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.
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).
  o 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:
  o listing existing information sources that can be helpful in identifying Glacial Deep Seated Landslides,
  o guidance to landowners on the appropriate use of these information sources and the need for soliciting advice from qualified experts, and
  o 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:
  o 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.
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

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 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.
## Appendix A

<table>
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<tr>
<th>Type</th>
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<th>Item format</th>
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<td>2D-based models (e.g., contour maps, hillshade images)</td>
<td>In the public domain through various websites or available through individual businesses</td>
<td>Limited public access, some products are charge-based</td>
<td>Images still available for download.</td>
<td>Available through GIS portals or various websites.</td>
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<td>Limited public access, some products are charge-based</td>
<td>Images still available for download.</td>
<td>Available through GIS portals or various websites.</td>
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</table>

### Lidar Digital Elevation Model

The Lidar Digital Elevation Model (LDEM), a 3D-based model, was generated through a process involving high-resolution lidar data. This data is intended to provide detailed information about the terrain, including elevation and topographic features. The model is available in various formats, including GIS datasets, and can be accessed through various websites. The level of detail varies, with some data being available for free while others require a subscription or purchase.

### Digital Elevation Models

Digital elevation models (DEMs) are 2D-based models that represent the elevation of the Earth's surface. These models are created from various sources, including aerial photography, LiDAR data, and ground-based surveys. They can be used for a variety of applications, such as natural resource management, urban planning, and environmental studies. The data is available in various formats, including GIS datasets, and can be accessed through various websites. The level of detail varies, with some data being available for free while others require a subscription or purchase.

### Orthophoto (NAIP)

Orthophotos are aerial photographs that have been corrected for distortions caused by the aircraft's motion. They provide a clear and accurate representation of the landscape, making them useful for a variety of applications, including urban planning, agriculture, and natural resource management. The data is available in various formats, including GIS datasets, and can be accessed through various websites. The level of detail varies, with some data being available for free while others require a subscription or purchase.

### Stere Photos

Stere photos are photographs taken from slightly different angles to create a stereoscopic image. They can be used to create a 3D model of the landscape, which can be useful for a variety of applications, including urban planning, agriculture, and natural resource management. The data is available in various formats, including GIS datasets, and can be accessed through various websites. The level of detail varies, with some data being available for free while others require a subscription or purchase.
Appendix B

Insert DNR Map of glaciation x lidar coverage
Appendix C – Table of FPA Mitigations and associated summary figures.
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 (gwr). 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 gwr.

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 gwr’s? (characteristics such as landslide type, glacial stratigraphy, and relative sizes of gwr harvest and gl dsls)
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
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 gwrr. 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 gwrr, 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.
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.

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