



Contact Information

2024 Upper Columbia Regional Project Pre-Application

* Pre-applications due March 11, 2024 (COB)

*Complete applications due in PRISM April 19, 2024 (COB)

*Revised proposals due in PRISM May 24, 2024 (COB)

*Final revised applications due in PRISM June 24, 2024 (noon)

Project Title	Bioenergetics modeling and restoration effectiveness: Pilot study.
Sponsor	Chelan County Natural Resource Department
Primary Contact	Matt Holland
E-Mail Address	matt.holland@co.chelan.wa.us

Budget Request

Values MAY be duplicative and do not have to equal TOTAL anticipated budget in pre-application.

Anticipated Request - SRFB (standard round) \$50,000

Anticipated Other Funding \$60,000

Anticipated TOTAL Budget \$50,000

Other Funding Source(s)

Pacific Northwest Research Station (USDA Forest Service), 2024 work already funded; 2025 request pending 2024 results

Project Location

Briefly describe the location of the project

This monitoring project would occur throughout the Middle Enitiat and Upper Wenatchee sub basins on recent restoration projects, largely within Gray/Stormy reaches and the lower 12 miles of Nason Creek..

Latitude (decimal degrees) 47.837315

Longitude (decimal degrees) -120.417016

Project subbasin Multiple Subbasins

Please explain why there are multiple subbasins

Entiat and Wenatchee sub-basins. Several large, coordinated, reach scale projects were recently implemented in the middle Entiat, making it ideal for restoration effectiveness monitoring. Expanding the study to the Wenatchee sub-basin can enable the incorporation of spatial variability in fish populations and river basins.

Does the proposed project span multiple assessment units? Yes

List the additional assessment units directly impacted by this proposal. Entiat River-Potato Creek, Lower Nason Creek

Reach(es) Name Entiat River-Potato Creek, Lower Nason Creek

Identify the reach(es) priority/ reach ranking. Note: If the project involves work in multiple reaches, select "Multiple" and include details in the text box that will appear below. Please reference the Prioritization Web Map: <https://prioritization.ucsr.org/>. Multiple reaches (provide details below)

Please detail the reach-ranking of the reaches below

- Reach: Entiat River Potato 05 - Rank 3
- Reach: Entiat River Potato 06 - Rank 2
- Reach: Entiat River Potato 07 - Rank 1
- Reach: Nason Creek Lower 02 - Rank 3
- Reach: Nason Creek Lower 03 - Rank 2
- Reach: Nason Creek Lower 10 - Rank 1

Project Information

1. What are the project objectives? Objectives support and refine biological goals, breaking them down into small steps. Objectives are specific, quantifiable actions the project will complete to achieve the stated goal. Each objective should be SMART (Specific, Measurable, Achievable, Relevant, and Time-bound). Note: This exact question is included in the PRISM application. Example format: The project seeks to address [specify limiting factor(s)] for [limiting life stage(s)] by [specific actions proposed] to create an estimated [include specific target metrics, as described below] upon implementation in [estimated year].

This project seeks to augment an existing research and monitoring program (focused on river restoration effectiveness) in two subbasins of the Upper Columbia by monitoring the food availability for juvenile salmonids in restored floodplain and mainstem reaches compared to unrestored control reaches and putting it in context of fish growth and density measured in the same reaches. We will quantify the average abundance of zooplankton and drifting and benthic macroinvertebrates at random sampling sites in perennially inundated floodplains, seasonally inundated floodplains, restored mainstems and unrestored mainstem control reaches. We will also measure the average growth rates of juvenile Chinook salmon and steelhead fry and parr in these reaches as part of a larger study to understand how growth correlates to food availability. Furthermore, we will measure temperature, flow and depth and classify the habitat type of each sampling replicate into account to better understand what habitat types within each reach are most productive and can provide for the highest number of individuals. We will then apply bioenergetic

modeling to predict growth, habitat selection by fish and population carrying capacity, and compare actual fish data to these predictions.

2. What species will the project benefit?

Spring Chinook

Steelhead

Summer Chinook

3. Select the project's objectives and the associated tracking metrics

Design, Monitoring or Assessment

4. Does this project already exist in Salmon Recovery Portal or PRISM?

No

5. Has this project been submitted previously for funding through the SRFB and/or other process(es)?

No

6. What category is the project?

Monitoring

If applicable, what is the secondary project category?

N/A

Is the project eligible for Riparian Funding?

No

Design and Restoration Proposals

Assessment Proposals

Protection Proposals

Monitoring Proposals

7. Does this project address a Tier 1 data gap in the MaDMC Regional Data Gaps List?

Yes

8. To what extent does your project address a regional data gap?

This project addresses the following data gaps:

Data Gap ID - 3.1 (Tier 1): Effectiveness of habitat projects incorporating spatial and temporal influences on results and at the appropriate scale (e.g., project, reach, assessment unit, population).

Data Gap ID - 3.3 (Tier 2): Certain project types are missing robust effectiveness monitoring (e.g., floodplain, off-channel, riparian, upland water storage, beaver reintroduction, BDAs).

Data Gap ID - 2.12 (Tier 1): Habitat requirements and limiting factors by life stage.

The overall study design involves monitoring floodplain fry density, estimating survival via growth and mark-recapture experiments, and collecting stranding data, thereby addressing all three data gaps.

The work proposed here will add a bioenergetic component to the study by quantifying food availability based on the biomass of zooplankton and drifting and benthic macroinvertebrates.

These studies will address the two Tier 1 data gaps mentioned above regarding the spatial scale of monitoring and limiting factors (food availability) by life stage, while also investigating the effectiveness of

different project elements (Tier2).

9. What is the scale of inference?

Multiple Populations

10. Purpose - How will the monitoring complement, enhance, or leverage ongoing monitoring efforts?

This study would compare the biomass of important food resources for fish under river restoration to determine whether restored areas increase foraging opportunities in restored habitats. We propose this project as a pilot study that complements objectives of a larger regional monitoring program implemented in 2023 and 2024. In that work, we are determining the patterns of fish habitat use during high flows that inundate floodplains, and whether growth and survivorship of Chinook Salmon fry are enhanced by floodplain reconnection. Because that monitoring work is ongoing, there is the opportunity to add collection of pilot data on the availability of food resources to fish and conduct preliminary bioenergetics modeling.

The ongoing work also seeks to collect accurate fry-to-parr and parr-to-smolt abundance and survival data in floodplains, tributaries, and restored and unrestored reaches of the Entiat River to parameterize and evaluate a Life Cycle Model (LCM) for the Entiat River with productivity (e.g., abundance or growth) and survivorship data. Bioenergetics modeling would complement the LCM effort in that both provide estimates of carrying capacity. With two modeling efforts, the extent to which carrying capacity is enhanced by restoration will be more accurately estimated.

11. Methods - Briefly describe the methods and how they are appropriate to the monitoring question

To compare zooplankton and macroinvertebrate abundance, we will utilize spatially randomized sampling of zooplankton in comparison to growth rates and fish density within reference and restored floodplain reaches and in different habitat types. In addition, we will compare fish densities and growth rates with food abundance at the same sampling replicates. This will provide insights into food availability in different habitat types and floodplain reaches. Environmental data will be collected at each sampling replicate and event to analyze which factors have the greatest impact on zooplankton abundance. This analysis will help us to quantify the benefit of restored floodplains compared to unrestored mainstem control reaches for juvenile salmon regarding food availability, growth and survival (Corline et al. 2017).

12. Describe how the data (raw and processed), results, and other information will be disseminated and accessed once the project is complete

All data will be archived with the Principal Investigator, with project sponsor Chelan County Natural Resource Department, and with the project partner Hinchinbrook, Inc. The quantitative ecologist from Hinchinbrook, the principal investigator, and the project sponsor will prepare at least one publication for distribution and present study results at regional meetings and conferences.

13. Explain why SRFB project funds are being requested rather than funds from other sources

This project is a component of a larger regional monitoring program started in 2022 with SRFB funds being instrumental to its development. Expanding upon success in 2022, we secured funding in 2023 and 2024 from the SRFB, HCP Tributary committees, and project partners. Those additional partners include Pacific Northwest Research Station (USDA Forest Service), NOAA Fisheries, Cascadia Conservation District, U.S. Forest Service, Yakama Nation, and Hinchinbrook, Inc. The SRFB is viewed as an essential partner for the ongoing success of this program, and the requested funds would augment existing funding and are directed toward a specific component of the project.

Project Risk and Economic Benefits

1. What is the landownership?

Chelan-Douglas Land Trust, USFS, some private

2. Have you secured landowner participation in or acceptance for this project?

Yes

Please explain

Monitoring sites would take place on recent restoration projects completed on either USFS land or CDLT properties, whom we have an ongoing relationship with regarding other project related monitoring actions. However, if one of the landowners revokes their consent, we will choose a different study site or locate alternative access routes.

3. Describe any land owner requirements (e.g., design elements, right-of-ways, access agreements, liability waivers, etc.) and if/how they could affect the project

N/A

4. Will the project raise potential concerns for interest groups (e.g., recreational users) or the community at large (including upstream/ downstream/ adjacent landowners)?

As a monitoring proposal this question is not generally applicable, however it is worth mentioning that restoration work, especially floodplain reconnection, can be contentious in our region with many documented concerns from the stakeholder community. We hope that our monitoring program can help mitigate some of these concerns by demonstrating a benefit to the fish populations.

5. Who will have the responsibility to manage and maintain the project? What is the responsibility of current or future landowners?

Project Sponsor: Chelan County Natural Resources Department, Matt Holland - Natural Resource Specialist

Principal Investigator: Pacific Northwest Research Station – USDA Forest Service, Carlos M. Polivka, Ph. D.

Co-Investigators: Keith van den Broek, Stine Griep – Hinchinbrook, Inc.

6. Are other projects being proposed immediately upstream or downstream of worksite?

No

7. Please describe the risk of failure associated with this project.

Our work assumes that we can access floodplains during high flows; however, some high-flow situations may preclude the ability to access the sites at the scheduled time. In that case, our timeline will be modified to begin sampling when water conditions allow field procedures to be carried out safely.

Some of the work proposed to study habitat selection and fry-to-parr/parr-to-smolt survival in floodplains relies on the ability to mark fry, either with FRy ID and PIT tags or VIE marking. If fish are too small to ensure their survival during marking, we will use density values to analyze habitat selection and a size-over-time model to estimate growth as described above. This approach is less accurate than the one we plan to use if marking is possible but enables us to derive a rough estimate of fry-to-parr survival without marking.

Both the Wenatchee and Entiat sub-basins are prone to wildfires that typically occur during the same months as much of our proposed sampling. Such wildfires often lead to debris flows that adversely affect the ability to observe and capture fish. Sometimes access to the river is prevented by the fire itself or by the need to keep access areas clear for emergency responders. If wildfires preclude a year of data, we will move the field activities to the following year.

8. Is there any public outreach planned during and/or after implementation? Does the project build community support for salmon recovery efforts?

Our project partners are active participants at several regional stakeholder groups including the Regional Technical Team, Watershed Planning Units, and Habitat Subcommittees. All project results will be

presented at these various forums with opportunities for public outreach and development of community support for salmon recovery efforts.

9. Does the project represent an opportunity for economic benefit? How much benefit does the project create for the dollars invested?

We will hire local staff as field work technicians as possible and have already developed strong partnerships with many local organizations. All permanent staff associated with the program are Washington residents.

10. Describe any partnerships, their experience, and types of contributions supporting the project.

Pacific Northwest Research Station – USDA Forest Service, Carlos M. Polivka, Ph. D. - Research Fishery Biologist

Hinchinbrook, Inc., Keith van den Broek – Senior Fish Biologist

Partnering with the County in 2022, PNWRS and Hinchinbrook have already produced one publication highlighting the effectiveness on some restoration elements throughout the Entiat watershed and presented study results at several meetings/conferences. Under proposed work, similar methods would be employed and expanded to additional restoration elements, and potentially to a greater spatial, and temporal coverage.

Optional Section - Preparation for PRISM

The following questions are identical to the questions RCO requires in the PRISM application. If desired, sponsors can complete associated questions early and copy responses into PRISM during the "Complete Application" phase due on April 19, 2024.

Do you want to review and/or pre-populate PRISM questions?

No

Supporting Documents

[Upper Columbia Process Guide 2024](#)

[SRFB Manual 18 \(2024\)](#)

[RCO Application Resources \(2024\)](#)