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Pacific Northwest National Laboratory
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Under Contract DE-AC05-76RL01830

Facilitation of the Estuary/Ocean Subgroup and the Expert Regional Technical Group, Annual Report for 2015

Final Report

GE Johnson

August 2015

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Pacific Northwest National Laboratory
Richland, Washington 99352

Preface

The Pacific Northwest National Laboratory (PNNL) conducted this project for the Bonneville Power Administration (BPA)—BPA Project No. 2002-077-00, Contract No. 56065-Release 7. BPA's contracting officer's technical representative for this project was Chris Read (503-230-5321). PNNL's project manager was Gary Johnson (503-417-7567)—PNNL Project No. 65387. The period of performance covered in this report is September 1, 2014 through August 31, 2015. The project addressed four topic areas, each with a separate deliverable(s):

1. Estuary/Ocean Subgroup (EOS) for federal research, monitoring, and evaluation and related work under the Columbia Estuary Ecosystem Restoration Program (CEERP).

   While EOS-specific work during this period was minimal, PNNL provided technical support to the adaptive management process for CEERP. This work culminated in the *"CEERP 2015 Restoration and Monitoring Plan."* This deliverable was submitted to BPA in June 2015 under separate cover.

2. Expert Regional Technical Group (ERTG) for estuary habitat restoration under the CEERP.

   About half of the total project effort concerned facilitation of the ERTG. ERTG activities for the period of performance are summarized herein; this is a project deliverable. Notes from ERTG meetings with the Steering Committee and regional parties for 2015 will be delivered in December 2015 as an annual, official ERTG work product, "*ERTG Meeting Notes for 2015."*

3. Research on restoration design challenges concerning topographic mounds, tidal channel outlets, and reed canarygrass.

   Restoration design challenges were researched to provide CEERP restoration practitioners and managers with technical assessments relevant to on-the-ground implementation. Work during 2015 on restoration design challenges will be delivered under separate cover during autumn 2015, entitled *"Columbia Estuary Ecosystem Restoration Program: Restoration Design Challenges for Topographic Mounds, Channel Outlets, and Reed Canarygrass."*

4. Technical support for BPA's research, monitoring, and evaluation efforts in Columbia River tributary basins.

   This ongoing effort involves coordination and collaboration with BPA staff to develop the following deliverable, due in September 2015: *"Current State of BPA's Tributary Research, Monitoring, and Evaluation Program, 2015."*

A suggested citation for this report is: Johnson GE. 2015. *Facilitation of the Estuary/Ocean Subgroup and the Expert Regional Technical Group, Annual Report for 2015.* PNNL- 24623, final report prepared for the Bonneville Power Administration, Portland, Oregon by the Pacific Northwest National Laboratory, Richland, Washington.

Acknowledgments

Important contributions to the EOS and ERTG during the reporting period were made by Blaine Ebberts and Cindy Studebaker (Portland District, Corps); Jason Karnezis, Chris Read, and Ben Zelinsky (BPA); and, Lynne Krasnow (NMFS). Assistance from the following PNNL staff is much appreciated: Susan Ennor, Mary Hughes, Lisa Sherman, and Ron Thom.

Acronyms and Abbreviations

AA	Action Agencies
BiOp	Biological Opinion
BPA	Bonneville Power Administration
CEERP	Columbia Estuary Ecosystem Restoration Program
Corps	U.S. Army Corps of Engineers
CREDDP	Columbia River Estuary Data Development Program
Council	Northwest Power and Conservation Council
EOS	Estuary/Ocean Subgroup
ERTG	Expert Regional Technical Group
FCRPS	Federal Columbia River Power System
ft	feet
FY	fiscal year
ISAB	Independent Scientific Advisory Board
LCRE	lower Columbia River and estuary
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PNNL	Pacific Northwest National Laboratory
rkm	river kilometers
RME	research, monitoring, and evaluation
SBU	survival benefit unit
WE	work element (Pisces)

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1.0 Introduction

This document is the annual report for the period September 1, 2014 through August 31, 2015 for the project—Facilitation of the Estuary/Ocean Subgroup (EOS) and the Expert Regional Technical Group (ERTG). Pacific Northwest National Laboratory (PNNL) conducted the project for the Bonneville Power Administration (BPA). The EOS and ERTG are part of the research, monitoring, and evaluation (RME) and habitat restoration efforts, respectively, developed by the Action Agencies (BPA, U.S. Army Corps of Engineers [Corps or USACE], and U.S. Bureau of Reclamation) in response to obligations arising from the Endangered Species Act as a result of operation of the Federal Columbia River Power System (FCRPS) and implemented under the Columbia Estuary Ecosystem Restoration Program (CEERP). BPA/Corps (2015) explain the CEERP and the role of RME and the ERTG. For the purposes of this report, the lower Columbia River and estuary (LCRE) includes the floodplain from Bonneville Dam down through the lower river and estuary into the river's plume in the ocean (Figure 1.1).

Figure 1.1. Map Showing the Lower Columbia River and Estuary. The tidal freshwater portion is approximately from rkm 56 to 234. Bonneville Dam is located at rkm 234.

The main purpose of this project is to facilitate EOS and ERTG meetings and work products. Other purposes are to provide technical support for CEERP adaptive management, CEERP restoration design challenges, and tributary RME. From 2002 through 2008, the EOS worked to design the federal RME program for the estuary/ocean (Johnson et al. 2008). From 2009 to the present day, EOS activities have involved RME implementation; however, EOS activities were minimal during the current reporting period. PNNL provided technical support to CEERP's adaptive management process by convening

meetings of the Action Agencies (AAs) and drafting material for the *"CEERP 2015 Restoration and Monitoring Plan"* (BPA/Corps 2015).

The ERTG assigns survival benefit units[1] for ocean- and stream-type juvenile salmon from estuary habitat actions implemented by the AAs as called for in the 2008 Biological Opinion on FCRPS operations (NMFS 2008). The ERTG has been operational since 2009. It comprises members from National Marine Fisheries Service (NMFS; Dan Bottom), PNNL (Ron Thom), Skagit River Cooperative (Greg Hood), Washington Department of Fish and Wildlife (Kirk Krueger), and a private party (Kim Jones[2]). The ERTG is directed by a Steering Committee that includes representatives from BPA (Jason Karnezis), the Corps (Blaine Ebberts), and NMFS (Lynne Krasnow). BPA/Corps (2012) describe the ERTG and the role science plays in the process to assign SBUs to habitat restoration projects in the LCRE. Under the EOS/ERTG project, notes from ERTG meetings are compiled and reported as separate work products (see http://www.cbfish.org/EstuaryAction.mvc/Index).

During the reporting period, project work also concerned restoration design challenges for CEERP and technical support for RME in tributary basins of the Columbia River, as described below.

1.1 Project Objectives

The period of performance reported herein is September 1, 2014 through August 31, 2015. During this period, the project had the following objectives, designated by work element (WE) codes from BPA's Pisces[3] project tracking system:

- Manage and Administer Projects (WE 119). Manage and administer the project according to BPA's "Work Element/Milestone" based project management and reporting system (Pisces).
- Produce Annual Report (WE 132). Produce an annual report of project activities.
- Produce Other Report (WE 141). Produce a report of a technical assessment of restoration design challenges for CEERP.
- Produce Status Report (WE 185). Produce quarterly status reports and upload them to Pisces.
- Provide Watershed Coordination (WE 191).
  - 191a − Estuary/Ocean Subgroup for Federal RME. As necessary, continue to facilitate the EOS in its mission to implement the Estuary RME Program and support CEERP adaptive management.
  - 191b − Expert Regional Technical Group. Aid the AAs as they continue the ERTG's work to assess survival benefits to juvenile salmon from habitat restoration in the LCRE. Convene and coordinate with subcontractors who will be members of the ERTG.
  - 191c – Tributary RME Support. Technical review and support to the RME effort by BPA's Fish and Wildlife Division focused on tributary RME.

[1] A survival benefit unit (SBU) is an index intended to represent the effect of LCRE habitat restoration on juvenile salmon survival (ERTG 2011). The SBU method uses an ecosystem-based approach to assess improvements to habitats supporting juvenile salmon and other species. SBUs are assigned on a restoration project-specific basis.

[2] Kim Jones, an original ERTG member, retired from the Oregon Department of Fish and Wildlife in 2014.

[3] Pisces is a database application for project management for the BPA Fish and Wildlife Division.

1.2 Background

The function of the LCRE in the life history of threatened and endangered salmonids is more than simply serving as a corridor for passage between the tributaries and the Pacific Ocean (Bottom et al. 2005; Sather et al. 2009). The estuary provides habitat for multiple life-history stages of salmon and steelhead, ranging from the rearing and feeding of fry, fingerlings, and smolts to the passage upstream of adults (Bottom et al. 2005; Roegner et al. 2012). Use of estuary habitats by juvenile salmonids varies by species and life-history stage (Rich 1920). Generally, the closer the natal stream is to the estuary and the smaller the juvenile migrant, the more likely it is that juveniles will use estuarine habitats as feeding, rearing, and refuge areas, i.e., as more than just a migration corridor (Dawley et al. 1986). Wetlands in the LCRE also export materials that support food webs used by juvenile salmon (Thom et al. In Review). Information about salmon biology and ecology in the Columbia River estuary can be found in reports by Bottom et al. (1984, 2005), Dawley et al. (1985a, b, 1986), Kirn et al. (1986), Ledgerwood et al. (1991), McCabe et al. (1983, 1986), McConnell et al. (1983), and Reimers and Loeffel (1967). Thom et al. (2013) synthesized and evaluated information relevant to juvenile salmon in the LCRE.

Activities and accomplishments for the project during the September 1, 2014 through August 31, 2015 period are documented in this annual report and in the deliverables provides under separate cover (see the Preface). Annual reports for the EOS/ERTG project have been submitted for FY05 through FY14 (Johnson 2005, 2006; Johnson and Diefenderfer 2007, 2008; Johnson 2009, 2010, 2011, 2012, 2014; Johnson and Sather 2013). These reports are available from BPA (http://www.cbfish.org/Report.mvc/SearchPublications/SearchByTextAndAuthorAndDate).

1.3 Study Area

The LCRE is defined as the tidally influenced portion of the river from Bonneville Dam to the plume. Habitats in lower Columbia River tributaries above tidal influence are not part of the estuary RME study area. The following publications provide descriptive information about the Columbia River estuary:

- the *Salmon at River's End* report by Bottom et al. (2005)
- Fresh et al.'s (2005) *Role of the Estuary in the Recovery of Columbia River Basin Salmon and Steelhead*
- the Corps' *Biological Assessment for the Columbia River Channel Improvements Project* (USACE 2001)
- the Council's subbasin plan for the estuary (Council 2005, 2009)
- recovery planning documents (Lower Columbia Fish Recovery Board 2010; NMFS 2011)

Important earlier compendiums include the following:

- *The Columbia River Estuary and Adjacent Ocean Waters* by Pruter and Alverson (1972)
- "Columbia River Estuary" in *Changes in Fluxes in Estuaries: Implications from Science to Management* by Dyer and Orth (1994)

- *Columbia River: Estuarine System* by Small (1990), which contains reviews of earlier work supported by the Columbia River Estuary Data Development Program (CREDDP) on physical and biological processes (CREDDP 1984a, 1984b).

1.4 Report Contents and Organization

The ensuing sections of this 2015 annual report describe project activities, summarize accomplishments, and provide recommendations for 2016. The sections on activities and accomplishments are organized by the work elements listed previously under project objectives (Section 1.1).

2.0 Project Activities

Activities during the current reporting period (September 1, 2014 through August 31, 2015) included project management, publishing the annual report and status reports, and coordination efforts, as described in the following sections for each work element (WE).

2.1 Project Management (WE119)

The project was managed according to procedures and principles set forth in PNNL's Standard Business and Management System. As requested by BPA, PNNL developed and submitted the FY16 scope of work and budget for Project 2002-077-00 to BPA via Pisces in July 2015.

2.2 Annual Report (WE 132)

This document fulfills the annual report objective.

2.3 Other Report (WE 141)

This report will be delivered under separate cover during autumn 2015: *"Columbia Estuary Ecosystem Restoration Program: Restoration Design Challenges for Topographic Mounds, Channel Outlets, and Reed Canarygrass."*

2.4 Status Reports (WE 185)

PNNL submitted status reports on Project 2002-077-00 quarterly to BPA during the current performance period. The status reports contained information about whether progress in conducting the project was satisfactory. Status was assessed by milestone for each work element.

2.5 Coordination (WE 191)

The bulk of the work on the EOS/ERTG project falls under the coordination work element. The material that follows is organized by the topics listed under the coordination objective in Section 1.1.

2.5.1 EOS Meetings and CEERP Activities (WE 191a)

During the current performance period, EOS work was minimal; no formal meetings were convened. However, activities under this work element involved providing technical support on the adaptive management process for CEERP. Specifically, this entailed coordinating and drafting the "*CEERP 2015 Restoration and Monitoring Plan"* (BPA/Corps 2015).

2.5.2 ERTG Meetings and Activities (WE 191b)

During the current performance period, the ERTG participated in 6 project presentations and 4 new site visits (Table 2.1). The group scored 4 projects from which 4 SBU reports were generated. Table 2.2 contains a summary of ERTG's cumulative and FY14 activities, as facilitated through Project 2002-077-00. Since its inception in June 2009, the ERTG has been involved in 75 project presentations, 73 site visits, 66 project scorings, and 62 SBU reports (Table 2.2).

Table 2.1. ERTG's Project Review Activities during the September 1, 2014 through August 31, 2015 reporting period.

Identification Number	Project Name	Presentation	Site Visit	Scoring	SBU Report
2012-05	Dairy Creek/ Sturgeon Lake (REVISED)	x	--	--	--
--	Willow Bar	x	--	--	--
2015-01	Batwater	x	x	x	x
2015-02	Clatskanie #2	x	x	x	x
2015-03	North Unit Ph 3	x	x	x	x
2015-04	Westport Slough	x	x	x	x
Total		**6**	**4**	**4**	**4**

Table 2.2. Summary of ERTG's Project Review Activities: Number of Restoration Projects (Actions) Total for Current Reporting Period and Cumulative Total June 2009 through August 2015, as Facilitated through Project 2002-077-00.

Activity	Cumulative Total (6/09 through 9/14)	FY15 Total	Grand Total (6/09 through 8/15)
Sponsor presentations	69	6	75
Site visits	58	15*	73
Scorings	62	4	66
SBU reports	58	4	62

*Includes 11 revisits (see list in text).

During the current performance period, a regional ERTG meeting was held on December 3, 2014, at the Northwest Power and Conservation Council in Portland, Oregon, to report on ERTG activities and disseminate results from the ERTG's review of restoration projects during calendar year 2014. The meeting entailed an open question/answer session between the ERTG and interested regional parties.

Bi-weekly conference calls for the Steering Committee were conducted to plan and coordinate ERTG activities. The results of these calls are reflected in the content of the regional ERTG and ERTG/Steering Committee meetings. The Steering Committee held 14 such calls during the current performance period.

The ERTG and its Steering Committee met six times over the course of the year to work on topics relevant to assigning survival benefit units to estuary habitat restoration projects. Notes from the ERTG/Steering Committee meetings will be presented in a forthcoming ERTG work product due to BPA

by December 1, 2015. The ERTG also met via conference or in-person call six times during the current performance period to score projects and work on ERTG assignments.

The ERTG had two specific work assignments from the Steering Committee. First, the ERTG is developing a manuscript for a journal article entitled "*An Expert Panel Process to Evaluate Proposed Ecological Restoration Actions for Juvenile Salmon in the Lower Columbia River and Estuary."* The intended journal for this manuscript, which is under construction, is the Journal of Environmental Management. The ERTG Steering Committee supported this assignment in part due to a recommendation from the Independent Scientific Advisory Board (ISAB 2014). Second, the ERTG is working on a review of the use of large woody debris (LWD) as a restoration design approach. During autumn 2015, the ERTG is scheduled to release a draft of the ERTG process paper and a draft LWD work product.

During the current reporting period, the ERTG revisited a suite of previously scored and restored sites. The purpose of the revisits was to improve the ERTG process by capturing learning from completed projects and applying this learning to reviewing and scoring future projects.. The ERTG revisited the following 11 sites: Dibblee, Gnat Creek, Liberty Lane (South Tongue Point), Otter Point, Colewort, Fort Columbia, Walluski Elliot, Kandoll 2, Mill Road, Abernathy, and North Unit Ph 1 Ruby Lake. In addition, the ERTG received presentations in lieu of revisits for Mirror Lake and Horsetail. Restoration project sponsors completed a revisit template (Table 2.3) prior to the event. They made the following observations (documented in ERTG+SC Meeting Notes May 18-19, 2015):

- The ERTG did not see things that were worse than expected; some were even better than expected. However, most sites are relatively young. It will be good to see some later in time.
- The performance of a site is dependent on two sources of control: systemic and local -- *systemic* controls, e.g., hydrosystem flow regulation and *local* controls, e.g., roads, bridges, landowner, things that created constraints on the projects.
- The ERTG will synthesize observations from the revisits for use in the process paper. The revisits were useful to the ERTG.

Table 2.3. ERTG Revisit Template

ERTG – Post-Construction Revisit -- <*project name*>	
Header	
Date prepared:	*<Date the revisit template was prepared>*
Prepared by:	*<Name, phone number, and email address>*
Sponsoring agency:	*<Contact name, phone number, and email address> [from Project Template]*
Funding agency:	*<Contact name, phone number, and email address> [from Project Template]*
Location:	*<River, river mile, latitude/longitude> [from Project Template]*
Project Numbers	<GAIL #> <ERTG #>
Project Description	
Problem statement	*<Summarize the site-specific problem(s) the proposed restoration(s) is intended to address. What are the causes of the problems? >[from Project Template]*
Vision/goal	*<Describe the expected outcome, i.e., what the site would look like if restoration is successful> [from Project Template]*
Objectives	*<State the project's objectives in terms of functions for salmon. For example, how will*

	access, capacity etc. be increased or enhanced?> [from Project Template]
Construction	
Period and date	*<State the construction period and date the project was completed>*
Construction actions	*<Describe the construction actions that were realized>*
Construction issues	*<Describe significant issues that occurred during construction that might affect future designs>*
Monitoring	
Experimental design	*<State the experimental design>*
Monitored indicators	*<List the monitored indicators, sampling period, sampling frequency, sampling locations>*
Data	*<Provide plots, tables, summarizations, etc.>*
Photographs/Images	
Pre-construction	*<Provide photos/images depicting pre-construction conditions>*
Post-construction	*<Provide photos/images depicting post-construction conditions, especially those that can be directly compared with pre-construction conditions>*
Sponsor Comments	
Comments	*<xxxxx>*
ERTG Observations	
Category 1 (TBD)	*<xxxxx>*
Category 2 (TBD)	*<xxxxx>*
Category 3 (TBD)	*<xxxxx>*
Category 4 (TBD)	*<xxxxx>*

3.0 Accomplishments and Recommendations

During the September 1, 2014 through August 31, 2015 performance period, accomplishments for BPA Project 2002-077-00 included the following:

- Performed research on restoration design challenges concerning topographic mounds, channel outlets, and reed canarygrass.
- Convened meetings with the AAs and developed *the "CEERP 2015 Restoration and Monitoring Plan."*
- Continued to facilitate and document activities of the ERTG and its Steering Committee.
- Organized, convened, facilitated, and documented 1 regional ERTG meeting, 6 ERTG/Steering Committee meetings or calls, 6 ERTG-only calls or meetings, and 14 Steering Committee conference calls.
- Provided technical support to BPA's RME effort in tributary basins of the Columbia River.

Recommended project work in the upcoming FY16 contract includes continued facilitation of the EOS and ERTG, as follows:

- Continue to facilitate the EOS in its mission to implement the RME component of CEERP.
- Aid the AAs as they continue the ERTG's work to assess survival benefits to juvenile salmon from habitat restoration in the LCRE under the CEERP.
- Support the ERTG in its effort to write a manuscript about the ERTG process.
- Consider work on new restoration design challenges.

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