PROJECT MANAGEMENT PLAN

Unstable Slope Criteria Project:

Empirical Evaluation of Shallow Landslide Susceptibility, Frequency, and Runout

(Projects 3 and 4)

February, 2024

PROJECT MANAGEMENT PLAN OVERVIEW

The Project Management Plan (PMP) breaks down project work into logical steps to help provide a framework to efficiently allocate resources, reliably estimate project costs, and help guide schedule, budget development and project scope. Previously in the CMER Protocols and Standards manual (PSM), this document was titled an implementation plan. The PMP documents and tracks the progress of a CMER project through its various stages. The contents of the PMP will vary depending on the type and complexity of the project. The Project Team is the primary audience for the PMP; however, UPSAG/CMER members are encouraged to provide feedback on the plan.

OVERSITE COMMITTEE: Upland Processes Science Advisory Group (UPSAG)

BACKGROUND

In 2001, the Washington State Forest Practices Board (Board) approved a comprehensive set of new forest practice rules based on the Forests & Fish Report (FFR). One of the goals of these rules is to protect water quality, including aquatic life, in streams on non-federal forest lands in Washington State. In concurrence with the approval of the FFR, the Board adopted a Forest Practices Adaptive Management Program (AMP). The purpose of the Forest Practices AMP is to "provide science-based recommendations and technical information to assist the Board in determining if and when it is necessary or advisable to adjust rules and guidance for aquatic resources to achieve resource goals and objectives." To provide the science needed to support adaptive management, the Board established the Cooperative Monitoring, Evaluation, and Research Committee (CMER) Committee which has been tasked with performing research in support of the AMP.

The Unstable Slope Criteria Project is part of the CMER's Mass Wasting Effectiveness Monitoring Program. The Technical Writing and Implementation Group (TWIG) developed a study design alternatives document, entitled "Unstable Slope Criteria Project – Research Alternatives" to provide the scientific design options for this CMER project. It provides the project purpose, objectives, alternative technical approach/experimental designs, general methods, schedule, and budget.

The Unstable Slope Criteria Project consists of five distinct phases that were outlined within the scoping document "Unstable Slope Criteria Project – Research Alternatives" approved by CMER and Policy in April 2017:

1. Compare/Contrast Landslide Hazard Zonation (LHZ) Mass Wasting Map Units with RIL (this project will be incorporated into subsequent projects per ISPR review comments).
2. Object-Based Landform Mapping with High-Resolution Topography
3. Empirical Evaluation of Shallow Landslide Susceptibility and Frequency by Landform
4. Empirical Evaluation of Shallow Landslide Runout

5. Models to Identify Landscapes/Landslides Most Susceptible to Management

This PMP addresses phases 3 and 4. As of the current date of this PMP, a study design for Projects 3 and 4 has proceeded through ISPR and received final approval from CMER, and implementation can begin. Projects 3 and 4 were combined into one study design.

Washington Administrative Code (WAC) Section 222-16-050(1)(d)(i) lists the five rule-identified landforms (RIL) and directs the reader to Section 16 of the board manual where the RIL and their criteria are described in detail. Those five RIL are utilized by DNR's FPA approval process to determine if timber harvest has the potential to deliver sediment or debris to a public resource or in a manner that would threaten public safety (WAC 222-10-030(2)(b), SEPA policies for potentially unstable slopes and practices). The Unstable Slope Criteria Project will evaluate the degree to which the landforms described in the unstable slopes rules and board manual identify potentially unstable areas that are likely to impact public resources or threaten public safety.

Current RIL definitions and criteria are based on landforms and processes that are inferred to yield relatively high landslide densities (landslide area per unit area), that are influenced by forest practices, and are likely to have a probable significant adverse impact (WAC 222-10-030(2)(c)). They were developed from field observations, regional research, and watershed analysis data collected from various sources and methods. Observations of storm-induced landslides that have occurred since the current rules were implemented have shown that a sizable proportion of landslides may originate from terrain that does not meet RIL criteria. Likewise, while models have been built that predict maximum runout potential, there are no explicit criteria for assessing delivery to public resources or risk to public safety.

DNR's threshold determination under SEPA includes an evaluation of whether proposed forest practices are likely to increase the probability of a mass movement on or near the site (WAC 222-10-030(2)(a)(b)). This project will evaluate the degree to which the landforms described in the unstable slopes rules identify potentially unstable areas that are likely to impact public resources or threaten public safety. The project will be designed to evaluate the original Forests & Fish Report Schedule L-1 research topic: "Test the accuracy and lack of bias of the criteria for identifying unstable landforms in predicting areas with a high risk of instability". The project replaces the Testing the Accuracy of Unstable Landform Identification Project, based on feedback from Policy at their November 2010 meeting. At that meeting, UPSAG presented two interpretations of the original Forests & Fish Report Schedule L-1 topic and asked for direction as to how to proceed and prioritize efforts. UPSAG understood Policy's direction was to evaluate the landslide susceptibility of different slopes/landforms in the interest of evaluating current rule-identified landforms and identifying/characterizing additional potentially unstable landforms.

PROJECT MILESTONES AND TASKS

	Project Milestones	Dates by Fiscal Year (Actual* or Estimated)						
		2020	2021	2022	2023	2024	2025	2026
Study Design	Draft Study Design*			May-Jun				
	Concurrent UPSAG/CMER review of Draft Study Design*			Jul				
	Study Design Finalization and Approval (UPSAG/CMER)*				Jan-Mar			
	ISPR of CMER Approved Study Design*				Apr - Jun	Jul - Aug		
	ISPR Approved Presentation and Approval (CMER)*					Sep		
	Prospective 6 Questions Document Approved*					Dec		
	CMER and ISPR Approved Study Design Presentation (Policy)*					Feb		
Implementation	Creation of a Landslide Inventory using Lidar differencing for the Post-Mortem Area					Jan - Mar		
	Building and compilation of terrain - element data sets					Apr - Jun	Jul-Aug	
	Identification of relationships between landslide locations and runout extents with terrain elements, RILs, and other landforms						Sep-Oct	
	Use of methods developed in Landform Mapping Project (Project 2) to build and compile the landform data sets						Nov	
	Use of empirically determined probabilities to evaluate susceptibility and runout with reference to current RIL definitions						Nov - Dec	
	Extension of workflows developed in previous tasks to other areas in the state						Jan-Feb	
	Possible field validation of data from other areas of the state (TBD based on results of LiDAR differencing)						TBD	
Final Report and Research Compendium	Draft Final Report						Mar-May	
	Final Report review and approval (UPSAG)						Apr-May	
	Final Report CMER review and comment						Jun	Jul-Aug
	Final Report in ISPR							Sep-Oct
	CMER Approval of Final Report							Nov
	TFW Policy Approval of Final Report							Dec

PROJECT DELIVERABLES

Task/Deliverable	Responsible Team Member	Estimated Completion Date
Update Charter	Henkel	January 2024
Project Management Plan	Henkel	March 2024
Draft Project 3 and 4 Study Design	Miller	Completed January 2023
Final Project 3 and 4 Study Design	Miller	Completed September 2023
Prospective 6 Questions	Miller	Completed December 2023
Implementation	Miller/Freeman	January 2024 - February 2025
Software (e.g. R or Python Scripts) for generating landslide inventories using LiDAR differencing and satistical analysis of landslide susceptibility	Miller/Freeman	December 2025
Final Report/Final 6 Questions	Miller/Freeman	December 2025

PROJECT TEAM MEMBERS

Name, Title, Affiliation, Contact Info	Roles and Responsibilities
Theryn Henkel, Project Manager, DNR	• Monitors project activities and the performance of the Project Team. • Communicates progress, problems, and problem resolution to the Adaptive Management Program Administrator (AMPA), CMER, and UPSAG. • Works with UPSAG/CMER, and Project Team to manage Project Charter and other managing documents, and keeps them updated. • Works with the AMPA, UPSAG/CMER, and Project Team to monitor contract performance, and provide input on budgeting, schedule, scope changes, and contract amendments. • Works with UPSAG, CMER, and Project Team to resolve problems and build consensus • Works with PI and Project Team to develop interim and final draft reports. • Ensures communication between team members is clear, concise, and consistent. • Coordinates technical reviews and responses in a timely fashion. • Facilitates archiving of data and documents. • Ensures that contract provisions are followed. • Provides direction and support to the Project Team to achieve clear and specific scopes of work, schedules, and budgets within approved contracts. • Maintains sole responsibility for all aspects of project management even if other individuals are completing or helping complete parts of the project.
Elise Freeman (NWIFC), CMER Scientist/Principal Investigator	• Executes the technical and scientific components of the project with Project Team member Dan Miller. • Provides materials needed by the PM. • Develops summaries and conducts statistical analyses to inform Final Report development with Project Team member Dan Miller.

	• Leads in the development and writing of the Final Report and Six Questions for Policy with Project Team member Dan Miller. • Presents study progress and/or findings to UPSAG, CMER, and Policy with Project Team member Dan Miller. • Communicates project status, project data and results, and issues to the PM and Project Team. • Coordinates project meetings as needed.
Project Team Member: Dan Miller (M2 Environmental Services)	• Executes the technical and scientific components of the project with PI. • Develops summaries and conducts statistical analyses to inform Final Report development with PI. • Leads in the development and writing of the Final Report and Six Questions for Policy with PI. • Presents study progress and/or findings to UPSAG, CMER, and Policy with PI. • Coordinates project meetings as needed with PI.
Project Team Members: Julie Dieu (Rayonier), Ted Turner (Weyerhaeuser), Tiffany Justice (Weyerhaeuser), Susan Shaw (Weyerhaeuser), Jeff Keck (DNR)	• Assist with finding solutions to technical issues that arise during project implementation. • Provide expertise needed for successful completion of implementation. • Assist with writing and provide rigorous review of technical documents such as: project charter, project management plan, and interim and/or final findings reports. • Provide constructive and timely feedback on project documents. • Assist as needed with communicating project information to UPSAG and CMER. • Prepare for and participate in project meetings and conference calls as needed. • Assist as needed with implementation tasks at the direction of the Principal Investigator.

PROJECT CONSTRAINTS AND ASSUMPTIONS

The following describes potential project constraints and assumptions.

Schedule constraints:

Potential schedule constraints exist because some of the projects listed in this strategy are sequential and rely on results/data from the previous project. Therefore, if one project becomes significantly delayed, it could delay progress on future projects. Likewise, many of the tasks in this project are sequential and if one task becomes significantly delayed, it will delay the completion of future tasks.

Budget constraints:

There are no specific budget constraints at this time. The project's continuation is contingent on the Forest Practices Board's approval of funding.

Human resource constraints:

The implementation of this project will be executed using a combination of internal and contractor resources with the CMER scientist as the PI, but with significant collaboration with the contractor Dan Miller from M2 Environmental Services, and the Project Team.

Resource constraints:
There are no specific resource constraints at this time.

Project assumptions:
The following are key assumptions for implementation of this project:

- The core members of the Project Team stay on the team throughout the majority of the project.
    - If a core member were unavailable, time could be lost in replacing them.
    - Loss of certain expertise could limit or slow the ability to execute some portions of the study design.
- Project Team members commit to timely review of project documents, providing feedback during implementation process, and preparing for Project Team meetings as necessary (reviewing materials, providing comments to documents, etc.) to facilitate productive meetings and project progress.
- Funding for the project remains stable.

A separate Risk Management Plan will not be developed unless one of these constraints or assumptions occurs or if one is deemed necessary. The process for developing a detailed Risk Management Plan is outlined in section 7.10 of the CMER Protocols and Standards Manual (PSM). A Risk Management Plan identifies potential actions to avoid, reduce, and/or mitigate impacts to a project.

DECISION-MAKING AUTHORITY
The Forest Practice Board (Board) has approval authority over proposed CMER projects, annual work plans, and expenditures. The Board manages the Timber, Fish and Wildlife Policy Committee (Policy), the Cooperative Monitoring, Evaluation, and Research (CMER) Committee, and the Adaptive Management Program Administrator (AMPA) to assist with the Board's directives. Policy assists the Board by providing guidance to CMER and recommendations on adaptive management issues. CMER is responsible for understanding available scientific information that is applicable to the questions at hand, selecting the best and most relevant information and synthesizing it into reports for Policy and the Board. The AMPA coordinates the flow of information between Policy and CMER according to the Board's directives. Decision-making authority described in this section needs to be consistent with CMER process and ground rules per the Board Manual section 22.

Decisions related to science and/or technical items is the responsibility of the PIs and the Project Team. If needed, decisions for scientific and/or technical items could be expanded to include UPSAG and CMER. Final documents will be prepared by the Project Team and then reviewed and approved by UPSAG, CMER, Independent Scientific Peer Review (ISPR), and Policy. Although the PM will assist in the facilitation of the discussion and decision-making process, the PM will not be directly involved in decisions related to science and/or technical items.

Decisions related to contractual (scope of work, RFQQ, contract process, contractor interaction, etc.) and budgetary items is the responsibility of the PM along with input from the Project Team. Requests for additional funding will be approved by the PM and Project Team and sent to UPSAG and CMER for formal approval. Minor budgetary or contractual items (e.g., contract extensions) will be handled directly by the PM with notification provided to the Project Team. Major budgetary or contractual items will be decided between the PM, Project Team, and AMPA. If needed, decision making for budgetary items may require CMER and/or Policy input and/or approval.

PROJECT RESOURCE NEEDS

Project Resource	Quantity
Computer/laptop	1
LiDAR	TBD
eCognition	NWFIC currently has license
Possible purchase of needed supplemental data sets	TBD

PROJECT BUDGET

	FY 22 Actual	FY 23 Actual	FY 24 Budget	FY 25 Budget	Total Budget
Personal Service Contracts (M2 Environmental)	$33,437	$26,138	$40,145	$49,210	$148,930

PROJECT SITES

Project tasks include construction of landslide inventories using lidar differencing. It is anticipated that lidar differencing will provide accurate and precise measurements of landslide location and size. Initial testing of that assumption will be made using the field-surveyed landslide inventory collected for the "Post-Mortem" project (CMER publication 08-802, 2013). A lidar acquisition from 2006 provides pre-storm topography; acquisitions from 2017 and 2019 provide post-storm topography with significant overlap of the 2006 lidar and the post-mortem study sites. Comparison of the field-based and lidar-based inventories for this area will enable determination of how complete an inventory is achievable and of the smallest landslide scars resolvable with lidar differencing. Recent lidar acquisitions will then be evaluated to identify locations with overlapping high-quality lidar datasets that span periods containing landslide-triggering storms. Extensive lidar acquisitions during 2023 will be available and these should include recent landslide events where lidar-measured landslide areas and volumes can be field verified for a subset of the mapped landslides. A project goal is to develop a largely automated workflow for assembling landslide inventories using lidar differencing that can then be applied incrementally across all landslide-prone portions of the state. We will target a diverse range of terrain types in this project for development of the landform susceptibility and runout. The geographic extent over which inventories can be generated specifically for this project is dependent on available lidar coverage, on the degree to which methods for collection and verification of inventories can be automated, and on the computing resources required and available for the automated methods.

COMPANION CMER DOCUMENTS

Document	Completion Date
Unstable Slope Criteria Project – Research Alternatives	Feb 27, 2017
Unstable Slope Criteria Project: Study Design for Object-Based Mapping with High-Resolution Topography	Sep 26, 2019
Unstable Slope Criteria Project Charter	Jun 2022, Jan 2024 Update
Empirical Evaluation of Shallow Landslide Susceptibility, Frequency, and Runout by Landform (Projects 3 and 4 study design)	Sep 2023

PROJECT COMMUNICATION OVERVIEW

Transparent and accurate communication between the different adaptive management parties (Project Team/UPSAG/CMER/AMPA/TFW Policy) is critical for the AMP to guide and oversee the work of the Project Team. This section provides a framework to manage and coordinate the communications needed for all phases of a project. If a separate Communication Plan is needed for a project, see section 7.6 of the PSM for detailed guidelines. Two primary pathways exist for project communication to occur when working on CMER projects - 1) between the Project Team and project oversight committees (i.e., UPSAG/CMER), and 2) communication within the Project Team.

PROJECT OVERSIGHT COMMITTEE COMMUNICATION

This section covers communication between the Project Team and the project oversight committees (i.e., UPSAG/CMER/TFW Policy). Project oversight communication includes three categories of documents/communication: 1) Project management documents that enable oversight committees to understand how projects will be managed, 2) Project tracking and communication to enable the oversight committee(s) to track project progress and provide guidance and approvals to move projects forward, and 3) communication with contractors.

1. Project management documents

The PM is the lead author for the Project Charter, Project Management Plan, and other project management documents. If the Principal Investigator (PI) has been identified at the time of project launch, the PM will work with the PI to draft the Project Charter and Project Management Plan, in consultation with the oversight committee.

Project Management Documents*	Primary Author	Collaborators	Final Approval	Primary Audience
Project Charter	PM	Project Team	CMER and TFW Policy	Project Team, UPSAG, CMER, and TFW Policy
Project Management Plan (including communication and risk sections)	PM	PI	CMER	Project Team, UPSAG, and CMER
Document Management and closure plan	PM	PI	N/A	Project Team, UPSAG, and CMER

*For details regarding these documents, see PSM Section 7.4.14

2. Project tracking and guidance documents

The PM is responsible for ensuring that all reporting tasks are complete and provided on schedule. When preparing progress reports, the PI is responsible for providing detailed and comprehensive costs, schedule, and project updates, in writing, to the PM consistent with prior written agreement. The PM, in turn, is responsible for summarizing project update information into progress reports, and presenting these progress reports to UPSAG and CMER per the project schedule or as requested by UPSAG or CMER. The PM may delegate preparation or presentation of progress reports to the PI or other Project Team members, with their consent.

Project Tracking/Guidance Documents*	Primary Author	Collaborators	Final Approval	Primary Audience
Project updates	PM	PI	N/A	Project Team, UPSAG, CMER, and TFW Policy
CMER quarterly and annual project progress reports	PM	PI	N/A	UPSAG and CMER
CMER Requests	PM	Project Team	CMER	CMER
TFW Policy Requests/Check-ins	AMPA	Project Team	CMER	TFW Policy
Public Presentations	PI/PM	Project Team	N/A	Public

3. Contractor Communications

In all cases, the PM is primarily responsible for facilitating open and transparent communication between contractor(s) and project oversight committee(s) members. Committee members should generally not directly communicate with the contractor(s) about substantive project elements outside of formally organized meetings, conference calls, or PM-facilitated group e-mail discussions, unless specifically authorized in pre-established contract terms, or approved in advance to do so by the PM. The PM may verbally grant authorization, and the rest of the Project Team and oversight committee members should be informed when this occurs. The PM is responsible for informing the contractor(s) of this policy as well.

For the implementation of this project, substantial communication outside of Project Team meetings will occur between the contractor (Dan Miller, M2 Environmental Services) and the Principal Investigator (Elise Freeman, NWIFC). They will be working on the implementation phase of this project together and therefore, will need to be able to communicate on a more frequent basis than the occurrence of Project Team meetings. Likewise, due to the highly technical nature of these communications, PM participation in every communication is not useful or needed. The Contractor and the PI commit to keeping communications in line with the tasks outlined in the contract with M2 Environmental Services and the PI will not assign any additional tasks outside of the contract Scope of Work. Any changes to the M2 Environmental Services contract need to be discussed with the PM and the Project Team, and a contract amendment may be necessary.

INTRA-PROJECT TEAM COMMUNICATION

The PM provides assistance to Project Team members by coordinating communication (e.g., one-on-one and group meetings, conference calls, etc.) when needed as well as maintaining the e-mail distribution list for the Project Team. The PM also ensures that any communication resulting in a formal decision about the project occurs in a transparent and inclusive way.

The PI is responsible for preparing and writing technical reports for CMER. How the PI communicates and works with other Project Team members to produce these documents will vary based on the nature of the project and dynamics of the Project Team. The PI works together with the PM to coordinate communication with other team members as needed.

Communication by individual team members includes participation at meetings and conference calls, providing feedback on draft documents, researching specific topics/issues, taking the lead on writing report sections, and/or acting as co-author(s) of CMER documents. The expectation is that Project Team members, including PMs and PIs, who communicate outside of normal project meetings, conference calls, and other venues will share substantive, project-related conversations they have with the rest of the Project Team. For additional details regarding Project Team communication see PSM section 7.5.14

COMMUNICATION STRUCTURE