WRAC fact sheet

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Characterization of Aquaculture in the Western U.S.

TROUT FARMING

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Photo: Trout raceways

Farm-raised trout are recognized as a major aquaculture foodfish sector in the U.S., ranking second behind catfish. Trout are raised not only for foodfish, but also for sale to private pond and lake owners and public agencies for stocking to support recreational fishing opportunities. Trout farms are widespread across the Western Region, with 10 of the 12 states in the region reporting at least one private farm that raises and sells trout (Figure 1).

Trout raised for food are primarily rainbow (*Oncorhynchus mykiss*) or steelhead. Steelhead are the anadromous form of rainbow trout that spend part of their lives in the ocean before returning to freshwater to spawn. Farmers that sell trout into recreational fishing markets raise a variety of species that include brown (*Salmo trutta*), brook (*Salvelinus fontinalis*), and cutthroat trout (*Oncorhynchus clarkii*) along with the hybrid tiger trout (♀ brown x ♂ brook), cutbow (♀ cutthroat x ♂ rainbow), and splake (♀ lake, *Salvelinus namay-cush*, x ♂ brook), as well as specialty varieties such as golden and albino trout.

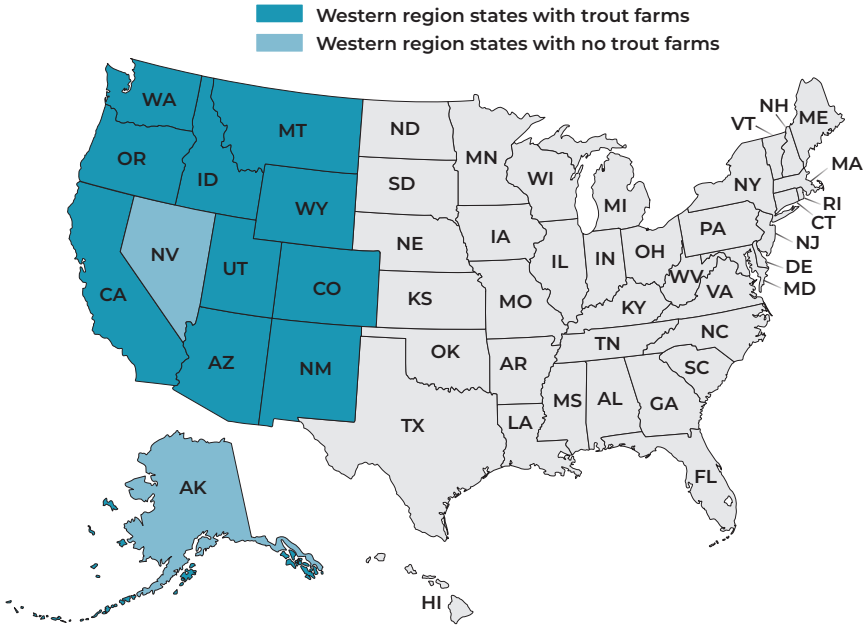

Figure 1. U.S. map highlighting the Western Region states that have private farm production of trout.

The Western Region is the original home of rainbow trout and includes its native range. Farmers in California began to raise rainbow trout in the late 1800s (Needham and Behnke, 1962; Behnke, 1992) and produced the original trout eggs that became the foundation for trout farms in other states of the U.S. and many countries around the world (Hardy et al., 2000; Fornshell, 2002). The trout raised in the 1800s to early 1900s were used for stock enhancement. It was not until the 1950s that trout processing facilities were developed in Idaho, which led to growth and development of a major farming industry to supply trout foodfish to consumers (Brannon and Klontz, 1989). The most commonly used production systems for trout in the Western Region are flow-through raceways that are constructed with quiescent zones to capture solids and associated

Photo: Keri Rouse

nutrients and offline settling basins for wastewater treatment. There is also a net pen farm that raises steelhead trout.

The state of Idaho leads the nation in sales of farmed trout, with 41% market share of all trout (food-fish and recreational fish) production in 2018, followed by Washington (second) with 26% market share (Figure 2). Other states in the Western Region that rank nationally for trout production include California (fourth), and Colorado (sixth). Tribal hatcheries also produce trout, mostly for recreational purposes, along with state and federal hatcheries that raise various species of trout for stocking into natural waters.

Among Western Region states, Idaho ranks first in both value and volume of trout production. Washington ranks second in total sales, followed by California, Colorado, and Utah (USDA-NASS, 2019). The greatest number of trout farms was reported in Idaho, followed by California, Oregon, Colorado, Utah, Washington, Arizona, New Mexico, Wyoming, and Arizona. No trout production was reported for Alaska or Nevada.

Trout farms in the Western Region, as well as across the country, range in size from very small farms with sales of less than 20,000 pounds (lb) to very large, vertically integrated farms (Engle et al., 2019). The total sales of trout in the Western Region have grown by 67% from 1998 to 2018 (Figure 3a), but this growth has been accompanied by a steady decrease in the number of trout farms (Figure 3b). Consolidation of the volumes and sales of trout produced into fewer, but larger farms is not unique to trout farming, having also occurred

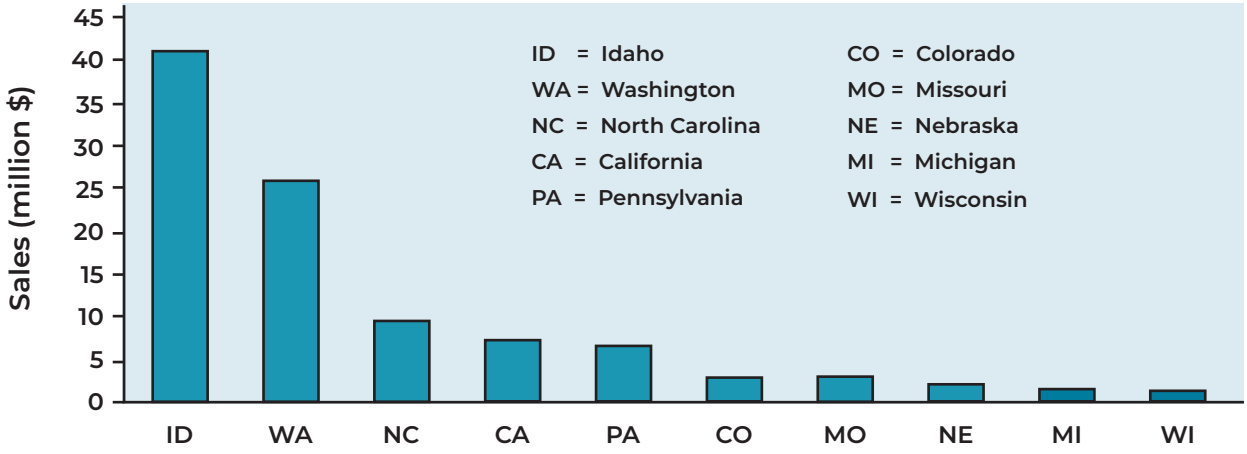

Figure 2. Top ten trout-producing states in the U.S. by sales. Source: USDA-NASS (2019)

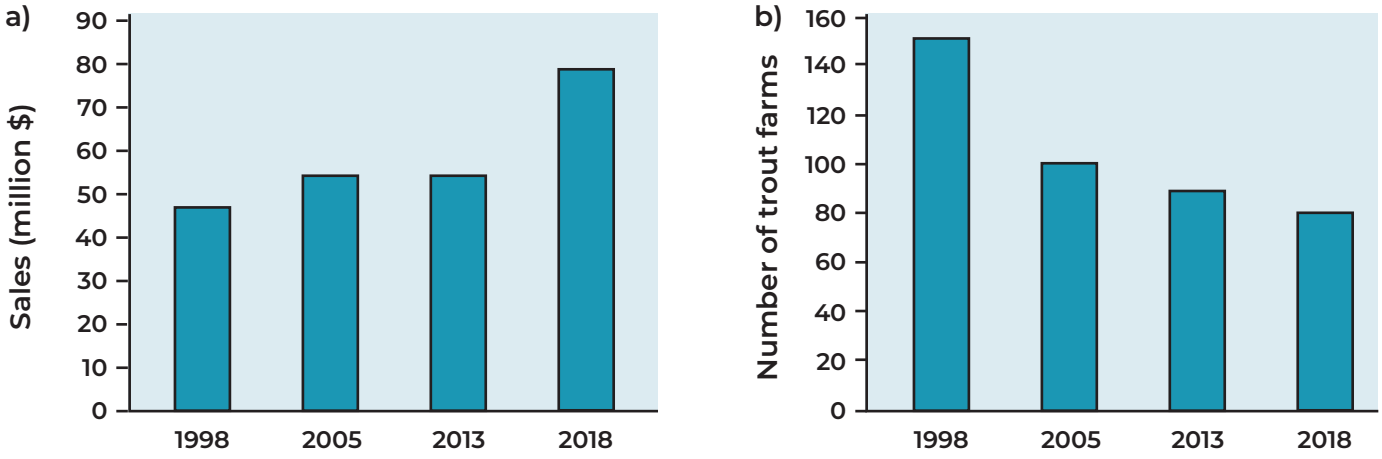

Figure 3. U.S. trout farming trends in the Western Region, 1998 to 2018 by: a) sales and b) number of farms. Source: USDA-NASS (2000, 2006, 2014, 2019)

in other sectors of U.S. aquaculture (Engle et al., 2022) and across U.S. agriculture generally.

Trout farmers in the Western Region have developed effective supply chains to sell their fish into different markets and through differing market channels. Trout supply chains begin with purchases of the supplies and inputs required to produce trout. Major expenditures on feed, equipment, and vehicles have created demand for development of feed mills that specialize in the production of feed for fish and manufacturers of specialized fish hauling tanks, among others. Other upstream supply chain partners include utility companies that provide electrical and communications services, fuel companies, insurance providers, and many others. Some trout farms maintain their own broodstock, but others purchase eggs or fingerlings from other farms or hatcheries that specialize in production of specific genetic strains of trout. Employment opportunities are created throughout the trout supply chains and include jobs on farms as well as in the many supply chain partner businesses supported by trout farming.

Photo: Keri Rouse

Golden trout.

Downstream supply chain partners include processors for trout sold as foodfish. Some trout farms have integrated their farming operations with processing while other farms focus on producing trout for sale to a processing company. Processed trout are then sold from processors to different downstream partners, including supermarket brokers, food service companies that sell to restaurants, and direct, often online, sales to consumers. Trout raised for recreational fishing markets are sold through different supply chains, which include private pond owners and lake management entities or public agencies for stocking into natural waters. Some trout farms have fee fishing ponds or stream sections where customers can fish for trout. Ten distinct supply chains were identified based on various business models used by trout farmers in the Western Region, with a generalized supply chain map illustrated in Figure 4.

The economic contribution of the private, recreation-based trout industry is substantial in the Western Region. Surveys of producers, their direct customers, and anglers in just two states, Colorado and California, found an economic

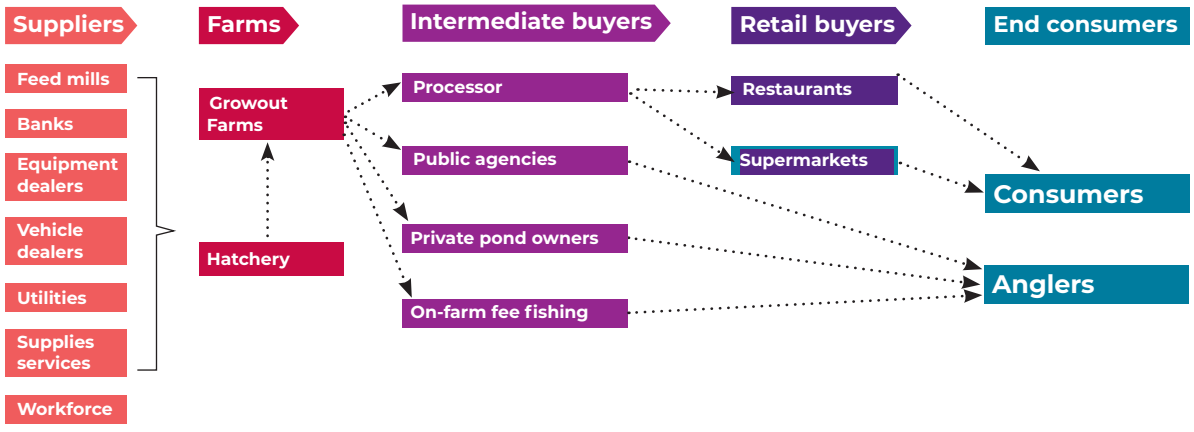

Figure 4. Generalized supply chain map of trout in the Western Region.

contribution of approximately $2 billion annually in 2010 (Deisenroth et al., 2012). Adjusting for inflation, the economic contribution in 2022 would be $2.7 billion annually. The economic multiplier estimated in this study, which included data from all downstream market sectors, was 36. In other words, every dollar of fish stocked supported $36 of angler-related expenditures. The economies of some towns in the Western Region depend largely on trout stockings during certain times of the year. Benefits of the recreationally based trout farming industry include economic support to concessionaires, municipalities, and various agencies in addition to supporting recreational opportunities for anglers.

At one time, seafood consumed in the U.S. consisted mostly of wild fish caught by domestic fishermen and by anglers for home consumption. In more recent years, however, the supply of seafood has shifted primarily to imported products. Trout imports have followed this trend, with sales of imported trout quadrupling from 2010 to 2022, with a 50% increase from 2020 to 2022 (Figure 5). The overall volume of imports has also increased and coincides with a period of decreased sales in the U.S., as U.S. trout farmers have had to compete with increasing volumes of imported product. Norway and Chile are the major trout exporters to the U.S., with market shares of 43% and 33%, respectively; smaller volumes come from Peru (8%), Colombia (6%), and a number of other countries. (Figure 6). While seafood import data do not differentiate rainbow from steelhead trout, it is likely that much of the imported trout from Norway and Chile are steelhead, especially given reports of increased production of steelhead trout on

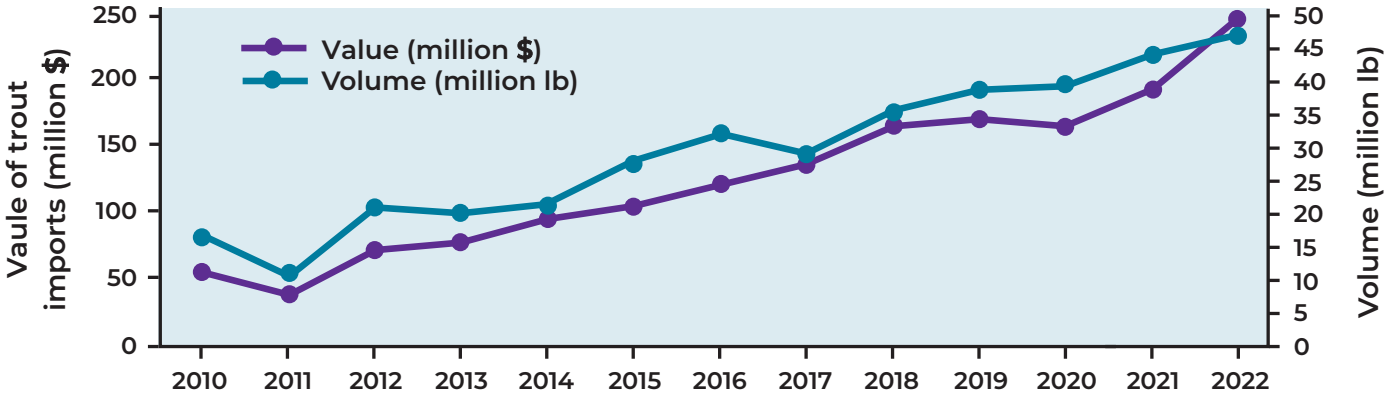

Figure 5. Imports of trout into the U.S. from 2010 to 2022. Source: NOAA Fisheries Trade Database.

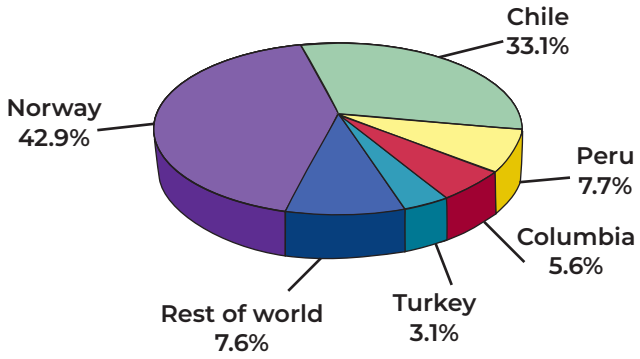

Figure 6. Major trout exporting countries to U.S., 2022. Source: NOAA Fisheries Trade Database.

salmon net pen farms in Norway (Landazuri-Tveteraas et al., 2021). Increasing volumes of imported trout likely have occurred because domestic production has not been able to meet U.S. demand for several reasons. One reason may be the greater competition for water resources that has restricted access to resources for new trout farms (Fornshell, 2002). For example, the area in the U.S. with the greatest potential for new trout production is the Great Lakes. U.S. trout producers, however, have been denied permits for production in the Great Lakes despite the development of net pen farms on the Canadian side. Canadian production of trout in the Great Lakes was 8 million lb in 2022.

Increased restrictions on allowable nutrient discharge has further constrained expansion in traditional trout-producing areas (Fornshell, 2002). The overall stringency of regulations on U.S. salmonid production was found to account for 12% of total costs of production (Engle et al., 2019). Utah and Colorado in the Western Region had some of the highest regulatory costs per lb (averaged by farm) nationally, but the greatest state-wide regulatory cost was that of Idaho. Regulations further resulted in lost revenue of $17.25 million per year from the loss of markets, production restrictions, and thwarted expansion attempts in the Western Region.

Photo: Keri Rouse

Feeding trout.

Conclusion

The Western Region is the birthplace of the U.S. and global trout industry. The growth and development of trout farming across the region has supported development of new economic sectors such as feed mills and businesses that provide specialized services to trout farms. These businesses support several hundred economic sectors and provide employment opportunities throughout the region. Moreover, demand for local, farm-raised trout continues to grow. Additional growth of trout farming in the region, however, will likely depend upon identifying solutions to the major constraints faced by trout farmers. Identifying “smarter,” more cost-efficient, ways to provide necessary regulatory oversight through participatory engagement among agencies and farmers has potential to support economic growth through trout farming, while at the same time protecting precious natural resources.

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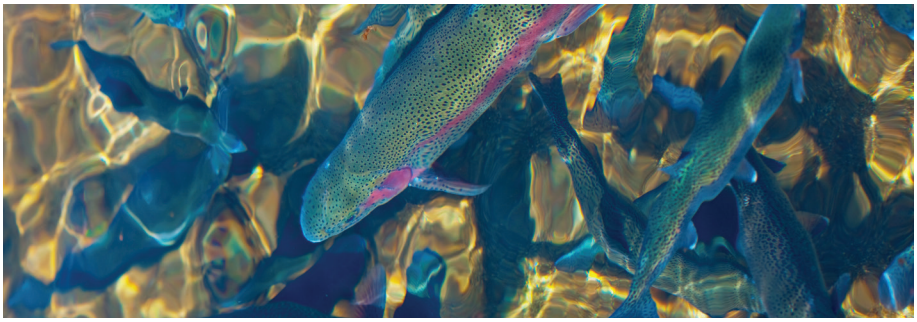

Photo: iStockphoto.com/kcline

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