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Cultivation of the Backwater: Weirs as a Window into Historical Ecology and Ecosystem Engineering in the Lower Columbia

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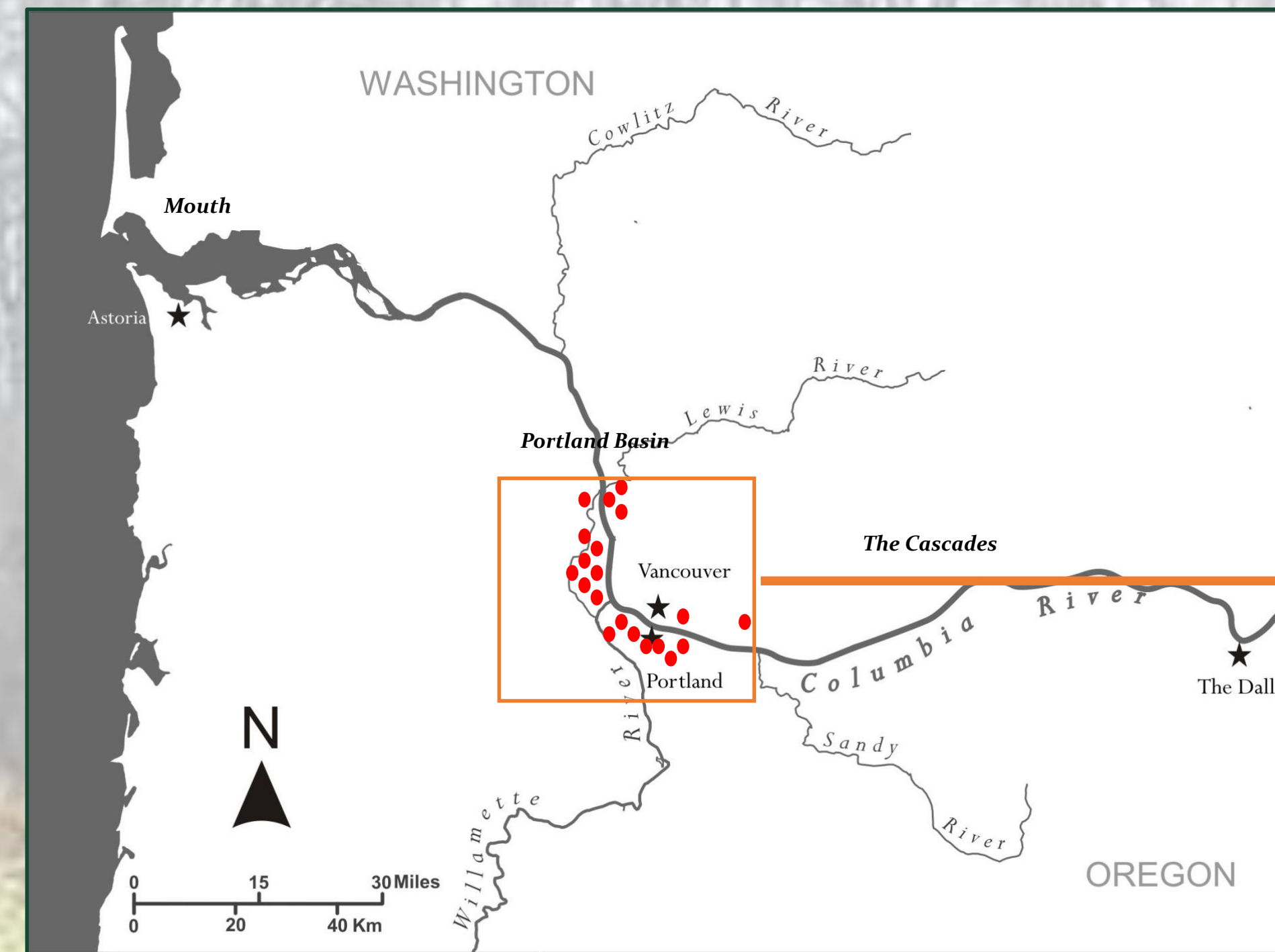
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Cultivating the Backwater: Weirs as a Window into the Historical Ecology and Ecosystem Engineering in the Lower Columbia

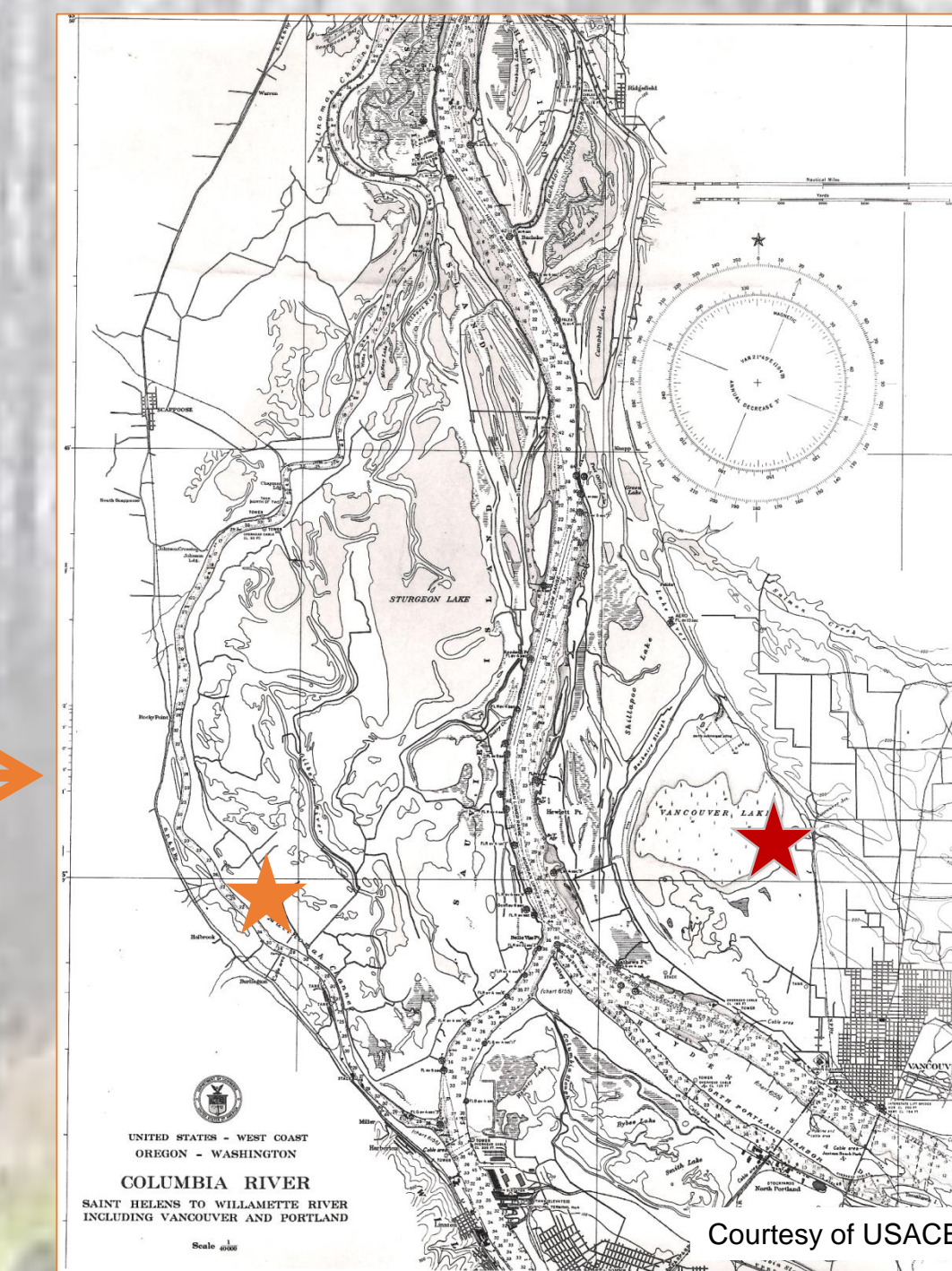
Michelle N. North & Virginia L. Butler (Portland State University)

Background Context

- Recent research highlights ways Indigenous people have employed systems of ecosystem engineering, social practice, and cultivation.
- Intentional modifications to the landscape have a cascading effect on the ecosystem creating an interconnected anthropogenic environment that supports cultivation.
- The term “aquaculture” can be applied to human engineering in aquatic systems.
- Most scholarship on aquaculture in the Pacific Northwest has focused on coastal and stream settings.
- Productive backwater wetlands such as on the Lower Columbia have received minimal attention.
- Ethnographic and ethnohistoric information on backwater use is limited.
- However, archaeological records from the Portland Basin show the importance of plants and animals that thrive in such wetlands.
- Wapato, small mammals (beaver, muskrat), and fishes such as sucker (Catostomidae) and minnow (Cyprinidae).
- According to foraging models, suckers and minnows are low ranked.
- Would cultivation and mass harvesting alter procurement costs, effectively raising their rank?
- What practices/ technology were used in the harvest and cultivation of backwater species to enhance the productivity of this archaeologically prominent fishery?**



Backwater assemblages in the Lower Columbia analyzed by Butler and Martin (2013). Approx. Portland basin in Orange. Image adapted from Boyd et al. (2013.)



1890s Navigation Chart of Sauvie Island and part of Portland Basin

Minnow and Sucker Remains Dominate Backwater Assemblages in the Lower Columbia (Butler and Martin (2013))

Sample Type	Fish Family	Site Abundance (N Sites where family most abundant)
➢ 6.4 mm (1/ 4" mesh)	Salmonid	2
	Sturgeon	2
8 assemblages	Minnow-Sucker	4
	Sturgeon	1
➢ 3.2 mm (1/ 8" mesh)	Salmonid	1
	Sturgeon	1
5 assemblages	Minnow-Sucker	3
	Sturgeon	1
➢ 2 mm (~ 1/16" mesh)	Salmonid	1
	Sturgeon	3
3 assemblages	Minnow-Sucker	1
	Eulachon	1
➢ 1 mm	Stickleback	1
	Stickleback	6

Note: if exclude stickleback (1 mm mesh), minnow-suckers dominate four assemblages

★ Vancouver Lake Weir

- Wood stake weir recorded in early 1980s, containing 158 stakes, and 120 stake holes (Wessen 1983).
- Made of split western red cedar.
- Located in southeast corner of lake.
- C-14 Dates= 310 +/-60. adjusted to Approx. 200 B.P. based on wood growth rate (contact era).
- Given location, backwater fish likely target.



Virginia Lake, Sauvie Island, possible fish weir

★ Virginia Lake Weir?

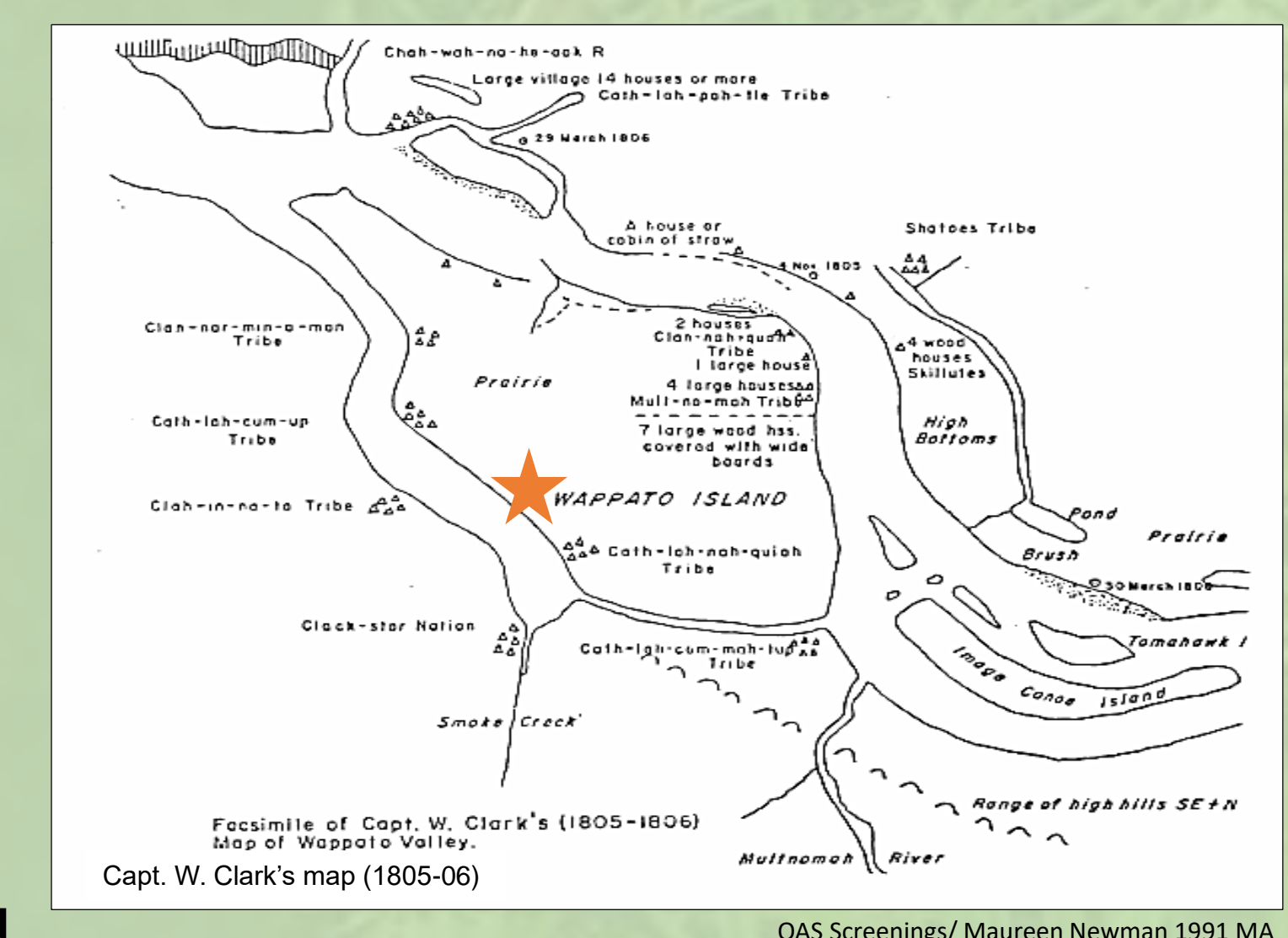
- Reported by local resident Dennis Torresdal in early 2010s.
- Located in seasonally dry backwater lake on Sauvie Island-likely seasonally flooded prior to levee construction.
- Nearby ethnographic village and multiple archaeological sites (villages, activity areas).
- Currently unrecorded.
- 18 visible wooden stakes in 2 horizontal alignments.

Proposed Project

- Record the feature, and any landscape modifications.
- Subsurface testing.
- Collect samples for C14 dating.
- Evaluate whether wood shaped with metal tools.
- Study lake history (legacy lake cores, historic photos/maps).
- Reconstruct how “weir” would have functioned.
- Synthesize faunal data from surrounding sites to identify the prevalence and role of backwater species.
- Compare feature to Vancouver Lake weir.
- Review the literature on landscape modification and Indigenous cultivation and place the site within the broader context of anthropogenic landscape modification.

Theoretical Frameworks:

- Historical Ecology
- Niche Construction Theory



OAS Screenings/ Maureen Newman 1991 MA



Smith-Bybee Lakes (2006), wetland environment in North Portland



Northern Pikeminnow (*Pychocheilus oregonensis*)



Largescale Sucker (*Catostomus macrocheilus*)

Research Goals

- Explore the role of weirs as more than technology-components in larger interconnected systems of aquaculture and ecosystem engineering.
- Resolve conflicting information from archaeology and ethnohistory about backwater resource use.
- Elucidate the role of the rich backwater environment of the Lower Columbia in Indigenous subsistence and cultivation.



Wapato (*Sagittaria latifolia*)



http://www.columbia.edu/~vjd1

Acknowledgements

Dennis Torresdal, Kenneth Ames, Jim O'Connor, Nancy Nelson, Pat Reed