Habitat Restoration Project Application

This application is based on the ERTG project review template. However, modifications necessary to satisfy the Estuary Partnership's project review process were made to the template. Habitat restoration project applications will be reviewed against both the Estuary Partnership's review criteria, as well as the ERTG project review criteria. The review process is described in greater detail in Section 2 (Project Narrative) of this application.

SECTION 1: BACKGROUND AND PROJECT DESCRIPTION

1. PROJECT INFORMATION

Project Title: Karlson Island Restoration Project
Project Type: ☐ Construction ☐ Acquisition ☑ Design / Planning

2. APPLICANT CONTACT INFORMATION

Organization: Columbia River Estuary Study Taskforce (CREST)
Project Manager/Title: Tom Josephson: Habitat Restoration Project Manager
Address: 322 NW 5th Ave, Suite 315, Portland, OR 97209
Telephone Number: (503) 943-2651 Email: tjosephson@columbiaestuary.org

3. PROJECT LOCATION

Latitude, Longitude: 46.205468, -123.605513
Watershed Name and Code (10 digit hydrologic unit code): Columbia River-Baker Bay (1708000605)
County/State: Clatsop County, OR
Columbia River Mile: 25
River or Stream Name: Columbia River
Distance from mainstem Columbia River (in river miles): Adjacent to the mainstem
Landowner(s)
☑ Public: Agency: US Fish & Wildlife Service
☐ Private: Name(s): Joel David: Preserve Manager

4. PROPOSED PROJECT SCHEDULE

Provide a list of major tasks to be completed as part of this project, start and end dates for each task, and a description of the task.

Project Task	Start Date	End Date	Task Description
Feasibility & 30% Plans	04/2012	10/2012	Project Analysis and 30% Design
Draft 60% Engineering Plans	11/2012	2/2013	60% Design
Draft 90% Engineering Plans & Permitting	2/2013	3/2013	90% Design and permit applications
Final Design	4/2013	4/2013	Final Design
Construction	7/2013	9/2013	Restoration construction work

5. PROJECT COST

Total Project Cost: $ 771,700 - $1,121,790
Estuary Partnership Share: $ 0
Applicant's Share: $ 771,700 - $1,121,790

Cost-share is not required for projects to receive funding through this funding opportunity.

6. PROJECT PARTNERS

List all anticipated funding sources and indicate the dollar value for of their cash or in-kind contributions. Mark the respective box to show if contributions have been secured or are pending.

Project Partner	Cash	In-Kind	Secured	Pending
BPA – CREST Contract	$121,790		X	
BPA – CREST Contract	$650,000-1,000,000			X

7. PROJECT SUMMARY

The Karlson Island restoration project will restore functional hydrology and fish access to over 320 acres of tidal marsh habitat. Main objectives of the project include maximizing access to tidal marsh habitat for juvenile salmonids species, improving hydrologic exchanges to more closely resemble natural conditions, improving hydraulics and flow patterns in the existing channels, and enhancing food web connectivity between the marsh floodplain and surrounding riverine system. Other sub actions include maximizing habitat structure and complexity, installing Large Woody Debris (LWD) to the slough network, and controlling invasive plant species. In addition, an existing deep scour hole will become less restrictive to juvenile salmonids as water velocities are reduced through the expansion of entry and egress points.

Through the restoration project over 2,050 feet of levee will be removed or notched, 760 linear feet of channel will be created, 6 acres will be replanted with native vegetation, 38 pieces of large woody debris will be added, and 9 acres will be treated for invasive species.

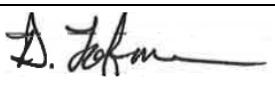
The project is currently at the 60% design stage. Final designs are scheduled for April 2013, followed by the permitting process. This project is scheduled to go to construction summer 2013.

Salmon Species which may benefit from this project

	Chinook Salmon (*Oncorhynchus tshawytscha*):		**Steelhead** (*Oncorhynchus mykiss*):
x	Snake River spring/summer Chinook salmon	x	Snake River steelhead
x	Snake River fall Chinook salmon	x	Upper Columbia River steelhead
x	Upper Columbia River spring Chinook salmon	x	Middle Columbia River steelhead
x	Upper Willamette River Chinook salmon	x	Lower Columbia River steelhead
x	Lower Columbia River Chinook salmon	x	Upper Willamette River steelhead
x	**Chum salmon** (*Oncorhynchus keta*) Columbia River chum salmon		**Sockeye salmon** (*Oncorhynchus nerka*) Snake River sockeye salmon
x	**Coho salmon** (*Oncorhynchus kisutch*) Lower Columbia River coho salmon		

8. AUTHORIZED SIGNATORY

I certify to the best of my knowledge that the information in this application is true and correct and that I am legally authorized to submit this information on behalf of the applicant.

Printed Name: Denise Lofman	Signature: 
Title: CREST Director	Date: 2/8/2013

SECTION 2: PROJECT NARRATIVE

Please answer the following questions. The responses to these questions will be the basis for evaluating and ranking the proposals. Please ensure text is single spaced, with no less than one inch margins and 11-point font. Refer to the ERTG Resources document (http://lcrep.org/sites/default/files/restoration/docs/Expert%20Regional%20Technical%20Group%20Resources.pdf), Estuary Partnership project review criteria (http://lcrep.org/sites/default/files/restoration/docs/Estuary%20Partnership%20Project%20Review%20Criteria.pdf), and definitions below (footnotes) when completing the project narrative. Reference to the Columbia River Estuary Conceptual Model (see above hyperlink for ERTG Resources document) can also be made to help standardize terminology and to provide descriptions for stressors, habitats, processes and functions. An example of a completed ERTG Project Template can be found on the Estuary Partnership's Project Application webpage (http://lcrep.org/sites/default/files/restoration/docs/Project%20Template%20Example.pdf).

Header:

Date	February 1, 2013
Prepared by	Tom Josephson (503) 943-2651 tjosephson@columbiaestuary.org
Sponsoring agency	US Fish & Wildlife Service Julia Butler Hanson National Wildlife Refuge Joel David: Refuge Manager (503) 795-3915 Joel_david@fws.gov
Funding agency	Bonneville Power Administration Ben Zelinksy 503-230-4737 bdzelinsky@bpa.gov
Site	Karlson Island Columbia River (Prairie Channel), Cathlamet Bay, Oregon River Mile (RM) 25
Project status or stage	60% Designs

Proposed Project:

Problem statement	Tidal wetland habitat loss has been identified as a priority concern in the Columbia River Estuary. Tidal marshes and swamps within the Columbia River Estuary have been reduced in size and function, and floodplain development and fragmentation has led to the isolation or elimination of many habitats historically used by juvenile salmon for rearing and refuge during their transition to salt water. Karlson Island is a 1400 tidal wetland marsh located in the eastern portion of Cathlamet Bay. A 320 acre portion of the island was diked off and used for cattle grazing in the late 1800's. The US Fish & Wildlife Service took ownership of the island in 1972 and designated it part of the national refuge system.

A portion of the levee breached in 1972-1973. This breach opened up the previously tidally restricted 320 acres, but also resulted in a deep scour hole emerging (~30 ft deep; adjacent channels are in the range of 10-12 ft deep). This scour hole has velocities that exceed 2 ft/s approximately 10% of the time (Tetratech 60% Hyrdology Report, 2012).

Although full tidal exchange has been returned to the site, ingress and egress to the interior of the island is restricted by remnant levees surrounding the island. These levees continue to alter natural hydrologic patterns while offering no flood protection or other benefits.

Vision/goal

The overall vision for the site is that functional processes are restored. By strategically breaching specific locations, naturally hydrology can be returned to the site and channel forming processes can return. Fish access will be enhanced through these new openings and water velocities will decrease at the scour hole location. Greater food web connectivity and nutrient exchange will occur as the higher marsh near the northern levee is opened to the nearby Prairie Channel. Himalayan blackberry and Reed Canary Grass will decrease as the available higher ground that these species depend on is removed.

Objectives

Objective: Maximize access to tidal marsh habitat for juvenile salmonids species

Objective: Improve hydrologic exchange to more closely resemble natural conditions

Objective: Improve hydraulics and flow patterns in the existing channels

Objective: Maximize habitat structure and complexity

Objective: Enhance food web connectivity between the marsh and surrounding river

Objective: Add large woody debris to the slough network

Objective: Control invasive species in the project area

Project action(s)

Year 1 (2012): Hydraulics modeling and Alternatives Analysis
Obtain 30% Designs

Year 2 (2013): Obtain Final Designs and Permits
Breach/remove levee in 9 locations
Install Large Woody Debris in the sloughs
Implement vegetation replanting plan
Treat invasive species in the project impact area

Project elements(s)/phases by yr

100% design completion (2013)
Implementation of project actions (2013)

Project size by yr	Strategic breaching at Karlson Island will require the removal of approval of approximately 11,700 cubic yards of materials. 2,050 linear feet of levee will be removed and 760 linear feet of channel will created. The project will install 38 pieces of large woody debris at 26 locations throughout the slough network. 6 acres will be replanted with riparian and marsh species and 9 acres will be treated for invasive species. (60% design documents and autocad drawings were used to determine the size of the project actions). The existing levee is approximately 3 miles long (15,840 feet long). This project will remove approximately 13% of this existing levee.

Linkage to Estuary Module: Estuary Module Action. Subaction(s) and Project Goal	Estuary Module Subactions:	CRE-10.1: CRE-9.4: CRE-15.3:	320 acres (a portion of this total acreage) 2.5 acres 9 acres

Pre-Assessment:

Location Map

Photo Point

Interior slough on Karlson Island. Photo taken on 4/11/2012 during an outgoing tide looking south. Water level was approximately 5.0 ft (NAVD88)

Collapsed tide gate at the former ferry landing plug. Photo taken on 7/19/2012 during an incoming tide. Water level was approximately 0.5 ft (NAVD88)

Vegetation along the northern levee (Elevation approximately 8 ft NAVD88)

Shallow water pond located near the northern levee. This water would be reconnected to Prairie channel at elevations 5.0 (NAVD88) and above.

Acoustic Doppler Current Profile (ADCP) used to measure channel bathymetry and currents flow. April 12, 2012.

Aerial image

Aerial view of Karlson Island looking north

Condition of physical metrics

Average tidal range:	6.77 feet*
Salinity:	Brackish
Ordinary high water tide elevation:	8.83 (NAVD88)**
Higher high water elevation:	11.25 (NAVD88)*
Two-year flood elevation:	9.12 (NAVD88)***

* NOAA Tongue Point gauge
http://tidesandcurrents.noaa.gov/station_info.shtml?stn=9439040%20Astoria,%20OR

**Mean higher high water level. NOAA Tongue Point gauge

***Calculated for Karlson Island based on Ft. Stevens gauge data. ACOE 536 Study for Karlson Island (2011)

Condition of habitat metrics

The project site is defined as Estuarine and Palustrine Emergent Tidal Marsh (USFWS 2010). Native freshwater herbaceous species including spirea *(Spirea douglasii),* wapato *(Sagittaria latifolia),* small-fruited bulrush *(Scirpus microcarpus)* and soft-stem bulrush *(Schoenoplectus tabernaemontani)* were identified in the flooded area, along with invasive species including purple loosestrife *(Lythrum salicaria)* and reed canary grass *(Phalaris arundinacea).* Reed canary grass is typically found on the higher elevation levees which also contain willow scrub habitat and some Himalyan Blackberry *(Rubus armeniacus).*

Several large channels lead to the interior of the island. Some of these channels have been altered by the digging of borrow ditches for the creation of the levee. Very few pieces of woody debris exist in these channels or on top of the marsh floodplain. Overall, the habitat conditions in the interior of the island and in the access channels appear to be simplified.

Condition of functional metrics	Juvenile salmonids have access to the site during all tide levels, although access may be limited due to high water velocities in the primary access channel, particularly during periods of high tidal exchange. Studies conducted at Karlson Island identified the fish species present at the site (Roegner et al 2004). Trap nets were set to sample juvenile salmonids in Cathlamet Bay in 2002. Both forested and shrub tidal channels were sampled at Karlson Island (Roegner et al 2004). Chinook salmon were the most frequently caught salmonid species at Karlson Island. Other salmonids found in Cathlamet Bay include: Chinook, coho, chum, and steelhead. In the greater Cathlamet Bay study chum and coho salmon appeared in all areas during the spring (March – May) and Chinook salmon were common throughout the sampling season (March – November).

Performance Anticipated:

Physical change	Three primary physical changes would occur as a result of implementing the proposed project. The first is reduced water velocities in the higher order tidal channels through opening several new tidal connections to the southern interior levee. The second is the excavation of levee barriers and channels to encourage passive development of interior channels. It is expected that over time, natural tidal fluctuation in the project area would increase the number and length of dendritic tidal channels. The third is the addition of large woody debris, which would moderate water velocities and enhance habitat quality. The actions of invasive species control, native vegetation restoration and placement of LWD would also restore off-channel riparian habitat and processes. The placement of log jams at the mouths of the levee breaches adjacent to the Columbia River is intended to create hydraulic complexity at the opening, preventing sedimentation along the opening and resulting in localized scouring that provides access for tidal flow and for fish. Improving the hydrologic conditions at Karlson Island through the breaching of levees will improve the access of salmonids species to an extensive area of off-channel rearing and refuge habitat. Water velocities at the scour hole will also become reduced as more water is able to enter and leave the island through multiple access points. Juvenile salmonids currently have limited access points to the site and by strategically breaching and reconnecting historic channels, the distance required to travel to the interior portions of the island will be reduced significantly.
Habitat change	The recommended actions will not change the amount of inundated area within Karlson Island, except at the levee breach locations. Instead, the actions will increase access to and value of existing habitat. Over time, a more dendritic system of tidal channels is expected to evolve due to the restored hydrology. The higher elevation marsh along the northern levee will be better connected to the surrounding Prairie Channel, enhancing food web productivity and connections.

Function change	An improvement in the hydrologic condition at Karlson Island through breaching of the levees will improve the access of salmonid species to an extensive area of off channel rearing and refuge habitat. Breaching will increase the habitat connectivity at the site from the Columbia River to off-channel estuarine wetland habitat. Tidal channels will be enhanced with large wood to increase refugia and provide cover and habitat diversity. The restoration of diverse tidally influenced off-channel habitats will promote food web productivity and increase available forage for salmonids. Reduced invasive vegetation and restoration of native plant communities will restore wetland function and site productivity.
Certainty of Success:	
Landowner support	Joel David of the US Fish & Wildlife Service is the refuge manager in charge of Karlson Island. He and his team of biologists have been consulted throughout the alternatives analysis and design process and are fully supportive of the project.
Constraints or show-stoppers	The levee system on Karlson Island needs to be decommissioned by the Army Corps of Engineers. CREST has been in negotiations with the ACOE on the levee issue for the past two years. The Portland district is supportive of the restoration project, but it needs federal approval. The federal approval process may take additional time.
Restoration technique	The primary restoration measures that would occur on this project include breaching levees, addition of woody debris, invasive species control, and revegetation. All of these measures would be constructed via the use of commonly available equipment such as excavators and dozers, are established measures, and have been implemented on other projects in the estuary and elsewhere with success.
Natural processes and self-maintenance	Restoration actions recommended for this site are intended to restore natural processes that will ultimately become self-sustaining and require little maintenance. Levee removal, tidal channel construction, and addition of anchored woody debris will not require maintenance.
Community Support	Numerous other habitat restoration projects have occurred in the vicinity of this project and the local community is supportive of the economic and ecological benefits that these projects are providing.
Project Management Experience	CREST has successfully completed a number of similar restoration projects throughout the Lower Columbia River estuary.
Potential Access Benefit:	
Distance of the project to the main stem Columbia River	The project area is located within a side channel of the Columbia River in Cathlamet Bay, approximately 4,000 feet from the mainstem.

Connectedness to mainstem	Following the restoration, the interior of Karlson Island will be connected to the Prairie Channel, which is a side channel of the Columbia River.
Species impacted	Salmonid species found in Cathlamet Bay include: Chinook, coho, chum and steelhead (Roegner et al 2004). All four of these species are likely to benefit from this project. <u>Most likely to benefit:</u> Lower Columbia River Chinook Salmon Lower Columbia River Coho Lower Columbia River Steelhead Columbia River Chum Salmon <u>May benefit:</u> Upper Willamette River Chinook Salmon Upper Willamette River Steelhead Middle Columbia River Steelhead Snake River Fall Chinook Salmon Snake River Spring/Summer Chinook Salmon Snake River Steelhead Upper Columbia River Steelhead Snake River Sockeye Salmon Upper Columbia River Spring Chinook Salmon

Potential Capacity Benefit:	
Habitat complexity	Habitat has been simplified at this site compared to historic conditions. Tidal sloughs have been blocked by levees, channels have been straightened and borrow ditches dug. There are little or no deposits of woody debris.
Water quality	Water temperatures were tested at the sites where fish surveys were conducted (Roegner et al. 2004). The temperatures at the two Karlson Island sampling locations did not vary as dramatically as other sites. Water temperatures began declining in mid-September and continued a cooling trend through December. However, warm temperatures were recorded in the summer months at times exceeding 86.F (30.C) at the forested site (Roegner et al. 2004), which is adjacent to the project site.
Invasive species	Purple Loosestrife is found in the marsh wetlands. Himalayan Blackberries are present on the tops of the levees.
Adjacent lands	The areas directly adjacent to Karlson Island are tidal mudflats, low elevation tidal marshlands, and Sitka Spruce swamps. Most of these islands and portions of the mainland are held in public ownership as protected lands or part of land trust conservation areas. These lands contain some invasive species but are otherwise in ecologically functional.

Monitoring:

Monitoring Plan:	Tier 3 Monitoring is planned for the site. Vegetation plots with elevation data and channel cross sections were recorded in summer 2012. These will continue to be monitored along with photo points for up to two years after the restoration project.
Management Plans:	This project is consistent with the EP's Management Plan's goal to restore 16,000 acres of wetland habitat. The Karlson Island project addresses the management plan's priority issues of restoring biological integrity and restoring areas altered by habitat modification.
Consistency with regional management plans Site management plan	The *2008 Biological Opinion for the Federal Columbia River Power Systems* lists among the habitat goals and strategies to implement in order to restore the populations of ESA-listed salmon and steelhead, to improve tributary and/or estuary habitat used by salmon for spawning and rearing, and improve juvenile and adult fish survival in estuary habitat. Implementation of this project is consistent with the above goals to improve salmonids habitat in the Columbia River Estuary. The *Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead* identifies management actions to improve the survival of salmon and steelhead migrating through and rearing in the estuary environments. The Karlson Island project is consistent with the management action CRE-*1 to restore and maintain ecological benefits in riparian areas and sub-actions* CRE-6.2 *Identify and implement dredge material beneficial use demonstration projects and habitat enhancement and/or creation*. Also sub-actions CRE-9.4 *restore degraded off-channel habitats with high intrinsic potential for increasing habitat quality*, CRE-10.2 *improve hydrology between wetlands and the channel and to provide juveniles with physical access to off-channel habitat*, and CRE-15.3 *implement projects to address noxious weeds infestations on public lands*.

Comments

Beechie, T.J., M. Liermann, E.M. Beamer and R. Henderson. 2005. A Classification of Habitat Types in a Large River and Their Use by Juvenile Salmonids. Transactions of the American Fisheries Society 134:717–729.

Beechie, T., H. Imaki, J. Greene, P. Roni, and G. Pess. 2011. Restoring Salmon in a Changing Climate. River Restoration Northwest Annual Symposium. Stevenson, WA.

Fresh, D., E. Casillas, L. Johnson, and D. Bottom. 2005. Role of the Estuary in the Recovery of Columbia River Basin Salmon and Steelhead: An Evaluation of the Effects of Selected Factors on Salmonid Population Viability. NOAA Technical Memorandum NMFS-NWFSC-69.

Kagley, A.N., K. Fresh, S. Hinton, G.C. Roegner, D.L. Bottom and E. Casillas. 2005. Habitat use by Juvenile Salmon in the Columbia River Estuary: Columbia River Channel Improvement Project Research. Prepared for the Northwest Division United States Army Corps of Engineers, Portland, OR.

Johnson, G.E, N.K. Sather, A.J. Storch, D.J. Teel, J.R. Skalski, E.M. Dawley, A.J. Bryson, G.R. Ploskey, C. Mallette, T.A. Jones, A,B, Borde, S.A. Zimmerman, E.S. Van Dyke, D.R. Kuligowski, and K.L. Sobocinski. 2011. Ecology of Juvenile Salmon in Shallow Tidal Freshwater Habitats of the Lower Columbia River, 2007–2010. Prepared for the Bonneville Power Administration, U.S. Department of Energy Contract DE-AC05-76RL01830.

Lower Columbia River Estuary 536 Studies: Reconnaissance Report. Karlson Island. US Army Corps of Engineers, Portland District. Prepared by Tetra Tech Inc. 2011

Roegner G.C., A. Baptista, D.L. Bottom, J. Burke, L. Campbell, C. Elliot, S. Hinton, D. Jay, M Lott, T. Lundrigan, R. McNatt, P. Moran, C.A. Simenstad, D. Teel, E. Volk, J. Zamon and E. Casillas. 2008. Estuarine Habitat and Juvenile Salmon: Current and Historical Linkages in the Lower Columbia River and Estuary, 2002-2004. Prepared for the United States Army Corps of Engineers, Portland District, Contract W66QKZ20374382.

Roegner, G.E., E.W. Dawley, M. Russell, A. Whiting, and D.J. Teel. 2010. Juvenile Salmonid Use of Reconnected Tidal Freshwater Wetlands in Grays River, Lower Columbia River Basin. Transactions of the American Fisheries Society 139:1211–1232.

SECTION 3: PROJECT BUDGET

Task	Budget
Hydraulic Modeling, Alternative Analysis, & 30% Designs	$49,700
60%, 90%, and Final Designs	$72,000
Construction	$650,000 - $1,000,000
Grand Total	**$771,700 - $1,121,790**

SECTION 4: MAP AND PHOTOS

See attached files