

Red Atlantic King Crab (*Neolithodes grimaldii*)

Common Names: Porcupine crab, spiny red crab and spiny spider crab.

Description, Distribution and Biology

The porcupine or Red Atlantic King crab is a bottom dwelling marine crustacean from the family Lithodidae. This species is characterized by an intense red colouring and predominant spines, reaching up to 5 cm in length and cover the carapace and legs (Fig.1). It has three pairs of walking legs and one pair of claws. The right claw, used for crushing activities, is typically larger than the left, predominately used in handling food. There is also a small pair of legs located under the carapace that is used for cleaning the gills. Porcupine crabs can grow to a maximum carapace length of 14 cm and a weight of 3.5 kg. This species usually has a softer shell texture in comparison to the commercially harvested snow crab.



Figure 1. Red Atlantic King crab. Source: Department of Fisheries and Aquaculture, St. John's, NL.

The porcupine crab is located on both sides of the North Atlantic Ocean. In the northwest Atlantic it is distributed along the coast from Greenland to North Carolina, however there is no recorded data for distribution in either the Gulf of St. Lawrence or the Bay of Fundy. It is a deep-water species that can be found at depths ranging from 800 to 2,000 m and typically prefers soft substrates.

There is limited information on the growth, reproduction, abundance and life history of porcupine crab, however it is known that they are primarily carnivorous, often feeding on small mussels, snail, scallop, worm and crustaceans. Males usually grow much larger than females and have larger claws. Egg extrusions and green filaments on the pleopods characterize female abdomens at maturity. Approximately 50% of females will reach maturity at 90 to 95 mm. Although it is difficult to determine the maturity of males, it is estimated they reach maturity at approximately 100 mm. This species has a unique reproductive adaptation allowing it to spawn at great depths. Reports suggest the female becomes fertile during the autumn months. The number of eggs released by the female can range from 7,200 to 28,600. The eggs are dark brown to black and are considerably larger, (average diameter of 2.1 mm), than those produced by other members of the family and other crab species. It is also known that females do not have the ability to form new eggs while simultaneously incubating eggs under the abdomen.

Harvesting, Technology and Resource Management

Rectangular and conical pots have been used to test for a potential porcupine crab fishery in Newfoundland and Labrador. The rectangular pots, modeled after the Alaskan King crab pot, are typically 1.83 x 1.83 x 0.76 m high with two side entrances. The pots are constructed from mild steel round stock, measuring $\frac{3}{4}$ " in diameter, and covered by a 5 $\frac{1}{4}$ " mesh size (inside mesh). The two side entrances measure 183 x 25.4 cm with a ramp constructed from 3.8 cm bar length square mesh. The conical pots are standard snow crab pot design, measure 61 cm high with a top diameter of 71 cm and a bottom diameter of 122 cm. The top entrance is made from a 20.3 cm wide polyethylene cone, which has a 50.8 cm diameter opening at the top and a 35.6 cm opening at the bottom. The frame is constructed from a 1 cm bar and enclosed with a 13.5 cm polyethylene netting. An experimental pot design was also introduced during a study conducted in 2000. This new pot, referred to as a "Hoop pot", is constructed of a 1.5 m diameter ring with monofilament netting attached to the edges and bait placed in the centre. Many types of bait can be employed in the harvesting of porcupine crab, including squid, mackerel, herring, turbot, and seal blubber.

Despite the different types of pots and baits tested, the catch rates have been very low and the majority of landings have been by-catches from the deep water gillnet fishery off the coast of Labrador. There is currently no regulation regarding the harvesting and processing of king crab species in the province.

Markets and Processing

Since a commercial fishery for porcupine crab has yet to be developed, handling and holding practices, processing procedures, and markets have not been established. However, as with any crab industry, the harvested crab should be processed live to ensure product quality. Processing can occur either on board with the aid of a blast freezer or at a processing facility. Crab should be held live in storage tanks filled with circulating seawater immediately after capture where they can remain for 6 to 10 days prior to processing. The claws of the crab should be banded to prevent fighting thereby, reducing the number of marks and missing limbs. The temperature of the water should be maintained near 5 °C. Crab can also be iced and held in boxes on board the vessel as long as they are not packed too densely. Crab will expire after 5 days when packed on ice. Initial condition of the crab and handling procedures play a significant role in crab mortality.

Although markets have not been established for the porcupine crab, samples for exploratory fisheries were sent to Asia and the United States and it was favorably received. The meat of a red atlantic king crab is comparable to the Alaskan king crab in both taste and appearance. The Alaskan king crab is considered a more lucrative fishery than the snow crab and therefore the introduction of red atlantic king crab products should be widely accepted in similar markets.

Constraints and Future Development

There is no direct fishery for king crab species in the province, however large quantities have been taken as by-catch in deep-sea gillnet turbot fisheries off the coast of Labrador. In 1993 and 1994, exploratory fisheries were developed to determine resource availability of porcupine crab in Newfoundland and Labrador. An effort to capture the crab using baited pots was largely unsuccessful. In 1995, a porcupine crab workshop was held in Gander, Newfoundland, and proposed future initiatives including further studies on baited pots and the gathering of biological information. In 2000, a project was designed to test several pot types, however no crab was captured during the study, suggesting crab does not respond to conventional baited pots.

Future development of this industry will require a better understanding of biological issues such as biomass, distribution, reproduction, feeding habitats and moulting of porcupine crab. Further research is needed to determine appropriate gear technology, implementing proper handling and holding procedures, and developing and installing suitable processing equipment. Furthermore, markets will have to be identified and processing will have to reflect consumer specification.

ADDITIONAL READINGS:

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