



# An Overview of the 2018 Synthesis Memorandum for the Columbia Estuary Ecosystem Restoration Program

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# BOTTOM-LINE UP FRONT

Purpose of Talk – Convey some preliminary findings from the 2018 CEERP Synthesis Memo.

New data and information since 2012 support:

- Continuing the primary restoration strategy of hydrologic reconnection.
- Developing strategies for incorporating climate change and landscape principles into the program.
- Examining the efficacy of habitat creation through dredge material placement.
- Treating selected restoration projects as experiments.
- Updating monitoring and research strategy.



- Background
- Management Questions
- Organization and Collaboration
- CEERP Progress
- Action Effectiveness Meta-Analysis
- State of the Science
- Key Uncertainties
- Recommendations
- Next Steps



Restoring wetlands at the Kandoll Farm (top) and Mill Road (bottom) projects on the Grays River. Courtesy of Ian Sinks.



# BACKGROUND

- CEERP's main strategy for restoring ecosystems supporting juvenile salmon is hydrologic reconnection of tidal floodplain wetlands to the mainstem estuary.
- Adaptive management for CEERP has been operationalized and institutionalized.
- Synthesis memo's help capture learning to inform programmatic strategy and decision-making.
- The first CEERP Synthesis Memo was for data through 2012 (SM1; Thom et al. 2013). Given that five years of restoration, monitoring, and research have occurred since SM1, it is time for a second synthesis effort.



Ebberts et al. (2017) provide a detailed explanation of implementation and institutionalization of CEERP's adaptive management process.



# MANAGEMENT QUESTIONS

- What **progress** has been made to date by CEERP in terms of the number of restoration projects and acreage restored?
- What are updates to the findings and uncertainties regarding the science questions identified in **SM1**?
- What **additional science questions** are relevant to CEERP and why?
- What key scientific **uncertainties** are affecting CEERP management?
- What **conclusions** can be drawn from CEERP restoration and research, monitoring, and evaluation (RME) activities since 2012?
- What are the **recommendations** for future CEERP activities?



# ORGANIZATION AND COLLABORATION

## Main Body

1. Introduction
2. CEERP Progress
3. State of the Science:  
SM1 Updated
4. State of the Science:  
Additional Questions
5. Evidence-Based  
Evaluation
6. Uncertainties and  
Recommendations

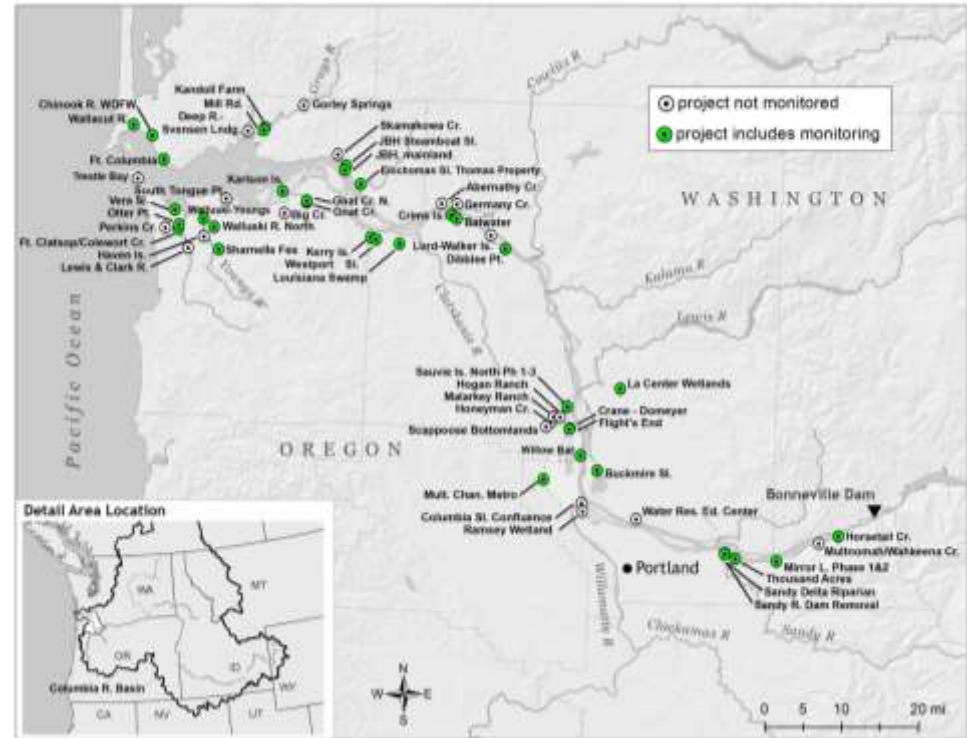
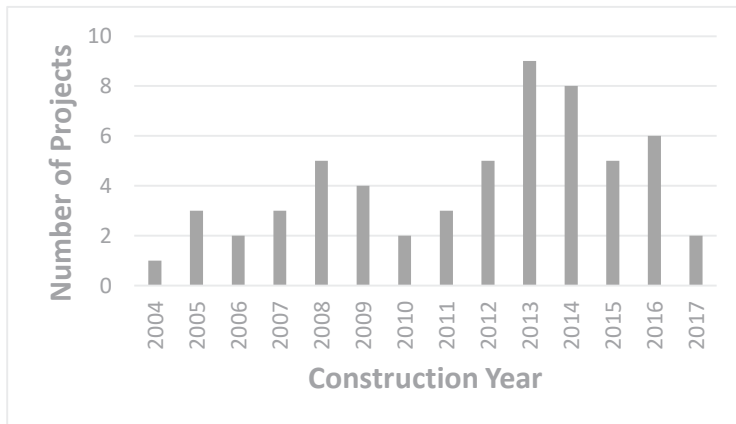
## Appendices

- A. Restoration Project Descriptions
- B. Quantitative Analysis of Habitat  
Connectivity
- C. Site Evaluation Cards
- D. Action Effectiveness Monitoring
- E. Juvenile Salmon Diet
- F. New Techniques and Resources
- G. Juvenile Chinook Salmon Food  
Web at Tidal Emergent Marsh  
Wetland Habitats



# CEERP PROGRESS

- Sponsors constructed 58 tidal reconnection restoration projects from 2004 through 2017.
- Restoration ramped up during the 2012–2017 period when 35 projects were constructed.



- Restoration totaled 55 miles of riparian habitat and 5,412 acres of floodplain wetlands.
- ~2,500 acres have been acquired for conservation.

# ACTION EFFECTIVENESS META-ANALYSIS



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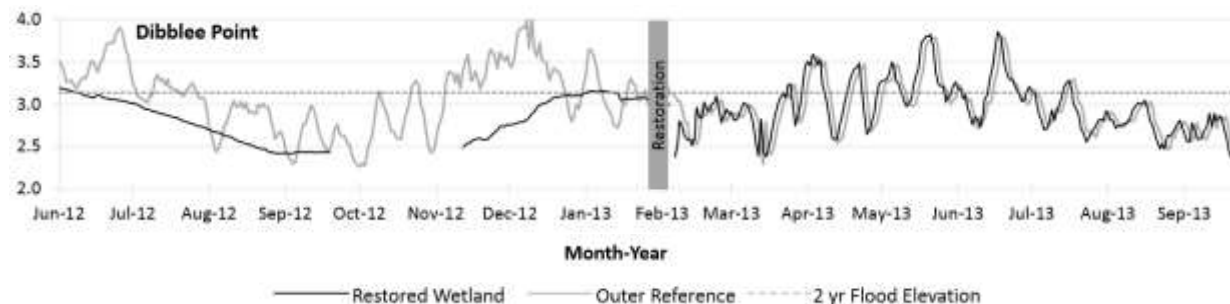
STORY  
Since 1965

Project	WSE	Water Temp	Sediment Accretion	Channel X-sec	Vegetation	Macro-inverts	Fish Capture	Fish PIT
Batwater Station	A	C	B			X	B	
Colewort Slough	X	X	X			X		C <sup>(c)</sup>
Crims Island	A <sup>(a)</sup>	C <sup>(a)</sup>	B <sup>(a)</sup>	B <sup>(b)</sup>	B <sup>(a)</sup>	C <sup>(b)</sup>	B <sup>(a)</sup>	
Dibblee Point	A	D	X		X	X	B	
Elochoman Slough Thomas	C	C	B		X	X		
Fort Clatsop/South Slough	A <sup>(a)</sup>	B <sup>(a)</sup>		X	X		C <sup>(a)</sup>	
Fort Columbia		X		X			B <sup>3</sup>	C <sup>(c)</sup>
Horsetail Creek	X	X	X	X				D
JBH Mainland	C <sup>(a)</sup>	C <sup>(a)</sup>					B <sup>(a)</sup>	
Kandoll Farm #2	X	X	D	B	X	X		
Karlson Island	A	B	D				B	
LA (Louisiana) Swamp	B	C	B	X	X			
La Center Wetlands	A	C	C		X	X		
Mill Road	X		X	B	X			
Mirror Lake		X		X		X	B	
Multnomah Ch Metro	X	X					B	C
North Unit Ruby	A	C	B		X	X		
North Unit Widgeon	B	C	B		X	X		
North Unit Three Fingered	A	B	X					
Sandy River Dam	C <sup>(d)</sup>	C <sup>(d)</sup>		A <sup>(d)</sup>	X	X	B	
Steamboat Slough	X	X	X	X	X	X	B	B
Vera Slough	D <sup>(a)</sup>	D <sup>(a)</sup>	B <sup>(a)</sup>	C <sup>(e)</sup>	D <sup>(a)</sup>		C <sup>(a)</sup>	
Wallacut	X	X	C	C	X			

\*Results based on <sup>(a)</sup>Diefenderfer et al. (2016a), <sup>(b)</sup>Haskell and Tiffan (2011), <sup>(c)</sup>Thom et al. (2013), <sup>(d)</sup>Johnson and Sather (2016), <sup>(e)</sup>Diefenderfer et al. (In Review).



- Revisited the science questions in SM1: Contemporary use patterns? Limiting factors? Effectiveness of restoration actions? State of the estuary?
  - The general paradigm that yearling-sized fish migrate rapidly through the estuary, feed little, and make little use of wetlands was not supported by the findings.
  - Action effectiveness monitoring data from 23 project sites collected in various years since 2004 indicated that restoration actions are generally having desired physical and biological effects by beginning reestablishment of ecological processes, especially restored hydrologic connectivity.





# STATE OF THE SCIENCE cont'

- Addressed additional science questions: Hatchery/wild effects? Estuary/ocean linkages? Climate change impacts? Restoration design implications?
  - CEERP managers are beginning to consider how climate change should be incorporated in restoration project design and CEERP strategy.
  - New data and analyses informing design of restoration projects are available for predicting plant community composition and density, reed canarygrass control, seed banks, mounds, channel network design, and large wood.
- A revisit of the evidence-based evaluation of CEERP substantiated the conclusion of the first EBE (Diefenderfer et al. 2013) “...the restoration program is having a cumulative beneficial effect on juvenile salmon.”



# SCIENTIFIC UNCERTAINTIES

- Affects (or not) of **non-native species** through competition and predation on the benefits of restoration for juvenile salmonids.
- Direct and indirect benefits of restoring wetlands to **yearling-sized fish**.
- Effects of **climate change** on estuary habitat characteristics and salmon.
- Relationship of restoring estuary habitat to **spatial structure and diversity** of salmon populations emigrating through the estuary.
- Others....



Chinook River Estuary.  
Courtesy of N. Czarnomski.

# RECOMMENDATIONS TO CEERP MANAGEMENT: PROGRAMMATIC



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- Continue the basic CEERP strategy of **reconnecting wetland floodplain habitats** to the mainstem estuary.
- As an additional CEERP strategy, investigate the efficacy of using **dredge material placement** to create habitat.
- Develop and apply strategies to incorporate **climate change and landscape principles** into restoration planning, project design and monitoring.
- Perform **experiments** at selected restoration sites to test key uncertainties concerning restoration design.
- Update the strategy for and support continuation of a strong **monitoring and research program**.

# NEXT STEPS

- April 22, 2018 -- 95% draft final report scheduled for release for regional review.
- May 2018 – 100% final report.
- SM2 should help inform the post-2018 Biological Opinions and the EIS on FCRPS operations, along with future CEERP strategy and actions.



Wallooskee-Youngs restoration site on Youngs Bay. Courtesy of R. Salakory.

# THANK YOU



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