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| **Project Name** | Forested Wetlands Effectiveness Project (FWEP) – Chronosequence Study |
| **Workplan Critical Questions Addressed** | **Rule Group Critical Questions**:<br>• What are the magnitude and duration of effects of timber harvest in and upslope of forested wetlands on water regimes, water quality, habitat functions, and aquatic resources in those wetlands, in downgradient waters, and the connectivity between them?<br>• Are current Forest Practices Rules for timber harvest in and around forested wetlands effective at meeting the Forest and Fish aquatic resource objectives and performance targets, and the goal of no-net-loss of functions of those wetlands?<br>**Program Research Questions:**<br>• What are the effects, and their magnitudes and durations, of forest practices on water regimes, water quality, plant and animal habitats, and watershed resources in forested wetlands and linked (via surface or subsurface flow) downstream waters?<br>• How does timber harvest in forested wetlands alter processes that influence hydrologic regimes in those wetlands, in downgradient waters, and the connectivity between them?<br>• How does timber harvest in forested wetlands alter processes that influence water quality in those wetlands and in downgradient waters?<br>• How does timber harvest in forested wetlands alter processes that influence plant and animal habitat functions in wetlands, in connected waters, and in surrounding uplands?<br>• How well do current Forest Practices Rules in forested wetlands meet the Forest and Fish aquatic resource objectives and performance targets, and the goal of no-net-loss of functions of those wetlands by half of a timber rotation cycle?<br>**FWEP Chronosequence Project Research Questions**:<br>The FWEP Chronosequence study strives to answer two sets of research questions derived from the CMER work plan's critical questions (Hough-Snee et al. 2019):<br>1. How does forested wetland hydrology change over time following post-harvest forest stand development? Specifically:<br>a. How does the hydrology of recently harvested forested wetlands compare to the hydrology of recently undisturbed second-growth forested wetlands?<br>b. How does the timing, duration, and magnitude of flow and material transport differ between recently harvested and recently undisturbed second-growth forested wetlands?<br>2. How do forested wetland vegetation and canopy-mediated habitat conditions change over time following post-harvest forest stand development? Specifically:<br>a. How does recently harvested forested wetland vegetation composition compare to recently undisturbed second-growth forested wetland vegetation over time?<br>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? |

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| **Project Elements** | Timber harvest effects on forested wetlands and wetland forest practices prescription effectiveness. |
| **Responsible SAG and Project Manager** | SAG: WetSAG<br>Project Manager: Jenny Schofield |
| **CMER Scientist and Principal Investigator(s)** | CMER Scientist: Tanner Williamson<br>PI: Tanner Williamson |
| **Status/Phase** | • ISPR and CMER approval of the FWEP Chronosequence study design in December 2019.<br>• The Prospective 6 Questions document was delivered to Policy in August 2020.<br>• The FWEP literature review, database, and webmap were approved by CMER in June 2020 and presented to Policy in August 2020.<br>• Wetland Intrinsic Potential Tool Final Report was approved by CMER in April 2021 and presented to TFW Policy in June 2021.<br>• Wetland Intrinsic Potential Tool Final Report answers to the Six Questions was approved by CMER in April 2021 and presented to TFW Policy in June 2021.<br>• Project Management Plan was developed and approved by CMER in October 2022.<br>• The FWEP project team is currently implementing sites and continuing landowner outreach and site validation.<br>• |
| **Project Timeline** | • FY22: Hire principal investigator. Complete project documents, site selection, field reconnaissance, and instrumentation of pilot four sites.<br>• FY23: Instrumentation of 20 sites, data collection and data QA/QC<br>• FY24 - FY25: Data collection and data QA/QC.<br>• FY26: Data QA/QC, data analysis, CMER-approved final report.<br>• FY27: ISPR-approved final report, Findings Report, begin FWEP BACI study design.<br>• FY28: Develop FWEP BACI study design and complete WetSAG and CMER review.<br>• FY29: ISPR approved BACI study design. Develop site selection and data management document. Initiate site selection.<br>• FY30: Year 1 BACI data collection. |
| **Expenditures** | • FY17 - FY20: $182,968<br>• FY21: $11,312<br>• FY22: $29,200<br>• Expenditures through FY22: $223,480 |
| **Complementary Projects and Project Sequencing** | Forest Practices and Wetlands Systematic Literature Review (complete); Statewide Forested Wetlands Regeneration Pilot Project (complete); Wetland Management Zone |

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| | Effectiveness Monitoring Project (planned); Wetlands Intensive Monitoring Project (proposed) |

**Project Summary and Purpose**

The FWEP projects will look at the effectiveness of forest practices prescriptions to protect, maintain, and restore aquatic resources, namely water quality and wetland hydrologic and ecological functions (CMER 2021). It will be evaluated to determine if they achieve the FPHCP goal of no-net-loss of functions of those wetlands by half of a timber rotation cycle while meeting water quality standards (FPHCP).

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. This FWEP Chronosequence study is the predecessor study to a BACI study on how forested wetlands recover from harvest and will help inform how disturbance associated with forest harvest is affecting forested wetland hydrology, habitat, and water quality over time. The Chronosequence substitutes studying multiple sites at different development states post-harvest (recently undisturbed, two, ten, and twenty years) in lieu of studying a set of sites for half of a timber harvest rotation (~20 years) following timber harvest.

**Project Objectives**

The primary research objectives of the FWEP are:

1. To examine how well current forest practices rules meet the performance target of a no-net-loss of wetland functions by half of a timber rotation cycle (≥ 20 years), and Washington State Department of Ecology water quality standards.
2. To develop study designs that, when implemented, will yield information on the changes in wetland functions and associated aquatic resources due to the implementation of forest practices under existing forest practices rules.

**Current Budget***

| FY22* | FY23 | FY24 | FY25 | FY26 | FY27 | FY28 | Total Budget |
|---|---|---|---|---|---|---|---|
| $368,934 | $189,753 | $171,562 | $116,219 | $55,000 | $55,000 | $200,000 | $1,156,468 |

**Revised Budget**

| Pre-FY22 Spending | FY22 | FY23 | FY24 | FY25 | FY26 | FY27 | Total Budget |
|---|---|---|---|---|---|---|---|
| $194,279 | $144,279 | $280,176 | $173,305 | $165,023 | $85,000 | $35,000 | $1,077,062 |

*August 10, 2022 Board approved budget. Funding approved for FY22-FY23. Budget beyond FY23 are estimates only.

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| **Project Name** | Wetlands Management Zone Effectiveness Monitoring |
| **Workplan Critical Questions Addressed** | **Rule Group Critical Question**:<br>• Are current Forest Practice Rules-specified wetland buffers (WMZ) for Type A and B wetlands (WAC 222-16-035) effective at meeting the Forest and Fish aquatic resource objectives and performance targets, and the goal of no-net-loss of functions of those wetlands?<br>**Program Research Questions**:<br>What are the magnitude and duration of effects of timber harvest occurring upslope of Type A and B wetlands on processes, functions, and aquatic resources within and downstream of those wetlands?<br>How effective are current forest practice wetland buffers at facilitating no-net-loss in wetland functions following timber harvest? |
| **Project Elements** | WMZ effectiveness, wetland functions, wetland forest practices prescription effectiveness, in-stream LWD targets. |
| **Responsible SAG and Project Manager** | SAG: WetSAG<br>Project Manager: Alexander Prescott |
| **CMER Scientist and Principal Investigator(s)** | CMER Scientist: Tanner Williamson (vacant)<br>Principal Investigator(s): Tanner Williamson |
| **Status/Phase** | Scoping. Initial steps for this project would be to review past-approved CMER study findings and combine those results with additional relevant science into a draft BAS report. |
| **Project timeline** | • FY22: Updated project charter.<br>• FY23: Develop scoping document. Initiate WetSAG and CMER review of scoping document.<br>• FY24: CMER approval of scoping document. Policy Six Questions Document for the scoping phase. Initiate project study design.<br>• FY25: Complete study design and initiate WetSAG and CMER review of study design.<br>• FY26 - FY34: Complete CMER review and ISPR of study design. Phases will include site selection, field implementation, data analysis, reporting, and approval processes. Timeline will be determined based on the scoping document. |
| **Expenditures** | Expenditures to date: $0 |
| **Complementary Projects and Project Sequencing** | Forest Practices and Wetlands Systematic Literature Review (complete); Statewide Forested Wetlands Regeneration Pilot Project (complete); Wetlands Intensive Monitoring Project (proposed); Wetland Intrinsic Potential Tool (WIP) (complete); Forested Wetlands Effectiveness Project (in progress) |
| **Project Summary and Purpose** | |
| This project will evaluate wetland functions to determine if the target of no-net-loss of hydrologic function, CWA assurance targets, and hydrologic connectivity are being achieved. This would include informing these two research questions: 1) test whether the wetland prescriptions are effective in preventing downstream temperature increases beyond targets, and 2) evaluate the effectiveness of current WMZs in meeting in-stream LWD targets. | |

**Problem Statement**

The Forest Practices and Wetlands Systematic Literature Review (CMER #12-1202) highlighted the lack of applied research projects focused on the effectiveness of wetland management zones (WMZs) for Type A and B wetlands at meeting the Forest and Fish aquatic resource objectives and performance targets. Adamus notes in the Wetland Research and Monitoring Strategy (2014, CMER #12-1203) that extrapolations from studies examining effects of forest practices on streams are "fraught with many interpretive difficulties." Some of these difficulties are attributed to variations in sampling and data analysis, short duration studies that would be ineffective at monitoring wetland functions, and variations in buffers from those prescribed specifically for wetlands. There is little research specific to forest practices and wetlands in the Pacific Northwest, and no TFW or CMER research relative to the effectiveness of forest practices WMZs for large woody debris contribution (LWD), shade, meeting water quality targets for receiving streams, or other functions. Thus, this study will build upon the Forest Practices and Wetlands Systematic Literature Synthesis to further test whether the functional objectives for fish, wildlife, and water quality are met through the application of WMZs and BMPs for WMZ management.

**Purpose Statement**

The purpose of this project is to evaluate the effectiveness of WMZs for Type A and Type B wetlands in meeting the targets outlined in the FPHCP Appendix N, Schedule L-1 of the Forest and Fish Report, no-net-loss of hydrologic function, water quality standards, and hydrologic connectivity within the wetlands and downgradient streams. Similar work is being done with forested wetlands by the Forested Wetlands Effectiveness Project (FWEP).

**Project Objectives**

This project will evaluate wetland functions to determine if the target of no net loss of hydrologic function, water quality standards, assurance targets, and hydrologic connectivity are being achieved.

This would include informing two Schedule L-2 research questions:

1. Test whether the wetland prescriptions are effective in preventing downstream temperature increases above targets.
2. Evaluate the effectiveness of current WMZs in meeting in-stream LWD targets.
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**Budget***

| FY22-FY25 | FY26 | FY27 | FY28 | FY29 | FY30 | FY31 | FY32 | FY33 | Total Budget |
|---|---|---|---|---|---|---|---|---|---|
| $0 | $100,000 | $360,000 | $360,000 | $360,000 | $360,000 | $360,000 | $100,000 | $45,000 | $2,045,000 |

*August 10, 2022 Board approved budget. Funding approved for FY22-FY23. Budget beyond FY23 are estimates only.