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04 | OLYMPIA OYSTERS

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Olympia oysters (*Ostrea lurida*) are our only native oyster species here in the Salish Sea. The namesake of Washington State's capital and a sought-after delicacy for miners during California's Gold Rush, Olympia oysters once covered an estimated 13-26% of the intertidal area in Puget Sound, mostly near the heads of inlets. A combination of overharvest, pollution, and habitat loss reduced the current population to less than 4% of historic numbers, though sparse numbers of Olympia oysters can still be found throughout most of their historic distribution. Looking to the future, as our region's marine waters experience effects of climate change and ocean acidification (OA), native species such as the Olympia oyster may prove to be a critical building block in overall resilience of the marine ecosystem. Not only do Olympia oysters provide a suite of ecosystem services including water filtration and creation of intertidal habitat structure, but they may have adapted over the eons to cope with wide fluctuations in the pH of Puget Sound, possibly making them hardy to OA-induced stress. In experiments conducted at Oregon State University, Olympia oyster larvae have shown themselves to be more tolerant to low pH levels than non-native Pacific oysters, perhaps due to Olympia oysters' relatively slow development (Waldbusser et al. 2015). By bringing back what was once abundant—our small but mighty Olympia oyster—we may also be bringing a more reliable stream of benefits that they provide—including improved water quality and local food—as they (and we) weather changing ocean conditions.

Olympia oyster restoration in Puget Sound has been underway since 1999. It has grown into a sustained priority for state, federal, tribal, and nonprofit partners working to improve the health of the Salish Sea. Puget Sound Restoration Fund (PSRF), a local non-profit dedicated to restoring

foundational elements of Puget Sound's marine ecosystem, and many other partners have been restoring Olympia oysters in Puget Sound in several of 19 priority locations. Those locations are described in Washington Department of Fish and Wildlife's 2012 updated Olympia oyster stock rebuilding plan. The 19 sites are locations where Olympia oyster populations were once abundant and also sites that, once populations are restored, may serve as source populations, spilling over to repopulate other areas of Puget Sound.

The main methods for restoration are to add settlement substrate to areas where Olympia oyster larvae are found, and to distribute oyster seed as spat-on-shell or individual oysters. For the first method, the substrate most often used is clean Pacific oyster shell, which is distributed over the restoration site to provide habitat for Olympia oyster larvae to settle on. The second tool in the restoration toolbox is to distribute restoration-grade Olympia oyster seed as spat-on-shell or small, individual oysters across the restoration site. Spat-on-shell, as the name indicates, refers to small Olympia oysters that have settled onto Pacific oyster shells, which provide structure for the settlement of larval Olympia oysters. It turns out, Olympia oysters love the rough, craggy surface Pacific oyster shell provides. The bags of shell are then delivered to restoration sites, opened and spread across the area of interest. In areas without breeding populations, reintroduction of Olympia oyster seed serves as a jump start for the population. Spat-on-shell production happens either by catching Olympia oyster larvae in the wild or producing them in a conservation hatchery. If in the wild, bags of Pacific oyster shells are placed within the basin of interest in areas where monitoring has shown Olympia oyster larvae to be abundant. If larvae successfully settle, the spat-on-shell bags are then relocated to the restoration site. Alternatively,

adult broodstock oysters are collected in the wild, from within the same basin as the prospective restoration site, and brought to a conservation hatchery, where larvae are produced and settled onto bags of shell following conservation genetic protocols. A key element of this strategy is having a conservation hatchery (or following conservation protocols within alternative settings).

In 2014, PSRF, the National Oceanic and Atmospheric Administration (NOAA) and other partners took a bold step forward for Olympia oyster restoration by establishing the Kenneth K. Chew Center for Shellfish Research and Restoration, which PSRF operates at NOAA's Manchester Research Station. The Chew Center is dedicated to research and production of native shellfish and other Pacific Northwest living marine resources. The development of a conservation hatchery was identified as a high-level need in both phases of the Washington Shellfish Initiative, as guided by the National Shellfish Initiative, and as a recommendation of the Blue Ribbon Panel on Ocean Acidification in the 2012 and 2017 reports. The facility is operated through a cooperative research and development agreement (CRADA) between NOAA and PSRF. With the Chew Center up and running, PSRF and partners could accelerate the pace of restoration and continue to ensure that restoration-grade spat-on-shell were produced, with genetic fidelity to the basins in which restoration was to take place. The collaboration was further solidified in 2017, when the state began providing base-level funding to cover 50% of hatchery operations through the Washington State Department of Fish and Wildlife.

The capacity to produce Olympia oysters for priority locations also supported an ambitious goal, set in 2010, to restore 100 acres of Olympia oyster habitat by the end of 2020, in partnership with multiple stakeholders. We successfully reached the restoration goal in 2020, buoyed by restoration in Sinclair Inlet, Liberty Bay, Port Gamble Bay, Fidalgo Bay, Dyes Inlet, and many other locations. The work is highly collaborative in nature, with partnership and support from a dizzying array of groups, including Washington State Departments Fish and Wildlife, Ecology,

and Natural Resources, the Suquamish Tribe, the Swinomish Indian Tribal Community, the Jamestown S'Klallam Tribe, the Port Gamble S'Klallam Tribe, the Squaxin Island Tribe, the Skokomish Tribe, the Nisqually Indian Tribe, the Samish Indian Nation, the Tulalip Tribe, Northwest Straits Commission and Marine Resource Committees, NOAA, shellfish growers, tideland owners, University of Washington, and United States Department of Agriculture's Natural Resources Conservation Service. To put this collective accomplishment into perspective, only 150 acres of natural, dense Olympia oyster beds were estimated to exist in 2010.

In recent years, restoration of Olympia oysters has expanded and taken hold beyond the Salish Sea. In California, Oregon, and British Columbia, groups have been working to bring back assemblages of the West Coast's native oyster, building from lessons learned in Puget Sound, as well as early seeding efforts in Oregon in the mid-1990s. The group of oyster conservation and restoration practitioners that has developed on the West Coast is known formally as NOOC—the Native Olympia Oyster Collaborative. For the curious among us, NOOC has recently launched a story map to showcase nearly 40 Olympia oyster restoration projects, distill findings, and serve as a powerful and collective communication tool.

The success story of the return of Olympia oysters is beginning to unfold. The truth is that they have been here all along, just hidden away in small numbers—present, not abundant, yet a persistent part of our nearshore ecosystem. As this once high-profile species makes its way back into our region's conversations, it reemerges as part of our culture. And as we rebuild low density aggregations into complex, three-dimensional habitat, we rebuild a fundamental part of our marine ecosystem, one that supports fish, invertebrates, and ultimately, one that supports us.