

Eastern Nova Scotia Snow Crab

Background

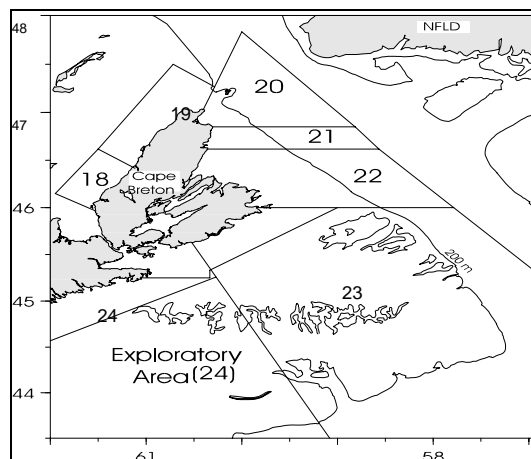
Snow crab (*Chionoecetes opilio*) are crustaceans (like lobsters and shrimp), with a flat almost circular body and five pairs of spider-like legs. The hard outer shell is periodically shed (called molting) in order to grow. Unlike lobsters, male and female snow crab do not continue to molt throughout their lives. Females stop growing after the molt in which they acquire a wider abdomen for carrying eggs. This occurs at shell widths less than 95 mm. Male snow crab stop growing after the molt in which they acquire relatively large claws on the first pair of legs. This can occur at shell widths ranging from 70 mm to 165 mm.

Female crab produce eggs that are carried beneath the abdomen for a year or more. The eggs hatch in late spring or early summer and the tiny newly hatched crab larvae spend several months free floating in the water. At the end of this period they settle on the bottom. It then takes about 7 years for snow crab males to reach legal size.

The minimum legal shell width is 95 mm, and female crab are not kept by industry. Fishing is by baited traps constructed of wood, wire or tubular steel on muddy or sand-mud bottoms at temperatures ranging from -0.5 to 4.5 °C. Typical fishing depths off eastern Cape Breton are 130 m to 250 m.

There are 5 Snow Crab Fishing Areas off eastern Nova Scotia (20,21,22, 23 and 24). The fishery for snow crab off the east coast of Cape Breton Island began in the late 1970s. Landings rose rapidly to a peak in 1979; landings and catch per unit effort (CPUE) then dropped precipitously. By 1985 the fishery was deemed to be on the verge of commercial extinction. Eastern Cape Breton snow crab stocks were thought to be unproductive due to marginal snow crab habitat and little endemic recruitment. In 1986 a pulse of pre-recruits entered commercial catches of snow crab in all areas off eastern Cape Breton.

Management of these fisheries was based strictly on effort controls (seasons: July 22-Sept 15 (Areas 20-23); Aug. 1-Sept. 30 (Area 24), limited entry and 30 traps/license) from 1982-93 because of the difficulty in setting quotas where recruitment is unpredictable. License number remained stable except for Area 24 where a total of 7 new licenses were added between 1989 and 1991. These are all restricted to a midshore area that was fished little prior to 1989. A small exploratory fishery is underway in NAFO Division 4X. Management objective is to distribute fishing effort in a manner that best utilizes the resource and supports the long term stability of the snow crab fishery. Tools include a 9 week season, limits on the number of licenses and number of traps. In 1995 restrictions were placed on the landing of soft-shelled crab, and individual boat quotas (IBQs) were introduced in all Areas.



The Fishery

Management: In 1995 there were substantial changes to the management of the snow crab fishery in Areas 20-24. Nine temporary one-year licenses were allowed in Area 23 and 10 in Area 24. Each license was permitted to land 10,000 lb with 10 traps per license. To control total effort, managers introduced individual boat quotas (IBQ) for regular licenses in all Areas. The IBQs were 55,000 lb in Areas 23 and 24, 20,000 lb. in Area 20, 10,000 lb. in Area 21, and 35,000 lb in Area 22 (to a maximum of 350 mt for the Area). All quotas were arrived at by a combination of historical landings and negotiations with fishers, and were regulated by dock side monitoring. An additional management change was directed at reducing the landing of soft-shelled crab. The percentage of soft-shelled crab in the landed catch of any individual on any given day was not to exceed 10%.

In addition to the fishery on the “traditional” grounds off eastern Cape Breton, there is interest by non-license holders in exploring for snow crab further to the southwest, and further offshore. In NAFO Division 4X, four vessels fished a total of about 130 days between September 1994 and October 1995.

Available from: Maritimes Regional Advisory Process, Department of Fisheries and Oceans, P.O. Box 1006, Stn. B105, Dartmouth, N.S., Canada B2Y 4A2 Telephone: 902-426-8487. E-Mail: d_geddes@bionet.bio.dfo.ca

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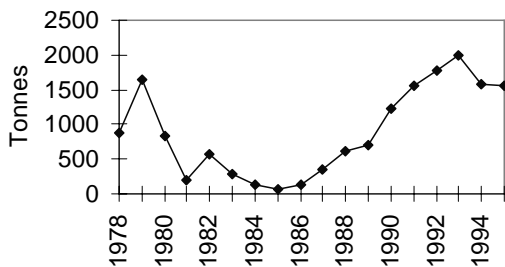
April 1996

Area	Landings (mt)							
	Year					1978-1995		
	91	92	93	94	95	Mean	Min	Max
20	14	18	20	29	44	21	0	80
21	157	196	167	108	100	116	7	247
22	183	240	390	259	284	181	3	684
23	530	595	770	497	576	324	28	770
24	682	743	662	682	550	278	4	743
Total	1566	1792	2010	1574	1554	875	77	2010

No. of licenses: 117. Area 20: 5; Area 21: 31; Area 22: 38; Area 23: 22; Area 24: 21 (7 limited to midshore grounds).

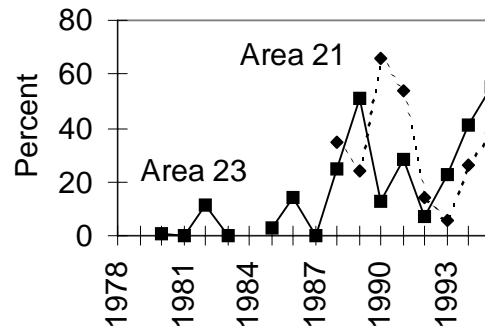
Landings: The fishery in Areas 20 to 24 began in earnest in 1978. The fishery was deemed collapsed in the mid-1980s but from 1987 to 1993 landings increased steadily, due to a greater abundance of crab, an expanded fishing area, and increased effort. Total landings in 1994 declined by 23% relative to 1993. Dock-side monitoring of catches was introduced in 1994 with the result of decreased reliability of effort reported in logbooks provided by DFO Science Branch. The compliance rate for completing logbooks has declined from >75% up to 1993 to 30% in 1995.

Total landings Areas 20-24



Biological data: Samples of commercial catch at-sea and at dockside were obtained to evaluate the percentage of soft-shelled crab. Samples of crab from the commercial catch are categorized by shell characteristics (size, hardness, colour), claw size, and sex. Although the sampling rate was low (8 sea samples and 5 port samples), the percent of soft-shelled crab caught was high, between 40% and 65%, but the amount landed was low, between 0% and 8%.

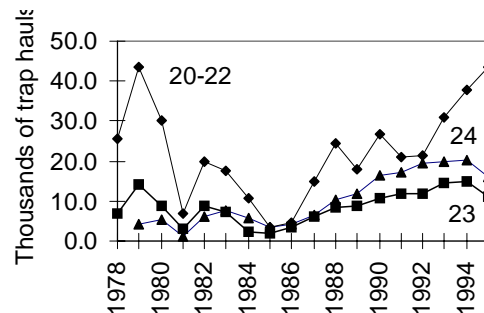
Percent soft-shelled crab



Resource Status

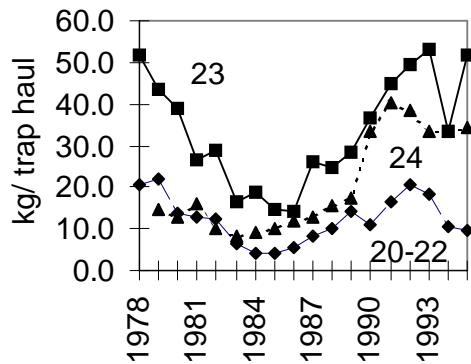
Inputs: Stock status is based on fishery information. There is no fishery-independent abundance index. Landings are derived from dock-side monitoring and fishing logs. Catch rate (kg/trap haul) and effort (total number of trap hauls) are derived from fishing logs, but as mentioned above the compliance rate has declined and it is not known how this change has affected the time series of catch rates. Catch rates in 1994 and 1995 have also been influenced by factors such as individual boat quotas, whether or not soft-shelled crab were retained, and a reduced fishing season in Area 21. Estimated total fishing effort was unchanged in 1995 even though crab price was high, and additional one-year licenses were active in Areas 23 and 24.

Fishing effort in trap hauls



Catch rates in the largest Areas were either higher than 1994 (Area 23 by 52%) or similar to 1994 (Area 24). Despite low compliance with return of logbooks, there was evidence for an increase in Area 21 and a decrease in Area 22, but these changes could not be confirmed.

Catch rates in Areas 20-24



Catch rates by the exploratory fishery in NAFO Division 4X (west of Area 24) averaged 1.5 kg/trap (less than 20% of the lowest catch rates in Areas 20-24).

Surveys: To examine the distribution of snow crab in 4X and in the extreme offshore of the eastern Scotian Shelf groundfish survey data were analyzed. Groundfish trawl surveys have been conducted at least once per year on the Scotian Shelf since the 1950s and snow crab have been enumerated since 1980. The groundfish surveys covered a much larger area than the commercial fishing, but the incidence of snow crab in the trawl catch was low. Of a total of 5801 trawl sets between 1980 and 1994, 96 (1.7%) yielded snow crab. During each season most snow crab were collected on the eastern Scotian Shelf and in the Sydney Bight area.

Population abundance: There is uncertainty about the status of this resource due to conflicting indices and reduced data on fishing effort from logs. The high incidence of soft-shelled crab suggests high exploitation or high recruitment; the high catch-rate of hard-shelled crab in two of the Areas suggests relatively high abundance. The interpretation of stock status is highly dependent upon accurate effort information. If effort is underestimated because of inadequate or inaccurate log data, catch rates are lower than indicated here.

Ecosystem: The sustained good recruitment in the late 1980s and early 1990s were coincident with a decline in groundfish and changes in the environment. Snow crab on the Scotian Shelf are near the southern limit of their distribution, and are found mainly in areas where summer bottom temperatures are less than 3 °C. Temperatures have been colder than average in Sydney Bight for the past decade, but have warmed in the past 2 years. Temperatures in Areas 23-24 (Misaine Bank) have remained cold since 1985. Lower than normal temperatures, such as during the

second half of the 1980s may be beneficial to snow crab abundance on the Scotian Shelf.

Outlook

Projection: Projections are difficult because of a lack of a fishery independent survey. As a result there are no reliable biomass estimates, and there are uncertainties as to when pre-recruit crab will become available to the fishery. With total effort in Areas 20-24 remaining near all-time highs, and soft-shelled crab comprising a large percentage of the catch, these fisheries appear to be dependent upon incoming recruitment.

In 1995 we recommended that total effort not increase, and that the landing of soft-shell crab be reduced. We also noted that recruitment rates in Areas 20-24 appeared to be declining, and cited low recruitment trends in the southern Gulf, Quebec and Newfoundland as supporting this interpretation.

The 1995 fishery results are not indicative of a recruitment failure. The high percentage of soft-shelled crab indicates recruitment is continuing. Although the relationship between the pre-recruit catch rate and future catch rates is not clear, many fishers remarked on the large numbers of small crab they saw in their traps this year.

Areas 20-24 are currently fished at high effort levels relative to the 1978-93 period and have a higher percentage of soft-shelled crab than many snow crab fishing Areas. Furthermore, unless there has been a fundamental shift in the productive capacity of eastern Cape Breton snow crab grounds, the current high levels of landings are unlikely to continue. In the mid 1980s this resource was deemed collapsed, and prior fishing effort was not as high as current levels.

Management considerations: Despite high incidence in the catch, landings of soft-shelled crab decreased substantially in 1995, perhaps because of restrictions in the management plan. Soft crab have low meat content and low value. If handled carefully, survival should be high when returned to the sea, but there is potential for wastage. Soft crab incidence may be associated with high exploitation or high recruitment. If high exploitation is the cause of the high incidence of soft crab, then reductions in effort would be necessary to reduce the problem.

Exploratory fisheries outside of the grounds fished in Areas 23 and 24 are likely to experience low, unstable catch rates, but small fisheries may be possible when price and recruitment are high. Groundfish surveys indicated that juvenile snow crab may be relatively more abundant in the Sable Island area. Given high effort by the regular fishery, caution

is needed in creating any new fishing zones that would allow further increase in effort.

The uncertainty in the stock status of snow crab in Areas 20-24 calls for a prudent approach in 1996. Effort should not increase over 1995.

For More Information

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References

Tremblay, M.J., and M.D. Eagles. 1996. Assessment of the 1995 snow crab fishery off eastern Nova Scotia. DFO Atl. Res. Doc. 96/35.