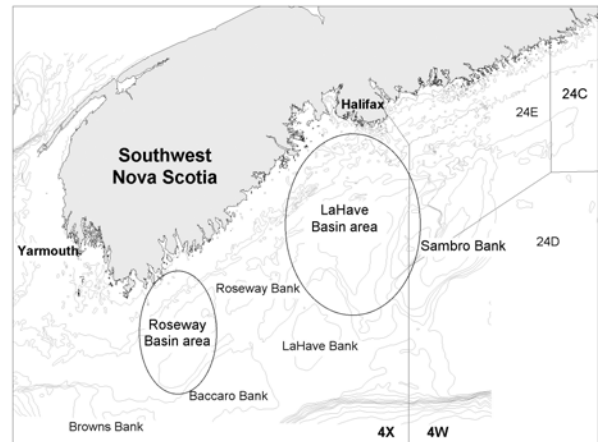


Southwestern Nova Scotia Snow Crab



Background

Snow crab (*Chionoecetes opilio*) are crustaceans like lobster and shrimp, with a flat, almost circular, body and five pairs of spider-like legs. The hard outer shell is periodically shed in a process called moulting. After moulting, crabs have a soft shell for a period of time. Unlike lobsters, male and female snow crab do not continue to moult throughout their lives. Females stop growing after the moult in which they acquire a wider abdomen for carrying eggs. This occurs at shell widths less than 95 mm. Male snow crab stops growing after the moult, in which they acquire relatively large claws on the first pair of legs. This can occur at shell widths as small as 40 mm. Female crabs produce eggs that are carried beneath the abdomen for approximately 2 years. The eggs hatch in late spring or early summer and the tiny newly hatched crab larvae spend 12-15 weeks free floating in the water. At the end of this period, they settle on the bottom. It then takes at least 8-9 years for snow crab males to reach legal size.

The minimum legal shell width is 95 mm, and female crabs are not kept by industry. Soft-shelled crab is defined by shell hardness of the right claw (<68 durometer units). The term "white crab" describes both new-soft and clean hard-shelled crab (carapace conditions 1 and 2 respectively). Fishing is by baited conical traps constructed of tubular steel and netting. The traps are set on muddy or sand-mud bottoms.

The range of distribution of this species in the western Atlantic is from Greenland to the Gulf of Maine, and at depth from 20 to 310 m, but mostly from 70 – 280 m. Typical fishing depths of southwestern Nova Scotia are 90 to 180 m. The records of distribution clearly indicate that Crab Fishing Area 27 (CFA 27) is situated at the most southerly limit for the distribution of this species. Different sources indicate that no snow crab have been captured on Georges Bank (NAFO Area 5ZE, situated immediately west to CFA 27).

Summary

- During the 2000 / 2001 fishing season, the catch was 213 t. Overall, landings and total effort (15,568 trap hauls) have increased compared to the same period in 1999/2000.
- The average catch rate (CPUE) (13.7 kg/th) has increased compared to previous years. However, CPUE is not considered to be an index of abundance to the fishery in 4X because it is affected by the gear types, the fishing grounds and the effort deployed by each fisherman.
- There is insufficient information to estimate the snow crab biomass for this area.
- Being near the southern limit of snow crab distribution and located in what is considered marginal environmental conditions, the long term stability of this fishery is doubtful.

The Fishery

Harvesting of snow crab, *Chionoecetes opilio*, off the southwestern coast of Nova Scotia (NAFO Division 4X; CFA 27) began in 1994/95 with 4 licenses and a 30 trap limit. A by-catch of Jonah crab (*Cancer borealis*) was allowed and logbooks were mandatory. Reported landings were 17t.

In 1995/96, license holders were allowed 100 traps of which 30 could be 6 feet in diameter instead of the 4 feet in diameter (standard Japanese trap). No adjustment in trap types was undertaken. By-catch of Northern Stone crab (*Lithodes maja*) was added. Fishing effort reached 11,146 trap hauls, but often trap catches were equal to zero and landings were only 11t.

In 1996/97, the trap limit was increased to 250, of which 30 could be the larger-size traps. By-catches of Jonah crab and Northern Stone crab were again allowed. Traps required biodegradable panels, and 10% dockside monitoring (DMP) was introduced. Performance criteria were introduced to the fishery, and set at 18 sea days per year, which was based on 10% of the available fishing days in the previous year's season. Only two license holders fished during the 1997 fishing season. The effort was 3,475 trap hauls and landings were 4t.

In 1997/98, the dockside monitoring program coverage was increased to 20%. Only two license holders fished during the 1997 part of the fishing season. Jonah crab was dropped from allowed by-catch. During the second part of the fishing season, a concentration of snow crab was found along the NAFO fishing boundary 4W/4X. Three fishers relocated to this area. The trap limit was reduced to 175, of which 30 could be

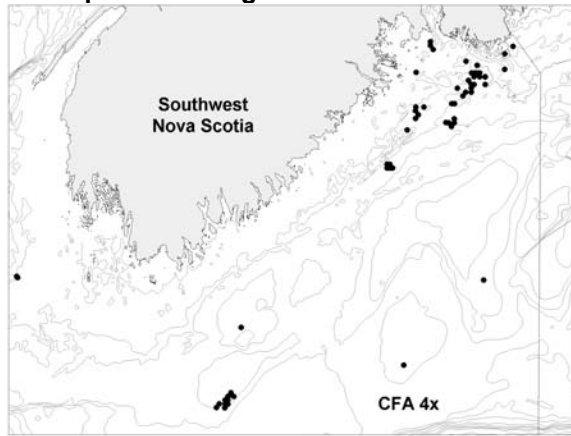
large-sized traps. The effort was 7,893 trap hauls and landings were 42t.

During the 1998/99 and 1999/2000 fishing periods, management measures remained similar to those of 1997/98. The effort was 5,986 and 12,038 trap hauls, respectively. Landings increased to 70t in 1998/99, and to 119t during the 1999/2000 fishing period. Two temporary permits were issued to native bands in the fall of 1999 and spring of 2000, but no fishing activities were reported in CFA 27 from these bands.

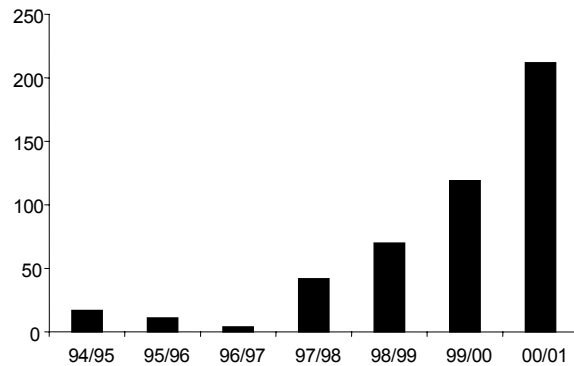
In the fall of 2000, the 4 exploratory permits in existence since 1994 were converted into permanent licenses. As a result, Northern Stone crab was dropped as an allowed by-catch species in this area. The first official fishing season was set for November 1st 2000 to June 1st 2001. A minimum coverage from the Observer at-sea Program was introduced and established at a total of 12 trips (3 trips per vessel) for the 2000-2001 fishing season. The DMP coverage was increased to cover 100% of the landings. Fishermen are now allowed either a trap limit of 60 large traps or of 145 Japanese traps and 30 large traps.

Fishing locations reported during the 2000/2001 fishing season have indicated only two commercial fishing grounds: the Roseway Basin area and an area north of LaHave Basin. Available information from the summer groundfish survey in 2001 also indicated no other grounds with snow crab. This confirmed information from an extensive trap survey conducted in 1999 that identified only these two commercial fishing grounds in CFA 27.

Reported fishing locations in 2000/2001



Landings (t)

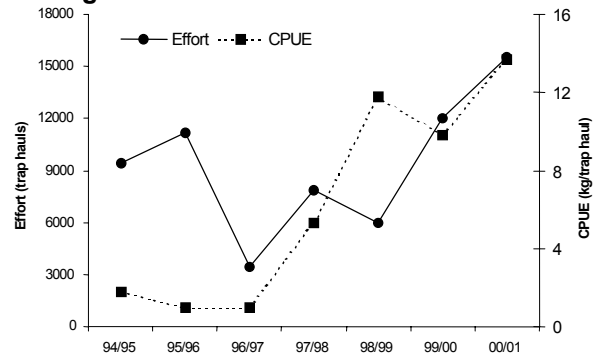


The fishing season of 2000/2001 is the first time that all licenses were possibly exploited to their full potential in term of fishing effort. As such, it should be regarded as representative of the current potential of the fishery, but not as direct evidence that stock status has ‘improved’ since the last assessment.

Resource Status

The evaluation of stock status for the fishing season of 2000 / 2001 is based primarily on fishery information and observer at-sea data. Catch-per-unit-effort (CPUE: kg/trap haul) and effort (total number of trap hauls) were derived from fishing logs. CPUEs were not adjusted for soak time or gear type. A shift toward larger, more efficient traps has been observed in recent years.

Fishing effort and CPUE



Overall, landings (213t), average CPUEs (13.7 kg/th) and total effort (15,568 th) have increased during the 2000/2001 fishing season compared to the same period in 1999/2000 (119 t, 9.8 kg/th and 12,038 th, respectively).

To verify the presence of female and juvenile male snow crabs, as well as to gather biological data, a survey using unmodified shrimp traps was conducted in the spring of 2000. Each fisherman was responsible for setting and fishing 3 shrimp traps in his current fishing ground. This indicated females and future recruitment to the fishery were present in 4X at the time of the survey. However, recruitment to this fishery may also originate from the eastern Scotian Shelf. Except for the 10% that were barren, all others mature females were carrying orange eggs, which are at the same stage of development. The development of the eggs takes almost two years and during this time they change colour from bright orange to dark purple or black.

There is insufficient information to estimate the snow crab biomass for this area.

Sources of Uncertainty

Pending further information, the average CPUE could not be used as a relative index of abundance for this fishery because it was affected by differences in gear types, fishing

grounds and the effort deployed by each individual/license for any given year.

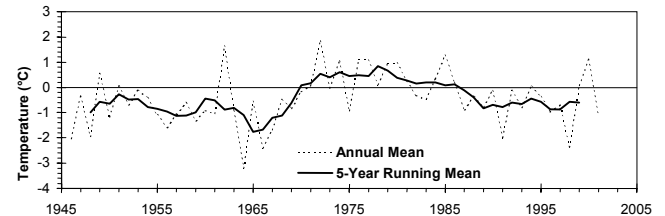
Environmental Factors

Two types of Slope Water can persist along the offshore edge of the Scotian Shelf. Warm Slope water with temperatures typically $>8^{\circ}\text{C}$ has dominated the region during the past 30 years. Subsequently, the waters in the deep basins on the shelf have reflected its presence. At times, however, cold ($4^{\circ}\text{-}8^{\circ}\text{C}$) Labrador Slope Water flows into the region from the north and replaces the Warm Slope Water. Such an event occurred in 1998 and persisted for approximately 1 year. Once along the shelf edge, the cold Labrador Slope Water soon penetrated onto the shelf through channels and gullies. It displaced the Warm Slope Water that had occupied the deep basins of the Scotian Shelf and Gulf of Maine and also covered much of the bottom of the southwestern Scotian Shelf. In 1998, the central and southwestern Scotian Shelf experienced the coldest near-bottom temperatures in the over 30-year record of groundfish surveys. In 1999, the Warm Slope Water returned to the shelf edge and gradually the shelf waters warmed up. By late 1999 or early 2000, deep temperatures had returned to above the long-term mean.

Annual mean near-bottom temperatures on the southeastern Scotian Shelf in the region of the LaHave Basin where snow crab are fished vary with depth. At 100m, they are near 4.5°C with a typical seasonal range from approximately 3.5° to 5.5°C . These temperatures tend to be $1^{\circ}\text{-}2^{\circ}\text{C}$ cooler than those found at depths in Roseway Basin where snow crabs are caught. During 2001, temperatures in both of these regions were generally colder than their long-term (1971-2000) average conditions. They also cooled relative to 2000 and are similar to the

colder-than-average temperatures observed during the late-1980s through the 1990s. Given that colder-than-average bottom temperatures are considered to be preferred by snow crab in these regions, the conditions in 2001 indicate a return to more favourable temperatures for snow crab compared to 2000 and are similar to most of the 1990s.

LaHave Snow Crab Area



Outlook

CFA 27 (4X) is at the southern most limit of the fishable concentration of snow crab. The snow crab habitat is limited to 2 small areas of 'cold' summer bottom temperature ($4\text{-}7^{\circ}\text{C}$): the Roseway Basin and an area north of LaHave Basin. Being at the limit of the natural range, this fishery would be susceptible to sudden environmental changes. As these 2 small areas of cold bottom temperature expand/reduce in size, the crab population will follow by expanding/reducing in size. Based on current knowledge, it is unlikely that a large fishery is sustainable.

Management Considerations

Based on the current available information, this fishery should be considered as an intermittent fishery.

For more Information

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