

WRAC fact sheet

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Characterization of Aquaculture in the Western U.S.

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WASHINGTON

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Photo: Oyster farm at low tide on Orcas Island, WA.

Washington is the second-largest aquaculture-producing state (by value of sales) in the U.S., and produces a variety of shellfish and finfish. Washington has a long history of aquaculture farming, with oyster farms that date back to the late 1800s, and trout farms that started in the mid-1900s. Aquaculture farms in Washington are multi-generational farms (five generations in some cases) that have continued to develop innovative farming practices and have expanded the number of species raised, the types of shellfish gear employed, and the various production systems used to raise finfish and shellfish.

Washington aquaculture producers have created and sustained multiple and diverse supply chains that contribute to local economies and employment, while supplying aquatic products locally, across the U.S., and internationally. A recent supply chain analysis, funded by the Western Regional Aquaculture Center, identified 40 distinct supply chains for aquaculture products raised on farms in Washington. Figure 1 presents a generalized supply chain map for shellfish raised in Washington.

Washington aquaculture is diverse and includes a variety of shellfish species raised in marine waters along the coast and finfish

raised currently in freshwater. More shellfish are produced in Washington than in any other state in the U.S. Although Washington is known mostly for its shellfish, it is also second in the value of trout produced in the U.S., including steelhead trout (USDA-NASS, 2019). Washington has also had a long history of contributions to the development of net pen salmon farming, with nine net pen operations in the 1990s that were eventually consolidated into one company (Johnson, 2018). The collapse of a pen at one site in 2017 led to a 2018 ban by the state on new leases and lease renewals. Despite promising harvests of triploid rainbow trout in

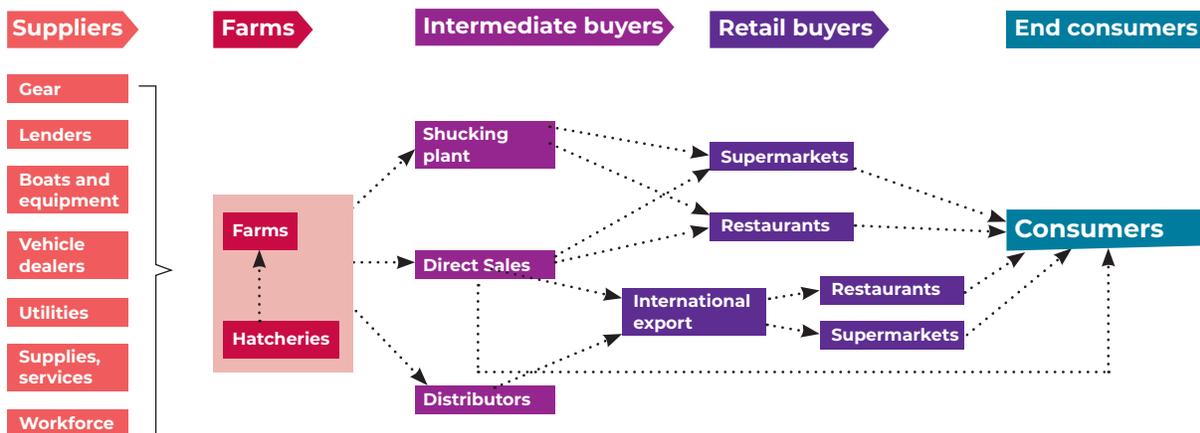


Figure 1. Supply chain map of shellfish produced in Washington.

the same systems, the lease held by the remaining net pen company expired in 2022, ending net pen salmon farming in Washington and net pen production of triploid steelhead trout in marine waters. Triploid steelhead continue to be raised in net pens in freshwater by a private company in cooperation with a local tribal authority. Washington aquaculture also includes several seaweed farms, one of which produces nutraceutical-grade products for use in cosmetics, with several others seeking permits or in experimental production of seaweed.

The Contribution of Aquaculture to the Economy of Washington

The total economic contribution of aquaculture in Washington (2022) was \$284.5 million (Table 1) and did not include the contribution of the major farm that was shut down from regulatory action. Of this, \$174.6 million was from direct contributions from aquaculture farms, \$38.2 million of indirect contributions of supply chain partners, and \$71.7 million in induced output from the additional household spending from employment created. Of the total 3,500 jobs supported by aquaculture in Washington (without including

salmon), 3,016 were on aquaculture farms, 147 were from supply chain partners, and 337 from induced effects. Additional economic contributions include \$22.6 million in federal tax revenue, \$5.4 million in state tax revenue, and \$2.9 million in local taxes (Table 2). The major fish farm that had been shut down from regulatory action would have contributed an additional \$48.1

million of direct economic contributions, with additional losses of \$41.6 million in indirect economic contributions and losses of \$19.6 million of induced output. An estimated 579 jobs throughout the supply chain were lost as a result of this regulatory action (Table 1). In addition, lost tax revenue as a result of the closure of salmon net pen farming included \$4.9 million in

Table 1. Contribution of the aquaculture sector to the economy of Washington.

Type of impact	Employment (number of jobs)	Total output (2022 \$)
Without salmon		
Direct economic impact	3,016	\$174.6 million
Indirect economic impact	147	\$38.2 million
Induced economic impact	337	\$71.7 million
Total economic impact	3,500	\$284.5 million
With salmon		
Direct economic impact	3,387	\$222.7 million
Indirect economic impact	264	\$79.8 million
Induced economic impact	428	\$91.3 million
Total economic impact	4,079	\$393.8 million
Foregone economic impacts from the ban on salmon net pens		
Direct economic impact	371	\$48.1 million
Indirect economic impact	117	\$41.6 million
Induced economic impact	91	\$19.6 million
Total economic impact	579	\$109.3 million

Table 2. Tax revenue generated from the aquaculture sector in Washington with and without salmon.

Tax category	Tax revenue (2022 \$)		
	Without salmon	With salmon	Foregone tax revenue from the ban on salmon net pens
Federal	\$22.6 million	\$27.5 million	\$4.9 million
State	\$5.4 million	\$7.6 million	\$2.2 million
Local/county	\$2.9 million	\$4.1 million	\$1.2 million
Total	\$30.9 million	\$39.2 million	\$8.3 million

federal tax revenue, \$2.2 million in state tax revenue, and \$1.2 million in local/county taxes (Table 2).

Hatchery Aquaculture Production in Washington

Aquaculture farming begins with spawning and reproduction of the animals in specialized hatchery facilities. In Washington, some farms have developed hatchery facilities that produce and sell either shellfish seed, or finfish eggs or “fingerlings” (the young fish that are stocked into growout facilities) to other farms that do not have hatchery facilities. Washington hatcheries are principal suppliers of seed, eggs, and fingerlings across the U.S. and internationally.

Shellfish Aquaculture in Washington

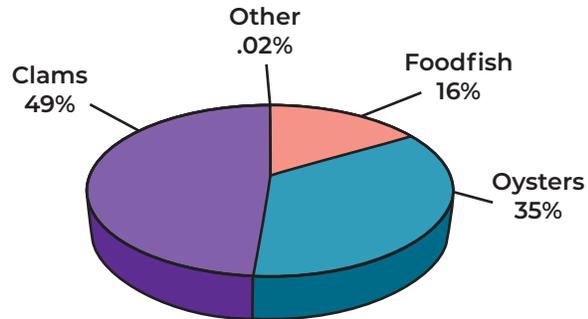
The Washington shellfish industry is diverse. Oysters farmed include Pacific, Kumamoto, native Olympia, Eastern, and European oysters. A variety of clams are also farmed in the state, including Manila, geoduck, butter, native littleneck, and softshell clams, along with blue (or bay) mussels.

Sales of shellfish raised in Washington accounted for 84% of total aquaculture sales in 2022 (with the ban in place on salmon farming) (Figure 2a). Clams accounted for 49% and oysters 35% of total Washington aquaculture sales. By specific species, Pacific oysters accounted for 39% of all shellfish sales, followed by geoduck clams (35%) and Manila clams (21%), with smaller percentages of other oysters (Kumamoto, Olympia), clams (butter, native littleneck, and softshell),

and other shellfish (i.e., mussels) (Figure 3). Geoduck clams were sold primarily for export to China and

Hong Kong and are one of the very few U.S. aquaculture products for which international export markets

a) With the ban on salmon farming in marine waters



b) Prior to the ban on salmon farming

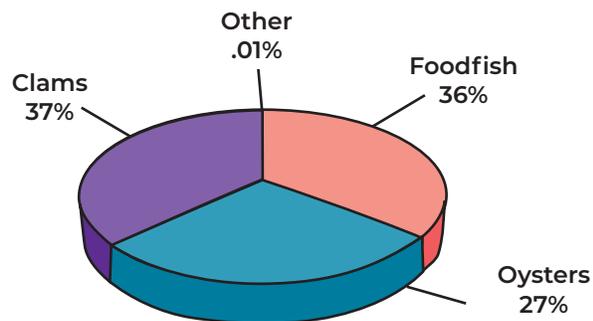


Figure 2. Percentage of total aquaculture sales in Washington, 2022. a) With the ban on salmon farming in marine waters; b) Prior to the ban on salmon farming.

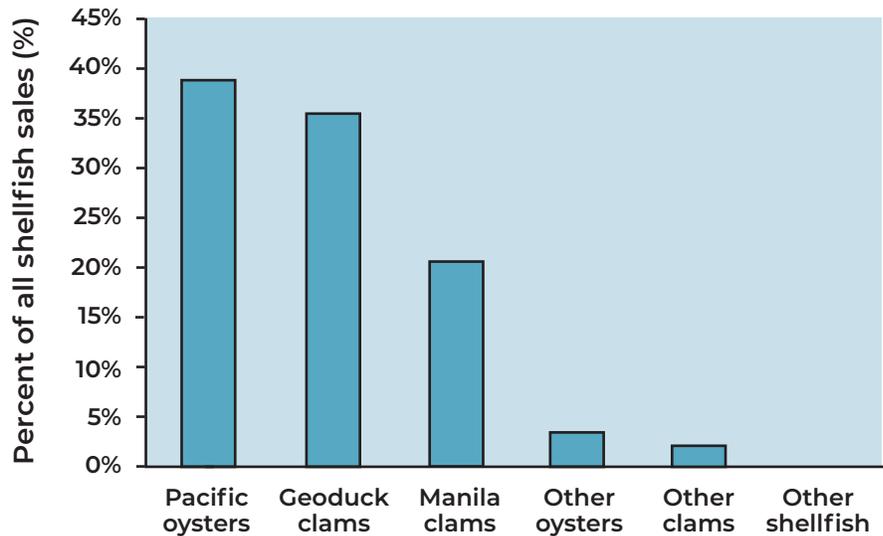


Figure 3. Proportion (by sales) of types of shellfish raised in Washington.

have been developed successfully. Manila and other clams raised in Washington were primarily sold directly from farms to retailers or to consumers online. Overall, 58% of oysters were sold either retail (restaurants and supermarkets) or directly to consumers online, but 42% were sold to shucking plants for processing prior to sale to retail markets.

Finfish Aquaculture in Washington

Finfish sales accounted for 16% of total aquaculture sales in 2022, with the ban in place on salmon farming in marine waters (Figure 2a). Prior to the closure of salmon farming in Washington, finfish sales had accounted for 36% of total aquaculture sales in the state (Figure 2b). Most finfish raised in Washington are trout (rainbow and steelhead), which are sold as foodfish to processing facilities or as eggs and fingerlings to other farms around the U.S. and internationally. Additional finfish production includes production of salmon smolts for ocean ranching by tribal fisheries for 3 to 6 months prior to release to increase ocean survival rates and support food sovereignty.

Trends of Aquaculture in Washington

The number of aquaculture farms in Washington increased from 1998 to 2005, but has since declined to 1998 levels (USDA-NASS 2019) (Figure 4). Total aquaculture sales in Washington increased by more than 300% from 1998 to 2013, but decreased by 11% from 2013 to 2018.

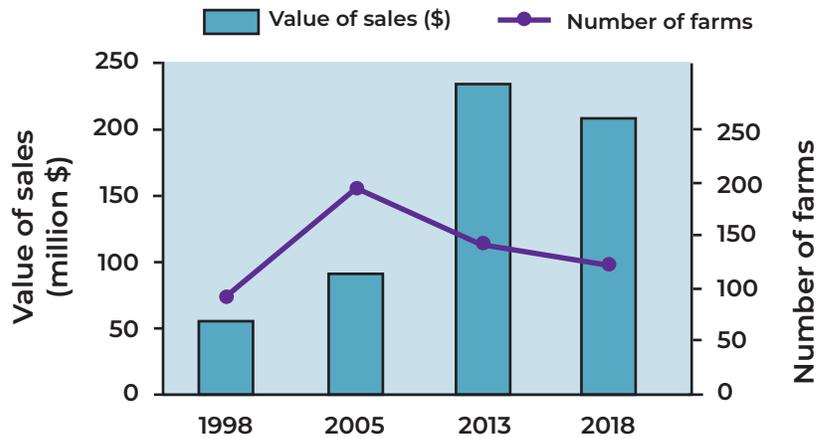


Figure 4. Total aquaculture sales and number of farms in Washington 1998 to 2018. Source: USDA-NIFA (2000, 2006, 2014, 2019)

In addition to private farms, Washington has publicly funded hatcheries that raise fish for stocking into lakes and streams to enhance fishing opportunities. Publicly funded hatcheries also support aquaculture supply chain businesses such as feed mills, but it was beyond the scope of this project to survey publicly funded hatcheries and measure their economic impact to Washington.



Photo: IStockphoto.com/ Nikoncharly

Rainbow trout fry (*Oncorhynchus mykiss*) at a fish farm.

References

Johnson O. 2018. History of salmon net pen culture in the Pacific Northwest. Presentation, WABC Chapter meeting, Kelowna, BC, American Fisheries Society. Available at: <https://wa-bc.fisheries.org>. Accessed November 1, 2023.

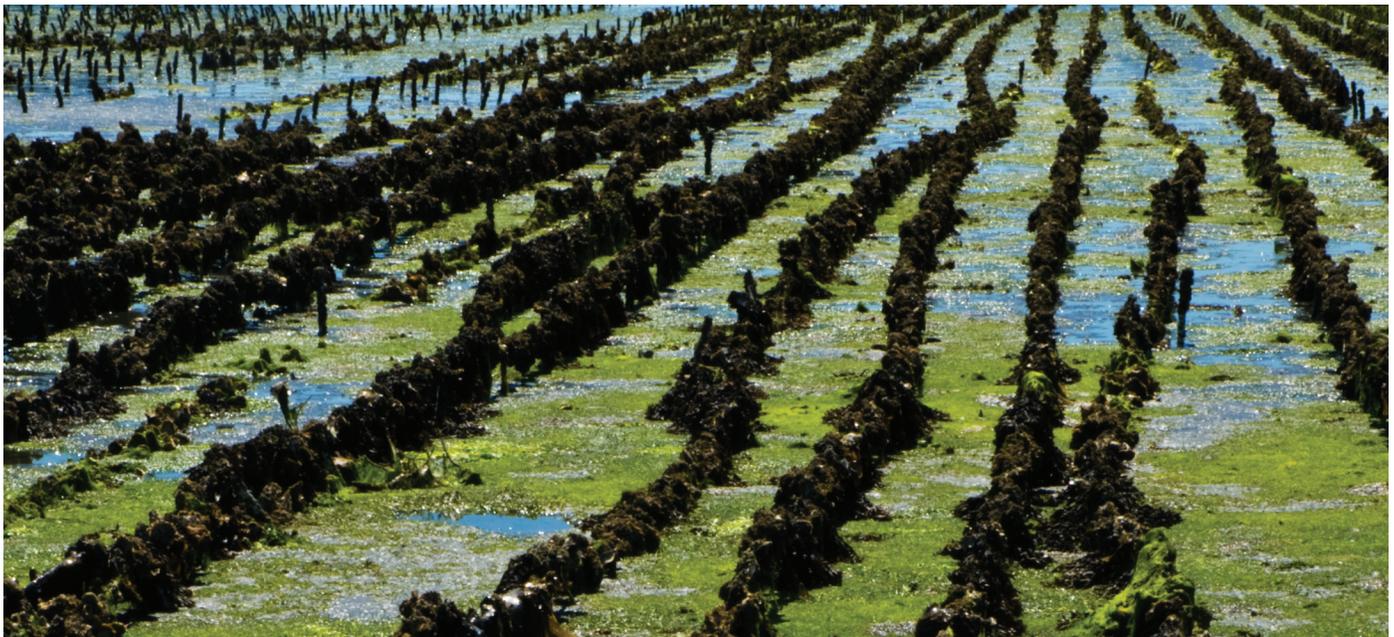
USDA-NASS. 2000. Census of Aquaculture 1998. National Agricultural Statistics Service, United States Department of Agriculture, Washington, DC. (not online, print version).

USDA-NASS. 2006. Census of Aquaculture 2005.* United States Department of Agriculture, National Agricultural Statistics Service, Washington, DC. Accessed April 1, 2023.

USDA-NASS 2014. Census of Aquaculture 2013.* United States Department of Agriculture, National Agricultural Statistics Service, Washington, DC. Accessed April 1, 2023.

USDA-NASS. 2019. Census of Aquaculture 2018.* United States Department of Agriculture, National Agricultural Statistics Service, Washington, DC. Accessed April 1, 2023.

* *Census of Aquaculture 2005, 2013, and 2018 available at: https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Census_of_Aquaculture/index.php*



Photos, iStockphoto.com/pflemming

Oyster farm at low tide on Orcas Island, WA.

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