

WRAC fact sheet

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Characterization of Aquaculture in the Western U.S.

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COLORADO

Photo: Colorado trout farm.

Carole Engle, Engle-Stone Aquatic\$ LLC
Jonathan van Senten, VA Seafood AREC, Virginia Tech University

The term “aquaculture” includes production by publicly funded state and federal hatcheries to enhance natural stocks of fish. The Census of Aquaculture (2018) (USDA-NASS 2019) re-ported that 12.2 million trout were produced and stocked in Colorado for conservation, recreation, or restoration. The Cen-sus data, however, do not distinguish between fish raised by public or private facilities. State and federal hatcheries also support aquaculture supply chain businesses such as feed mills, but it was beyond the scope of this WRAC-funded project to survey publicly funded hatcheries and measure their economic impact to Colorado.

Colorado is known for its recrea-tional opportunities. The value of recreational fishing alone has been estimated to be \$1.9 billion in Colorado (Lizarraga and Wendland, 2020). Fish farms make important contributions by raising and selling fish that are stocked into a wide variety of recreational fisheries, which are managed by private land owners, ranchers, fishing clubs, and homeowner’s associations (Diesenroth et al., 2012). Colorado is home to some of the first fish farms in the U.S. (Colorado Aquaculture Association, 2023), many of which have a long history of supporting important recreational fisheries in the state.

Colorado is widely known for its farm-raised production of trout. Fish farms in the state also produce foodfish such as hybrid striped bass and tilapia. These aquaculture farms have created and sustained various supply chains for their products, which contribute to the economy and society in different ways. A recent supply chain analysis funded by the Western Regional Aquaculture Center identified 15 distinct supply chains for aqua-culture products in Colorado. Figure 1 presents a generalized supply chain map for farm-raised trout to illustrate the variety of aquaculture supply chains in Colorado.

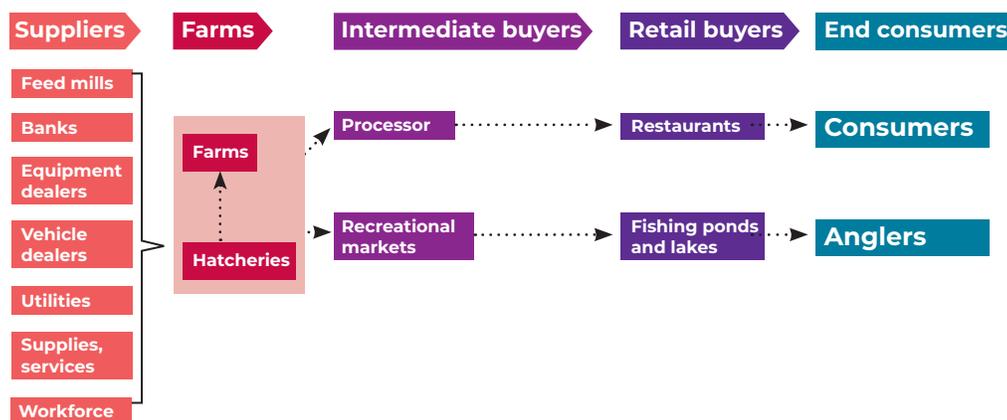


Figure 1. Supply chain map of trout produced in Colorado.

The Contribution of Aquaculture to the Economy of Colorado

The total economic contribution of aquaculture in Colorado (in 2022 \$) was \$14.6 million (Table 1). Of this, \$9.0 million was from direct contributions from aquaculture farms, \$3.4 million from indirect contributions of supply chain partners, and \$2.2 million in induced output from the additional household spending from employment created. Of the total 45 jobs supported by aquaculture in Colorado, 21 were on aquaculture farms, 12 were indirectly from supply chain partners, and an additional 12 were from induced household spending effects.

Additional economic contributions include \$0.6 million in federal tax revenue, \$0.1 million in state tax revenue, and \$0.1 million in local taxes (Table 2). It should be noted that these estimates of the economic contributions of Colorado aquaculture are at the farm level. Sales into recreational markets generate substantial additional impacts from expenditures by anglers, which were not accounted for in this analysis. For example, in a study that surveyed anglers and first point-of-sale customers in the



Photo: Liley Fisheries, Colorado

Colorado trout farm.

western region, combined multiplier effects were 22 times greater than those at the farm-level for economic output and more than 200 times greater for employment (Diesenroth et al., 2012). Applying the increased economic contributions from angling to the portion of Colorado sales to recreational markets results in a total economic impact of \$186 million, with support for more than 7,000 jobs.

Hatchery Aquaculture Production

Aquaculture farming begins with spawning and reproduction of the animals in specialized hatchery facilities. Most trout farmers in Colorado buy eggs produced from selectively bred broodstock from hatchery farms that specialize in egg production, although some farms purchase fingerlings (young fish that are stocked into growout facilities) or maintain broodstock

Table 1. Economic contribution of the aquaculture sector to the economy of Colorado.

Type of impact	Employment (number of jobs)	Total economic output (\$)
Direct economic impact	21	\$9.0 million
Indirect economic impact	12	\$3.4 million
Induced economic impact	12	\$2.2 million
Total economic impact	45	\$14.6 million

Table 2. Tax revenue generated from the aquaculture sector in Colorado.

Tax category	Tax revenue (\$)
Federal	\$0.6 million
State	\$0.1 million
Local/county	\$0.1 million
Total	\$0.8 million

for spawning on their farms. Most Colorado farms that raise hybrid striped bass, tilapia, and catfish purchase fingerlings from hatcheries that are often located in other states, while some spawn these species on their own farms.

Markets and Supply Chains Supported by Colorado Aquaculture Farmers

The greatest sales value of Colorado aquaculture products is from sales into recreational sportfishing markets, which provide opportunities for anglers. More than half of the sales from aquaculture (55%) are sold into recreational markets (Figure 2). Trout sales account

for nearly two-thirds of the total recreational sales from Colorado fish farms; the other sales include yellow perch, largemouth bass, crappie, sunfish, walleye, catfish, and grass carp, some of which are purchased from other states for sale to private fishing ponds and lakes. Hybrid striped bass and tilapia are sold into food markets for consumers, with a small percentage (1%) of fish sold to other farms.

Recent Trends of Aquaculture in Colorado

The aquaculture sector in Colorado has grown substantially, with sales more than doubling from 2005 to 2018; during this time, the number

of farms increased by 13% (Figure 3). The greater growth of sales as compared to the number of farms indicates that the average size or scope of farms in Colorado has increased. New technologies to conserve water through recirculation and economical ways to warm water have contributed to the growth of aquaculture sales in Colorado despite the semi-arid climate of the state. The number of aquaculture farms in Colorado decreased dramatically (by 53%) from 1998 to 2005. The loss of farms may represent the trend of consolidation similar to that exhibited in other leading sectors of U.S. aquaculture, such as catfish (Engle et

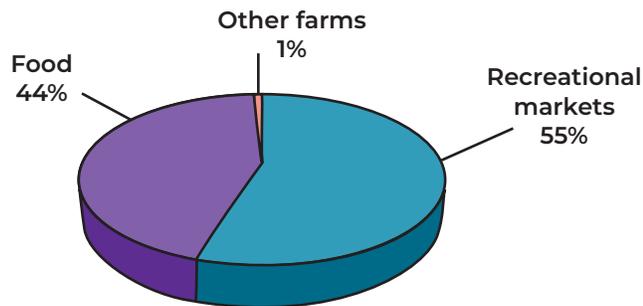


Figure 2. Percent of sales of aquaculture products sold into various supply chains from Colorado aquaculture farms.

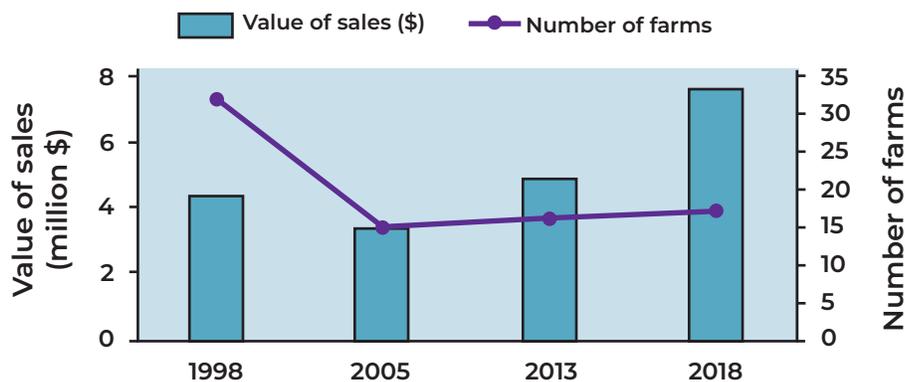


Figure 3. Total aquaculture sales and number of farms in Colorado, 1998 to 2018. Source: USDA-NIFA (2000, 2006, 2014, 2019)

al., 2022), but may also have been driven by an outbreak of whirling disease in Colorado. Farms that could not afford the renovations necessary to remain whirling-disease free were reported to have shut down.

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Photo: Liley Fisheries, Colorado

Stocking trout into private pond in Colorado.

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

For more information, contact Jonathan van Senten at jvansenten@vt.edu or Carole Engle at cengle8523@gmail.com

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