

Aquaculture in Ontario

Learn about raising aquatic animals, the different species being farmed and the future outlook of the industry.

Introduction

Aquaculture is the raising of aquatic organisms under controlled conditions. Often referred to as fish farming, aquaculture also includes the cultivation of crustaceans (shrimp, crab), mollusks (oyster, mussel) and aquatic plants (kelp, algae).

Aquaculture is done in both fresh and saltwater environments in ponds, rivers, lakes and oceans, as well as at land-based facilities.

Aquaculture is one of the world's fastest growing food production sectors and is widely recognized as a vital part of global food security and nutrition. Over half of all seafood consumed globally is produced by aquaculture.

Future increase in global seafood demand is expected to be met through a diversity of aquaculture species and productions systems. It is projected that by 2030 aquaculture will supply nearly 60% of all seafood consumed globally^[1].

Aquaculture serves many purposes:

- food production for human consumption
- enhancement of recreational and commercial fisheries
- rehabilitation of threatened and endangered aquatic species
- research and education
- fee-fishing operations
- baitfish production

- the aquarium trade and zoos
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History of aquaculture in Ontario

There is a rich history of aquaculture in Ontario dating back to 1865 when Atlantic salmon were first cultured at a private hatchery on Wilmot Creek near Newcastle. Early aquaculture efforts in the province were targeted toward fish stocking for the enhancement of sport and commercial fisheries.

In the early 1900s, the province began operating numerous fish hatcheries. Provincial hatcheries were involved in spawning and fertilization, egg incubation and the culture of juvenile fish for stocking into local rivers and lakes^[2]. The province of Ontario continues to operate 9 fish culture stations (<https://www.ontario.ca/page/ontarios-fish-stocking-program>) and stocks approximately 8 million fish annually to support species rehabilitation and stock enhancement.

Aquaculture for food production or fish farming began in 1962 when the *Game and Fish Act* was amended to allow for the sale of rainbow trout and brook trout for human consumption. This regulatory change opened the door for a new form of aquaculture in the province focused on food fish production^[3].

The *Fish and Wildlife Conservation Act* permits more than 45 aquatic species for aquaculture in Ontario.

Since the beginning of aquaculture for food production in Ontario, more than 60 years ago, the industry has progressively advanced production practices, technologies and domestic stocks to produce seafood more efficiently and sustainably.

Ontario has become Canada's largest freshwater aquaculture producer. It leads all provinces in rainbow trout production accounting for over 60% of national production^[4]. An abundance of freshwater resources, proximity to major consumer markets and an established aquaculture infrastructure and workforce have all contributed to the success and productivity of Ontario's aquaculture industry^[5].

Ontario's aquaculture industry

The aquaculture industry is an important economic driver in rural, northern and Indigenous communities across Ontario. It provides employment, prosperity, food security and a healthy local food source for the people of Ontario.

Ontario seafood farmers use sustainable farming practices to produce high-quality seafood products rich in protein, omega-3 fatty acids, minerals and vitamins. Ontario aquaculture has been internationally recognized for sustainable seafood production following independent third-party reviews and on-farm audits.

Major Ontario producers are certified under the Global Seafood Alliance (<https://www.globalseafood.org/>). The Vancouver-based conservation program Ocean Wise (<https://ocean.org/>) has recommended Ontario-farmed rainbow trout as a sustainable seafood choice.

The Ontario aquaculture industry is made up of a diverse group of seafood farmers, feed suppliers and other stakeholders committed to sustainable aquaculture production. Many of the province's aquaculture sites operate through long-term partnerships with Indigenous communities, supporting job creation, economic development and food security within the community.

Ontario's aquaculture industry is using land-based and open water net pen production systems to grow seafood for human consumption and to support recreational fishing. Ontario seafood farmers are embracing innovation by incorporating new technologies to improve the industry's level of production and environmental stewardship.

Aquaculture is well supported in Ontario through advocacy, public outreach, research, education and regulatory framework to ensure responsible and sustainable development of the aquaculture industry. The Ontario Aquaculture Association (<http://www.ontarioseafoodfarmers.ca>) (OAA) represents over 45 members and promotes the industry by fostering growth, innovation and partnerships across the province's aquaculture sector.

The Ministry of Agriculture, Food and Rural Affairs (OMAFRA) provides extension services for new entrants and established producers and supports aquaculture research through

the Ontario Aquaculture Research Centre (<https://www.uoguelph.ca/alliance/research-facilities/research-centres/animal-research-centres/ontario-aquaculture-research-centre>) (OARC).

Regulations

Aquaculture in Ontario is governed by regulatory framework that ensures sustainable and responsible production of aquatic species while protecting the province's natural resources. Regulatory requirements for operating an aquaculture facility include licensing, permits and approvals at the federal, provincial and municipal levels of government.

Federal government regulations

- Aquaculture in Canada is governed federally by Fisheries and Oceans Canada (<https://www.dfo-mpo.gc.ca/index-eng.html>) under the *Fisheries Act* (<https://laws-lois.justice.gc.ca/eng/acts/F-14/>) which sets out Aquaculture Activities Regulations (<https://laws.justice.gc.ca/eng/regulations/SOR-2015-177/page-1.html#h-820176>) to protect fish and fish habitat.
- The Canadian Food Inspection Agency (<https://inspection.canada.ca/eng/1297964599443/1297965645317>) (CFIA) regulates the import, export and humane transportation of aquatic animals in Canada under the *Health of Animals Act* (<https://laws-lois.justice.gc.ca/eng/acts/h-3.3/>).
- CFIA addresses aquatic animal health and reportable diseases through the National Aquatic Animal Health Program (<https://www.dfo-mpo.gc.ca/science/aah-saa/naahp-pnsas-eng.html>) co-delivered with Fisheries and Oceans Canada.
- CFIA regulates and licenses (<https://inspection.canada.ca/food-licences/eng/1523876882572/1523876882884>) the processing of aquaculture products for sale outside of Ontario under the Safe Food for Canadians Regulations (<https://laws-lois.justice.gc.ca/eng/regulations/SOR-2018-108/index.html>).

Provincial government regulations

In Ontario aquaculture is regulated by three provincial ministries: the Ministry of Natural Resources and Forestry (MNR), the Ministry of the Environment, Conservation and Parks (MECP) and OMAFRA.

- **MNR** (<https://www.ontario.ca/page/ministry-natural-resources-and-forestry>) is the lead provincial ministry regulating and licensing aquaculture under the *Fish and Wildlife Conservation Act* (<https://www.ontario.ca/laws/statute/97f41>) .
- An aquaculture license (<https://www.ontario.ca/page/aquaculture-and-fish-stocking-licences>) is required to culture fish in Ontario (except as otherwise exempted). It provides authority to culture, buy, sell and transport eligible aquatic species set out in the license.
- **MNR** sets the species eligible for aquaculture in Ontario, listed in schedule B — **O. Reg. 664/98: Fish Licensing** (<https://www.ontario.ca/laws/regulation/980664#BK22>) under the *Fish and Wildlife Conservation Act*. Only aquatic species listed in schedule B are eligible for aquaculture in Ontario.
- **MECP** (<https://www.ontario.ca/page/ministry-environment-conservation-parks>) issues permits to take water (<https://www.ontario.ca/page/permits-take-water>) for aquaculture facilities utilizing more the 50,000 L per day and regulates effluent water discharge through Environmental Compliance Approvals (<https://www.ontario.ca/page/environmental-compliance-approval>) under the *Ontario Water Resources Act* (<https://www.ontario.ca/laws/statute/90o40>) .
- **OMAFRA** (<https://www.ontario.ca/page/ministry-agriculture-food-and-rural-affairs>) addresses the management of materials (such as fish manure) containing nutrients in ways that protects the natural environment and ensures the sustainability of aquaculture operations under the *Nutrient Management Act* (<https://www.ontario.ca/laws/statute/02n04>) .
- Land-based aquaculture operations are subject to compliance with the *Nutrient Management Act* and may require a nutrient management strategy (NMS) or nutrient management plan (NMP) (<https://www.ontario.ca/page/when-farms-require-nutrient-management-strategy-nms-nutrient-management-plan-nmp-or-non>) .
- **OMAFRA** regulates and licenses fish processing for sale of aquaculture products within Ontario under the *Food Safety and Quality Act* (<https://www.ontario.ca/laws/statute/01f20>) . As of January 1st, 2020, fish processors within scope of the regulations are required to have a provincial fish processing license (<https://www.ontario.ca/page/fish-inspection-program>) issued by **OMAFRA**.

Municipal government regulations

- Aquaculture operations may be subject to business licensing, building permits, zoning and land-use bylaws as set out by the municipality.
 - Aquaculture operations utilizing municipal water sources or discharging effluent water into municipal drains are subject to municipal regulations.
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Research

Owned by the Agricultural Research Institute of Ontario (ARIO) and operated by the University of Guelph, OARC plays a key role in aquaculture research supporting breeding and genetics, culture methodology, fish health, welfare and behaviour, nutrition, growth and waste management.

OARC is home to the “Getting Started in Aquaculture and Aquaponics (<http://www.uoguelph.ca/alliance/research-centres/aquaculture/workshops/register>)” workshop hosted by OMAFRA and the University of Guelph. This workshop provides education and training for those interested in starting an aquaculture or aquaponics farm.

Training opportunities

The University of Guelph and Fleming College offer post-secondary education and training in aquaculture, providing qualified new entrants into the domestic aquaculture workforce every year. The University of Guelph’s Aquaculture Centre (<https://www.aquacentre.uoguelph.ca/>) co-ordinates research, extension and educational activities to support the transfer of information and technology to the private sector. Strong aquaculture education in Ontario is producing a skilled local workforce capable of leading the next generation of Ontario seafood farmers.

Ontario’s aquaculture outlook

There are many opportunities for aquaculture development within the province. The upper Great Lakes (Huron and Superior) have suitable locations and climatic conditions allowing

for efficient production in open water net pen systems. Advancements in land-based recirculating aquaculture systems (RAS) present new opportunities to produce a diversity of species close to major domestic and international markets. Ontario aquaculture producers are innovating and expanding production using decommissioned aggregate pits and quarries to culture finfish in closed-containment raceways.

The province of Ontario is home to a unique combination of physical and human assets which enable the production of world-class aquaculture products and provide opportunities for expanded production into the future. Ontario's vast aquatic resources, proximity to major consumer markets, strong regulatory regimes and established infrastructure all contribute to a productive and sustainable aquaculture industry and will be an instrumental part of future aquaculture development in the province.

Fish species farmed

For food production

Primary species:

- rainbow trout (<https://www.ontario.ca/document/species-profiles-aquaculture/rainbow-trout>)

Secondary species:

- Arctic char (<https://www.ontario.ca/document/species-profiles-aquaculture/arctic-char>)
- coho salmon
- lake whitefish (<https://www.ontario.ca/document/species-profiles-aquaculture/lake-whitefish>)
- tilapia (<https://www.ontario.ca/document/species-profiles-aquaculture/tilapia>)

For stocking, fee fishing and aquaponics

- Atlantic salmon
- Aurora trout
- bass (small and largemouth)
- bloater

- brook trout
- brown trout
- Chinook salmon
- cyprinid baitfish
- koi
- lake trout
- lake sturgeon
- lake whitefish (<https://www.ontario.ca/document/species-profiles-aquaculture/lake-whitefish>)
- rainbow trout (<https://www.ontario.ca/document/species-profiles-aquaculture/rainbow-trout>)
- splake
- sunfish (crappie, bluegill, pumpkinseed)
- tilapia (<https://www.ontario.ca/document/species-profiles-aquaculture/tilapia>)
- walleye

Related

Aquaculture Alliance of Canada (<https://www.aquaculture.ca/>)

Getting Started in Aquaculture and Aquaponics Workshop
(<http://www.uoguelph.ca/alliance/research-centres/aquaculture/workshops/register>)

Ontario Aquaculture Association (<https://ontarioseafoodfarmers.ca/>)

Ontario Aquaculture [Descriptive Video] (<https://www.youtube.com/watch?v=2dO6AhNaSpQ>)

Updated: May 13, 2024

Published: September 08, 2023

Footnotes

- [1] ^ The state of world fisheries and aquaculture 2022. Food and Agriculture Organization of the United Nations, Rome, 2022.

- [2] ^ An historical review of fish culture, stocking and fish transfers in Ontario, 1865–2004. Kerr, S. J. 2006. Fish and Wildlife Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario. 154 p. + appendices.
- [3] ^ Aquastats — Ontario aquaculture trout production in 1988 with an historical perspective of the industry’s development. R.D Moccia and D.J Bevan, University of Guelph, May 1989.
- [4] ^ Aquaculture Production Quantities and Value. Government of Canada.
- [5] ^ An overview of aquaculture in Ontario. Richard D. Moccia, Steven Naylor and Gregor Reid, University of Guelph, January 1997.