

**Stock Status Report
Newfoundland and Labrador Snow Crab**

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Background

Snow crab, Chionoecetes opilio, occur over a broad depth range in the Northwest Atlantic from Greenland to the Gulf of Maine. In Newfoundland and Labrador there are no known barriers to larval drift or settlement, or other evidence to indicate distinct stocks. The preferred bottom type of adults is mud or mud/sand while juvenile crabs appear to favour gravel or small rocks. The snow crab diet includes clams, polychaete worms, brittle stars and other crustaceans. Predators include seals, cod, thorny skate, and other snow crabs.

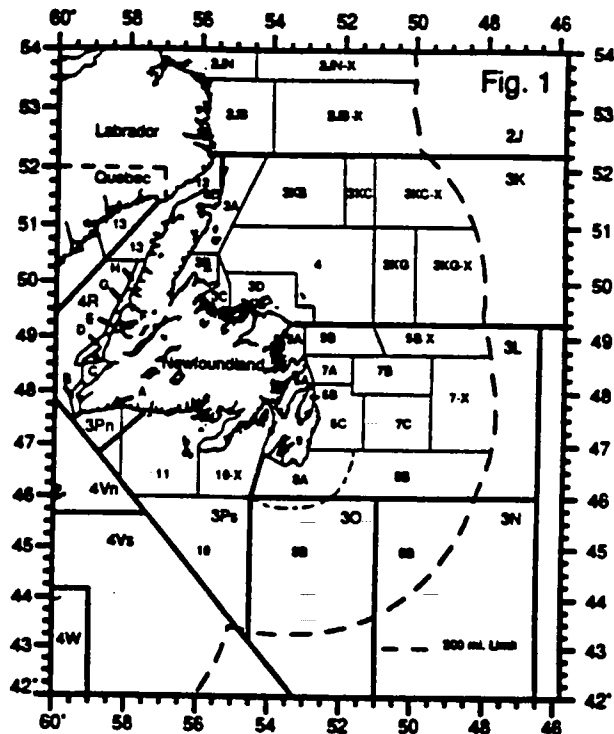
Males continue to molt until they develop large claws, which enhances their ability to compete for mates. This happens during a final molt which may occur over a wide size range, (50-110 mm carapace width, CW). Females cease molting when they mature, at relatively small sizes (40-75 mm CW). It is believed that these crabs live no more than 5-6 years after the final molt.

The minimum legal size in the fishery is 95 mm CW. This regulation excludes females from the fishery while ensuring adequate numbers of sexually mature males in the population for reproduction.

The Newfoundland fishery began in Trinity Bay in 1968. Initially, crabs were taken as gillnet by-catch but within several years there was a directed trap fishery in inshore areas along the northeast coast of the Island. Until the early 1980's the fishery was prosecuted by approximately 50 vessels, limited to 800 traps each. In 1981 fishing was restricted to the NAFO Division where the licence holder resided. In the mid 1980's there was a large decline in catches in traditional areas in 3K and 3L while at the same time fisheries started in 2J, 3Ps, 4R and offshore 3K.

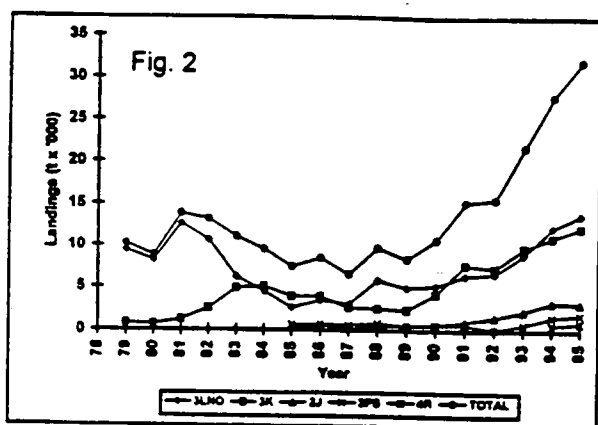
Since 1989 there has been a further expansion in the offshore. Fisheries supplemental to the groundfishery started in 3K in 1985, in 3L in 1987 and in both areas of 2J in the early 1990's.

In the late 1980's quota control was initiated in all management areas of each Division and fishing seasons for both fleet sectors were redefined. A dockside monitoring program designed and managed by fishers to enforce daily and weekly quotas was initiated in 3K in 1994 and expanded to include 2J, 3L and 3Ps in 1995. Temporary permits for small vessels (<35 ft) were introduced in 1995 all around the island. There are now four fleet sectors: fulltime; supplementary >40 gross tons; supplementary <40 gross tons; and temporary, <35 ft vessels restricted to nearshore areas. All sectors have designated trap limits, quotas and fishing areas. Management areas (Fig. 1) do not reflect stock structure. Rather, they were established as a mechanism to control the distribution of fishing effort and prevent local over-exploitation.



The Fishery

Landings have been increasing steadily since the late 1980's and reached a record high of 32,000 t in 1995, more than double the historical peak in 1981 (Fig. 2). The bulk of the increased landings came from Div. 3K and 3L and largely from expansion of the fishery to offshore areas. Effort, as indicated by estimated trap hauls, has approximately doubled since the late 1980's. Recent catch rate patterns have been quite variable between management areas, but levels have remained high in most offshore areas of 3K and 3L. In certain inshore areas, where catch rates tend to be lower, there have been declines.



Div. 2J: Landings have continued to increase and reached 3,178 t in 1995, up from 2,978 t in 1994 (Table 1); effort continued to increase as well (by ~36%). The overall catch rate has been declining from a high in 1991 of 14.6 kg/trap haul to 7.9 kg/trap haul in 1995. Both management areas were expanded in 1995 (northward in 2JN and eastward in 2JS) to provide opportunity to maintain catch rates by accessing new grounds.

Div. 3K: Landings increased to 12,245 t in 1995 from 11,039 in 1994 (Table 1). The overall catch rate has declined from 14.5 kg/trap haul in 1993 to 11.5 kg/trap haul in 1995. This is mainly attributable to declines in area 4 and inshore areas 3A and 3D. Catch rates in most offshore areas remained high.

Div. 3LNO: Landings, 90% from Div. 3L, totalled 13,790 t in 1995, up from 12,237 t in 1994 (Table 1). The overall catch rate has been increasing steadily from 7.8 kg/trap haul in 1990 to 17.0 kg/trap haul in 1995. Catch rates remained high in all management areas in 1995 and were particularly high in newly-exploited areas near the 200 n mi limit.

Div. 3Ps: Landings increased to 1,853 t in 1995, up from 1,590 t in 1994 (Table 1). The overall catch rate dropped from 15.2 to 10.0 kg/trap haul indicating an approximate doubling of effort. Catch rates remained high in areas 10 (at more than 3 times the 1990 and 1991 values) and in 10X but declined in area 11.

Div. 4R: Development of the west coast crab fishery continued in 1995 with 47 new, temporary permits issued for six coastal areas (to 8 mi off). This component of the fishery landed 200 t in 1995. The remaining permit holders landed 720 t in 1995 at a mean catch rate of 5.9 kg/trap haul (Table 1). This was up from 655 t at 5.5 kg/trap haul in 1994.

Table 1. Landings (t) and commercial catch rate (kg/trap haul) by NAFO Division, 1990-95.

Div.	1990	1991	1992	1993	1994	1995
2J	645 (12.8)	989 (14.6)	1,529 (12.5)	2,275 (12.9)	2,978 (9.6)	3,178 (7.9)
3K	4,253 (10.7)	7,675 (12.4)	7,295 (12.0)	9,760 (14.5)	11,039 (13.4)	12,245 (11.5)
3LNO	5,211 (7.8)	6,394 (8.6)	6,652 (12.7)	8,979 (14.3)	12,237 (15.7)	13,790 (17.0)
3Ps	596 (4.8)	176 (4.5)	121 (9.4)	704 (10.6)	1,590 (15.2)	1,853 (10.0)
4R	-	-	-	-	655 (5.5)	920 (5.9)

Research Surveys

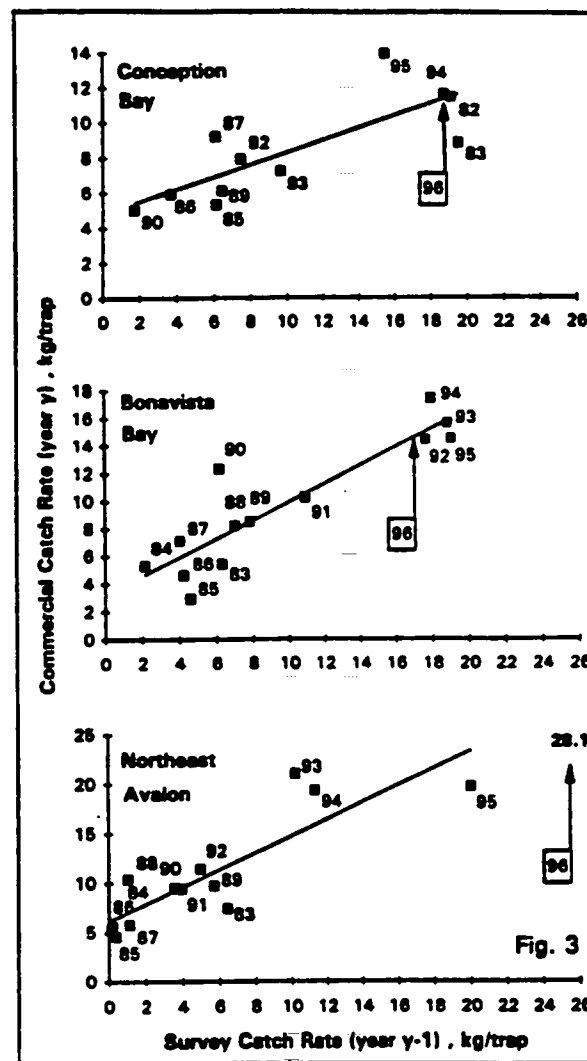
Research surveys using commercial and small-meshed traps have been carried out in three crab management areas in Div. 3L since the early 1980's. Similar surveys were carried out in Div. 3K (White Bay) in 1994 and 1995. A model was developed for each Div. 3L survey area which uses the survey catch rate of legal-sized (including soft) crabs to provide an indication of commercial catch rate in the following year. Yearly trends in survey catch rate of sub-legal sized males from small-meshed traps are also monitored as an index of future recruitment. Crabs of 76-94 mm CW (Prerecruit 1 group) which have small claws will continue to molt and could begin recruiting to the fishery, as hard-shelled crabs, in two years. Smaller crabs of 60-75 mm CW (Prerecruit 2 group) which have small claws could begin recruiting in three years. Data on claw type were available only since 1988.

In 1995, with the introduction of a new survey trawl, data on snow crab were available for the first time from the annual fall bottom trawl survey. This stratified random survey sampled an extensive area of snow crab distribution throughout Div. 2J3KLNO. Data on catch rate of males by size and molt status

(large-clawed versus small-clawed) were summarized by division.

Resource Status

Commercial catch rate in Div. 3L remained high in 1995, as had been predicted by the abundance of legal-sized crabs in the 1994 trap surveys (Fig. 3). Abundance of legal-sized crabs remained high in the 1995 surveys, indicating that commercial catch rates should continue to be high in 1996.

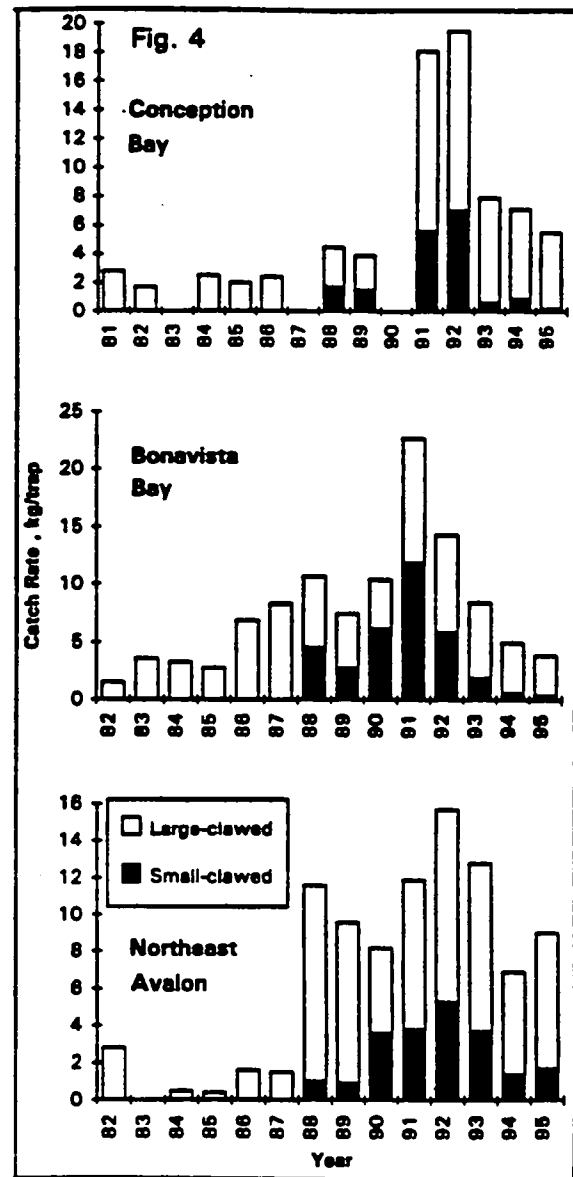


Survey catch rates of Prerecruit 1 crabs, especially those with small claws, began declining in 1992 or 1993 (Fig. 4). They generally remained low in 1995, as did catch rates of smaller Prerecruit 2 crabs. This suggests that recruitment is declining in Div. 3L and this trend is expected to continue for at least the next two years. Trap survey data also indicate that there has been an increase in the proportion of old-shelled crabs in Div. 3L since 1992 (Table 2). This likely reflects declining recruitment and low exploitation rate in an ageing standing stock. It is believed that crab carapaces become fouled or 'mossy' after about three years from their final molt such that they are undesirable for the crab section market. Such old-shelled crabs probably live for another 2-3 years.

Table 2. Percentage old-shelled in large-meshed trap catches of legal-sized crabs.

Year	Survey area		
	Conception Bay	Bonavista Bay	Northeast Avalon
1990	-	3.7	8.7
1991	3.1	4.2	2.2
1992	1.5	4.2	1.6
1993	1.0	7.1	1.9
1994	2.6	11.9	2.1
1995	15.3	14.3	6.5

The trap survey catch rates for White Bay (Div. 3K) were generally similar for 1994 and 1995. However, commercial catch rates have declined over the past two years in Div. 3K and 2J suggesting that a decline in commercial biomass may have begun in the most northern areas. For other divisions there are no data from trap surveys. The status of crab in Div. 3Ps, where the 1995 catch rate declined to approximately the 1993 level, is unclear because only commercial data are available. Interpretation of commercial catch rate data may be confounded by uncertainties due to spatial and seasonal variation in fishing practices.



Trends in trap catch rates of small-clawed prerecruit crabs must be interpreted with caution, because traps may not efficiently sample small-clawed crabs. However data from the 1995 fall bottom trawl survey also suggest that the abundance of prerecruit crabs is low relative to that of commercial crabs in Div. 3L. Trawl catch rates were lower in Div. 2J and 3K than in Div. 3LNO. They were particularly high for prerecruits in virtually unexploited Div. 3N.

The fishery has apparently been supported by widespread strong recruitment during the early 1990's. The current recruitment decline is similar to a trend which is evident in other Canadian Atlantic snow crab fisheries. Declining recruitment has already negatively impacted the fishery in Gulf of St. Lawrence areas, where trawl survey data indicate poor prospects for recruitment over the next several years.

Outlook

Trap surveys in Div. 3L indicate that the fishery should continue to perform well in 1996. However, recruitment appears to be declining and this should eventually be reflected in declining commercial catch rates. Div. 2J and 3K already show signs of declining catch rate. As recruitment declines the trend for increasing incidence of old-shelled crabs can be expected to continue if exploitation levels remain low.

For More Information

Research Documents:

Dawe, E.G., D.M. Taylor, P.J. Veitch, H.J. Drew, P.C. Beck, and P.G. O'Keefe. 1996. The status of Newfoundland and Labrador snow crab. DFO Atl. Res. Doc. 96/ .

Taylor, D.M., and P.G. O'Keefe. 1996. Summary of performance of the 1995 Newfoundland and Labrador snow crab fishery. DFO Atl. Res. Doc. 96/ .

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