



# NOVA SCOTIA SPECIES SPOTLIGHT: FARMED ATLANTIC SALMON (*Salmo salar*)

## FISHERY

Atlantic salmon cultivation in Nova Scotia is performed using both marine net pens and land-based production systems.

Production in marine net pens is represented by 8 license holders operating 27 approved lease sites totalling 424 hectares\*.

Production in land-based hatcheries and grow-out production systems is represented by 16 license holders in 9 different counties across Nova Scotia.

In 2021, 8592 t of Atlantic salmon were produced in Nova Scotia with a value of \$68M, representing 7% of total Canadian Salmon production.

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## BIOLOGY

Atlantic salmon is an anadromous species, meaning that they are born in, and swim up rivers to spawn in freshwater, but then eventually move out to the pelagic zone of the ocean. They are more closely related to the brown trout (*Salmo trutta*) than to pacific salmon species (*Oncorhynchus spp.*).

Atlantic salmon have long, thin bodies, with small heads, blunt noses and a mouth that extends below the eye. They can grow up to 70 cm in length, weigh up to 30 kg, and have a lifespan from 3 to 7 years.



## LIFE CYCLE AND PRODUCTION

The stages in the life cycle of Atlantic salmon include:

Stage	Description
<b>Alevin</b>	Hatched fish still dependent on the yolk sac for nutrition
<b>Fry</b>	Transitional stage where the fish emerge from nests (redd), begin to feed exogenously, and disperse
<b>Parr</b>	Stage between full absorption of the yolk sac and smoltification
<b>Precocious parr</b>	Sexually mature parr
<b>Smolt</b>	Stage when seaward (lakeward if landlocked) migration occurs
<b>Post-Smolt</b>	Stage from departure from the river to the end of the first winter in the sea
<b>Adult</b>	Fish after the end of the first winter in the sea which returns to river to spawn
<b>Grilse</b>	A fish that returns to breed after one sea-winter
<b>MSW</b>	A fish that returns to breed after multiple sea-winters
<b>Kelt</b>	Adult fish after spawning, until it reaches the sea.

All Atlantic salmon produced commercially in NS are farm-raised. All farm-raised Atlantic salmon start in a freshwater hatchery. Most commonly, Atlantic salmon are raised from egg until smolt, and are then transferred to their grow-out sites until they reach harvestable size from 2 – 5 kg.

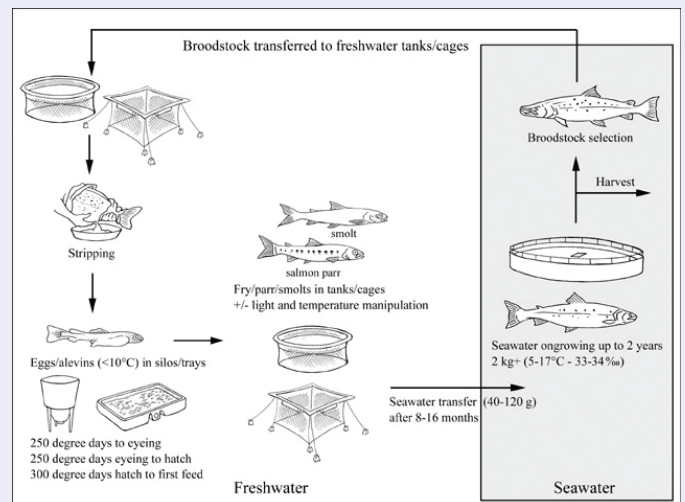


Figure. Atlantic salmon aquaculture production cycle (FAO, 2022)



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## MANAGEMENT AND CONSERVATION

Atlantic salmon producers in NS must develop and implement a farm management plan meeting the minimum requirements outlined by the NS Department of Fisheries & Aquaculture. Producers are required to outline plans related to stocking levels, production inputs, procedures for fish health management, farm operations, environmental monitoring, and to maintain records to verify adherence to the procedures outlines in the farm management plan.

Atlantic salmon is rated *Good Alternative (Yellow)* by the Monterey Bay Aquarium Seafood Watch Program when raised in marine net pens, but rated *Best Choice (Green)* by Seafood Watch and *Recommended* by Oceanwise when raised in land-based recirculating aquaculture systems.

## SEAFOOD LABELLING

	Terminology	Description
<b>Common Name</b>	<b>English:</b> Salmon, Atlantic Salmon <b>French:</b> Saumon, Saumon Atlantique	Accepted names to refer to products of <i>Salmo salar</i>
<b>Production Method</b>	Farmed	Cultivated in marine net pens or land-based recirculating systems
	RAS	Recirculating Aquaculture Systems, raised in tanks on land
<b>Certifications</b>	Best Aquaculture Practices (BAP)	Production standards for the governance, environmental impact, and social responsibility of aquaculture operations throughout the supply chain
	Aquaculture Stewardship Council (ASC)	
<b>Production Claims</b>	Sustainable	Contains a third-party sustainability certification such as BAP or ASC
	Organic	Aquaculture products that comply to the <b>Canadian Organic Aquaculture Standard</b>
<b>Product Forms</b>	Round	Unprocessed
	Dressed	Eviscerated
	HOG	Head-on and gutted, same as dressed
	H&G	De-headed and eviscerated
<b>Process Description</b>	Sushi-Grade	Previously frozen and stored at -35 °C or below for at least 15 hrs, or -20 °C or below for at least 7 days



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## PROCESSING/HANDLING

### Process Yield

Total Edible Yield of Atlantic Salmon = **73 %**

Round to Dressed = **90.7 %**

Dressed to Untrimmed Fillet = **77 %**

Dressed to Trimmed Fillet = **67.5 %**

Dressed to Smoked Fillet = **62 %**

### Primary Products

Head on Guttled (HOG, Dressed) Salmon

### Secondary and tertiary products

Trimmed fillets, portions, marinated preparations, cured preparations, smoked preparations, other specialty products

### Post-Harvest Primary Processing Flow

Harvest » Slaughter » Bleed » Gutting » Icing » Storage » to secondary processing

### Secondary & Tertiary Processing Flow

Receiving » Thawing » Filleting » Trimming » Pin Boning » Skinning » Portioning » Freezing » Packaging » Storage » Transportation

### By-Products

Offal, blood, heads, frame, trim, skin, brown muscle

### Post-Harvest Processes and Processing Factors Impacting Quality

- Slaughter technique and effectiveness
- Bleed time and tank temperature
- Cleanliness of gut
- Rigor status
- Product chilling
- Gentle handling
- Freezing and Thawing
- Packaging

## CHEMICAL COMPOSITION

	Proportion (g / 100 g)	
	Raw	Cooked
<b>Moisture</b>	64.9	64.8
<b>Protein</b>	20.4	22.1
<b>Fat</b>	13.4	12.4
<b>Carbohydrate</b>	0.0	0.0
<b>Ash</b>	1.13	1.15

\*USDA Nutritional Database ID, 15236 (Raw) and 15237 (Cooked)

Atlantic Salmon is considered a fatty fish.

Over 25% of fat is polyunsaturated, and approximately 50% of these polyunsaturated fats are the omega-3 fatty acids alpha-lipoic acid (ALA), docosahexaenoic acid (DHA), and eicosapentaenoic acid (EPA).

## STORAGE

Fresh Atlantic Salmon spoils primary due to the growth of bacteria on the surface of the fish, and should be stored from -1.5 to 4 °C, to slow the rate of spoilage and extend shelf life.

In the HOG format, belly cavities should be filled with ice and positioned to prevent the accumulation of melting ice in the bellies. In contrast, indirect ice contact of fillets stored skin-to-skin and meat-to-meat is optimal to limit the transfer of bacteria from the surface of the skin to the meat. Direct ice contact with flesh can cause localized freezing, pigments to bleed, and promote bacterial growth.

**Fresh whole (HOG) salmon remain acceptable for up to 4 weeks (28 days)**

**Fresh salmon fillets can remain acceptable for up to 2 weeks (14 days)**

Atlantic salmon should be held at temperatures no greater than -18 °C if planning to store over the short term (< 6 months), but -30 °C or below if planning to store over the long term (> 6 months). Atlantic salmon continue to spoil by fat oxidation when under continuous frozen storage. Vacuum packaging for both short- and long-term frozen storage is recommended to remove oxygen from the product environment and prevent oxidation in these products in cold storage.



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## KEY FOOD SAFETY AND QUALITY CONCERNS

Fresh and frozen, raw Atlantic salmon do not pose an inherent food safety risk if they are cooked to an internal temperature of 70 °C / 158 °F.

Consideration of the rigor-status of fish should be made during processing. Filleting Atlantic salmon pre-rigor can lead to fillet shortening if not immediately frozen.

Mishandling and rough treatment of animals can contribute to bruising, gaping, and discoloration in the fillets.

Smoked salmon products with a durable life > 14 days can pose a risk for the growth of *Clostridium botulinum* when packaged in oxygen impermeable packaging and when at refrigerated temperatures. Oxygen permeable films must be used if smoked salmon products are intended to be packaged at refrigerated temperatures. For more info on the safety and quality of smoked fish, see the fact sheet on **Preserved Seafoods**.

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