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: Gnat Creek North Restoration Project
Project Type: ✔ Construction ☐ Acquisition ☐ Design / Planning

2. APPLICANT CONTACT INFORMATION

Organization: Columbia River Estuary Study Taskforce (CREST)
Project Manager/Title: Madeline Dalton/ Habitat Restoration Project Manager
Address: 750 Commercial Street, Room 205
Telephone Number: (503) 325-0435 Email: mdalton@columbiaestuary.org
Fiscal Agent: CREST- Paula Gerttula

3. PROJECT LOCATION

Latitude, Longitude: 46.116, -123.318
Watershed Name and Code (10 digit hydrologic unit code): Lower Columbia (17080006)
County/State: Clatsop County, OR
Columbia River Mile: 27
River or Stream Name: Gnat Creek
Distance from mainstem Columbia River (in river miles): 2.5- 3 miles from Gnat Creek confluence with Cathlamet Bay
Landowner(s)
☐ Public: Agency:
☑ Private: Name(s): Marvin and Nancy Autio, and the Eikrem Family Trust

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
Restoration Construction Work	7/15/2013	9/30/2013	Breach Existing Levee in 3 locations and enhance 2 existing openings.

5. PROJECT COST

Total Project Cost: $ 259,000
Estuary Partnership Share: $ 250,000

Applicant's Share: $ 9,000

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
US Fish and Wildlife Service	$9,000		X	

7. PROJECT SUMMARY

Provide a 250 word summary of the project, including the following: project type (i.e., design, restoration, acquisition); project description; number of acres or miles treated; habitat function(s) being restored; benefit to salmon; timeline; and partners.

Gnat Creek is located in the Nicolai-Wickiup watershed of Clatsop County, Oregon and is a tributary of the Columbia River through Blind Slough at approximately river mile 27. The proposed project site includes approximately 60 acres of a 72 acre wetland owned by three private landowners. This wetland is immediately downstream from a restoration project that was completed in 2012 on a separate wetland property owned by the Oregon Department of Forestry (ODF). The goal of this project is to continue the work completed on the ODF property by restoring full tidal influence to approximately 80 total acres of currently diked tidal wetlands. Project actions will include removing portions of the existing levee in 5 locations within the property boundaries of 2 of the properties within the wetland complex. Re-establishing tidal influence to the site will benefit native fish and wildlife species dependent on tidal wetlands.

The project aims to increase function of the site by restoring full tidal inundation and increasing access to preferred off-channel habitat for juvenile salmonids. Restoration will include:

- Breaching the levee in 3 locations
- Expanding natural openings in 2 locations
- Invasive plant treatment

Restoration will focus on promoting both estuarine processes and habitat structure to benefit a variety of salmonids, waterfowl, and other estuarine species.

The project is currently in the 90% design stage. These designs will be completed by March 2013. We are seeking funding to complete the construction portion of this restoration project. This project is scheduled to go into construction in the summer/ fall of 2013.

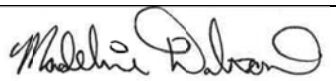
Note which of the 13 ESA listed salmon Evolutionarily Significant Units (ESUs) or steelhead Distinct Population Segments (DPSs) found in the Columbia River will benefit from the project:

	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	X	**Sockeye salmon** (*Oncorhynchus nerka*) Snake River sockeye salmon
X	**Coho salmon** (*Oncorhynchus kisutch*) Lower Columbia River coho salmon		

If ESU information is unavailable, specify if ocean-type or stream-type salmonids will benefit from project. (http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Maps/Index.cfm)

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 Madeline Dalton	
Title Habitat Restoration Project Manager	Date 2/5/2013

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 5, 2013
Prepared by	Madeline Dalton (503) 325-0435 mdalton@columbiaestuary.org
Sponsoring agency	CREST Madeline Dalton: Habitat Restoration Project Manager (503) 325-0435 mdalton@columbiaestuary.org
Funding agency	Bonneville Power Administration, Ben Zelinsky, 503-230-4737, bzelinsky@bpa.gov/ US Fish and Wildlife Service, Amy Horstman, 360-604-2500, amy_horstman@fws.gov
Site	Gnat Creek North 8N-7W-10, 10 The Gnat Creek watershed drains into tidal Gnat Creek near Blind Slough, located at approximately River Mile 27 of the Columbia River (source data: USGS). 46.116, -123.318
Project status or stage	This project is currently in the 90% Design Phase.

Proposed Project:

Problem statement	Gnat Creek borders the unincorporated community of Brownsmead at approximately river mile 27. Through extensive diking and wetland reclamation efforts in the late 19th century, Brownsmead was developed on the bank of the Columbia River by W.G. Brown, a well-known engineer of Portland. Much like the other slough networks built throughout the Brownsmead community, the tidally influenced lower portion of Gnat Creek was altered for grazing and agriculture. As a result, it became disconnected to the adjacent floodplain due to the construction of a levee system, and the natural tidal sloughs through much of the wetlands were channelized. The simplification of available aquatic habitat has contributed to the decline of native salmonids within the lower Columbia River estuary, particularly by diminishing habitats associated with the juvenile life history stage. The altered hydrology of the system has resulted in reduced floodplain inundation and less foraging opportunities for rearing salmonids.
Vision/goal	VISION: The goal of this project is to restore floodplain access for juvenile salmonids that

may be rearing in the Gnat Creek estuary. Concurrently, as the floodplain is reclaimed, passive development of tidal channels is expected to accelerate and expand as inundation periods increase.

Objectives	Objective:	Reconnect 60 acres of historical tidal floodplain with the mainstem of Gnat Creek by removing or breaching portions of the existing levee along over a mile of lower Gnat Creek. This action will provide increased forage and floodplain refuge habitat opportunities for juvenile salmonids during periods of tidal inundation and/or high flows.
	Objective:	Increase habitat complexity throughout the reconnected wetland through the placement of large wood and enhancement of existing native wetland vegetation, which will increase on-site primary production, provide refuge from potential predators, and increase overall floodplain roughness.

Project action(s)	Year 1:	Complete Project Feasibility Analysis and Preliminary Designs
	Year 2:	Complete 100% Project Designs and Construction Plans and Obtain Permits
		Breach Remnant Levee System and Enhance Existing Openings
		Install Large Woody Debris within the Existing Wetland
		Implement Vegetation Enhancement Plan for disturbed areas on the levee

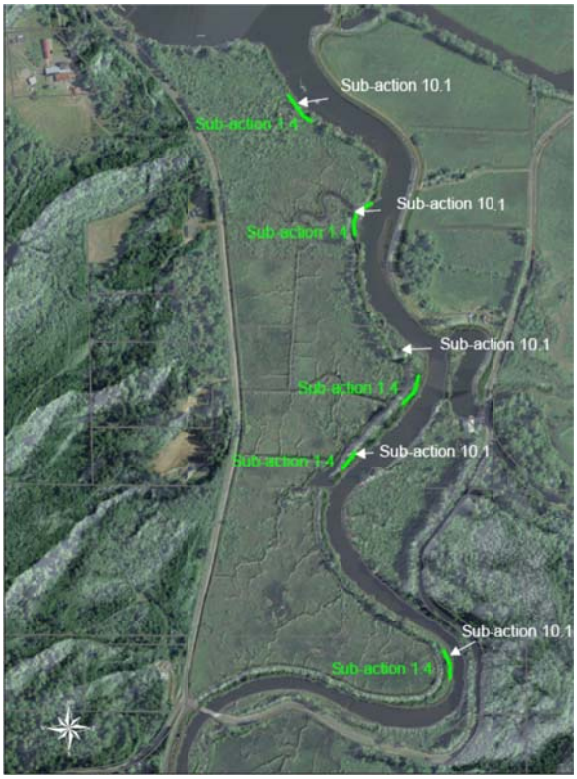
Project phase by year	Project Feasibility Analysis and Preliminary Designs (Fall/ Winter 2012) 100% design completion (Winter 2013) Implementation of project actions (Summer 2013)
Project size by year	Over 60 acres of tidal floodplain will be reconnected through the removal or breaching of the existing levee along 1.1 miles of lower Gnat Creek. The current designs recommend breaching the levee in 3 locations, and widening existing natural breaches in 2 locations to improve access and floodplain connection. The proposed breaches will be, on average, about 150 linear feet in length. All implementation actions are anticipated for the summer/ fall of 2013. Project size was determined through a combination of ArcGIS 9.3 spatial analysis in combination with surveys conducted by HLB Otak.

Linkage to Estuary Module:

Estuary Module Action. Subaction(s) and Project Goal	Estuary Module Subactions:	CRE-1.4:	0.3 acres
		CRE-10.1:	60 acres*

These values were obtained by looking at the overall wetland acreages of the project site, and looking at the sum of the levee areas that will be treated for invasive plant species removal, and native plant installation.

* This area is based on the assumption that the 21 acres of wetland habitat that was restored by the Gnat Creek restoration project on ODF property has already been accounted for.



Sub-Action Map of Project Site

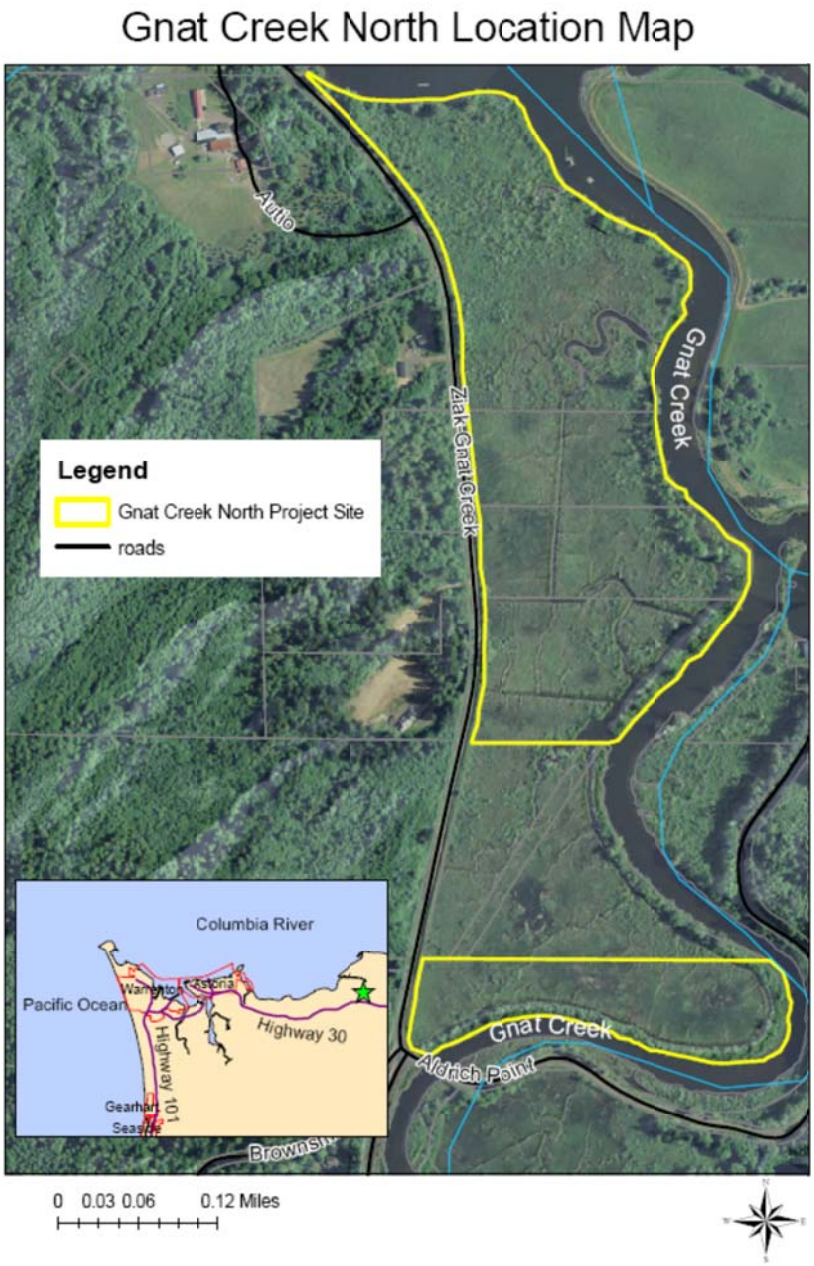
Pre-Assessment:

Photo Point

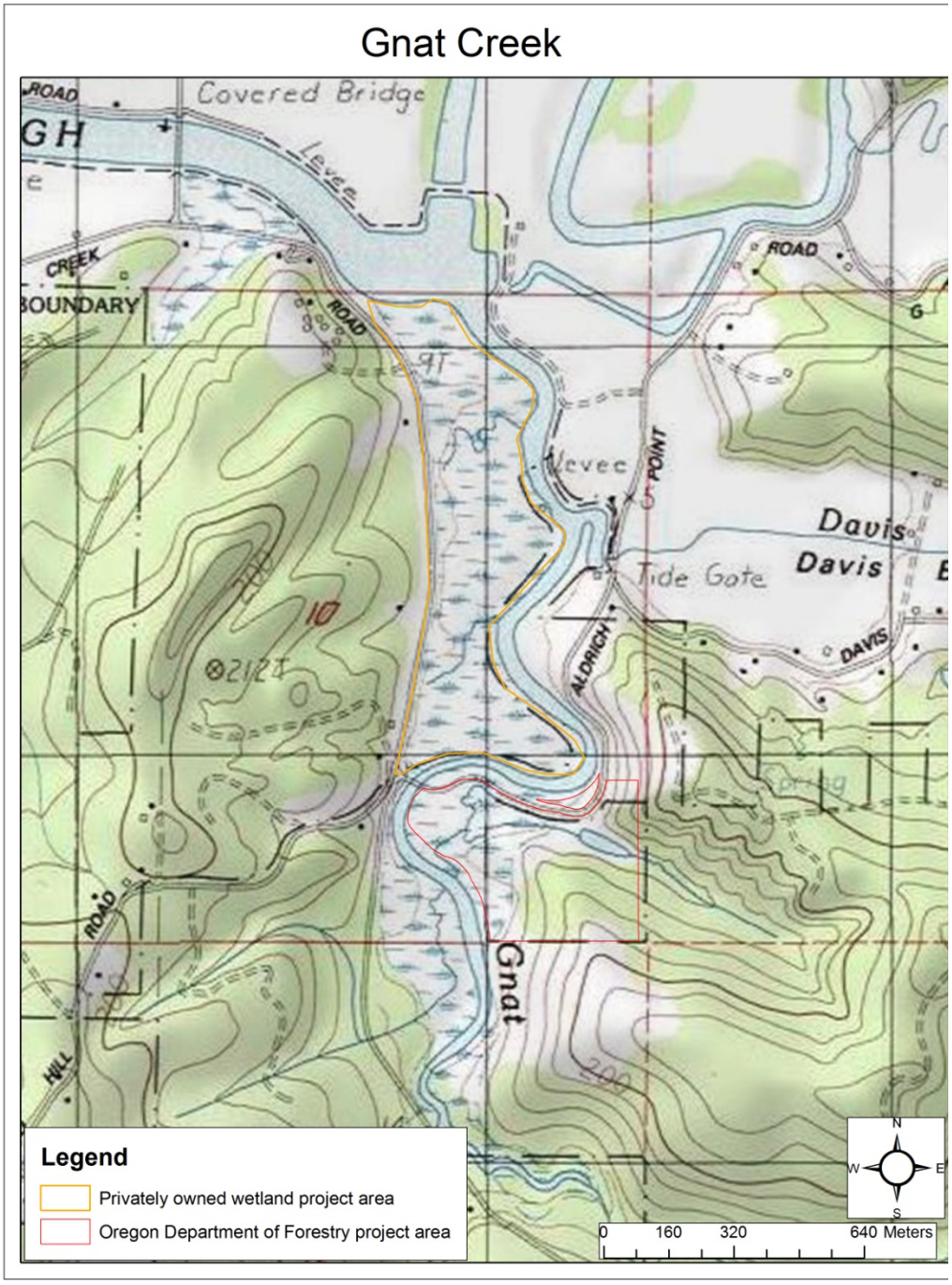
Photo taken from the berm along Ziak- Gnat Creek Lane looking eastward at the wetland at low tide during the winter of 2012

Picture taken from mainstem Gnat Creek looking westward at Gnat Creek levee. Photo taken during the winter of 2013 during the rising tide.

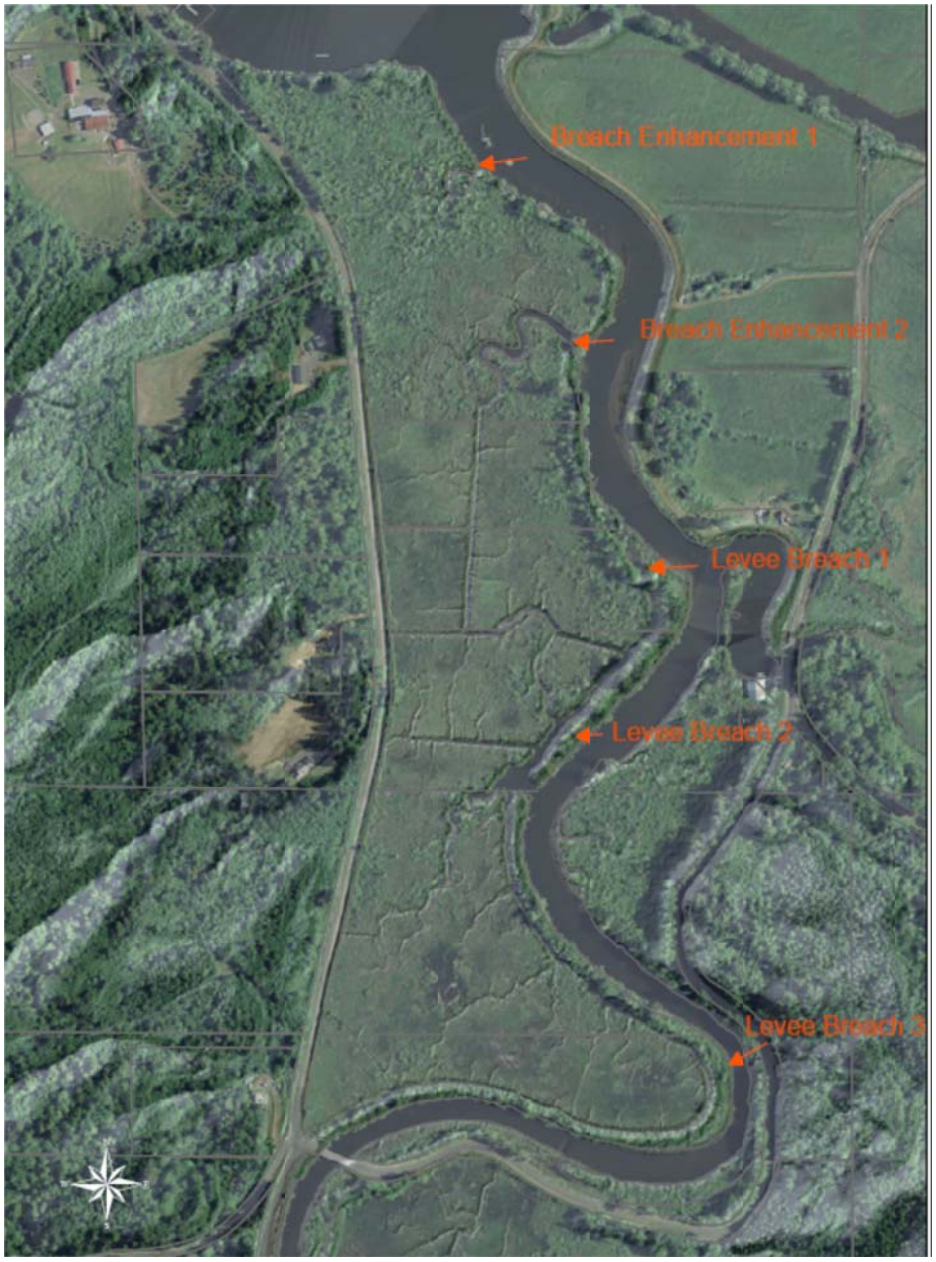
Aerial image



Aerial View of Restoration Site.



Topographic depiction of project area



Proposed Gnat Creek North Levee Removal Areas

Condition of physical metrics

Average tidal range:	8.61 feet
Salinity:	0.5 ppt*
Ordinary high water tide elevation:	8.23 feet (NAVD88)**
Higher high water elevation:	8.97 feet (NAVD88)**
Two-year flood elevation:	11.5 (NAVD88)***

* Average salinity based on CREDDP data.
Based on Previous water year data October 2009-September 2010

Condition of habitat metrics

The tidal wetland conditions of the Gnat Creek site are dominated by bulrush and sedge marsh, which are low, brackish marshes that are located on silty or sandy substrate. The wetlands are inundated regularly by high tides, drained diffusely, and are continuously vegetated.

Condition of functional metrics	Due to the proximity to the Cathlamet Bay, it is assumed that juvenile salmonids originating from the Lower Columbia ESU and all Interior Columbia River ESU's may potentially utilize all available habitats of tidally influenced Gnat Creek. Species potentially present during various times of the year include all 13 Columbia River ESA listed salmonid species. Historic salmonid distribution in the Gnat Creek watershed likely included chum, coho and fall Chinook salmon and winter steelhead and coastal cutthroat trout. During 2003-04, spawning surveys conducted by ODFW research staff observed spawning fall Chinook salmon, coho salmon and winter steelhead throughout the 1.8 miles below the ODFW Gnat Creek hatchery. The hatchery is located roughly 3.5 miles upstream of the proposed project area and currently produces spring Chinook (mid-Willamette River stock, released out-of-basin) and winter steelhead (Big Creek stock, released on-site). Hatchery production was established in 1960 as part of the Columbia River Fisheries Development Program (Mitchell Act) and is used to mitigate loss of fishing and harvest opportunities resulting from the Columbia Basin hydropower system (ODFW 2010). Of the species observed by ODFW spawning surveyors in 2003-04, only the contemporary presence of juvenile coho has been confirmed at the site thus far. A snorkel survey was conducted on the ODF property, immediately upstream of the currently proposed project site, by CREST staff March 22, 2011 covering all visible sections (depth <1m) of the impoundment pond, the tributary habitat above the impoundment pond and below the push-up dam, and throughout the tidal ODF wetland. The tidal wetland was surveyed near the peak of flood tide. Young-of-the-year coho were observed in the tributary section between the impoundment and the ODF wetland in densities as high as 142 coho parr/m^3. Due to the close proximity and similar wetland characteristics, it is likely that similar species are also utilizing the Gnat Creek North wetland.
Performance Anticipated:	
Physical change	Performing additional levee breaches will increase habitat connectivity and restore tidal and floodplain processes to over 60 acres within the lower Columbia River estuary. Installation of large woody debris will increase floodplain roughness, promoting habitat heterogeneity through development of microtopography and propagation of diverse wetland plant strata.
Habitat change	Following restoration activities, the project site will be re-introduced to tidal and seasonal flood inundation patterns that allow salmonids to access preferred rearing and refuge habitat. Diurnal tidal action will passively reconfigure wetland tidal channels and continue to generate a native estuarine wetland vegetation community.
Function change	The restored estuarine habitat is intended to increase preferred off-channel habitat for salmonids and improve habitat connectivity, promote food web productivity, increase available forage, provide cover from predation, and reduce riparian invasive species.
Certainty of Success:	
Landowner support	The Gnat Creek North project area is owned by 3 separate families. The two families with the largest parcels are extremely supportive of the project and have consented to having construction activities completed on their properties. The third landowner indicated that he would not like us to work on his property, but did not disprove of the restoration project as a whole.
Constraints or show-stoppers	Potential issues with constructability of removing remnant levee, especially because the breach locations are only accessible by boat, are being explored now by CREST and our consultant team led by Henderson Environmental Design Build Professionals. Sediment removal logistics are also being explored. However, we do not anticipate the uncertainties

	of this restoration technique to prevent the project implementation.
Restoration technique	Levee removal and large woody debris installation is a widely utilized technique for tidal wetland restoration. With proper geotechnical analysis and engineering, this restoration technique has a low level of technical uncertainty. Barging large equipment out to levee breach locations is less common, but this technique has been conducted previously for other restoration projects in the Columbia River estuary, such as the Haven Island Project.
Natural processes and self-maintenance	Levee removal actions proposed for Gnat Creek North will re-establish natural hydraulic processes and require little or no maintenance activity. Some maintenance will be required for the native plantings over a period of 2-3 years to ensure their survival.
Community support	The Gnat Creek Restoration project has received positive feedback from the surrounding community. Both the private and public landowners have expressed excitement at the opportunity to partner in a project to positively impact the environment and their local community. CREST was able to partner with the Brownsmead Drainage District to donate excavated material from the dam removal and levee breaching on the ODF property for the maintenance and repair of functional levees in the community. We are also discussing the possibility of donating additional materials from the Gnat Creek North project to the District.
Project management experience	CREST has been involved with numerous restoration projects throughout the Columbia River estuary and its tributaries. CREST has developed, managed, and implemented similar wetland restoration projects that involve breaching levees or material removal such as the Otter Point Wetland Restoration, the Gnat Creek Tidal Wetland Restoration on ODF property, the Colewort Creek Wetland Restoration, and the Seaside levee breach properties on the Lewis and Clark River.
Potential Access Benefit:	
Distance of the project to the main stem Columbia River	The Gnat Creek restoration area is located approximately 3 miles from Cathlamet Bay and the mainstem Columbia River.
Connectedness to mainstem	The project area will have complete connectivity to the mainstem Columbia via Blind Slough/Gnat Creek following restoration activities, including fully functioning tidal inundation.
Species impacted	Tidally influenced reaches of Gnat Creek, including the proposed restoration project area, may also provide juvenile rearing opportunities for other life history variations of salmonids from throughout the Columbia River basin. Juvenile Chinook salmon are found in the Columbia River estuary throughout the year and appear to be utilizing the estuary during April-November as rearing habitat (Johnson et al 2011, Roegner et al 2008, Fresh et al 2005). Microsatellite DNA analysis conducted on samples collected by Roegner et al (2008) during 2002-2004 indicated that while the majority of salmonids sampled were of Lower Columbia River origin, 15% of them were identified as Interior Columbia or Willamette River fall and spring Chinook origin where 2.9% could be positively identified as hatchery origin. An observed increase in mean fork length between individuals captured at the river mouth leaving the estuary from those captured in the tidal freshwater portion entering the estuary indicates that valuable foraging opportunities are available (Fresh et al 2005). Roegner et al (2008) also reported evidence for juvenile Chinook salmon growth while residing in the estuary. Several different size classes of salmonids can be found throughout the year indicating that multiple life history strategies are expressed in the estuary at various times (Johnson et al 2011, Roegner et al 2008, Fresh et al 2005). Based on these findings, Gnat Creek restoration activities would primarily benefit Lower

Columbia River Chinook salmon ocean-type life history variants, where juveniles may spend weeks or months rearing in the estuary before migrating out to sea. However, other Interior Columbia River stocks where an ocean-type life history strategy is expressed may also benefit from restorative actions within the tidally influenced, shallow-water wetland habitat types associated with Gnat Creek. Sampling conducted by the Pacific Northwest National Laboratory (Johnson et al 2011) indicates that juvenile salmonids can be caught in shallow tidal freshwater habitats all year where the highest densities occur in spring due to high abundances of sub-yearling Chinook salmon, the majority of which are believed to be wild stock. Also, based on climate change models where interior Columbia River habitats are predicted to shift from stream-type to ocean-type over the next several decades, there could be an increasing number of juvenile Chinook requiring estuarine rearing habitat (Beechie et al 2011).

Additionally, stream-type Chinook salmon or other interior hatchery stock could potentially benefit, as other sampling efforts have captured yearling Chinook in similar tidal freshwater habitats. Roegner et al (2010) found fin-clipped yearling Chinook salmon presumably of out-of-basin origin at a tidal freshwater site approximately 10km from the mainstem Columbia, a similar proximity of Gnat Creek to the mainstem.

Oregon Department of Fish and Wildlife has also initiated a program to reintroduce chum salmon into the Lower Columbia River basin, where they have been functionally extirpated for several decades. Roughly 100 adult chum were collected in fall 2010 from the Gray's River, a stock that is believed to be most genetically representative of those historically present throughout the Lower Columbia River. During April 2011, approximately 106,000 juvenile chum salmon were released into lower Big Creek only a few miles from the Gnat Creek restoration site. Chum salmon are known to spawn in low gradient habitats just upstream from the tidal salinity gradient (Salo 1991). After several weeks of incubation fry begin to emerge from the spawning gravels and then migrate towards the ocean, spending anywhere from a few days to a few weeks rearing in estuarine habitats (Salo 1991). Any improvement made to the associated low gradient, tidally influenced rearing habitat types—such as those found in lower Gnat Creek—may greatly improve the probability that juvenile chum may survive to reach the ocean.

The stocks likely to benefit from habitat enhancement at Gnat Creek are:

<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	Habitat complexity for the proposed restoration area of Gnat Creek, in terms of the available

complexity	wetland habitat and associated components, currently displays characteristics associated with a habitat that historically was isolated through levee and tide-gate actions, and channelized likely for grazing and/or agricultural activity, and is now slowly on a trajectory towards recovery since the tide-gate mechanism once controlling tidal inundation has failed. Although the tidal inundation process likely has improved habitat conditions and tidal channel formation, the floodplain processes that have been eliminated due to the presence of the levee should be restored to allow the site to reach the full complexity capacity that historically may have been present. There are no visible remnants of floodplain functions, such as deposited large woody debris present on the historic floodplain.
Water quality	Lower Gnat Creek exceeds Oregon DEQ temperature TMDL's listed for salmonid spawning activity (September 15 period). There are no other known water quality limitations.
Invasive species	Invasive plant species within the project site are concentrated in the areas that were previously disturbed due to construction and maintenance of the levee system. Himalayan blackberry is extensive along almost the entire length of the levee. Reed canary grass is also fairly prevalent on the levee, along with small communities of holly and English ivy.
Adjacent lands	Adjacent lands are generally used for forestry and rural residential purposes and can generally be regarded as functional.

Monitoring:

Monitoring Plan:	The parameters monitored for this site will include landscape changes such as channel cross-sections and photo points, water quality parameters including temperature, dissolved oxygen, and depth.
Reference Site:	The tidal freshwater portion of Gnat Creek above the project area is in natural (un-diked condition and provide an excellent adjacent reference site.

Management Plans:

Consistency with regional management plans	This project is consistent with the EP's Management Plan's goal to restore 16,000 acres of wetland habitat. The Gnat Creek project addresses the management plan's priority issues of restoring biological integrity and restoring areas altered by habitat modification.
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 Gnat Creek project is consistent with the management sub-actions CRE-10.1 to breach or lower the elevation of dikes and levees; create and/or restore tidal marshes, shallow-water habitats, and tide channels; and CRE-1.4 to restore and maintain ecological benefits in riparian areas; this includes managing vegetation on dikes and levees to enhance ecological function and adding shoreline/

instream complexity for juvenile salmonid refugia.

Comments *Include comments or other pertinent information.*

References

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.

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

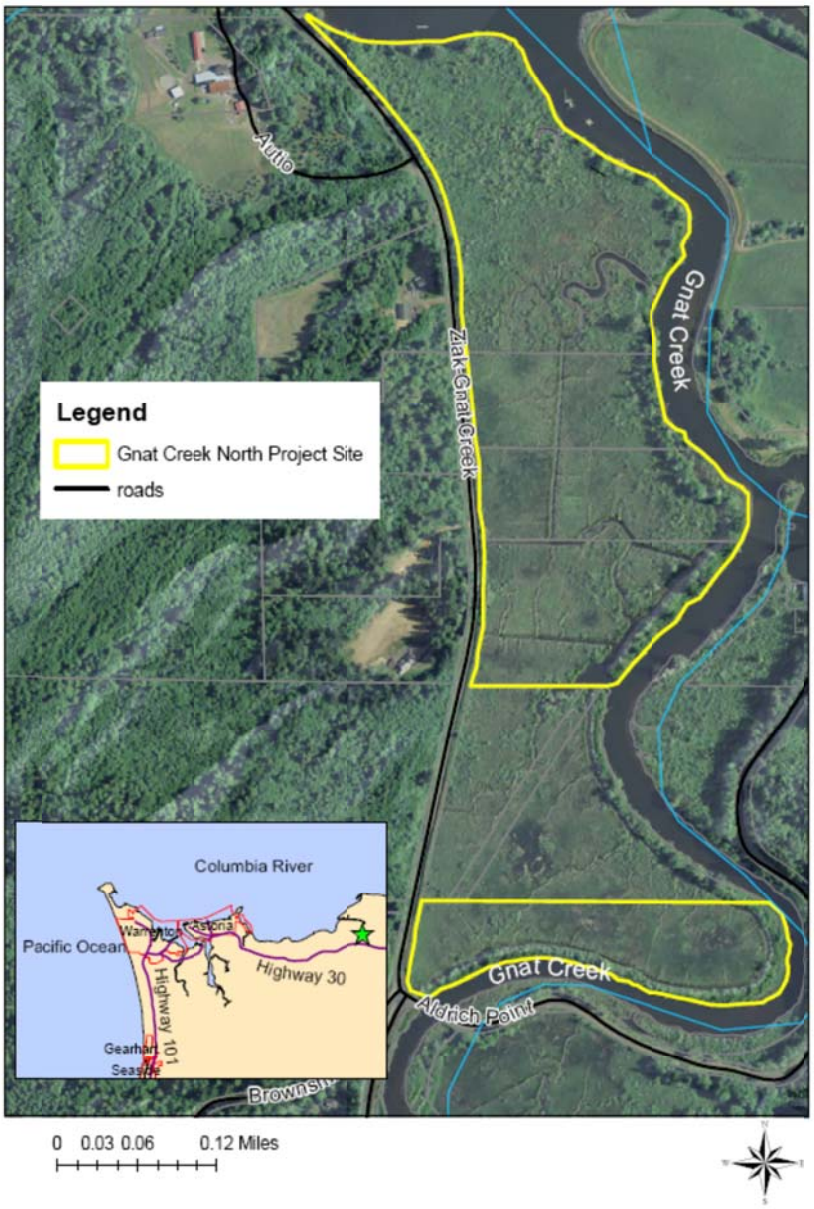
Gnat Creek North Wetland Restoration January 2013		Quantity	Unit	Cost per Unit	Total Cost	Estuary Partnership Expense	Cost Share Expense	Non-Cost Share Expense	Cost Share Source
Task 1.	**Mobilization and Site Preparation and Clean- Up**								
	Equipment Mobilization	1	LS	$20,000	$20,000	$20,000	$0		
	Clear Levee Breach and Disposal Areas	2.5	AC	$3,000	$7,500	$0	$7,500		USFWS
				Task Subtotal	$27,500	$20,000	$7,500		
Task 2.	**Install Temporary Sediment and Erosion Control Measures**								
	Sediment Fencing	550	LF	$1	$550	$550	$0		
	Straw Wattles	1000	LF	$2	$2,000	$2,000	$0		
	Turbidity Curtains	250	LF	$28	$7,000	$7,000	$0		
	Misc. ESC Measures	1	LS	$2,500	$2,500	$2,500	$0		
				Task Subtotal	$12,050	$12,050	$0		
Task 3.	**Barge Operations**								
	Barge Prep and Mobilization	1	LS	$25,000	$25,000	$25,000	$0		
	Barge Operation During Construction	12	Days	$3,300	$39,600	$39,600	$0		
	Barge LWD Mobilization	5	Days	$3,300	$16,500	$16,500	$0		
	Barge Operations Stand-by Rate	12	Days	$350	$4,200	$4,200	$0		
				Task Subtotal	$85,300	$85,300	$0		
Task 4.	**Excavation**								
	Levee Breaching and Enhancement	2083	CY	$29	$60,407	$60,407	$0		
				Task Subtotal	$60,407	$60,407	$0		
Task 5.	**Habitat Structures**								
	Salvaged Large Woody Debris	2.3	AC	$2,000	$4,652	$4,652	$0		
	Import Logs with Rootwads	8	EA	$650	$5,200	$5,200			
	Import Pin Pile Logs	32	EA	$65	$2,080	$2,080			
				Task Subtotal	$11,932	$11,932	$0		
Task 6.	**Permanent Erosion and Sediment Control**								
	Seeding	3.0	AC	$500	$1,500	$0	$1,500		
	Straw Wattles	2,000	LF	$2	$4,000	$4,000	$0		
	Straw Mulch over All Disturbed Areas	1.0	AC	$2,500	$2,500	$2,500	$0		USFWS
				Task Subtotal	$8,000	$6,500	$1,500		
Task 7.	**Native Revegetation**								
	Salvaged Native Sod and Root Mats	2.3	AC	$1,500	$3,435	$3,435	$0		
				Task Subtotal	$3,435	$3,435	$0		
Task 5.	**Fiscal Management and Overhead**								
	Field Management by Design Engineer	100	hr	$95	$9,500	$9,500	$0		
	Overhead	0.1	percentage of total		$19,962.44	$19,962	$0		
	Travel	90	miles	$0.56	$50	$50	$0		
	Project Contingency	0.1	percentage of total		$20,862.44	$20,862	$0		
				Task Subtotal	$50,375	$50,375	$0		
TOTAL					$259,000	$250,000	$9,000	$0	
PERCENTAGE TOTAL					100%	97%	3%	0%	

Project costs for construction are based on feasibility estimates provided by local contractors, as well as historical implementation costs recorded from similar restoration projects in the area. Because barging equipment to the excavation locations is not a commonly used restoration tactic, project contingency was included in the overall budget.

SECTION 4: MAP AND PHOTOS

Please include a project map and photos of the project site. Please attach photos, including those used in Section 2 (Project Narrative), in JPEG format, separately.

Gnat Creek North Location Map



Completed applications must be submitted electronically (in MS Word format) to:
ccorbett@estuarypartnership.org
Catherine Corbett
Chief Scientist
Lower Columbia Estuary Partnership