Pre Application Due Date: March 5 2014
Draft Application Due Date: April 23, 2014
Final Application Due Date: July 11, 2014

2014 SRSRB-Application

Project Title: Working with Beaver to Restore Salmon and Steelhead Habitat in Pataha Creek

Submitting Organization: *Pomeroy Conservation District*

Project Contact Information
(Complete for each contact)
For additional Contact Info Sheets go to: http://snakeriverboard.org/wpi/salmon-recovery/grant-applications/

☐ Mrs. x☐ Ms. First Name: Duane Last Name: Bartels

Address: 910 Main St, City/Town: Pomeroy State:WA Zip: 99347

Telephone # (509) 843-5008 Cell # (509)566-7006

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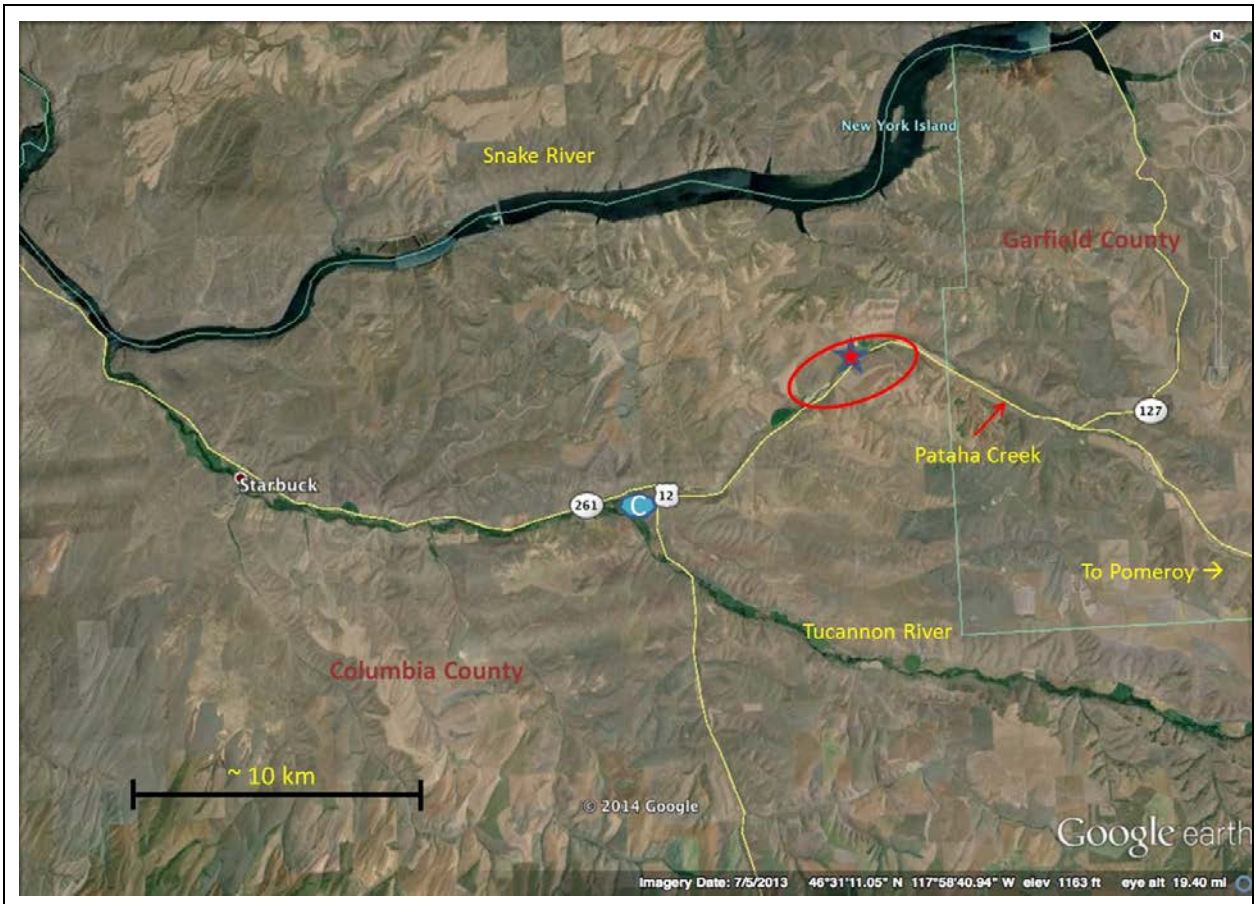
Project Locations: The project location is on the mainstem of Pataha Creek approximately 10 km upstream of the confluence with the Tucannon River in the Columbia County (and may extend upstream depending on final design). One property owner is participating in the project at this time: Chapman and Wessels.

Maps: Provide both a map illustrating project vicinity and a site map. Map descriptions can be placed in this section but maps should be attached as a separate page. (Contact SRSRB staff to construct maps and set up project in the HWS prior to pre-application deadline).



Lower Tucannon River and Pataha Creek and the location of the proposed study area (red oval), the landowner (red star), and an existing Columbia Habitat Monitoring Protocol site (blue C) on Pataha Creek just upstream from its confluence with the Tucannon River.

Short Description of Project

Describe project, what will be done, and what the anticipated benefits
Will be in **1500** characters or less.

***NOTE**:* Many audiences, including the SRFB, SRFB's Technical Review Panel, media, legislators, and the public who may inquire about your project use this description. Provide as clear, succinct, and descriptive an overview of your project as possible – many will read these 1-2 paragraphs!

- The description should state what is proposed.
- Identify the specific problems that will be addressed by this project, and why it is important to do at this time.
- Describe how, and to what extent, the project will protect, restore, or address salmon habitat.
- Describe the general location, geographic scope, and targeted species/stock.
- This short description should be the summary of the detailed proposal set out under the Evaluation Proposal, with particular emphasis on questions 1-4.

The PRISM database limits project descriptions to 1500 characters (including spaces); any excess text will be deleted. Additional detail should be provided in the project proposal!

The goal of this project is to determine the amount of potential habitat that could support dam building beavers in the Tucannon watershed with a focus on Pataha Creek, conduct a trial of building beaver dam support (BDS) structures to improve the habitat diversity, reduce incision, and reconnect the floodplain in the lower reaches of Pataha Creek, and develop a comprehensive plan for further implementation of this restoration method with a possible larger implementation in 2016-2017. This project would take place on a single landowners property in the lower reaches of Pataha Creek and could help to restore more ecological based stream processes that are promoted by beavers (e.g., increased aggradation, reduced sediment and erosion, increased habitat diversity) and demonstrate a cost effective restoration method that may be applicable to many areas in southeast Washington. The target species are Snake River ESU steelhead with potential benefits for chinook and bull trout.

Beaver dam support structures are built out of wooden fence posts driven in to the stream bottom on which beavers can build more stable dams that can survive floods. An extensive Intensively Monitored Watershed Project in Bridge Creek, Oregon demonstrated that these structures can reduce channel incision, create more diverse salmonid habitat, increase ground water levels, reduce stream temperature, and increase wild steelhead survival and production. We believe that Pataha Creek has similar conditions to Bridge Creek and would be an excellent candidate for testing and potentially implementing a large scale ecological based restoration project using beavers to restore stream habitat and provide many other ecological benefits.

Pre-Application Extended Project Design Description: (This section is only needed in the Pre-Application & is replaced in the Draft and final applications with the Projects Scope of Work Document)

Use this section to describe the preliminary project design that will be used to address the need. This section may be used to provide a more detailed description than provided above. Not required for pre-application (Max one page)

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Pre-Application Budget Estimate: See Attached BUDGET with RCO application

List SRFB request match and total project costs

Budget Items	Cost/Unit	Unit	Matching Funds	SRFB Request	Project Cost
Phase one	$15,000	1	$1,000	$14,000	$15,000
Phase Two	$15,950	1	$3,200	$12,750	$15,950
Phase Three	$63,000	1	$15,500	$47,500	$63,000
Total Matching			$19,700		
Total SRFB Request				**$74,250**	
Total Project Cost					$93,950

Restoration Implementation Projects Preliminary Design Requirements (New in 2013)

Starting in 2013, the SRFB changed the requirement for design review on implementation projects which exceed $250,000 in SRFB requested funds. If your grant request from the SRFB will exceed $250,000 you will be required to submit a preliminary design or equivalent with the final application. Check the SRFB Manual 18 Appendix D for information of the Design Requirements or contact your LE Coordinator.

Check the appropriate box below as to whether the design requirement can be met.

I have preliminary designs completed and have cross walked them w/ SRFB requirements	X
I am currently working on preliminary design and may be able to complete by final application deadline	☐
I do not have preliminary designs and will not have them by the final application	☐

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Evidence that this project is part of the Snake River Salmon Recovery Plan:

List the HWS project number and title of project as stated in the 3 Year Plan. If project is not directly stated in the 3 Year Plan list the general project category your project pertains to and describe the correlation.

35-00438

This project proposes a watershed assessment of Pataha Creek and assessment of the potential to restore habitat with the aid of beavers. Pataha Creek represents one of the most significantly degraded portions of the Tucannon watershed, and therefore, has a high potential to increase salmonid production if restored. Pataha Creek has been upgraded to an MaSA but most spawning occurs upstream of the proposed restoration section. Restoring functioning instream and riparian conditions in the study area will increase life history diversity (allow for survival of juveniles that move down from the headwaters and attempt to rear in the lower reaches) as well as improve upstream and downstream survival of adults and juveniles during migration.

This is the end of the PRE-APPLICATION

When submitting your draft application, make sure to updates the pre-application information where pertinent as well as completing the following draft application. The pre-application will become part of the draft application to reduce redundant forms.

SRFB Draft Application Information	
X☐Draft	Date Submitted to SRSRB April 23, 2014

Updated Vicinity / Site Maps & Photos

Please submit photos as JPEG or other non PDF picture format. Maps and designs maybe submitted in photo or PDF format.

Vicinity Map Attached:	x☐
Site Map Attached:	x☐
Aerial or Site Specific Photos Attached:	x☐
Preliminary Designs or Field Sketches:	x☐

Project Proposal Guides

To complete this section download the Project Proposal template that fits your proposed project and attach as a separate document. Check appropriate box below.
NOTE: This project proposal will be used primarily to evaluate your project. Please include appropriate metrics within the body of the text.
The below documents can be found at http://snakeriverboard.org/wpi/salmon-recovery/grant-applications/

	Attached
1) Restoration, Acquisition and Combination (Restoration & Acquisition) Project	x
2) Planning Projects (Assessment, design, and Study) and Combination (Planning & acquisition) Projects	☐
3) Barrier Inventory Projects	☐

Imminent Threat Projects --Population Effect Determination				
Following the draft application the RTT will be consulted on the severity of Imminent Threats being proposed for restoration funding. The RTT will consider population effect the project could have given completion and provide a technical recommendation to the LE Committee either (I) large improvement on a population scale or (i) minimum impact on a population scale.				
RTT Technical Opinion	(I)	☐	OR (i)	☐

Landowner Information

Landowner Acknowledgment Forms

(Remember to complete the Landowner Acknowledgement form for each Landowner.)

To complete this section download the landowner acknowledgment form and have the

landowner complete the form and submit a copy with the draft application. Draft applications without signed agreement forms may not be considered by the SRSRB for final scoring and ranking. These forms can be found on the SRSRB web site at: http://snakeriverboard.org/wpi/salmon-recovery/grant-applications/	
Number of Landowners and Attached Landowner Forms	# 1

Project Proposal Cost Estimate Template

To complete this section complete the budget template that pertains to your project type
Found on the SRSRB website at: http://snakeriverboard.org/wpi/salmon-recovery/grant-applications/
and *check the appropriate attachments box below*.
OR you may submit a detailed budget in your own format.

		Attached
1)	Personal Format Budget	☐
2)	Assessments	☐
3)	Property Acquisition	☐
4)	In-stream Restoration	x
5)	Diversion and Screen	☐
6)	Barrier Inventory or Fish Passage Design	☐
7)	Riparian	☐

This is the END of the DRAFT APPLICATION.

Don't forget to update the pre-project information to reflect changes, if didn't submit in the pre-application round fill out the pre-application information on your draft submittal.

Restoration, Acquisition, and Combination Proposal

Style Definition: Heading 1

Project Number	
Project Name	**Using beaver dam analogs to restore salmon and steelhead habitat on Pataha Creek**~~Pataha Creek: Working with Beaver to Restore Salmon and Steelhead Habitat~~
Sponsor	Pomeroy Conservation District

1. Problem Statement

Pataha Creek is the largest tributary to the Tucannon River in southeast Washington and drains an area of 480 km^2 (185 mi^2). Both the Tucannon River and Pataha Creek are listed on the Department of Ecology's 303(d) list: Pataha Creek for temperature, fecal coliform, and pH exceedances (DOE 2010). Historically, Pataha Creek was a significant source of sediment to the lower Tucannon River due primarily to loss of riparian habitat and intensive upland farming practices (CCD 2004). Pataha Creek can have excessively high stream temperatures (above optimal for salmonids), and has had several seasonal barriers or partial barriers to salmonid migration in the past (CCD 2004, SRSRB 2011). However, there has been an improvement in stream conditions due to land management practices over the last 25 years such as the use of sediment reduction measures such as terraces, grassed waterways, sediment basins, and strip cropping, and more recently by the introduction of direct seeding and no till farming practices (~ 60-70% of the farms now use these practices). Riparian habitat is also being restored and/or conserved as the watershed has 374 acres enrolled in the Conservation Reserve Enhancement Program (CREP) which involves 37 miles of stream bank.

The fisheries resources of Pataha Creek are primarily the Snake River steelhead distinct population segment (DPS). Recently the steelhead DPS in Pataha Creek was reclassified to a major spawning area (MaSA) from a minor spawning area (MiSA) due to the improvements in management practices in the watershed. Bull trout use the upper watershed and some rearing of juvenile Chinook salmon (Snake River ESU) occurs in the lower reaches of Pataha Creek (SRSRB 2011). Steelhead and Chinook also use the lower 20 km of Tucannon River downstream of the confluence with Pataha Creek and the lower portion of the Tucannon River has recently been reclassified as a priority restoration reach because of the improvements in water quality in Pataha Creek and the lower Tucannon River.

Despite improvements to land management, water quality, and riparian conservation, Pataha Creek remains deeply incised and disconnected from much of its original floodplain in the lower 35-40 km of the mainstem (Figure 1). Incision is a common problem in semi-arid streams in the western US and recently a survey of 500 km of the Walla Walla and Tucannon River watersheds found 259 km were incised and in a degraded condition (Beechie et al. 2007). Incision and disconnection of the flood plain is thought to be the result of loss of riparian function, straightening of the stream channel, removal large woody debris (LWD), and reduction of beaver populations (Pollock et al. 2014). These conditions have been well documented in the Intensively Monitored Watershed in Bridge Creek, a tributary in the John Day Watershed, Oregon (Pollock et al. 2007, Pollock et al. 2014). Much of Pataha Creek below the USFS boundary now has a simplified channel, lacks habitat diversity, has unstable banks, is single thread channel, and

shows little sign of being able to reconnect with its historic floodplain in the near future (i.e., next few decades; Figure 2).

2. Project Purpose

A. **State the project goal(s)**.

The goal of this project is to i) test the effectiveness of beaver dam ~~support~~ analog structures ~~(~~BDA) at ~~-~~ increasing habitat diversity, reducing incision, ~~-~~ and creating/enhancing~~and reconnecting~~ floodplain habitat in the lower reaches of Pataha Creek for the benefit of steelhead, Chinook, and bull trout populations~~laitons~~, and ii) implement a larger scale project based on the trial. This project could help to restore ecological based stream processes that are promoted by beavers (e.g., increased aggradation, reduced sediment and erosion, increased habitat diversity) and demonstrate a cost effective restoration method that may be applicable to many areas in southeast Washington (Figure 3).

B. **List the project's objectives.**

The specific objectives of our proposal are to:

- ~~To assess~~ Determine the potential for the Tucannon River watershed to support dam building beaver using the Beaver Restoration Assessment Tool (BRAT) developed by Dr. Joe Wheaton's lab at Utah State (http://etal.usu.edu/BRAT/) ~~Tucannon River and Pataha Creek potential for supporting dam building beaver using the Beaver Restoration Assessment Tool (BRAT) developed by Dr. Joe Wheaton's lab at Utah State (http://etal.usu.edu/BRAT/),~~
- Build 5-10 trial beaver dam analog structures (BDA) to ~~T~~test their effectiveness ~~of beaver dam support structures used~~ to reduce incision by promoting aggradation ~~using a trial of 5 structures~~, ~~and~~
- Develop a more comprehensive plan and treat 2-3 km of stream habitat with BDAs~~the method (and possibly ~ 5km if other landowners are signed up),~~ and.
- Build up to 50 more BDA~~/ a~~ year in 2016 and 2017.

3. Project Context

A. **Describe the location of the project in the watershed**.

The project will focus on Pataha Creek which enters the Tucannon River approximately 20 km upstream of the Snake River (Figure 4). However, we will assess the entire Tucannon watershed for the potential of this restoration action because it would be more cost effective than to just assess Pataha Creek (the focus of this proposal). Implementation of the trial BDS structures (Phase 2) and larger implementation (Phase 3) will occur on one private property: the Chapman and Wessels property (Figure 4). The length of stream available on these properties is approximately 2-3 km.

B. List the fish resources present at the site and targeted by this project.

Species	Life History Present (egg, juvenile,	Current Population Trend (decline, stable, rising)	ESA Coverage	Life History Target (egg, juvenile,

	adult)		(Y/N)	adult)
Steelhead	All Life stages	Limited data but appears stable/declining	Yes	All life stages but focus on juvenile rearing
Chinook (s & f)	Juvenile Life stages	Unknown but appears stable/declining	Yes	Focus on juvenile rearing
Bull trout	All life stages	Unknown but appears stable/declining	Yes	Adult passage, juvenile rearing

C. How proposal fits within regional recovery plan

The project is very relevant to the regional recovery plan because Pataha Creek:

- has listed steelhead, spring chinook and bull trout present
- is a MaSA for steelhead
- is a Priority Protection reach
- the proposed restoration will address ***priority habitat factors*** (embeddedness, temperature, riparian function, LWD, and channel confinement), and
- restoration of Pataha Creek is fundamental to the success of any habitat restoration actions in the lower 20 km of Tucannon River; beaver dam ~~support~~ analogs~~structures~~ could significantly improve the water quality (reduce sediment, temperature) and quantity (flow) of the lower Tucannon River.

Pataha Creek was recently upgraded to a major spawning area (MaSA) for the Snake River steelhead distinct population segment (DPS) and there is over 35-40 km of low elevation accessible habitat that is currently underutilized because of poor habitat condition. It is unknown if the lower reaches of Pataha Creek may have been an historically significant area of spawning due to its current degraded state and predominance of fine sediments, but the lower reaches were likely an important rearing area for juvenile steelhead and chinook, and potential refugia during high flows in the Tucannon River. The Salmon Recovery Plan currently lists Pataha Creek as a priority protection area, but due to the significant incision, poor habitat conditions and water quality, and its location (upstream of the lower Tucannon River), restoration actions in Pataha Creek could enhance a significant portion of juvenile rearing habitat and benefit the lower reaches of the Tucannon River which is recognized as a priority restoration area.

D. Explain why it is important to do this project now instead of at a later date.

Pataha Creek has had many of the past stressors reduced or eliminated by past restoration efforts such as improved upland farming practices, CREP, barrier removal etc. However, the degradation to the stream channel may not recover by itself or will take many decades to do so because of the disruption of riparian habitat and deep incision of the channel which has disconnected most of the stream from its historic floodplain. Typically, incision can happen fairly quickly (years to decades) but may take centuries or longer to recover naturally (Figure 5) (Beechie et al., 2007; Pollock et al., 2014). Instream actions appear ~~to~~ necessary to promote natural processes that will reduce incision, aggrade the stream bottom, and increases habitat diversity and floodplain connection. Also, the method we are proposing for restoration (BDA~~S~~)

have not been tried in this region and it would be beneficial to test this method because currently there are few cost effective options available for restoration work in Pataha Creek.

E. Previously reviewed or funded. No.

4. Project Description

A. **Provide a detailed description of the proposed project.**

We propose to use a method extensively tested in the Bridge Creek IMW (Jordan and Pollock 2007) using beaver dam ~~support~~ analogs~~structures~~ to reduce incision and create and expand~~reconnect~~ floodplain habitat (Pollock et al. 2014). Bridge Creek is similar in many ways to Pataha Creek as both have steelhead populations and both streams flow through a semi-arid environment where riparian habitat has been degraded resulting in an incised stream channel. Our approach will be to drive wooden fence posts across the stream channel (spaced 0.5 – 1.0 m apart) to act as a support structure for beavers to build dams. A small beaver colony exists downstream of the proposed restoration area and this project will be designed to aid in the expansion of this population so that the beavers can help create more diverse habitat – a more cost effective way to restore the stream than using more traditional engineered approaches. Should beavers not colonize the structures, the structures themselves have also been shown to reduce incision by trapping sediments in a similar way to natural beaver dams (Pollock et al. 2014).

Phase 1. Scoping and Feasibility Planning (2015)

During phase 1 we will visit the site to confirm regional habitat assessments and to determine the geomorphic characteristic of the study area. GIS will be used to assess watershed characteristics and we will use the Beaver Restoration Assessment Tool (BRAT) to further investigate the potential to restore beaver populations within~~to~~ the study area. The tool is a spatially-explicit model to assess the capacity of landscapes in and around streams and rivers (i.e., riverscapes) to support dam building activity for beaver. Capacity is assessed in terms of readily available nation-wide GIS datasets to assess key habitat capacity indicators: water availability, relative abundance of preferred food/building materials and stream power at base flows versus regular floods (i.e., 2-year recurrence interval flows). A more detailed restoration plan will be the result of phase 1. See Macfarlane and Wheaton (2013) and http://etal.usu.edu/BRAT/ for more details on BRAT. *** If the landowner does not agree with the plan it will be revised to the landowner's satisfaction. No work on the property will proceed without an approved plan.

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The plan developed in phase 1 will have the following:

- An assessment of the feasibility of the proposed restoration; if for any reason the project is determined to not be feasible at the proposed site (private property concerns or ecological/geomorphological) the project will be stopped.
- A risk management and maintenance section that outlines how actions will be taken prior, during and after any construction activities to protect and minimize any damage to private property. Budget will also be requested to prevent and repair any damage beavers may cause, such as protecting CREP planting, removing beavers or dams that are

built in places that compromise private property, etc. Additionally, w~~W~~e will specifically develop a reed canary grass management plan in consultation will local invasive species and riparian management experts due to the extensive colonies of this species along much of Pataha Creek.

- A detailed description of where each trial structure will be built and how it will be built.
- Identification of other landowners that are willing to participate in the project.

Phase 2. Trail and demonstration project (2015)

Based on the results of phase 1, we propose to conduct a trial of the proposed restoration action. The trial will involve the construction of ~~a maximum of~~ 5-10 trial beaver dam ~~support~~ analogs ~~structures~~ designed to promote beaver dam construction and maintenance in the study area. The intent of these structures will be to create more stable and dynamic beaver dams that promote trapping of fine sediments, aggradation of the stream bed upstream of the structures, creation of new floodplain surfaces as well as expansion of existing inset floodplain.~~reconnection of the floodplain, ,~~ and creation of more diverse stream habitat including side channels and pool habitat.

Briefly, these structures are built by driving in non-treated wooden fence posts into the stream bed, generally perpendicular to the flow (Figure 6). Posts are spaced 0.5-1.0 m apart and driven in 0.75 – 1.0 m depending on substrate conditions. Depending on the specific site and reach conditions some small woody debris (e.g., willow) may be woven into the posts to speed up the effect of the structure. Locations of specific structures will be based on the general design criteria described by Pollock et al . (2012) and we will target sites where:

- the height of incision in the surrounding area is less than 2-3 m so there is a reasonable chance of accessing historic floodplain areas (i.e., structures will withstand flood events if water can dissipate into floodplain areas more readily),
- soft banks exists upstream of the dam, which can act as suitable locations for bank lodges, and
- there is more existing riparian vegetation (i.e., vegetation is used as food and building material by beavers).

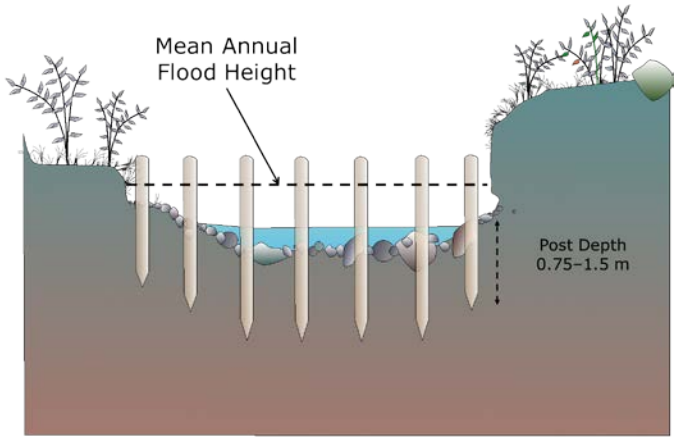

Figure 6. Schematic of a typical beaver dam ~~support~~ analog (BDA~~S~~) structure.

**** Special care will be taken to avoid any potential damage to existing infrastructure on the private property including irrigation equipment, agricultural areas, and private property or buildings. The intent of these structures will be to create more stable and dynamic beaver dams that promote trapping of fine sediments, aggradation of the stream bed upstream of the structures, creation of new floodplain surfaces as well as expansion of existing inset floodplain.~~reconnection of the floodplain~~, and creation of more diverse stream habitat including side channels and pool habitat.

****If the landowner is happy with the results of the trial and is willing to increase their participation in the project, a plan will be developed to build more structures (phase 3).

Phase 3. Development and implementation of a larger implementation plan (2016)
Based on the results of the trial structures and FULL agreement from the landowner, a plan will be developed to implement a larger restoration project with a maximum of 20-30/km over a 2-3 km of stream length. These structures will only be built if it is feasible to maintain protection of private property and infrastructure.

B. This proposal is not specifically intended to stabilize eroding banks.

C. **Steps in Application**.

This project includes three phases: 1. Assessment of potential for dam building beavers in the Tucannon River. 2. Implementation of a trial of the beaver dam support structure method. 3. Development of a larger implementation plan and implementation of a larger number of structures (~ 20-30/km over 2-3 km).

D. **long-term stewardship and maintenance obligations.**

There are no expected maintenance responsibilities for the landowner. The Grantee in accordance with the restoration plan that will be developed will, where necessary, maintain or

repair the BDA~~SS~~ throughout the life of the project. However, these structures are designed to be dynamic and work as a group and therefore, no maintenance is inherently required. All materials will be biodegradable.

E. Describe other approaches and design alternatives that were considered.

We considered two main alternatives. 1. Do nothing. This option assumes that incision is a natural process and over time, aggradation will occur, reconnecting the floodplain ~~and promoting~~. This is a plausible outcome, however, it could take decades to centuries or longer because of the severity of the incision, lack of riparian vegetation, and reduction in beaver populations from historic levels. This option does not seem like a tenable alternative, especially if recovery of salmon and steelhead populations in the region is a priority. 2. We also considered grading back the banks so as to mechanically widen the stream channel and reduce incision. This option would likely be cost prohibitive, highly disruptive to the riparian vegetation that does exist. We therefore, settled in on our preferred option – beaver ~~dam~~ dam analog ~~support~~ structures because beavers have well documented ecological benefits in low gradient stream systems (Naiman et al. 1986, Naiman et al. 1988) and because this method has been shown to increase the abundance, survival, and overall production of wild steelhead in a similar watershed (ISEMP 2013, Pollock et al. 2014).

F. **Othe studies that informed this project**

An entire Intensively Monitored Watershed Project has been devoted to the beaver dam support structure method and results are very encouraging. In 2009, 114 BDA~~S~~ structures were built over a 4 km long section of Bridge Creek, a tributary to the John Day River, OR (ISEMP 2013). Intensive fish and habitat monitoring in treatment and control areas within Bridge Creek and out-of-basin controls found that 1) significant aggradation occurred upstream of the structures (up to 1 m) in a short amount of time (i.e., 1-2 years), bankfull widths increased, pool frequency and depth increased, and the number of side-channels increased. Furthermore, groundwater elevation increased in treatment areas, and stream temperatures decreased downstream of the structures. Fish responses were also dramatic with a 30% increase in juvenile steelhead survival and overall there was an increase in production (g/area/season) in Bridge Creek (the treatment) compared to the control stream (ISEMP 2013).

G. **List all landowner name**. Anne Champan

H. **List project partners and their role and contribution to the project.** To be provided with final proposal.

I. **Stakeholder Outreach:**

There are no direct public safety concerns from this project because it will take place entirely on private land with the landowner's approval. The landowner will be made aware of all construction activities one week ahead of time.

J. **Contingency Planning:**

We first need to assess the Tucannon watershed (including Pataha Creek) for the potential to support ~~for~~ dam building beavers to fully understand the potential effectiveness of this proposal. We feel, based on our experience in other watersheds, that it is highly feasible but we need to confirm this with GIS analysis and site visits. Using beavers as a "tool" in restoration has potential risks. Beavers can harvest large numbers of trees and potentially block culverts and irrigation infrastructure. We will need to work closely with landowners and concerned parties to

negate these issues where possible. A risk management plan will be developed as part of the planning of this project. However, the low cost and ecological benefits should out--weigh~~t~~ the potential benefits.

K. Proposed time schedule.

Year	Period	Activity	Description
2015	Jan - Mar	Phase 1. Review exisitng information and develop preliminary plan	Review exisitng watershed assessments, conduct site visits, and run the BRAT model to determine the potentail for dam building beavers throughout the Tucannon watershed
	Apr - Sept	Phase 2. Implimentation of Trial Strucutres	Build a maximum of 5 beaver dam support structures as a trial and monitor pre condition of treamment and control site in study area (monitoring to be funded by ongoing monitoring projects)
	Oct - Dec	Phase 2. Assess trials	Conduct implementation monitoring
2016	Jan- June	Phase 3. Complete trial assessment and develop scaled-up implementation plan	Use information gathered from trial and GIS analysis to develop a more comprehnesive implementation plan for a scaled-up implementation
	Jul - Oct	Phase 3. Implement a large scale BDS structure project	Based on the trial results and scaled-up restoraiton plan construct a ~ 25 BDS structures over 1-1.5 km of study area
2017	Jul - Oct	Phase 3. Complete a large scale BDS structure project	install another ~ 25 BDS structures over an additon 1-1.5 km area of the study area
	Oct - Dec	Reporting	Provide a project completion report

L. **Describe your experience managing this type of project.**

Pomeroy Conservation District – The Pomeroy CD has very little experience with this particular type of project. That is the reason we contacted Eco Logical Research Inc. to bring their experience into this project proposal. Our primary focus over the years has been addressing the upland erosion and sedimentation problems for years and are now seeing the positive results from our efforts. We have addressed the most evident riparian concerns along the Pataha with the implementation of the CREP program, also mentioned earlier in this application. We will assist Ecological Research Inc. in any way they deem necessary. We assume that we will be the local entity for doing several on-site visits to monitor and record any changes that may be occurring under the direction of Eco Logical Research. We are looking forward to working with them on this project.

Eco Logical Research Inc. with assistance from Utah State University will be providing technical support and some project management and implementation duties as required. The primary people involved are Dr. Nick Bouwes, Dr. Joe Wheaton, and Dr. Stephen Bennett. The project team has managed dozens of restoration and monitoring projects related to stream habitat restoration and fisheries research. Dr. Bouwes and Dr. Bennett are currently managing two IMWs where restoration activities have already been implemented that are similar to those proposed in this application. Specifically, in Bridge Creek, a tributary to the John Day River, Dr. Bouwes was part of a team that developed a method to drive posts into the stream bottom to create starter

dams for beaver as part of the Bridge Creek IMW. As manager and president of Eco Logical Research Inc. Dr. Bouwes has managed numerous projects for Bonneville Power Administration and National Oceanic and Atmospheric Administration including the development and implementation of the Columbia Basin Habitat Monitoring Protocol and the John Day portion of ISEMP. Dr. Bennett has been an environmental consultant since 1990 and has managed several large restoration and habitat assessment projects for salmon and inland trout. Dr. Wheaton is the Director of Ecogeomorphology & Topographic Analysis Lab at Utah State and the Co-Director of Intermountain Center for River Rehabilitation & Restoration and as such manages numerous large--scale river restoration, assessment, and monitoring projects.

5. Design and Implementation Questions for Restoration Projects

A. **Professional engineer?**

No. Our project team consists of two fisheries ecologists/biologists (N. Bouwes and S. Bennett) and one fluvial geomorphologist (J. Wheaton). Dr. Bouwes has a PhD in Fisheries Ecology and has been working with the Integrated Status and Effectiveness Monitoring Program (ISMEP) on developing restoration and monitoring methods for salmon and steelhead since 2004. Dr. Bouwes currently manages Eco Logical Research Inc. and is an adjunct professor at Utah State University teaching Fish Ecology. Dr. Bennett has a PhD in Fisheries Biology with several decades of experience studying stream ecology with a focus on salmon, steelhead and inland trout biology and habitat requirements. Since 2008, Dr. Bennett has been coordinating the Asotin Creek IMW and developing the experimental, monitoring, and restoration plans proposed in this funding application. Dr. Wheaton has published extensively in the area of river processes and stream restoration. Dr. Wheaton teaches a course of River Restoration at USU as well as courses in GIS and Fluvial Hydraulics and Ecohydraulics.

B. Describe who will provide on-site management for the project.

Duane Bartels and Steve Bennett will be the primary onsite managers of this project.

C. Describe your design process and pre-restoration deliverables.

Our design process is a design-build process where we will 1) assess the watershed for suitability of the proposed restoration method, and 2) design 5-10 trial structures in the field based on the design criteria we have provided in this proposal. Our pre-restoration deliverables will be a assessment report and more detailed description of the exact location and types of strucutres to be built including specific hypotheses for each structure.

D. **Describe how you will document your project's as-built conditions**

We will record the following basic as-built conditions of each structure:

- Each structure will be tagged and monumented for future identification and location
- GPS location (accurate to ± 5 m)
- Number of posts used, ~~Height~~ height and width of the structure
- Hypothesized reponses
- Photo and video documentation of pre, built, and post conditions
- Instream habitat and floodplain conditions upstream and downstream of the structure.

E. **Describe the steps you will take to minimize the introduction and spread of invasive species during construction and restoration.**

We will work with the local landowner, forest service, and local conservation districts to identify and minimize the spread of invasive species by adopting best management practices while working in the study area. Additionally, we will develop a riparian vegetation management plan that will largely focus on reducing the current impacts of reed canary grass. Work vehicles will be inspected prior to accessing and leaving the study area and all vegetation will be removed.

Literature Cited

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Draft Application Review and Site Visit – REVIEW PANEL comments

Date: June 18, 2014

Panel Member(s) Name: Kelley Jorgensen and Steve Toth

Early Project Status: ☒ Reviewed
Project Site Visit? ☒ Yes ☐ No

1. Recommended improvements to make this a technically sound project according to the SRFB's criteria.

The project is more appropriately titled "Working *like* Beavers" rather than Working with Beavers, since it is not the intention to reintroduce beavers into the project area.

Response: There is at least one known beaver colony downstream of the proposed project area and a goal of the project is to have these beavers colonize the proposed structures upstream. This is why we selected that title. However, we are also employing the method of Beaver Dam Analogs (Pollock et al. 2014) that assumes the structures themselves will reduce incision, promote aggradation, floodplain creation and expansion and enhance the riparian corrider regardless of whether beavers occupy the structures. We have changed the title to "Using beaver dam analogs to restore salmon and steelhead habitat on Pataha Creek"

Please clarify whether the mainstem Tucannon will be included in the project – this proposed technique does not scale up to larger streams and rivers and the modeling efforts should be focused on smaller tributaries such as the Pataha.

Response: The mainstem Tucannon River is only included in the Assessment (Phase 1) of the project. In phase 1 we will conduct field and GIS based assessments of the Tucannon watershed to better understand incison issues and to model the historic, current and future potential to support dam building beaver colonies. The modeling will use the Beaver Restoration Assessment Tool (BRAT - http://etal.usu.edu/BRAT) designed by our technical team. Because much of the modeling uses readily available GIS data which are at the watershed scale it will be more cost effective to model the entire Tucannon watershed rather than just Pataha Creek. We also feel that much of the historic floodplain within laterally unconfined portions of the valley along the mainstem would have been very suitable for beavers and therefore the model will likely idenfity these areas as "high potential" to support large beaver colonies. However, we need to run the model to confirm this.

The application would be improved by a clearer articulation of project objectives. The following "S.M.A.R.T" criteria from the WDFW Stream Habitat Restoration Guidlines (2012) can help in the development of restoration objectives:
1. **S**pecific – objectives are clear, concise statements that specify what you want to achieve.
2. **M**easurable – objectives use parameters that can be measured before and after project implementation.
3. **A**chievable – objectives are geomorphically and ecologically possible.
4. **R**elevant – objectives are clearly related to and support the project goal.
5. **T**ime-bound – objectives are bound by a specified time frame.

Response: We have revised the goals and objectives to meet the above criteria.

We appreciate the attempt to emulate natural processes and reduce incision by promoting aggradation to improve floodplain connectivity rather than chasing the incision by carving down the floodplain elevation to match the current incision.

The technical team needs to work with local expertise in ecology and geomorphology to gain a strong understanding of the local systems and site conditions that may impact the success and longevity of the proposed project. One item of particular importance that would benefit from local perspective is understanding why the channel is disconnected from its floodplain, which is critical to identifying appropriate treatments and likely outcomes. (On site, the consultant noted that the channel likely hasn't incised as much as it seems , but instead has been subject to a combination of incision and hillside slumping. But hillside slumping seems less likely to have been a dominant landscape-forming process in these predominantly loess soils that are prone to incision.) Local expertise is also critical to understanding how to minimize the risk of reed canary grass colonization and spread in reconnected floodplains.

Response: We agree that local expertise is invaluable and will work with all appropriate land management agencies and local experts to better understand the historic impacts in the area, causes of incision, and potential for the restoration to reduce incision and promote aggradation. These activities will all be part of Phase 1 where we assess the local conditions and put them in context with what we have learned from this restoration approach in Bridge Creek, OR.

We would like to clarify the issue of hillside slumping. We do not know the actual history of this site yet and will learn a lot more during Phase 1. However, from an initial visit of the technical team, it appears that the valley has been significantly modified by ongoing farming pratices in the valley and hillslope erosion from intensive land use practices in the late 1800's and early 1900's in the uplands. These impacts appear to have increased the base elevation of the valley by an increase in erosion rates. At the same time, there was likely an increase in hillslope and tributary surface runoff rates because of large-scale changes in landcover which would provide the stream power to initiate incision. Therefore, it is unlikely that the reduction of incision will lead to a reconnection to a historic floodplain height because the current height of the top of the incision trench is likely not the height of the pre-disturbance floodplain. The issue of hillside slumping that was discussed on site was in relation to the Beechie et al. (2007) report on incision in Pataha Creek that suggested small streams have a different incision trajectory (relative to larger streams) because they are unable to evacute sediment entering the stream from hillside slumping. This prevents widening of the channel and slows natural recovery from incision. But we would like to stress, more investigation is needed to confirm these speculations.

We agree that reed canary grass is a significant concern and will require consulation with local riparianrain and invasive species biologists to develop an appropriate risk management plan to prevent the spread or maintenance of this invasive species. We have made specific reference to this in the risk management section of the proposal.

2. Missing Pre-application information.

3. Comments/Questions:

The project proposal is well written with detailed information about the project. The project sponsor may want to provide additional time and budget to communicate with nearby landowners about the project and to address potential concerns with future beaver activities. Ideally the restored areas get recolonized by beavers that are allowed to remain on the landscape and are not trapped or shot out of habit.

Response: We have alredy included budget and time for local consultation (as part of the project management) and will rely heavily on the project sponsor (Pomeroy Conservation District) to help coordinate local consultation. We anticipate meeting either formally in a public meeting or informally with local landowners to explain the project goals and our risk management plan as well as the potential beenfits of sustaining and promoting beaver populations in Pataha Creek.

4. Staff Comments:

EARLY APPLICATION Review and Site VISIT – lead entity and project sponsor responses

Directions: **By the final application due date**, applicants must revise their project proposals using "track changes" and update their PRISM applications and attachments, as needed, to respond to the review panel comments. In addition, please fill out the section at the end of the project proposal which asks how you responded to the review panel's comments.

Special Note: To help speed the local and SRFB Review Panel evaluation process, if for any reason throughout the application review process you update your project proposal based on SRFB Review Panel comments please update your project proposal using WORD "track changes" and re-attach your proposal in PRISM. This step will save time and focus the reviewer on the changes.

Response: We have appended the above responses to our application and have used track changes to revise the document as requested.

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Project Name:	Working with Beaver to Restore Salmon and Steelhead Habitat in Pataha Creek			
Compiled By:	Duane Bartels and Stephen Bennett			
Date:	April 22, 2014			

Draft Cost Estimate

Schdule	Item	Cost	Match	Description
Phase 1 (2015)	Watershed Assessment	7,500.00	-	review and refine existing watershed assessments, run the Beaver Resotoration Assessment Tool (BRAT), and conduct a field assessment
	Develop Restoration Plan	2,500.00	-	based on the watershed and BRAT assessments develop a preliminary plan for beaver assisted restoration throughout Pataha and Tucannon
	Project management and site visits	4,000.00	1,000.00	costs of project management onsite supervision and coordination/visits with landowner and SRSRB staff includes office and field expenses (i.e., office supplies, vehicles, etc)
subtotal		**14,000.00**	**1,000.00**	
Phase 2 - 2015 trial	Materials for construction of 5 structures	1,000.00	-	wooden fence posts ~ 20 per structure delivered
	Large Woody Debris including delivery	-	1,200.00	material to increase the effectiveness of the structure prior to beaver occupation (small and meidum size wood and slash)
	Equipment	-		
	post driver rental	-	1,000.00	hydraulic post pounder rental from SRSRB
	misc.	500.00	-	miscellaneous expenses (chainsaw maintenance, gas, repairs, etc).
	Construction Labor	3,750.00	-	crew of 4-5 people to move materials to site and construct 5 trial structures and site clean up after the project
	Implementation Monitoring	1,000.00	-	conduct detailed implementation monitoirng of all trial structures
	Refine Restoration Plan	2,500.00	-	based on the results of the trial revise the restroation plan developed in phase 1
	Project management and site visits	4,000.00	1,000.00	costs of project management onsite supervision and coordination/visits with landowner and SRSRB staff includes office and field expenses (i.e., ofice supplies, vehicles, etc)
subtotal		**12,750.00**	**3,200.00**	
Phase 3 - 2016-2017 full implementation	Materials for construction of ~ 50 structures	10,000.00	-	wooden fence posts ~ 20 per structure delivered
	Large Woody Debris including delivery	-	12,000.00	material to increase the effectiveness of the structure prior to beaver occupation (small and meidum size wood and slash)
	Equipment	-		
	post driver rental		2,500.00	hydraulic post pounder rental from SRSRB

	misc.	1,500.00	-	miscellaneous expenses (chainsaw maintenance, gas, repairs, etc).
	Construction Labor	22,500.00	-	crew of 4-5 people to move materials to site and construct 5 trial structures and site clean up after the project
	Implementation Monitoring	2,500.00	-	conduct detailed implementation monitoirng of all structures
	Final Report	2,000.00		final reporting
	Project management and site visits	9,000.00	1,000.00	costs of project management onsite supervision and coordination/visits with landowner and SRSRB staff includes office and field expenses (i.e., ofice supplies, vehicles, etc)
subtotal		**47,500.00**	**15,500.00**	
TOTAL BUDGET		**74,250.00**	**19,700.00**	
		93,950.00		

Appendix F: Landowner Acknowledgement Form

Landowner Information

Name of Landowner:

Landowner Contact Information:

☐ Mr. ☒ Ms. Title:

First Name: Rosie Last Name: Archer

Contact Mailing Address: 105 Maple Lane, Dayton, WA 99328

Contact E-Mail Address:

Property Address or Location:

1. (Landowner or Organization) is the legal owner of property described in this grant application.
2. I am aware that the project is being proposed on my property.
3. If the grant is successfully awarded, I will be contacted and asked to engage in negotiations.
4. My signature does not represent authorization of project implementation.
5. If I am affiliated with the project sponsor, I will recuse myself from decisions made by the project sponsor to work on or purchase my property.

Rosemary Archer
Landowner Signature

4/23/2014
Date

Project Sponsor Information

Project Name: Pataha Channel

Project Applicant Contact Information:

☒ Mr. ☐ Ms. Title

First Name: Duane Last Name: Bartels

Mailing Address: 910 Main St, Pomeroy

E-Mail Address: