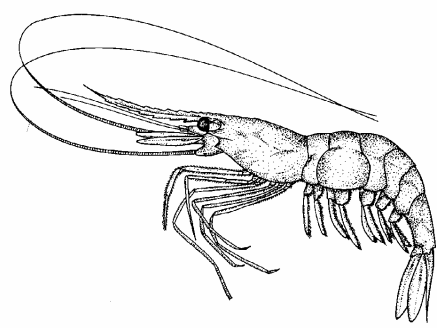


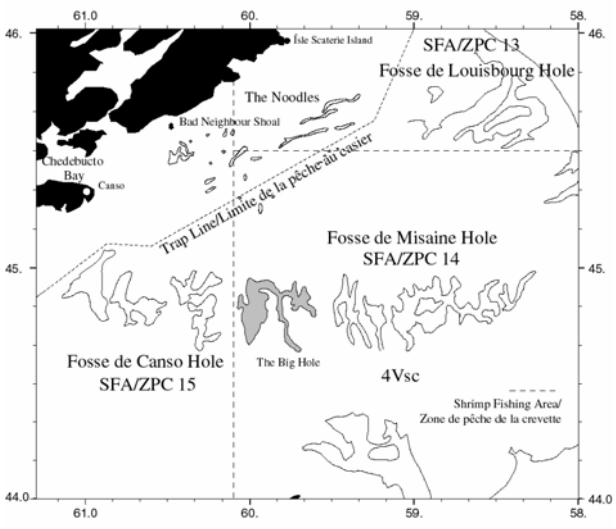
Northern Shrimp on the Eastern Scotian Shelf

Background

The northern or pink shrimp, Pandalus borealis, is the only shrimp species of commercial importance in the Maritimes Region. Shrimp are crustaceans, and have a hard outer shell which they must periodically shed (molt) in order to grow. The females produce eggs once a year in the fall and carry them, attached to their abdomen, through the winter until the spring, when they hatch. The newly hatched shrimp spend 3 to 4 months as pelagic larvae, feeding near the surface. At the end of this period, they move to the bottom and take up the life style of the adults. On the Scotian Shelf the northern shrimp first matures as a male, at 3 years of age, and at age 4, it changes sex (transitionals), to spend another 1 to 2 years as a female.

Shrimp concentrate in deep holes on the eastern Scotian Shelf, but nearshore concentrations along coastlines closest to the offshore populations have recently been discovered. They prefer temperatures of 2 to 6 ^{o}C, and a soft, muddy bottom with a high organic content.

The shrimp fishery on the Scotian Shelf concentrates during summer in Shrimp Fishing Areas (SFAs) 13-15, also called the Louisbourg, Misaine and Canso holes, respectively. The shrimp are fished with otter trawls having a 40 mm mesh size throughout. The main management tools are limits on the number of licenses and size of vessels used, minimum mesh size, use of a Nordmøre separator grate, and a Total Allowable Catch (TAC). The fleet is divided into two sectors, a midshore sector consisting of vessels 65-100' LOA based in New Brunswick on the Gulf of St. Lawrence side, and an inshore sector consisting of vessels <65' LOA based on the Atlantic coast of Nova Scotia. An experimental trap fishery, currently consisting of 10 active licenses, has recently developed in Chedebucto Bay. Three vessels are currently engaged in an experimental trap fishery in Mahone Bay on the South Shore.



Summary

- CPUE, survey indices and catches continue to increase.
- Total effort has remained about the same since 1993.
- Catch composition has not changed since 1995.
- Spawning stock biomass remains high.
- The 1994 year-class is strong and will recruit to the fishery in 1999, but the 1995 and 1996 year-classes appear to be weaker.
- Predators and temperature remain low.
- Exploitation rates appear to be low, <10%.

The Fishery

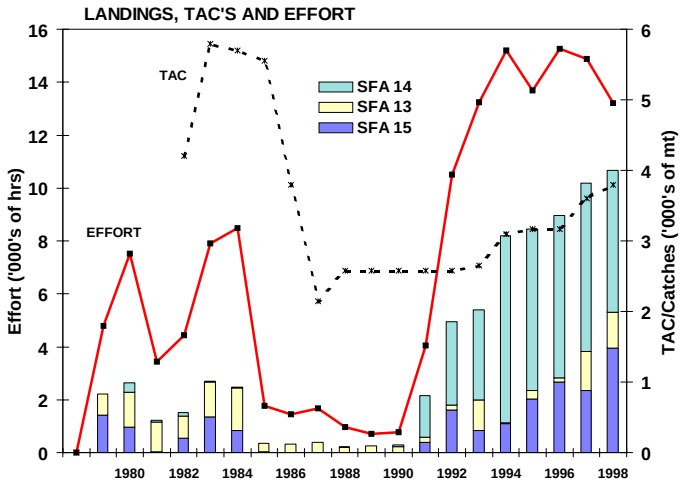
The introduction of the Nordmøre grate in 1991 reduced bycatches of groundfish to negligible levels and allowed the shrimp fishery to expand. In 1996, the inshore (24 vessels <65' LOA) component of the trawler fleet moved from individual quotas (IQs) to individual transferable quotas (ITQs), while the midshore (6 vessels 65-100' LOA) moved from a competitive fishery to IQs. In 1998, all licenced vessels were under ITQs. A 5 year management plan (1998-2002) includes provisions for sharing increases in TAC between permanent licence and temporary permit holders. This fishery continues to take most (75%) of the TAC early in the season (during May and June) and has taken the TAC every year since individual SFA quotas were combined into the single TAC in 1994. Note that catches from the experimental trap fishery are not presently counted against the TAC.

Most of the effort and catch since 1991 has been in the Misaine Hole (SFA 14), while fishing in peripheral areas has varied. In 1998, the trawl fleet fished the inshore heavily for the first time when the June survey showed a large concentration of relatively large shrimp off Bad Neighbour Shoal.

Landings (thousands of mt)

Year	1992	1993	1994	1995	1996	1997	1998
TAC	2580	2650	3100	3170	3170	3600	3800
Trawl	1850	2044	3074	3170	3171	3595	3800
Trap	-	-	-	27	187	222	197
Total	1850	2044	3074	3197	3358	3817	3997

The 1998 catch is estimated.

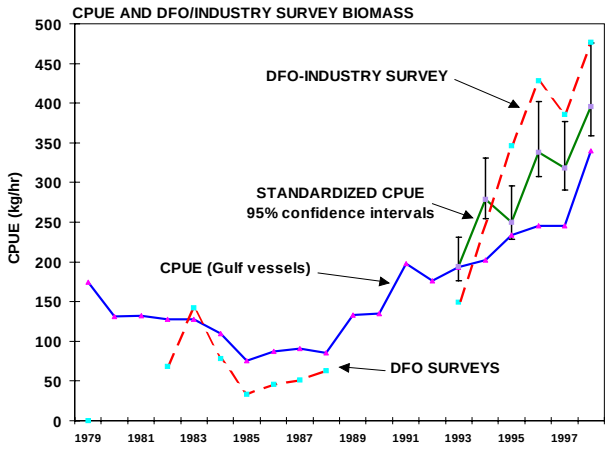


Resource Status

Assessments are based on two commercial catch rate (CPUE) indices (since 1979 and 1993) obtained from trawler logbooks, samples from commercial trawl and trap catches (since 1995), a DFO shrimp survey (1982-88) and a DFO-industry shrimp survey (since 1995). Logs are also available from the experimental trap fishery to monitor changes in catches per trap haul and effort distribution.

The standardized **CPUE** index and the CPUE series from Gulf based vessels both increased in 1998, after appearing to have leveled off in 1997. The 1998 index was the highest for both series.

The 1998 **DFO-industry trawl survey** produced the highest abundance estimate to date. Estimates in the offshore strata have remained high and relatively stable since 1995, while the inshore has increased during the last 2 years.



Port sampling in 1995-98 indicates that there has been little change in the **catch composition** by length and age over the last 4 years. Ages 4 and older, consisting mainly of transitionals and females, make up 78-85% of the catch by number.

Population estimates at length and age from the industry survey indicate that the 1994 year-class is strong and that the 1995 and 1996 year-classes are weaker. Assessments of year-class strength must remain tentative until a longer time series is available and the surveyed area includes the main nursery areas.

The spawning stock biomass remains high. Bottom temperature, percent of females that were ovigerous, and the incidence of egg disease exhibited no changes that could indicate decreased fecundity or survival of eggs.

The **exploitation rate** based on minimum population estimates at age from surveys and commercial catch at age indicates that the fully recruited ages (5+) were being exploited at between 8-14 percent between 1995-98. Exploitation rates for ages 2, 3 and 4 average 0.3, 5.0 and 6.2% respectively. However, actual exploitation rates are probably less than this because all ages are underestimated by the trawl survey.

Ecosystem considerations

Shrimp are important prey species for commercially important fish. Significant negative correlations between groundfish abundance have been demonstrated (Koeller, in press). With groundfish currently at low levels on the eastern Scotian Shelf, predation mortality by these species is probably below the long-term average.

On the Scotian Shelf, northern shrimp are near their southern limit of distribution and population increases may be associated with colder water temperatures during the early 1990's. Warmer temperatures were observed in 1997, but temperatures decreased again in 1998 and remain on the low end of the observed range.

Outlook

The 1994 year-class is strong in both survey and commercial samples and the 1995 and 1996 year-classes, if they prove to be weaker, should not affect the fishery until 2000. Estimation of year-class strength is still uncertain because the survey currently does not catch younger animals efficiently. Considering these uncertainties, but taking into account the increasing abundance trends noted during a period of increasing catches, a cautious increase in TAC for 1999 is indicated. This would take advantage of the strong 1994 year-class and maintain a high spawning stock biomass.

Prospects for a sustainable trap fishery in Chedabucto Bay continue to be good, despite decreased catch rates during the 1997-98 season attributed to a concentration of effort and an abundance of snow crab in a small area off Canso, and the fishery's limited success in exploiting the rich inshore

grounds just outside Chedabucto Bay. Experience gained during the experimental phase, begun in late 1994, can now be used to define management measures for a permanent fishery.

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