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| **Project Name** | Type N Experimental Buffer Treatment Project in Hard Rock Lithologies Amphibian Monitoring Phase III |
| **Work Plan Rule Group Critical Questions Addressed** | **Continued monitoring of Hard Rock Study sites for the amphibian response will address the following critical questions:**<br>• How do two other buffers compare with the forest practices Type N prescriptions in meeting resource objectives?<br>• Are riparian processes and functions provided by Type Np buffers maintained at levels that meet FPHCP resource objectives and performance targets for *shade, stream temperature, LWD recruitment, litter fall, and* amphibians? (only amphibian response is evaluated in this work – Phase III)<br>• How do stream-associated amphibian populations respond to the Type N prescriptions over time?<br>• Is stream-associated amphibian population viability maintained by the Type N prescriptions? |
| **Project Elements** | Addresses the effectiveness of FPHCP riparian buffer prescription for FP designated amphibians in Type N Waters in western Washington, including a comparison of the current rule to buffer alternatives that provide more and less protection within the RMZ, and unharvested reference sites. |
| **Responsible SAG and Project Manager** | SAG: LWAG<br>Project Manager: Lori Clark |
| **CMER Scientist and Principal Investigator(s)** | CMER Scientist: N/A<br>Principal Investigator: WDFW – Aimee McIntyre |
| **Status/Phase** | Phase I report covering 2006-2011 was approved in 2018.<br>Phase II (extended) report covering 2006-2017 was approved by CMER on July 27, 2021, was presented to TFW Policy on 6 January 2022, and presented to the FP Board on 10 August 2022.<br>The Phase III monitoring, focused on stream-associated amphibian abundance, is in implementation. |
| **Project Timeline** | Amphibian demographic sampling began in FY22 and is intended to continue into FY24. The timing of resample is consistent with sampling every 7-8 years, as has been done previously. Data analysis and report writing for the continued effectiveness-monitoring phase would extend into FY25. |
| **Expenditures to Date** | FY22 (Phase III of Hard Rock): $167,937<br>2006-FY22: $8,276,960 (from Phase I and Phase II of Hard Rock) |
| **Complementary Projects and Project Sequencing** | Stream-Associated Amphibian (SAA) Detection/Relative Abundance Methodology Project (completed), Amphibian Recovery Project (completed), Buffer Integrity – Shade Effectiveness (Amphibians) Project (completed), Van Dyke's Salamander Project (planned), Amphibians in Intermittent Streams Project (planned), Eastside Amphibians Evaluation Project (planned). |
| **Project Summary and Purpose** | |

Responses Evaluated: stream-associated amphibian demographics.

Study Sites: Seventeen (17) Type N, first-, second- and third-order stream basins located in western Washington. These are the same Hard Rock sites that were included in Phase I and Phase II of the Type N Hard Rock studies.

Treatments: (1) unharvested reference; (2) current FP buffer for Type N streams (e.g., riparian buffer throughout ≥50% of the Type N RMZ); (3) 50 foot riparian buffer on the entire Type N stream; (4) no buffer.

**Project Objectives**

This Effectiveness Study (Phase I) evaluated the effectiveness of the FPHCP riparian buffer prescription for westside Type N streams. The study compared the current rule to buffer alternatives that provide more and less protection within the RMZ, and unharvested reference sites. Effectiveness was evaluated in terms of whether Forest Practices rules for Type N Waters produce forest conditions that achieve agreed upon Resource Objectives. This study (Phase III) directly informed two of the four FFR goals, including (1) to support the long-term viability of stream-associated amphibians and (2) to meet or exceed water quality standards.

Preliminary results from the Extended Study (Phase II) suggested declines (65%-93%) in larval Coastal Tailed Frog densities 7- and 8-years post-harvest that were not apparent in the two years post-harvest (i.e., Phase I). There was also a delayed negative response detected for torrent salamanders in the FP treatment. Observed declines in amphibian densities were greatest in the FP treatment. One of the focal goals of the Forest Practices Rules is to provide compliance with ESA for aquatic and riparian-dependent species, including Forests and Fish-designated stream-associated amphibians, and the Forests and Fish Agreement was intended to protect rare amphibians in headwater streams. Additionally, the current known distribution of Coastal Tailed Frog is not uniform across the landscape; present in some streams but absent in other nearby streams. As a result, we may not be able to rely consistently on repopulation from nearby sources.

In response to study results from Phase II, Additional data is being collected for stream-associated amphibians and other relevant covariate data (e.g., stream temperature) to evaluate continued trends in amphibian densities. Do amphibian densities stabilize, continue to decline, or recover over time? Continued monitoring is consistent with the study design to evaluate effectiveness through time. Sampling in post-harvest years 14 and 15 will help us evaluate longer-term tailed frog and torrent salamander trends and densities through 40% of a typical harvest rotation.

**Budget***

| FY22 | FY23 | FY24 | FY25 | Total |
|---|---|---|---|---|
| $142,800 | $304,500 | $300,300 | $82,950 | $830,550 |

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

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| **Project Name** | Water Temperature and Amphibian Use in Type Np Waters with Discontinuous Surface Flow (CWA Project) |
| **Work Plan Critical Questions Addressed** | What is the effect of buffering or not buffering spatially intermittent stream reaches in Type Np streams? (Type N Riparian Prescriptions Rule Group and Type N Riparian Effectiveness Program – Westside Critical Questions)<br>How do stream-associated amphibians (SAAs) utilize intermittent stream reaches near the origins of Type N (headwater) streams? (Type N Amphibian Response Program Critical Question) |
| **Project Elements** | Characteristics of streams with intermittent flow (i.e., Type Np stream segments with discontinuous perennial flow), including spatial and temporal patterns of flow, and how these patterns influence stream temperature in downstream non-intermittent reaches across the landscape.<br>Stream-associated amphibian use of streams with intermittent flow. |
| **Responsible SAG and Project Manager** | SAG: LWAG<br>Project Manager: Lori Clark |
| **Principal Investigator(s)** | WDFW – Aimee McIntyre |
| **Status** | In summer 2020, a Project Team was formed for this project and work began on updating the BAS synthesis. Work on drafting the Scoping Document began in early 2021. SAG priorities were focused on finalizing Type N Hard Rock products and the scoping is still in progress. Additionally, AMP staffing shortages resulted in delays to the development and approval of the project Charter, which impacted the ability of the contractor to begin work according to the original timeline. |
| **Project Timeline** | September 2021: Charter was approved.<br>February 2022: Complete literature synthesis and a summary of data from existing studies.<br>April 2023: Anticipated delivery of Scoping Document to CMER for review. |
| **Expenditures to Date** | FY19-21: $21,023 |
| **Complementary Projects and Project Sequencing** | Westside Type N Experimental Buffer Treatment Project in Hard Rock Lithologies, Westside Type N Experimental Buffer Treatment Project in Soft Rock Lithologies, SAA Sensitive Sites Identification Methods, SAA Detection/Relative Abundance Methodology, Dunn's Salamander, Buffer Integrity-Shade Effectiveness, Amphibian Recovery, Riparian Characteristics and Shade Response Study, Extensive Riparian Status and Trends Monitoring Program – Stream Temperature<br>Phase I: Westside Type F/S and Type Np Monitoring Project |

**Project Summary and Purpose**

This study will inform the Overall Performance Goals to meet water quality standards and support the long-term viability of covered species by evaluating the influence of intermittent stream reaches on water temperature and FP-designated amphibian use. A previous CMER-funded study (Hunter et al. 2005) found that intermittent stream reaches frequently occur near the origin of headwater streams (i.e., PIP), and that they exhibit one of two spatial patterns of surface flow (i.e., a single dry reach located adjacent to the PIP, or flowing sections interspersed with dry sections). This study will expand on previous findings by evaluating the influence of intermittent reaches on stream temperature and amphibian use, as well as identifying how spatial and temporal patterns of intermittency may differentially impact temperature and amphibian use. A project concept was developed by the Type N

Amphibian Response Program, LWAG and CMER in 2007. At that same time, an exploratory data review from an existing CMER-supported study (see Quinn et al. 2007) was conducted. The review provided limited information. Consequently, LWAG proposed waiting until the Type N Hard Rock project was complete to determine how that study could inform critical questions and project need/development. Though the Hard Rock Study focused primarily on 2nd order streams, it included an evaluation the entire length of the stream network from the F/N break and upstream to the uppermost point of perennial flow (i.e., perennial initiation point or PIP), including all Type Np reaches with discontinuous surface flow. Because of the pending completion of the Type N Hard and Soft Rock studies, and the desire to understand the relationship between intermittent stream reaches, stream temperature and FP-covered amphibians, LWAG proposes to continue work on this project.

LWAG proposes data summary and study development in 2 steps:

1. Scoping Document (April 2023): Summarize findings from peer-reviewed literature and Type N-related CMER studies (including the Type N Hard and Soft Rock Projects) to provide an updated summary and best available science for future study context and development. Findings will be included in a scoping document to CMER and Policy.
2. Study Design (delayed due to budget constraints to FY2025): CMER and Policy can use the completed Scoping Document to assess the value of a field study. If interest exists, a Study Design would be developed. LWAG anticipates that a study specific to intermittent reaches across the landscape would include an on-the-ground field evaluation of intermittent streams, identification of spatial and temporal patterns of intermittency, and potential impacts of these patterns on water temperature (to address the water quality standards Overall Performance Goal) and amphibian use (to address the long-term viability of covered species Overall Performance Goal).

Determining the influence of intermittent reaches on water temperatures and FP-designated amphibian use would provide important information for evaluating the relative benefits of riparian buffers on intermittent reaches, ultimately informing the riparian buffer rule for Type N streams. This project is intended to include both water temperature and amphibians as primary responses.

**Project Objectives**

This project is identified as a Clean Water Assurance (CWA) Milestone.

It will inform the Overall Performance Goals of meeting water quality standards.

A field study will help identify the effects of intermittent stream reaches on stream temperature and FP-covered amphibians for the Westside FPHCP landscape.

It may also be used to inform the effectiveness of Type N prescriptions in reaches with intermittent flow.

**Budget***

| FY20 | FY21 | FY22 | FY23 | FY24 | FY25** | FY26 | FY27 | FY28 | FY29 | FY30 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $5,173 | $39,827 | | | | $80,000 | $250,000 | $360,000 | $360,000 | $360,000 | $250,000 | $1,705,000 |

*August 10, 2022 Board-approved budget. Funding approved for FY22-FY23. Budget beyond FY23 are estimates only.
**Note that the exact budget figures and timeline for future work beginning in FY25 will depend on a study design that would be developed after scoping. FY25-FY30 funding amounts are preliminary estimates based on previous projects. These will be updated as the project is scoped.