Forested Wetlands Effectiveness Project

Answers to Six Questions from the CMER / Policy Interaction Framework Document

Chronosequence Study Design December 2019

March 19, 2020

Presented by the Wetland Scientific Advisory Group (WetSAG)
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Type of Product in Review:
Prospective Answers: ☐ Charter ☐ Scoping Document ☐ Study Design
Retrospective: ☐ Completed Pilot/Study Phase ☐ Completed Final Study Report

Brief Description: This is a study design for a pilot study that will produce information needed to effectively develop a larger BACI study examining how forested wetland functions change and recover over time following forest harvest under current Forest Practices Rules.

Project Status:

The Forested Wetland Effectiveness Project's (FWEP) Chronosequence study design (the Chronosequence), an exploratory study, was developed by a technical writing and implementation group (TWIG) under the LEAN pilot project process. The TWIG's resulting draft study design was reviewed and approved by CMER and successfully went through Independent Scientific Peer Review (ISPR) before being approved at the December 2019 CMER meeting.

1. **Does the study inform a rule, numeric target, performance target, or resource objective?**

No – not at the study design stage. The proposed chronosequence study is the first phase of a larger FWEP effectiveness monitoring study, which will include a long-term before-after-control-impact (BACI) study. These studies are intended to inform several rules, performance targets, and functional objectives. As this is only a study design for an initial pilot study, it does not yet directly inform these items. When implemented and paired with the BACI study, the FWEP will inform multiple attributes of the Schedule L-1, compliance with Clean Water Act assurances, and protections for listed species.

2. **Does the study inform the Forest Practices Rules, the Forest Practices Board Manual guidelines, or Schedules L-1 or L-2?**

No, the current study design will not inform Forest Practices Rules and/or board manual guidance *until it is implemented*. When implemented, the exploratory chronosequence study will directly inform the larger FWEP's study initiatives, including the BACI study design, and will prioritize the number and type of wetlands functions that are most likely impacted by WA Forest Practices Rules (WAC 222-30-020). When paired the chronosequence is implemented and paired with the forthcoming BACI study, will more fully inform functional objectives and performance targets:

Functional Objectives

The functional objectives in schedule L-1 that the Chronosequence study address include those for heat/water temperature (stream temperature, groundwater temperature, shade; P. 3 Schedule L-1), LWD and organic inputs (litter fall, riparian condition; P. 3 Schedule L-1), sediment (total suspended solids/fines; P. 4-5 Schedule L-1), hydrology (peak flows and wetlands; P. 6 Schedule L-1). This study is specifically designed to address these functional objectives and their associated performance targets.

Performance Targets

The Chronosequence study, when placed in the larger context of the BACI, is primarily designed to address overall performance goal C: "*Meet or exceed water quality standards (protection of designated uses, narrative and numeric criteria, and antidegradation).*" Accordingly, it informs the functional objectives and performance targets listed above: heat/water temperature (stream temperature, groundwater temperature, shade), LWD and organic inputs (litter fall, riparian condition), sediment (total suspended solids/fines), hydrology (peak flows and wetlands).

3. Was the study carried out pursuant to CMER scientific protocols (i.e., study design, peer review)?

Yes. The Chronosequence study design was written by the FWEP TWIG under the LEAN planning process. CMER proposed the study to the Timber Fish, and Wildlife (TFW) Policy Committee as a precursor to the larger BACI Effectiveness study. The TWIG's resulting study design was reviewed and approved by CMER, consistent with the Protocol and Standards Manual (2016), and successfully went through Independent Scientific Peer Review (ISPR). The study design was approved at the December 2019 CMER meeting. Appendix One outlines the sequence of the CMER/ISPR approval process as followed for this study design.

4. What will the study tell us? What will the study not tell us?

What this study will tell us:

The Forested Wetland Effectiveness Project is designed as a two-part, scientific investigation into how forested wetlands and their connected waters are affected by forest practices, as presently implemented under Washington State DNR's Forest Practices Rules.

The Chronosequence study is the predecessor study to a BACI study on how forested wetlands recover from harvest[1]. The BACI study has two sets of related critical questions:

A. What are the effects of forest practices on hydrologic regimes, water quality, and terrestrial and aquatic plant and animal habitats in forested wetlands and their connected downstream waters linked by surface or subsurface flow? What are the magnitude and duration of these effects?
    i. How does timber harvest in and around forested wetlands alter processes that influence hydrologic regimes in those wetlands, in downstream waters and the connectivity between them?
    ii. How does timber harvest in and around forested wetlands alter processes that influence water quality in those wetlands and downgradient waters?
    iii. How does timber harvest in and around forested wetlands alter processes that influence plant and animal habitat functions in wetlands, in connected waters, and surrounding uplands?

B. How well do current Forest Practices Rules in forested wetlands meet FPHCP (Schedule L-1, Appendix N) aquatic resource objectives and performance targets (see Question 2)?

The Chronosequence study will help inform how disturbance associated with forest harvest[1] is affecting forested wetland hydrology, habitat, and water quality over time. It strives to answer two sets of research questions derived from the CMER work plan's critical questions:

1. How does forested wetland hydrology change over time following post-harvest forest stand development? Specifically:
    a. How does the hydrology of recently harvested forested wetlands compare to the hydrology of recently undisturbed second-growth forested wetlands?
    b. How does the timing, duration, and magnitude of flow and material transport differ

[1] See: "Forested Wetlands Effectiveness Project: Chronosequence Study Design"

between recently harvested and recently undisturbed[1] second-growth forested wetlands?

2. How do forested wetland vegetation and canopy-mediated[1] habitat conditions change over time following post-harvest forest stand development? Specifically:
    a. How does recently harvested forested wetland vegetation composition compare to recently undisturbed second-growth forested wetland vegetation over time?
    b. Do canopy and vegetation-mediated habitat attributes (e.g., inundation duration, soil, and wetland temperature, etc.) converge between recent post-harvest forested wetlands and recently undisturbed second-growth forested wetlands over time?

Preliminary Work

During chronosequence study design and ISPR review, the FWEP TWIG found that it was not practical to implement a statewide study based on the potential natural variability of response variables across the state. Ideally, the study will highlight how the critical questions, as listed above, are answered in a region where forested wetlands are most likely to be impacted, based on examining the frequency of forested wetland harvests in recent forest practice applications. This study is predicated upon two literature reviews (Adamus 2014a, Adamus 2014b), a CMER best available science document (Beckett et al. 2016), a geospatial literature review (Hough-Snee et al. 2019), and historic CMER guidance on wetlands (Cooke et al. 2006), which point to several likely trends in forested wetland recovery and succession that impact water quality and habitat value.

What this study will not tell us:

This study is designed to quantify the rates of change in forested wetland habitat parameters following forest harvest in western coastal regions of Washington State where forested wetlands are the most common on forest practice applications (P. 7 Chronosequence Study Design). A trade-off of this approach is that the study does not encompass every region of the state. To maintain sufficient replication and power and reduce environmental variability, the study sites will be selected from within a specific area possessing common hydrology, climate and forest types. Consequently, answers to the critical questions from the Chronosequence study may not necessarily apply to all locations and conditions within Washington State. Statewide studies are still warranted to address these gaps at statewide scales.

5. What is the relationship between this study and any others that may be planned, underway, or recently completed?

The chronosequence study, along with the subsequent BACI study, are initial implementation steps in the WetSAG wetlands research strategy in the workplan. This strategy outlines a comprehensive, scientifically sound approach to addressing whether Forest Practices Rules are effective at protecting wetlands and wetland functions. The strategy includes the following six programs:

1. Forested Wetlands Effectiveness Project
2. Wetland Management Zone Effectiveness Monitoring Project
3. Forest Roads and Wetlands
4. Silvicultural Chemicals and Wetlands
5. Wetlands Intensive Monitoring Program
6. Wetlands Mapping Program

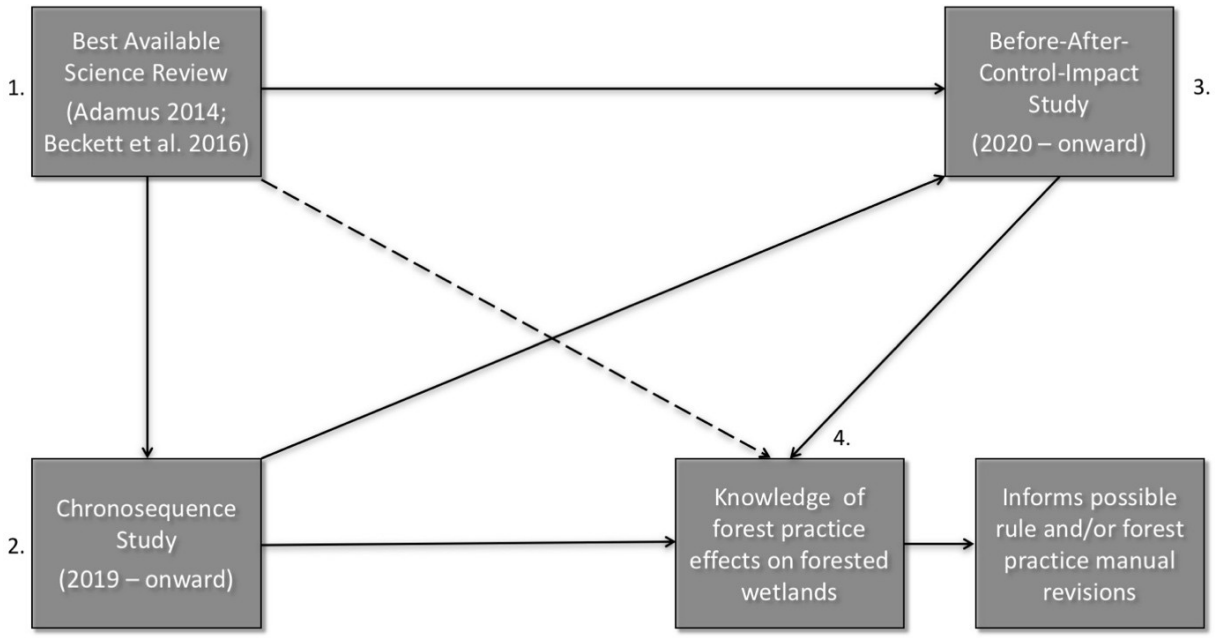

Figure 5.1. Conceptual map of how recent FWEP TWIG efforts, including recent literature review and best available science documents (1; Adamus 2014, Beckett et al. 2016), inform CMER mandates by increasing the body of information on forested wetland function (4) and how the proposed chronosequence study (2) serves as a pilot that informs the proposed before-after-control-impact study (3).

6. What is the scientific basis that underlies the rule, numeric target, performance target, or resource objective that the study informs? How much of an incremental gain in understanding do the study results represent?

At present there are limited rules governing the harvest of timber within and around forested wetlands and timber may be harvested within and around forested wetlands without buffering as long as these wetlands do not occur adjacent to a fish-bearing stream. From the Chronosequence study design (P. 6):

"Under current rules, forested wetlands may be harvested without buffering even though the effects of timber harvest and other forest practices on forested wetland structure and function have not been extensively studied. This poses a challenge to the adaptive management program because the impacts of timber harvest in and around forested wetlands on these ecosystems' hydrological, ecological, and habitat functions are not well understood (Beckett et al. 2016). Given the full range of forested wetland and forest types that occur within Washington State and are impacted by harvest, this knowledge gap is compounded when applying or revising relevant Forest Practices Rules."

If not already done so within the answers to the six questions above, provide the technical implications/recommendations resulting from the study.

To be determined based on the results of the study.

Appendix One: History of the Forested Wetland Effectiveness Project throughout the CMER process.

Date	Action	Comments
2015	TWIG formed	TWIG was formed in collaboration with NWIFC wetland ecologist
December 2016	BAS alternatives document presented to Policy	TWIG review and proposed designs based on state of the science
January 2017	Policy's selection of study design	Policy voted on hybrid chronosequence and BACI study design
June 2018	CMER Review and revisions	Critical question clarification to make sure study addressed the questions approved by CMER in previous study charter.
July 2018	CMER approval to send document to ISPR; Document sent to ISPR	Study approved and sent to ISPR for review
December 2018	ISPR Reviews Returned with major revision designation	Study scope reduced from statewide to only regions with most forested wetlands on forest practice application lands
July 2019	Returned to ISPR for review	Reviewed by ISPR associate editor and approved with several additional clarifying suggestions.
6 December 2019	Revised ISPR-approved study design returned to CMER	Sent to CMER
17 December 2019	Final CMER approval of ISPR-revised study design	Study design was approved at CMER meeting
March/April 2020	CMER- approved prospective six question document delivered to Policy	This document

Table A1. Summary of CMER and associated WetSAG and Policy benchmarks for the Chronosequence study.