

Species Profile for Aquaculture Coho Salmon

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INTRODUCTION

Coho salmon (*Oncorhynchus kisutch*) are native to the North Pacific Ocean and its tributaries from the Sea of Japan north to the Bering Sea and the west coast of North America from California to Alaska. ^{[1],[2]} The species has historically been an important sport and commercial fish in British Columbia and, in recent decades, an important sportfish in the Great Lakes. ^[1] As a revered sportfish, coho salmon were successfully introduced to all the Great Lakes through targeted stocking efforts in the late 1960s. ^[1] Coho salmon have been successfully introduced to areas outside their native range in North America, Europe, Asia and South America. ^{[1],[2]}

In the wild, coho salmon generally reach sexual maturation at 3 years of age and weigh approximately 3.0–5.5 kg. Mature fish return to their river of origin to spawn in the fall and early winter. ^[3] Female coho salmon deposit 2,000–5,000 fertilized eggs in the river substrate. Eggs incubate in the riverbed over winter and emerge as fry in the spring. ^{[2],[3]} Juvenile coho spend approximately 1 year living in freshwater rivers before migrating to the sea or lake. ^{[2],[4],[5]} Adult coho salmon spend 18 months (one winter) at sea or lake before returning to their natal stream to spawn and complete their life cycle. ^{[2],[3]}

COHO SALMON AQUACULTURE

Coho salmon were first cultured in Oregon, U.S., in approximately 1900 in an effort to both improve commercial fisheries and rehabilitate stocks that had been negatively affected by habitat degradation and dam construction. ^[3] Coho salmon aquaculture for food production began in 1969 in Puget Sound, Washington, U.S., using open water net pen production systems. By the mid-1980s, coho salmon aquaculture in Puget Sound was producing over 3,000 metric tonnes per year. ^[6] Coho salmon continues to be farmed in the Northwest U.S. at land-based aquaculture facilities and throughout the world.

In 2020, global aquaculture production of coho salmon reached 250,000 metric tonnes and Chile accounted for 82% of global production. ^[7] Chile is the world's leading producer of coho salmon followed by Japan and Canada. ^[6] In Canada, coho salmon aquaculture for food production began in British Columbia in the early 1970s using ocean net pen farming systems. ^[8] The species continues to be farmed in British Columbia and other provinces such as Ontario. Coho salmon are a novel aquaculture species in the province of Ontario with a small volume of production. Coho salmon eggs are imported into Ontario and grown to market size in land-based recirculating aquaculture systems (RAS).



Figure 1. Harvested coho salmon ready for market.
Source: Springhills Fish.

The species has many beneficial qualities that make it an appealing aquaculture species. Coho salmon have a lean dark red flesh with an attractive bright silver skin and are a very fast-growing salmonid species under proper controlled growing conditions in RAS (Figure 1).

FARMING CONDITIONS FOR COHO SALMON

The production cycle for coho salmon begins when mature fish are stripped of gametes, and the eggs are fertilized and incubated in fresh water, most often using Heath trays. Coho salmon eggs reach the eyed stage at approximately 220-degree days and generally hatch between 400–500-degree days.^[3] During egg incubation, survival is highest at consistent water temperatures of 2.5°C–6.5°C. The upper temperature threshold for coho salmon egg development is 12°C, with a recommendation of 10°C to avoid deformities.^{[3],[9]}

Juvenile coho salmon are cultured in fresh water using circular tanks, troughs and raceways. First feeding begins when the yolk sac is absorbed at approximately 700–800-degree days.^[3] At 120 mm in length or greater, coho typically undergo smoltification, a process that enables the fish to tolerate living in sea water. When juveniles take on a silver appearance, lose their parr marks and pass a seawater tolerance test, the smoltification process is complete and the fish may be transferred to saltwater.^[3] Coho salmon may be reared in freshwater for the duration of their lifecycle with no adverse consequences to growth rate. Coho salmon can be reared in a variety of grow-out production systems, including open water net

pen, land-based RAS and land-based flow-through in marine or freshwater environments.

Consistent water temperature ranging between 10°C and 14°C is suitable for rearing fry and adult coho salmon.^{[2],[3],[5],[10]} Temperatures below 4.4°C and above 15°C are not optimal.^[10] Coho salmon have a lethal upper thermal limit of approximately 25°C.^{[1],[2],[9],[10]} For optimal productivity and welfare, oxygen saturation in the rearing unit water should be maintained at 80%–100%.^[11]

SPECIES OUTLOOK

Coho salmon aquaculture for food production is new to the province of Ontario. The species provides producers with an alternative to rainbow trout production, helping to meet domestic market demand for salmonid species and provide consumers with a great tasting and nutritious seafood choice.

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