Grant Application

Renee Coxen

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Application ID : A27CR72
Custom Ref. -

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1	Have you ever applied for an OWF grant before?	
	no	
2	Have you ever been denied for an OWF grant before?	
	no	
3	Project Title	
	Coho Response to Beaver Dam Analogues	
4	Name of my Organization	
	Oregon Department of Fish & Wildlife	
5	If your organization is not a tax-exempt nonprofit, please list the name of your fiscal sponsor - If this does not apply to you, write N/A	
	Upper Nehalem Watershed Council	
6	Project Manager Full Name	
	Maggie Peyton	
7	Project Manager Mailing Address - Please enter full address with city, state & zip	
	1201 Texas Avenue Ste A, Vernonia, OR 97064	

8	Project Manager Phone Number
	503-396-2046
9	Project Manager Email Address
	maggie@nehalem.org
10	Please provide a brief biographical statement about yourself
	I have extensive work experience in conducting biological analysis on the impacts to salmon and steelhead and their freshwater habitat. I work for the ODFW and it's my responsibility to implement the states inland fishery conservation plans and federal recovery plans in the coastal region. A big part of my role is to coordinate, implement and track restoration and conservation actions for ESA-listed Oregon Coast Coho Salmon. I regularly work with the NOAA Restoration Center and watershed councils to identify, prioritize and assist in implementing freshwater habitat restoration actions to support our state's ESA-listed salmon's conservation and recovery.
11	Provide any social media handles you use - Enter social handles or URLs such as instagram, facebook, twitter, youtube, etc. so that we can use to cross promote on our channels - if you do not have any, please place N/A
	N/A
12	Please indicate if you are currently following Oregon Wildlife Foundation on our social media channels
	- None of these channels
13	Total estimated project cost
	161058
14	Funding that you are requesting from OWF - If you're request is for more than $5,000, please contact Tim Greseth - tim@myowf.org before submitting your application.
	25500.00
15	What type of project are your proposing?
	Fish
16	Will your project address an Oregon Conservation Strategy habitat or species?
	yes
16.1	What habitat or species is addressed?
	Oregon Coast Coho Salmon

17	Start date of project- Day/Month/Year
	08-03-2022
18	End date of project
	30-04-2028
19	Location of project
	Washington, Columbia and Clatsop County
20	Has a local, state or federal biologist reviewed this project?
	yes
20.1	What is their name and contact info?
	Dr. Michael Pollock, michael.pollock@noaa.gov
21	Have you already or will you obtain necessary permits from all requisite agencies as applicable to proposed project?
	yes
22	What will the requested funds be used for?
	To be used as match funds to complete long-term effectiveness monitoring to evaluate the use of beaver dam analogues as a cost effective restoration tool to address the primary limiting factor (over-winter rearing habitat) for Oregon Coast Coho.

23	Provide a brief Project Summary

The key limiting factor preventing federally Endangered Species Act (ESA)-listed Oregon Coast (OC) Coho from achieving recovery goals is the lack of adequate rearing habitat. Alcoves and beaver ponds are the primary ecological features used by juvenile salmon for rearing. The 2019 12-Year Assessment of the OC Coho Conservation Plan (ODFW, 2021) found there is a decreasing trend in alcoves and beaver pools in the North Coast strata, which includes the Nehalem. This pilot study is designed to determine the effectiveness of using beaver dam analogues (BDAs) on the Oregon coast to create critical over-winter rearing habitat for ESA-listed OC Coho Salmon. BDA design, implementation and three years of monitoring have been completed. The study design was developed to evaluate the efficacy of the BDAs over a long enough period (10 years) to be able to develop a sense of the true cost / benefit relationship. Additional funding is needed to fully evaluate the BDA structure longevity and their associated morphological and biological relationships. The first three- years of monitoring exhibited improving responses over time in many categories. We have not been able to fully witness and quantify all the potential benefits because these structures are still evolving and have the capacity to be augmented by beaver at any time as long as they remain functional. So far, of the 57 BDAs installed, only 3 have lost their horizontal integrity and could be classified as exhibiting limited function. It would be important to understand structure longevity for application in Coast Range Watersheds because it directly effects the final cost / benefit analysis of implementing this technique for coho salmon. Climate change is expected to cause additional impacts to stream temperature that will result in an even greater reduction of juvenile rearing habitat available on the Oregon coast. Evaluation of the effectiveness of using BDAs to aid in creating more rearing habitat needs to be completed so that we can determine its efficacy in creating a more resilient landscape for OC Coho in the face of climate change. This BDA Pilot Study is applicable coast wide in Oregon. The OC Coho Salmon ESU is made up of two primary underlying geologies Tyee Sandstone and Tuffaceous basalt. The Nehalem Basin contains both of these underlying geologies and consequently experimental reaches included examples of each of these in the distribution of selected stream reaches. The field work includes biological survey by Rapid Biological Assessment summer / winter snorkel surveys for juvenile Coho salmon presence to compare changes in over winter retention rates at 17 sites and physical attribute survey to measure effects of BDA design on beaver response and channel form at each of the 57 sites. The UNCW Project Manager will coordinate and provide three guided field trips to select BDA sites to interested agencies, stakeholders, and practitioners over the course of the study. In addition, the study will be well documented by UNWC in annual consultant reports dispersed to a wide audience, drone footage, video footage, and social media including UNWC Facebook page and website at www.nehalelm.org.

24	Upload pre-project pictures or a video - By submitting these photos or video I warrant that I am the legal owner of this media and grant the Foundation permission to reproduce, exhibit, or publish them for all general purposes in relation to Oregon Wildlife Foundation's work. If you have questions about photo or video submissions please refer to myowf.org/grants for guidance.

25	Fill out the budget

Project Revenue	Cash	In-Kind	Committed / Pending
Oregon Wildlife Foundation Request	25500		Pending
OWEB	121858		Pending
Wild Salmon Center - NOAA BDA 2019	13700		Committed
REVENUE	161058.00	0.00	
		TOTAL PROJECT SUPPORT	161058.00
Project Expenses	Cash	In-Kind	Total
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
		TOTAL PROJECT EXPENSES	0.00
Balanced budget? This cell should read "0" ---->		NET	161058.00

26 Upload your Project Narrative -
Please make sure your narrative is no more than 7 pages long, single spaced, 12 pt. font (Calibri preferred).

1 Document Uploaded

27	Upload letters of support	
		1 Document Uploaded
28	I understand that I am required to submit a Project Completion Report, copies of any publications or social media posts crediting the Foundation's support, and post-project pictures at the completion of my project	
		yes

Project Summary-Coho Response to Beaver Dam Analogue Pilot Study

Project location: The upper Nehalem watershed on public lands managed by the Oregon Department of Forestry and private lands managed by OSU Blodgett Tract and Olympic Resource Management.

Project Partners: The Upper Nehalem Watershed Council (UNWC), NOAA, Oregon Dept of Forestry (ODF), Oregon Dept of Fish & Wildlife (ODFW), Olympic Resource Management, OSU Blodget Tract, and Trask Consulting.

Need Statement: The key question of this pilot study is can we encourage native bank dwelling beaver to adopt constructed beaver dam analogues (BDAs) to increase the quality, quantity, and longevity of dammed rearing habitat that is critical to the recovery of federal Endangered Species Act (ESA)-listed Oregon Coast (OC) Coho Salmon. High quality over-winter rearing habitat for juvenile OC Coho is the primary limiting factor for most populations in the OC Coho evolutionarily significant unit (ESU).

Beaver are a key component of hydrologic, geomorphic, and biotic processes within the stream systems, and their dams alter stream and riparian structure and function to the benefit of many aquatic and terrestrial species. Structures designed to mimic the function of beaver dams are increasingly being used as effective and cost-efficient stream and riparian restoration approaches. The use of BDAs in eastern Oregon have been documented (Bouwes et. al., 2016; Weber et. al., 2017) to successfully support ESA-listed salmon and steelhead by creating and providing much needed critical habitat attributes at a very affordable implementation cost. Subsequently, restoration practitioners were eager to implement BDAs on the Oregon coast as a cost-effective restoration tool to support ESA-listed salmonids. However, no studies had yet determined their effectiveness in western Oregon.

This BDA Pilot Study is applicable coast wide in Oregon. The Oregon Coastal Coho habitat is made up of two primary underlying geologies Tyee Sandstone and Tuffaceous basalt. The Nehalem Basin contains both of these underlying geologies and consequently experimental reaches included examples of each of these in the distribution of selected stream reaches. In addition, BDA site selection was driven by real time beaver dam abundance data collected in the Rapid Bio Assessment Inventory and modeling outputs provided by a NOAA directed manipulation of the NetMap (https://terrainworks.com/netmap-portal) model tuned to identify High Intrinsic Potential reaches for beaver colonization. Subsequent modeling runs have been developed that have refined the modeling effort utilizing the LIDAR based NetMap program for identifying High Beaver IP that overlaps with known coho distribution (this effort has been referred to as the Nehalem HIP Backcast). This tool has been ground truthed in the Nehalem basin and is being used by NOAA in other basins for restoration planning. All of the model attributes utilized to select the High IP reaches for beaver have already been run coast wide throughout the OC Coho geography. This suggests that the results reported from the Nehalem

have a high likelihood of being replicated in other watersheds when combined with the baseline assessment tool provided by NOAA.

The key limiting factor preventing federal ESA-listed OC Coho from achieving recovery goals is the lack of adequate rearing habitat. Off-channel habitats, alcoves and beaver ponds are the primary ecological features used by juvenile salmon for rearing. The 2019 12-year assessment of the OC Coho Conservation Plan (ODFW, 2021) found there is a decreasing trend in alcoves and beaver pools in the North Coast OC Coho strata, which includes the Nehalem. This study will evaluate the effectiveness of using BDAs in the coastal region as a habitat restoration tool to support ESA-listed coho salmon, thus increasing the collective knowledge on cost-effective restation tools to benefit salmonids. BDA design, implementation and three years of monitoring have been completed.

The study design was developed to evaluate the efficacy of the BDAs over a long enough period (10 years) to be able to develop a sense of the true cost / benefit relationship. Additional funding is needed to fully evaluate the BDA structure longevity and their associated morphological and biological relationships. The first three- years of monitoring exhibited improving responses over time in many categories. We have not been able to fully witness and quantify all the potential benefits because these structures are still evolving and have the capacity to be augmented by beaver at any time as long as they remain functional. So far, of the 57 BDAs installed, only 3 have lost their horizontal integrity and could be classified as exhibiting limited function. It would be important to understand structure longevity for application in Coast Range Watersheds because it directly effects the final cost / benefit analysis of implementing this technique for coho salmon. Climate change is expected to cause additional impacts to stream temperature that will result in an even greater reduction of juvenile rearing habitat available on the Oregon coast. Evaluation of the effectiveness of using BDAs to aid in creating more rearing habitat needs to be completed so that we can determine its efficacy in creating a more resilient landscape for OC Coho for conservation and recovery in the face of climate change.

Along with annual field trips hosted for interested agencies, stakeholders, and practitioners a critical project outcome is a data-driven advancement of an exportable BDA design and construction methodology for the entire coastal region. Accordingly, this project focuses heavily on assessment and evaluation, specifically reviewing the project design and implementation strategies, location selection, monitoring metrics, cost profiles and biological outcomes that result from implementation. This study will provide valuable information on the use of BDAs as a restoration tool to support ESA-listed salmonids coast-wide in the future.

The first 3 years of monitoring documented that exponential change is occurring as the BDA structures mature and their utility as a foundation for beaver colonization continues to improve. Ensuring that there is limited lapse in monitoring will result in a very comprehensive picture of BDAs as a potentially very effective restoration tool. Therefore, funding is needed to continue the monitoring for an additional 7 years.

Monitoring Components: The project contains an extensive 10-year effectiveness monitoring strategy designed to quantify salmonid response and profile the attributes of both successful and

unsuccessful BDAs for use by future restoration technicians. A successful BDA is defined as a BDA that results in beaver utilizing the analogue site for the development of a maintained dam that is winter persistent. This addresses the observed seasonal habitat limitation for OC Coho of the lack of low velocity winter refugia. In addition, a winter stable impoundment attenuates the impacts of peak flow events on the remainder of the watershed downstream (providing lower peaks and a less flashy flood profile temporally). The monitoring questions driving the study are as follows:

1) Does the BDA achieve aggradation and how far upstream are the impacts of aggradation detectible (the goal is to increase the frequency of floodplain linkage to achieve low velocity for winter-rearing salmonids).
2) What are the differences in aggradation between a successful and an unsuccessful BDA?
3) Do specific BDA designs promote or avoid avulsion? Where avulsion occurs has it resulted in significant channel lengthening?
4) Has a vegetative treatment (willow) increased the beaver occupancy rates of constructed BDAs over time?
5) How does the inner riparian girdling of existing alder influence both occupancy rates and willow growth rates?
6) Is there a relationship between the number of bank dwelling beaver dens/mile and the final occupancy of BDAs by native beaver?
7) Can a BDA be constructed (includes willow weave) in a reach with no evidence of beaver and have that site still provide the functionality that benefits juvenile salmonids during winter flow regimes? Is this then a viable channel restoration technique even without beaver utilization of the BDA?

The selected reaches were reviewed by NOAA Fisheries scientist Dr. Michael Pollock who commented favorably on the sites as having features conducive to attracting beaver. Project design was based on the Beaver Restoration Guidebook (Pollock *et al* 2015/17), lessons learned from BDA projects in eastern Oregon and elsewhere, and local knowledge of the sites, beaver behavior and what constitutes high quality Coho salmon rearing habitat. Development and implementation of long-term effectiveness monitoring protocol was a collaboration with UNWC, NOAA, ODFW, ODF and the Primary Consultant (Bio-Surveys, LLC.).

Physical Attribute Monitoring: The physical attribute monitoring is conducted with a stationary laser level. These are simple measurements of gradient, pool surface areas, terrace heights, dam heights, post height, weave height, aggradation heights, channel heights, scour depths, etc. that are all attributes that can either be manipulated by design or altered by hydrology. Because there is limited precedent in the literature for establishing monitoring protocols for BDA installations, this project has relied most significantly on the foundational processes discussed in the "Beaver Restoration Guidebook" BRG. (Pollock, M.M., G. Lewallen, K. Woodruff, C.E. Jordan and J.M. Castro (Editors) 2015. The Beaver Restoration Guidebook: Working with Beaver to Restore Streams, Wetlands, and Floodplains. Version 1.0. United States Fish and Wildlife Service, Portland, Oregon. 189 pp.). Most importantly the guidelines for Assessing Habitat Quality for Beaver (pg. 51-53) assisted in the initial location of suitable reaches for implementing BDAs.

Many of the attributes that were chosen for long term monitoring were also documented in the BRG Chapter 6 – BDA's.

Biological Monitoring: The biological monitoring conducted to quantify the change in coho over winter retention before project implementation and 2 years post project is a snorkel inventory classified as a modified Rapid Bio Assessment (RBA). The RBA methodology was developed by Bio-Surveys, LLC (Steve Trask), the Mid-Coast Watershed Council (Wayne Hoffman) and ODFW (Bob Buckman) in 1998. The method is described in the methods section of "Upper Nehalem Rapid Bio-Assessment 2009". Comparing over-winter retention inter-annually removes the variability associated with the differential adult escapement between years if you were to focus directly on changes in productivity. Quantifying the change between pre and post project over-winter occupancy of coho utilizing the RBA protocol has been used successfully as a long-term monitoring strategy on many other project locations within the OC Coho evolutionarily significant unit (ESU) to evaluate the impacts of large wood treatments. These inter-annual comparisons have been conducted annually over 10-year periods and changes have been so dramatic between pre and post project occupancy that differential winter flow regimes have been relatively minor background noise.

This project sought assistance from multiple agencies for the final sampling design and fiscal support required for a long-range monitoring effort. Development and implementation of long-term effectiveness monitoring protocol was developed through collaboration with NOAA, ODFW, ODF, and the Primary Consultant (Bio-Surveys, LLC). These partners also participated in the collaboration and review of the site-specific final design metrics.


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