTING TIME, CMER DELIBERTION, OR POLICY APPROVAL TIMES - just time required to do the technical work.

PHASE	WHAT?	WHO?	HOW LONG? (see comment above)	HOW MUCH?
Phase 1	Literature synthesis	Contractor	3 mo.	$30K
Phase 2 (a)	Compile existing info	DNR?	3 mo.	?
Phase 2 (b)	Fill gaps with original mapping	DNR? Consultant?	Hopefully a few mo., may be able to continue with Phase 3 if gaps are minor	$100K or less
Phase 3 (a)	Classify gl dsls	Consultant	6 mo.	$75K
Phase 3 (b)	Examine samples Remote & field	Consultant	12 mo.	$300K
TOTAL			About 2 years	Around $500K?

Phase 1 Literature review can occur simultaneously with Phase 2 mapping.
Rough estimate for UPSAG/CMER/Policy – add a minimum of 1 year total for up-front planning and contracting, and final review and approval; another 6 mo. if ISPR is needed.

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