

A Pacific lamprey is shown swimming in clear water, surrounded by green reeds. The lamprey has a dark, elongated body with a lighter-colored head and a prominent blue eye. The background is slightly blurred, emphasizing the lamprey and the reeds.

Monitoring Pacific Lamprey During The Ecological Revitalization Of The Portland Harbor Superfund Site

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Pre-Home Messages

- E.P.A. Superfund Program
- Portland Harbor Site
- Ecological Revitalization
- Monitoring
- Pacific Lamprey
- Sediment
- Contaminants

E.P.A. Superfund Program

Superfund National Priorities List (NPL)



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Community Involvement

Cleanup Support

Training and Learning Center

Superfund Climate Resilience

Community Involvement

Cleanup Support

Natural Resource Damages: Assessments

This webpage provides information about Ecological Risk Assessments (ERAs) and Natural Resource Damage Assessments (NRDAs) for Trustees and EPA staff. EPA recommends an ERA as part of assessing the impacts of site-related contamination.



NRD Home

NRD Primer

Trustees

CERCLA is informally called Superfund. It allows EPA to clean up contaminated sites. It also forces the parties responsible for the contamination to either perform cleanups or reimburse the government for EPA-led cleanup work.



Portland Harbor Site

Sup
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Ecological Restoration Portfolio Site Locations

Portland Harbor Natural Resource Trustee Council



Updated June 2012

PREP BY
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Ecological Revitalization

Restoration Sites in the Study Area

Site # on Overview Map	Project Name	Page #
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Restoration Sites in the Broader Focus Area

Site # on Overview Map	Project Name	Page #
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PORTLAND HARBOR

Natural Resource Trustee Council



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21	Swan Island Lagoon	45	44	Willamette Park	99
22	Terminal 5	47			
23	Willamette Cove	49			

Monitoring



Trust Resources in Portland Harbor

Portland Harbor serves as habitat and a critical migratory corridor for many species of fish and wildlife including:

- Pacific salmon
- Pacific lamprey
- White sturgeon
- Bald eagle
- Osprey
- Double-crested cormorant

Superfund process > multifaceted

Site Selection

- Select site
- Identify project implementer
- Develop formal agreement
- Develop project vision and goals

Planning & Implementation

- Develop cost estimates
- Secure property access
- Obtain permitting and compliance
- Develop stewardship plan
- Complete final design
- Gather pre-project baseline data
- Construct as-built surveys

Stewardship

- Monitor site
- Conduct maintenance
- Conduct adaptive management

Monitoring – *Approach*

QUESTIONS

- Do lamprey occupy sites?
- What are the characteristics of the habitat?

Monitoring – Approach

- Sample framework
 - Define sample sites

Revitalization

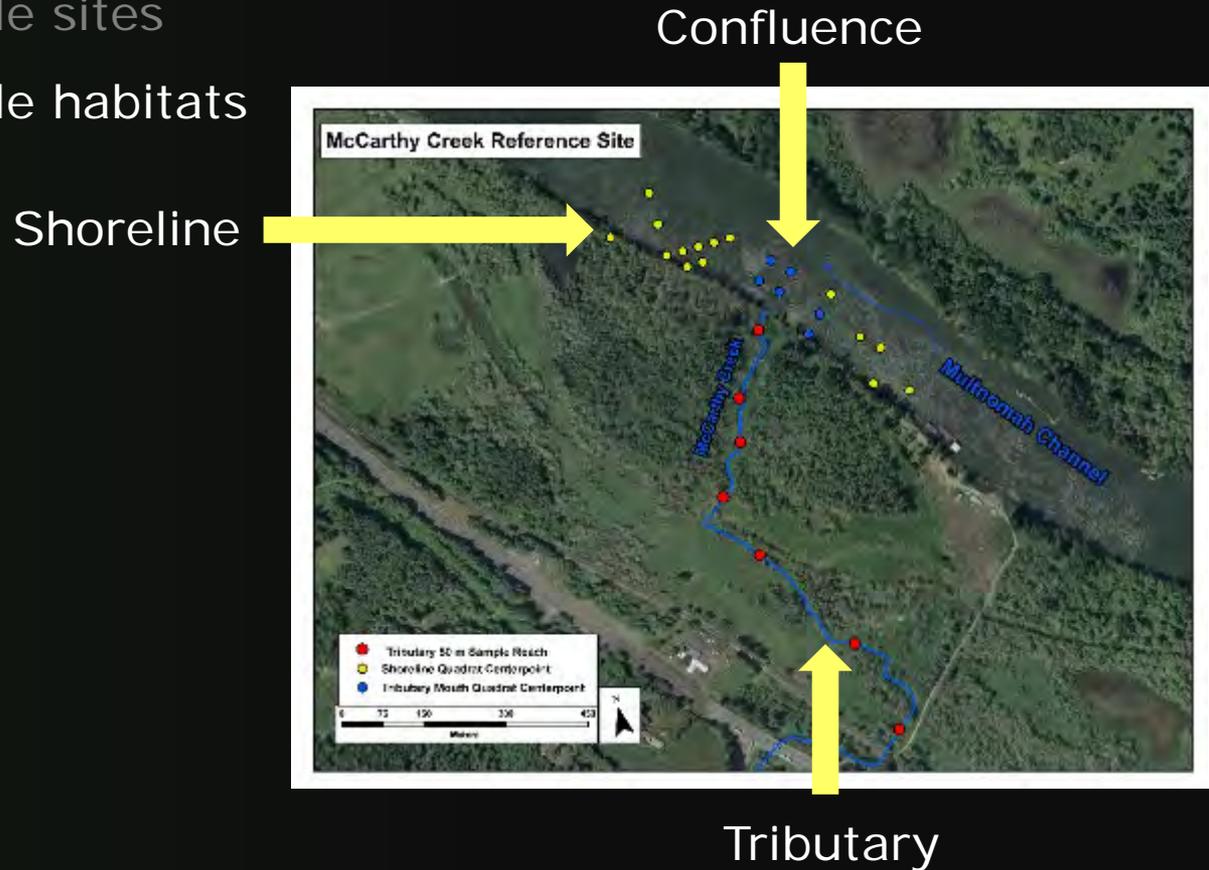


Reference



Site-Specific Monitoring – Approach

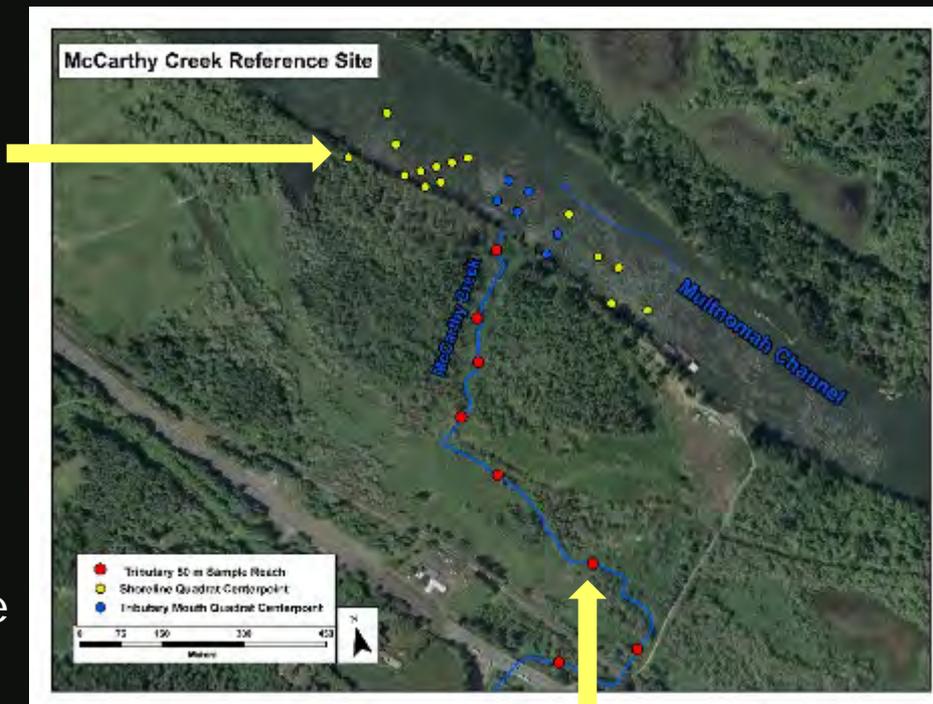
- Sample framework
 - Define sample sites
 - Define sample habitats



Site-Specific Monitoring – Approach

- Sample framework
 - Define sample sites
 - Define sample habitats

30 m quadrats



50 m reaches

- Define sample units
 - Tributary
 - Confluence/Shoreline

Monitoring – Approach

- Sample method
Tributary



Confluence/Shoreline

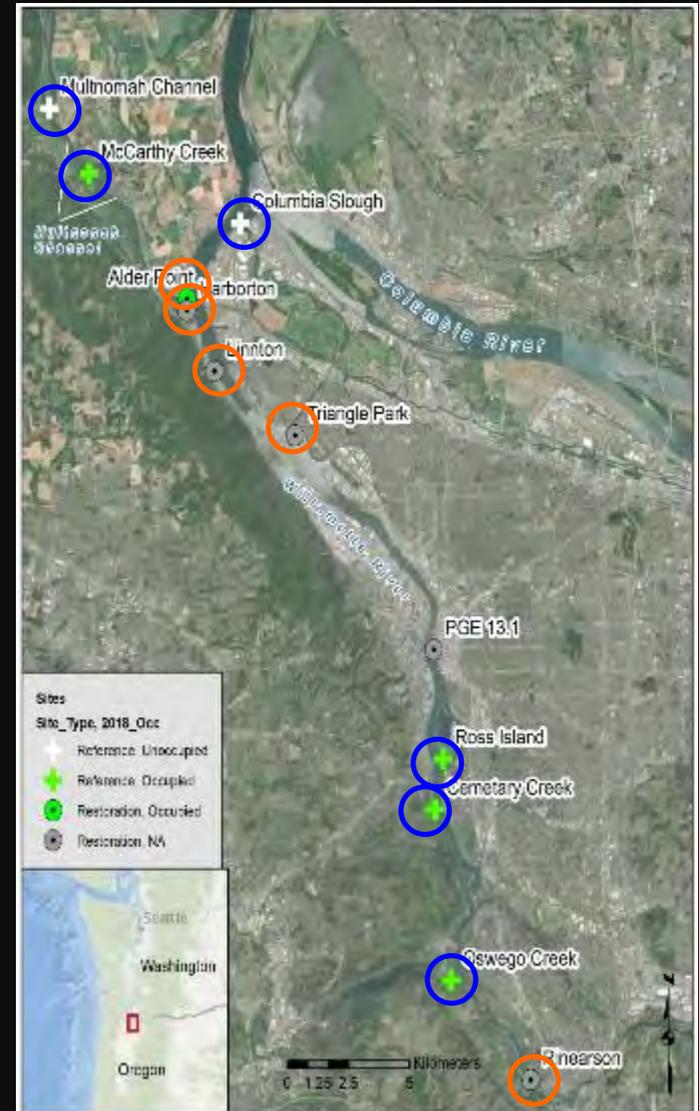


Monitoring – Approach

- Data collection
 - Lamprey
 - Occupancy
 - Length
 - Dev. stage
 - Physical anomalies
 - Habitat
 - Substrate
 - Temperature
 - Conductivity
 - Habitat type

Monitoring – Approach

- Current sample effort
 - 5 Revitalization ○
 - 6 Reference ○



Site Monitoring – Occupancy

Reference
> Ross Island

Site Type	Site Status	Sample Year	Quadrats					<i>d</i>	Pacific Lamprey	<i>Lampetra</i> spp.	UNI D	Total <i>N</i>	
			Site	Sample Area	Visited	Sampled	Occupied						
Rehabilitation	Pre Yr 1	2014	Alder Point	Shoreline	30	29	2	0.07	0	3	0	3	
		2015											
	Post Yr 1	2016			Confluence	30	30	1	0.03	0	0	1	1
				Alder Point	Shoreline	10	10	1	0.10	0	1	0	1
					Slough	10	10	0	0.00	0	0	0	0
	Post Yr 2				Confluence	30	30	1	0.03	0	0	1	1
				Alder Point	Shoreline	10	10	2	0.20	1	0	1	2
					Slough	10	10	0	0.00	0	0	0	0
	Pre Yr 1	2017											
	Post Yr 3	2018			Confluence	30	30	1	0.03	0	0	1	1
				Alder Point	Shoreline	10	10	0	0.00	0	0	0	0
				Slough	10	10	0	0.00	0	0	0	0	

Site Monitoring and Substrate

Reconnaissance of contaminants in larval Pacific lamprey (*Entosphenus*



- Unrein, J.R., J.M. Morris, R.S. Chitwood, J. Lipton, J. Peers, S. van de Wetering, and C.B. Schreck. 2016. Pacific lamprey ammocoetes (*Entosphenus tridentatus*) exposed to contaminated Portland Harbor sediments: Method development and effects on survival, growth, and behavior. *Environmental Toxicology and Chemistry* 35(8):2092–2102.
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 - Lindeman, A., J. Unrein, C. Schreck, R.L. Chitwood, J. Morris, J. Peers. 2011. Pacific Lamprey Exposed to Contaminants: A) Effects of Contaminated Sediment on Larval Growth and Development, and B) Impacts of Herbicides in Adult Lamprey. 141st Annual Meeting of the American Fisheries Society, Seattle, WA. September 4–8.
 - Unrein, J., J. Morris, R.L. Chitwood, J. Peers, and C. Schreck. 2011. Larval Pacific Lamprey (*Entosphenus tridentatus*) Exposed to Port of Portland Sediment. 47th Annual Meeting of the Oregon Chapter of the American Fisheries Society, Bend, OR. February 22–25.
 - Peers, J., J.M. Morris, J. Lipton, C. Schreck, R. Chitwood, and J. Unrein. 2010. Toxicity of Portland Harbor Sediments to Pacific Lamprey Ammocoetes (*Lampetra tridentata*): Experimental Design. 31st Annual Meeting of the Society of Environmental Toxicology and Chemistry (SETAC), Portland, OR. November 7–11.
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(Current) Site Monitoring – Substrate

- Objective: Characterize substrate (sediment) of the sites
- Sampling
 - ✓ *All revitalization and reference sites*
 - ✓ *All visits*
- Characteristics currently being evaluated
 - ✓ *Total organic content*
 - ✓ *Grain size*
 - ✓ *Total solids*
- Contaminants
 - ✓ *NOT currently being evaluated*
 - ✓ *Can we?*
 - ✓ *Should we?*



Coe et al., San Diego State University

Acknowledgements

- Portland Harbor Holdings II, LLC
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- University of Portland
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- Rinearson Natural Area, LLC
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Questions?



Unanswered Questions about Contaminants in Lampreys

