



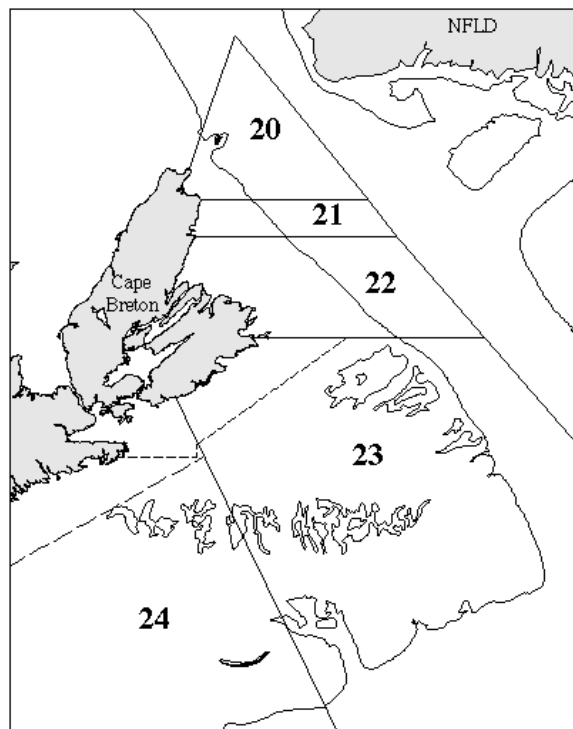
Eastern Nova Scotia Snow Crab

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 molting. After molting, crab have a soft shell for a period of time and are called white crab. 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 as small as 40 mm. Female crab 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 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 and depth ranging from 50 to 280 m. Typical fishing depths off eastern Cape Breton are 130 m to 250 m.

From 1982 to 1993, management of these fisheries was based on effort controls (seasons, limited entry and 30 traps/license). The number of licenses did not change except in Area 24 where 7 exploratory licenses were added between 1989 and 1991. By 1996, all of these 7 licenses were considered as regular status but were still restricted to midshore areas that had not been heavily fished prior to 1989. A small exploratory fishery is underway in NAFO Division 4X. Management objectives are to distribute fishing effort in a manner that best utilizes the resource and supports the long-term stability of the snow crab



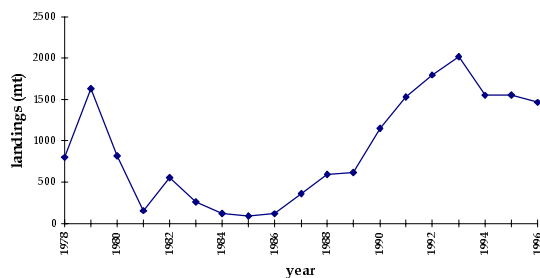
fishery. Tools for the commercial fishery include a nine-week season and limits on the number of licenses and number of traps. In 1995, restrictions were placed on the landings of soft-shelled crab, and individual boat quota (IBQ) were introduced in all areas except for Area 22. In 1996, the same management measures (IBQs and restriction of landings of soft-shelled crab) were maintained.

The Fishery

In 1996, individual boat quotas were set as follows: Area 20 - 20,000 lb., Area 21 - 10,000 lb., Area 23 - 55,000 lb., and Area 24 - 55,000 lb. Temporary communal licenses of 30,000 lb. were introduced in 1996 for First Nations in areas 23 and 24. An additional 3 temporary permits for 10,000 lb. IBQs were given to Area 23 and 4 such permits were issued in Area 24. In Area 24, the 3 remaining licenses limited to midshore grounds in 1995 were given permanent status in 1996. Area 22 and 4X (exploratory)

continued to operate as competitive fisheries without quota.

The fishery in areas 20 to 24 began in 1978. The fishery was considered 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.



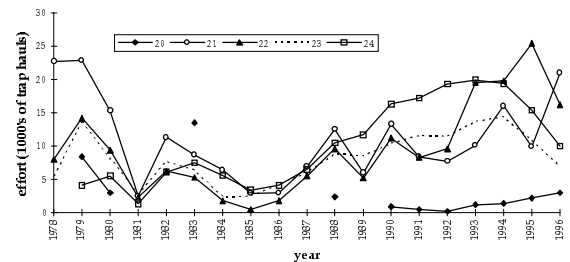
Reported historical landings (t)

Area	1992	1993	1994	1995	1996	Mean
20	18	20	29	44	43	30.8
21	196	167	108	100	135	141.2
22	240	390	259	284	188	272.2
23	595	770	497	576	565	600.6
24	743	662	682	550	562 ¹	639.8
Total	1792	2010	1574	1554	1493	

¹: including 13.6 t (Special allocation)

Total landings in areas 20 to 24 in 1996 declined slightly from 1995, while landings in 4X were negligible (11 t). Dockside monitoring of catches was introduced in 1994; coincidentally, return of logbooks declined from >75% prior to 1993 to 30% in 1995. In 1996, logbooks were mandatory and incorporated dockside monitoring and science data. Over 75% of logbooks were usable for data analysis.

Fishing effort in areas 20-24



Fishing effort is at high levels in all areas. There was a drop in effort from 1995 in areas 23-24, but a further increase in effort in areas 20-21.

Samples of the commercial catch at-sea were obtained by DFO Science staff to evaluate the percentage of soft-shelled crab in the catches prior to sorting. Samples of crab from the commercial catch were categorized by shell characteristics (size, hardness, color), claw height, and sex. The sampling program was greatly increased compared to the previous year, increasing from 8 sea samples and 5 port samples to 38 sea samples in 1996. The seasonal average percentage of soft-shelled crab varied from 7% (Area 20) to 30% (Area 22). The composition of carapace condition in the commercial catch can be categorized into three different phases: 1) Recruitment phase, where more than 50% of the catch comprises carapace categories 1 and 2 crab, such as was observed in areas 21 and 22; 2) Intermediate phase, where the majority of the catch belongs to category 3, such as was observed in Area 24; and 3), Aging phase, where the majority of the catch belongs to categories 4 and 5, such as was observed in areas 20 and 23.

Resource Status

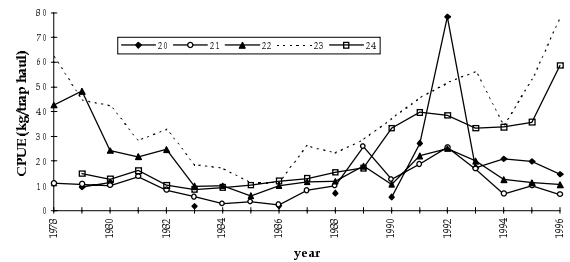
Stock status is based on fishery information. There is no fishery-independent abundance index. Catch rate (kg/trap haul) and effort

(total number of trap hauls) are derived from fishing logs and preliminary analysis of at-sea sampling.

Distribution of landings suggested that areas 20, 21 and 22 fishers exploited a continuous inter-zonal inshore fishing ground and areas 23 and 24 fishers shared the inshore portion of fishing ground. There were two main fishing grounds in Area 22. Three to four fishing grounds were exploited in areas 23 and 24. Area 20 fishers also exploit the fishing ground adjacent to Area 19. In general, the surface of currently exploitable grounds is limited to the northern-most part (areas 20-21) of the eastern Cape Breton fisheries.

Catch rates in 1996 compared to the previous year decreased 25 % in Area 20, by 35% in Area 21 and by 60% in the offshore portion of Area 22. By contrast, catch rates increased by 32% in the inshore portion of Area 22, by 32% in Area 23 and by 25-52% in Area 24. Catch rates in 4X averaged 1.0 kg/trap haul throughout the season. Preliminary data analysis indicates some differences in catch rates between logbooks and at-sea sampling. Log book catch rates were always higher. The main reason was double hauling of traps which was not recorded in the logbooks. It is not known to what extent double hauling was an issue in previous years, but it would have inflated logbook catch rates in 1996. A general decreasing trend in the incidence of soft-shelled crab was observed in eastern Cape Breton fisheries. However, the percentages were high in Area 21 (27%) and Area 22 (30%).

Catch rates in areas 20-24



A **preliminary trawl survey** was conducted in Area 23 in June 1996 prior to the start of the fishery. A total of 23 stations were sampled. The geographic distribution of commercially harvestable crab coincided with the distribution of landings based on the fishers' logs. The distribution of juvenile crab >56 mm CW revealed that there were two main concentrations, one in the same location as commercially harvestable crab and the other in the northern inshore part of the area. This experimental trawl survey revealed the feasibility of using trawl gear to measure snow crab abundance in the eastern Cape Breton area and it provided the first fishery-independent information on population structure, abundance and distribution for part of Area 23.

Ecosystem Consideration

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. Temperatures have been colder than average in Sydney Bight for the past decade, but have warmed slightly in the past 3 years. Temperatures in areas 23-24 (Misaine Bank) have remained cold since 1985. Lower than normal temperature, such as during the second half of the 1980s, may be beneficial to snow crab abundance on the Scotian Shelf; however, warm winters in 1995-96 and 1996-97 suggest that water

temperatures will continue to warm in the future.

Outlook

Projections are difficult because of the lack of an extensive fishery-independent survey. There are no reliable biomass estimates, and there are uncertainties as to when pre-recruit crab will become available to the fishery. However, the 1996 exploratory survey in Area 23, which had a small geographical coverage and low sampling intensity, indicates that recruitment in 1997 would be 975 t (\pm 840 t) in the area surveyed. The exploitation rate of the fishery is not possible to determine; however, with total effort in areas 20-22 remaining near all-time highs, and soft-shelled crab comprising a large percentage of the catch in all areas, these fisheries appear to be dependent upon incoming recruitment.

Areas 20-22 are currently fished at high effort levels relative to the 1978-93 period and have a higher percentage of soft-shelled crab than many other snow crab fishing areas. Given this and some tendency to a warming of the environment in Sydney Bight, the current high levels of landings are unlikely to continue. In the mid 1980s for example, this resource was considered collapsed when fishing effort was lower than current levels.

Management Considerations

Soft crab have low meat content and low commercial value. If handled carefully, survival should be high when soft crab are returned to the sea because the shells have partially hardened by the time the fishery starts. Nevertheless, there is potential for

wastage. High incidence of soft crab in catches may be due either to reduced abundance of hard-shelled crab, possibly because of heavy exploitation, or to strong 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 fishers in 4X did not seem to encounter high concentrations of snow crab in 1996. As mentioned by Tremblay and Eagles (1996), this fishery is likely to experience low, unstable catch rates, but a small fishery may be possible when price and recruitment are high. Given high effort by the regular fishery, caution is needed in creating any additional 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 to management in 1997. Until more information on biology and condition of the stocks is accumulated, no increase in quota or fishing effort is justified. An industry-sponsored trawl survey is planned in for areas 22-24 in the spring of 1997. If this survey can be continued for several years, it will contribute to better understanding of the stock condition and biology of snow crab in eastern Cape Breton fisheries and the strengthening of the management strategy.

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This report is available from the:

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