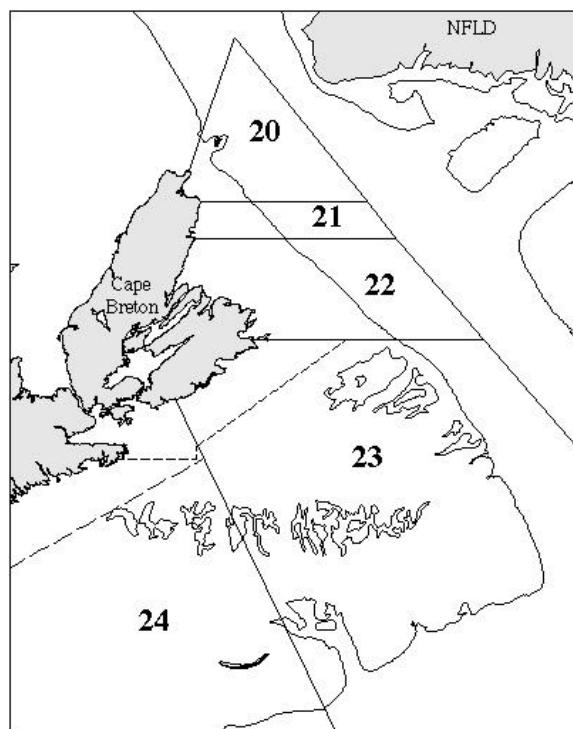


Eastern Nova Scotia Snow Crab

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 therefore called soft-shelled crab. Unlike lobster, 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 usually occurs between shell widths of 40 mm to 155 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 square or conical traps constructed of wire or tubular steel and netting. The traps are set on muddy or sand-mud bottoms at temperature 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.



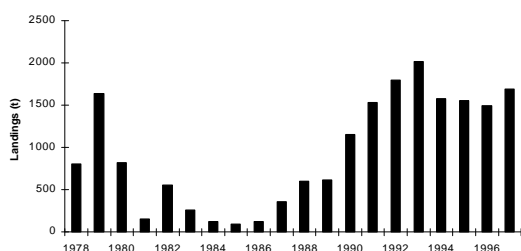
From 1982 to 1993, management of these fisheries was strictly based on effort controls (seasons, licenses and trap limits). In 1994-95, restrictions were placed on the landings of soft-shelled crab, and individual boat quotas (IBQ) that were tied to overall quotas were introduced in all areas except for Area 22. In addition to the fishery on traditional grounds off eastern Cape Breton, a small exploratory fishery is underway in NAFO Division 4X. The number of licenses remained stable in recent years, but temporary permits were introduced in Areas 23 and 24. In 1997, the same management measures (IBQs and restriction of landings of soft-shelled crab) were maintained.

The Fishery

In 1997, individual boat quotas were set as follows: Area 20 - 20,000 lb., Area 21 - 10,000 lb., Area 23 and 24 - 52,000 lb. The IBQs in Areas 23 and 24 were lowered to account for new allocations, not for conservation concerns. In each of these two

Areas, the total number of full quota licences in 1997 increased by 2 relative to the previous year, and the total number of temporary permits was set at 6, although the total allowable catch for each of these crab areas did not increase. The IBQ for temporary permits was 10,000 lb. Area 22 and 4X (exploratory) continued to operate as competitive fisheries without quota, but a fleet cap of 350 t exists for Area 22. This year also saw the introduction of certified observers to conduct the at-sea monitoring in Areas 22, 23 and 24, and a reduction in the trap limit to 25 from 30 in Area 21.

The fishery in Areas 20 to 24 began in 1978. The fishery collapsed in the mid-1980s but from 1987 to 1993 **landings** increased steadily. This increase resulted from an expanded fishing area and an increase in effort.

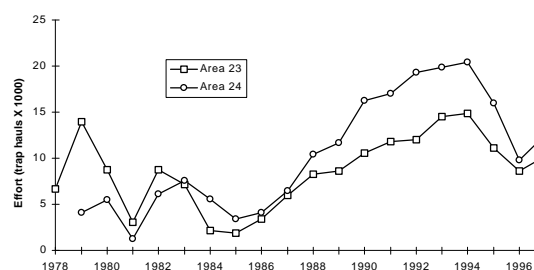
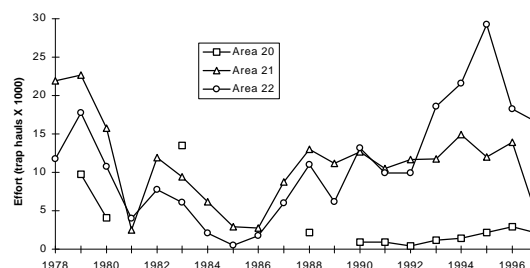


Area	Average 1978-89	Average 1990-94	Average 1995	Average 1996	Average 1997	Average 1995-97
20	20	17	44	43	45	44
21	99	159	100	136	146	127
22	151	238	284	188	343	272
23	206	555	576	565	592	577
24	78	662	550	560	565	558
Total	554	1631	1554	1493	1691	1578

The 1997 total landings in eastern Nova Scotia were 12% higher than those of 1996. The increase in landings was mostly the result of an 80% increase in landings in Area

22. Fishers from Area 21 also met their IBQ this year, representing a 7% increase in landings over 1996. Dockside monitoring of catches was introduced in 1994; coincidentally, return of logbooks declined from 75% prior to 1993 to 30% in 1995. Since 1996, logbooks have been mandatory and have incorporated dockside monitoring and science data. Over 75% of logbooks were usable for data analysis.

Although Areas 23 and 24 saw a 20% and 25% increase respectively in total **fishing effort**, the overall picture for eastern Nova Scotia fishery was a 10% decrease in fishing effort that was strongly influenced by changes in Areas 20, 21 and 22. Nevertheless, because of unmeasured changes in the type of trap, these general trends in effort should be viewed cautiously.



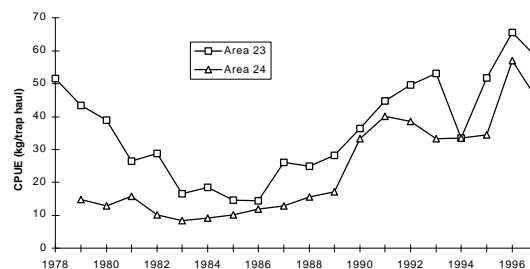
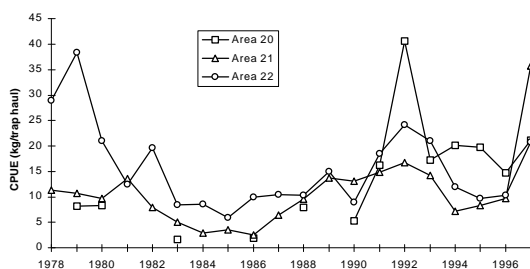
Samples of the commercial catch at-sea were obtained by DFO Science staff in Areas 20 and 21, and through a certified observer program in Areas 22, 23 and 24, to evaluate

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, condition), claw height, and sex. The sampling was greatly increased compared to the previous year, increasing from 38 sea samples to 74 in 1997. The seasonal average percentage of soft-shelled crab varied from 14% (Area 20) to 38.5% (Area 22). The majority of crab measured during sea-sampling were of carapace condition 2 (new) and 3 (intermediate) in Areas 20, 21 and 22, while of condition 3 and 4 (mossy) in Areas 23 and 24.

Resource Status

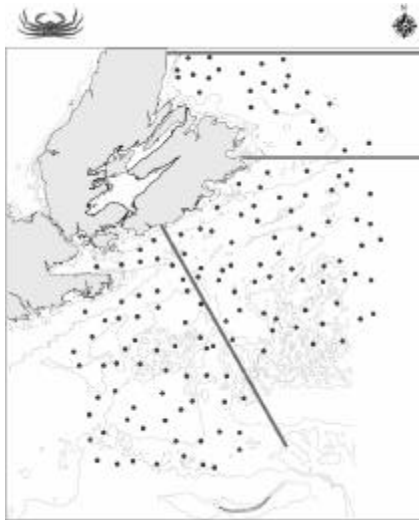
Stock status is based on fishery information. Although a fishery-independent abundance index was initiated in 1997, it was not used in this assessment. Catch rate (kg/trap haul) and effort (total number of trap haul) were derived from fishing logs.

Distribution of **catch rate** information suggested that Area 20 fishers exploited two main fishing grounds in 1997, one close to the boundary with Area 19 and the other in an inshore area that appears to be continuous with the location of the fishery in Area 21 and part of Area 22. Fishers in Area 22 also fished further offshore. In Areas 23 and 24, fishing occurred primarily on three to four grounds located in the inshore portion of these Areas.



There was a 25% increase in seasonal catch rates in eastern Nova Scotia compared to 1996. Marked increases were observed in Areas 20, 21 and 22, and although there was a decrease of 12% in Area 23 and 20% in Area 24, these values remained above average. Analysis of the logbook data collected in Areas 23 and 24 indicated a reduction in catch rates and an increase in total fishing effort. Some of this change could be explained by the better reporting of double hauling of traps. The presence of small crab indicate future recruitment for these grounds. In Areas 20, 21 and 22 the overall state of these fisheries has improved considerably since last year. There was a marked increase in the catch rate levels and an important decrease in fishing effort.

Biomass cannot be estimated from the first **annual research trawl survey** because of uncertainties in the methodology. The survey covered 150 trawl stations between May 15 and June 11, 1997. During the survey, 7,810 males and 6,787 females were caught and measured. Among the 7,810 males, 864 individuals (11%) were adults larger than 95 mm.



Distribution of the survey stations

One of the greatest sources of uncertainty in the survey was that concentrations of crab were found in the gullies between banks. The ocean bottom off Cape Breton is extremely rugged, quite different from the relatively smooth bottom of the southern Gulf where this type of survey has taken place for the past decade. As a result, a significant proportion of the bottom off Cape Breton may be unfishable to the survey but this aspect was not measured and simple areal expansion of the survey estimates was not felt to be appropriate at this time. In addition, the equations used to identify maturity of male crab and to convert numbers to weight have not yet been developed for the eastern Nova Scotia area and because of large variations in growth rates and environmental conditions they could not be borrowed from other areas like the southern Gulf. Despite these shortcomings, the trawl survey was useful for describing the potential distribution of the resource. In particular, the survey indicated two large patches of mature crab that were outside where the bulk of the fishery occurred in 1997.

Ecosystem Consideration

The sustained good recruitment in the late 1980s and the 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 (Areas 20-22) and Misaine Bank (Areas 23-24) for the past decade, but have warmed slightly in recent years. Lower than normal temperature, such as during the second half of the 1980s, may have been beneficial to snow crab abundance on the Scotian Shelf.

Outlook

Stock status appears better than previous years. Catch rates have increased in Areas 20-22; they declined by 20% in Areas 23-24 but are still above average. A new survey indicates that the resource is widely distributed, particularly in Areas 23 and 24 and that there are two concentrations of crab outside where the bulk of the fishery occurred in 1997. At least two more surveys will be required before reliable biomass estimates will be available. The survey indicates that there are good signs of new recruits, particularly in Area 23.

There is no scientific basis to indicate that a change is needed in the current level of catch and fishing effort. Although the 1997 trawl survey was successful, more surveys are required before any definitive statements can be made about the potential of the resource. Fishing effort directed in the offshore regions of Areas 23 and 24 would provide useful information that might help verify the results of the 1997 survey.

Management Considerations

Soft crab have low meat content and low commercial value. If handled carefully, survival should be high when returned to the sea, but there is potential for wastage. Incidence of soft crab may be associated with high exploitation of hard-shelled crab or 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 operating in 4X did not encounter areas of high concentration of snow crab in 1997.

Reference

Biron, M., M. Moriyasu, E. Wade, P. DeGrace, R. Campbell and M. Hébert. 1998. Assessment of the 1997 Snow crab (*Chionoecetes opilio*) fishery off eastern Nova Scotia (Areas 20 to 24, and 4X). Can. Stock Assess. Sec. Res. Doc. 98/2.

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La version française est disponible à l'adresse ci-dessus.



Erratum

Please note the following corrections in regards to certain references in the Stock Status Report:

Document Referenced:

Biron, M., M. Moriyasu, E. Wade, P. DeGrace, R. Campbell and M. Hébert. 1998. Assessment of the 1997 Snow crab (Chionoecetes opilio) fishery off eastern Nova Scotia (Areas 20 to 24, and 4X). Can. Stock Assess. Sec. Res. Doc. **98/2**.

Correction:

Document number should be **98/101**.