



# NOVA SCOTIA SPECIES SPOTLIGHT: NORTHERN (COLDWATER) SHRIMP (*Pandalus borealis*)

## FISHERY

The Nova Scotia Northern shrimp fishery consists of both inshore and offshore sectors. Shrimp inshore fishing areas (SFA) 13 to 16 are open year-round, and in 2022 had a total allowable catch (TAC) of 2,300 t, and SFA 16 was not actively fished.

The offshore fleet is comprised of 17 licence holders and ~10 vessels from NS, NL, QC, NT, with NS companies owning 4 licences and operating 4 vessels. In 2022, the offshore fleet was allocated 16,300 t of the TAC in SFA 4-6. Fishing in SFA 0-3 is challenged by ice cover. SFA 1 is jointly accessed by Greenland and Canada and the TAC for Canadian waters was ~ 16,000 t in 2021. SFA 7 has been closed to fishing since 2015 due to stock declines.

Northern shrimp is caught by otter trawl and trap in the inshore fishery, and by otter trawl in the offshore fishery. In 2021, 17,743 t of shrimp were landed in Nova Scotia with a value of ~ \$60M, and an export value of over \$100M.

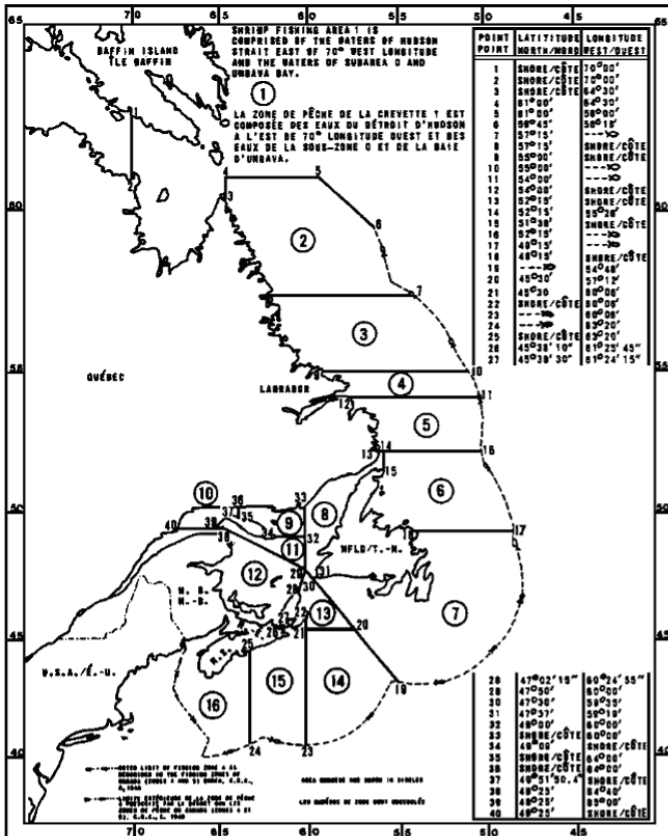


Figure. Northern (coldwater) shrimp fishing areas in the Northwest Atlantic

## BIOLOGY

Northern shrimp are crustaceans like crab and lobster and are one of ~ 20 separate *Pandalus* spp. found globally.

They prefer water temperatures from 2 to 6 °C, and soft and muddy ocean bottoms. In the Atlantic Ocean, they are found from Baffin Bay to the Gulf of Maine, and fished at depths of 200 to 600 m.

They feed on krill, amphipods, copepods, and plankton, and are preyed on by groundfish including cod, halibut, redfish, and silver hake.

## LIFE CYCLE

Mating occurs in later summer to fall, and fertilized eggs are carried on their abdomen until the following spring, lasting from 5 to 11 months. Shrimp move inshore to spawn, producing on average 2000 eggs per female. Hatched larvae will remain in the pelagic zone for up to 4 months before settling on the ocean bottom.

Shrimp are protandric, meaning that all eggs hatch as male larvae, then transition to females after 2 to 7 years of age. Male shrimp reach sexual maturity when nearly 2 cm in length after 1 to 3 years. After their sex transition, they live out the remainder of their lives as mature females. A proportion of hatched larvae are female, and referred to as primary females.

Male shrimp can grow up to 12 cm in length, whereas females can grow up to 15 cm in length, and live for approximately 8 years.

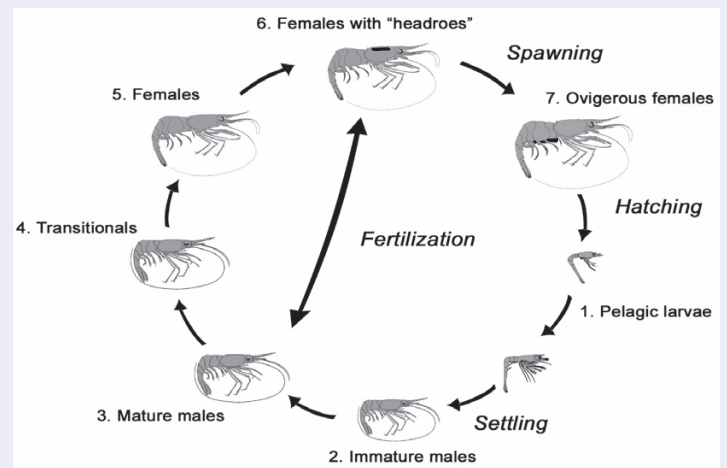


Figure. Shrimp life cycle



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## MANAGEMENT AND CONSERVATION

Management of the fishery is a collaborative effort between the North Shrimp Advisory Committee, Indigenous Groups, and Fisheries and Oceans Canada. Stocks are managed using a TAC for each SFA determined annually, seasonal/area closures, fishing gear restrictions, dockside monitoring of inshore landings, 100% at-sea observer coverage of the offshore fleet, and vessel monitoring systems, among others.

Gear restrictions specify trawl nets must have a minimum mesh size of 40 mm and be fitted with a Nordmore grate that allows groundfish to escape.

The fishery in SFA 1-7 accessed by the offshore fleet is certified sustainable by the Marine Stewardship Council. Additionally, the fishery in SFA 13-15 is also certified.

## SEAFOOD LABELLING

	Terminology	Description
<b>Common Name</b>	<b>English:</b> Northern shrimp, Cold Water shrimp, Deep Water shrimp, Shrimp, Prawn <b>French:</b> Crevette Nordique, Crevette D'eau Froide, Crevette Boreale, Crevette Rose, Crevette Nordique Du Canada, Crevette <b>Japanese:</b> Amaebi	Accepted common name(s) for <i>Pandalus borealis</i>
<b>Production Method</b>	Wild	Harvested from the ocean
<b>Certifications</b>	Marine Stewardship Council (MSC)	Certifies that fish products come from wild fisheries that meet environmental standards for sustainable fishing
<b>Product Forms</b>	Whole	Head-on, shell-on, raw or cooked
	C&P	Cooked and peeled
<b>Process Description</b>	Glazed	Dipped in fresh water after freezing
	IQF	Individually quick frozen
	Bits	Broken shrimp pieces less than 5-7 mm in length
	Clumps	Two or more shrimp fused together
<b>Size Grading</b>	95 - 125	Count per lbs
	125 - 175	
	150 - 250	
	250 - 350	



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## PROCESSING/HANDLING

### Process Yield

Whole, cooked: **90%**

Cooked and peeled: **20 - 45%**

### Primary Products

Raw or cooked whole shrimp (frozen), cooked & peeled (frozen)

### By-Products

Heads, Shells, Tail

### Post-Harvest Primary Processing

**Processing on Land:** Harvest » Chilling » Offloading » Receiving » Grading » Cooking (optional) » Cooling » Peeling (optional) » Washing » Freezing » Packaging » Storage » Transportation

**Processing at Sea:** Harvest » Grading » Washing » Cooking (optional) » Cooling » Peeling (optional) » Washing » Freezing » Packaging » Storage » Transportation

### Post-Harvest Processes Impacting Quality

- Product Exposure
- Product Chilling (delay in chilling, temperature abuse)
- Washing/Cleaning (washing to remove eggs, legs, eyes, antennae, sand)
- Process Effectiveness (Cooking, Cooling, Freezing)

## CHEMICAL COMPOSITION

	Proportion (g / 100 g)	
	Raw	Cooked
<b>Moisture</b>	75 - 80	65 - 70
<b>Protein</b>	18 - 20	25 - 30
<b>Fat</b>	1.0	1.0
<b>Carbohydrate</b>	0.0	0.0

\*FAO, 2001

## STORAGE

Fresh shrimp should be stored at temperatures from 0 to 3 °C. Chilling may be performed using ice or in recirculating seawater systems and can remain acceptable for up to 4 days. Characteristic shrimp flavour begins to subside after 6 days and becomes spoiled after ~ 8 days. Cooked shrimp should not be stored chilled for any period of time.

Shrimp intended for further processing onshore should not be stored chilled for greater than 2 days. If frozen at sea, they too should be frozen within 2 days of capture.

Cold storage of both whole and C&P shrimp at temperatures < -30 °C is optimal for long-term storage. Sensory characteristics (odour, flavour, and texture) will begin to change after 6 months of storage. Storage of whole shrimp at -20 °C will keep for 3 to 4 months, and storage at -10 °C will keep for only 1 month and are more difficult to peel when thawed.

## KEY FOOD SAFETY AND QUALITY CONCERNS

Exposure of shrimp directly to sun and wind on the vessel before processing can accelerate spoilage and make chilling more difficult.

Care should be taken not to use too much ice for risk of crushing shrimps. Additionally, recirculating sea water storage can be an effective mode of chilling, but drives greater salt uptake into the shrimp than by using ice.

Cooking, post-cook cooling, and freezing should take place as quickly as possible to preserve sensory attributes. Batch sizes and cook times should be clearly defined and validated. Adding too much shrimp into the cooker can drop water temperatures, which leads to non-uniform heating, and extends the required cook time. Cook times should be validated for different size grades.



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To ensure a high-quality cooked product, cooking water should be replaced as frequently as possible to avoid excess build up of protein and extraneous matter. Cooked shrimps are considered ready to eat (RTE), and care should be taken not to contaminate product after cooking.

Cooling should be performed with clean sources of water and ice, and untreated seawater should be avoided. Shrimp should not be immersed in cooling water for longer than it takes to reach the target internal temperature. Achieving an internal temperature of 5 °C within 10 mins is considered adequate.

Brine freezing of shrimps is complete when the internal temperatures reach -18 °C. Care should be taken not to immerse shrimp for prolonged periods as greater uptake of salt will occur. Individual quick freezing should include fluidized or vibratory systems to prevent clumping.

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