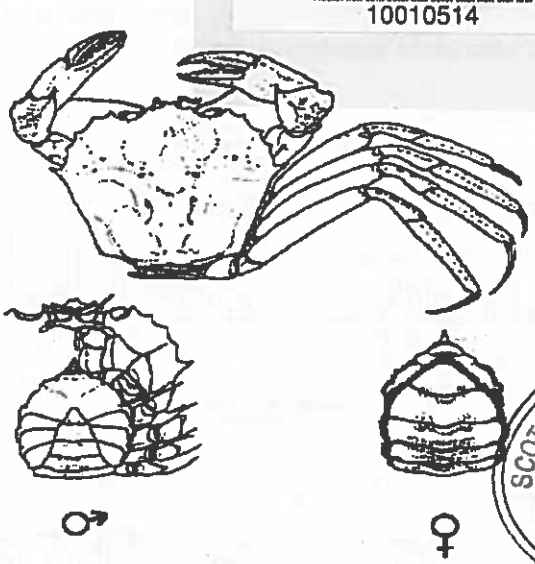

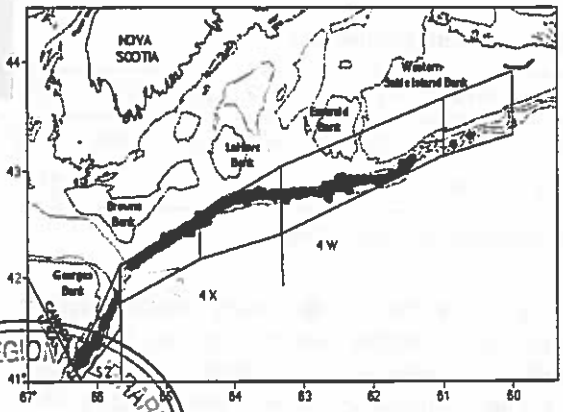

Scotian Shelf Red Crab

The Fishery

Background

The deep sea red crab, Chaceon (=Geryon) quinquedens, has a distinctive deep red-orange color, much like that of a cooked lobster. Its body, or carapace, is squarish when viewed from above, the legs are relatively long, and the left and right claws are similar. The red crab is widely distributed in the Atlantic, Pacific and Indian oceans. In Atlantic Canada the red crab is at the northern edge of its range, and populations are most dense on mud, sand and hard bottoms, in depths of 300 - 900 m and at temperatures between 5-8° C. Although red crabs are conspicuous members of the deep-water benthic community on the continental shelf and the slope of the western Atlantic, the ecology and behavior of this crab is poorly understood. Males can reach a carapace width (CW) of about 180 mm and a weight of nearly 1.7 kg, while mature females have similar proportions, but are smaller, reaching a CW of 136 mm and 0.7 kg. The abdomen of the female changes in shape at the size of maturity; its broad bulk serving to shield the extruded eggs. Red crabs are usually mature between 80-91 mm CW. Egg-bearing females are present year-round off New England, with a peak incidence in November, and egg hatching most prevalent from January to June. The larvae require 23-125 days to develop through six stages before settling to the bottom and substantial numbers have been collected between Georges Bank and Halifax in coastal waters, and out to 270 km offshore. Settlement is thought to occur at the base of the continental shelf. Immediate upslope migration to warmer water (>6°C) likely occurs to enhance growth rates. Laboratory studies suggest that the red crab would require 5-6 yrs to attain 114 mm CW.

Management: This fishery began in the late 1960's when intermittent commercial trapping took place off Nova Scotia. In 1984, by-catch of red crab was allowed in a pilot Jonah crab fishery, and two large vessels subsequently directed for red crab during 1984 and 1985. A TAC of 1,300 MT was set, based on 50% exploitation of the commercial biomass greater than 115 mm carapace width. The commercial biomass was estimated from a research trapping survey which used "effective fishing area" techniques to expand trap catch rates and crab size distribution, to crab population abundances.

Currently there are five exploratory licenses. The fishery is 100% dockside monitored and is managed by size and effort controls, under the original TAC. There is a 100 mm CW minimum size and a prohibition on landing females. The trap limit per license is 450 tagged traps. Offshore lobster traps are used, fixed with an escape vent and a degradable panel. The fishing grounds extend from the U.S.-Canadian boundary on Georges Bank to the eastern boundary of NAFO area 4W, in depths greater than 370 m (200 f).

Landings: Historical catch records are sparse and probably do not reflect actual landings. Fishing ceased in the mid-1970's due to unfavorable economic conditions. Commercial landings resumed during 1984 and 1985 with 120t and 468t, respectively, landed from the LaHave Bank area.

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

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February 1997

Annual Landings (tonnes)

	1984	1985	1993	1994	1995	1996
TAC	1300	1300	1300	1300	1300	1300
Total	120	468	31	345	734	533*

* preliminary to Sept. 30/96

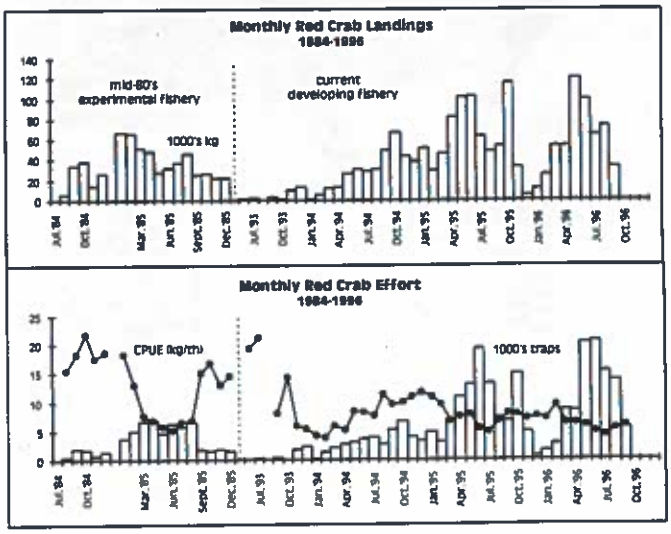
Due to low profitability the fishery stopped after two years, and no further activity occurred until 1993, when a small one-vessel experimental fishery landed 31 t. Three exploratory licenses were issued in 1994, the fishing area expanded to include the area adjacent to Baccaro and Browns banks to 64°30"W, and 345 t were landed. In 1995, the fishery was further expanded to Georges Bank and a total of 5 exploratory licenses landed 734t. To September 30, 1996, 533 t have been landed. Currently, most effort is being directed to the Georges Bank and LaHave-Emerald Bank areas. There has been a dramatic increase in trapping effort on Georges Bank from 1995, when fishing operations began and 69 metric tonnes were landed (9.4% of 1995 landings). In 1996, landings from this area account for 32% of landings (preliminary, to September 30). In contrast, landings from Brown Bank, also initially exploited in 1995, remained stable at 18% and 16% of the 1995 and 1996 (year to date) totals.

Resource status

The offshore red crab fishing grounds are now fully exploited. This evaluation is based on examination of monthly landings and catch rates from log books, sales slips and dockside monitoring documents, together with sampling of commercial catch length frequencies, principally from port sampling.

Catch rates (CPUE) have decreased from the initial high rates of up to 20 kg per trap haul (kg/th) in 1984, and appear to have stabilized in the last two years at between 5-10 kg/th. Conversely, total effort has increased, particularly in 1995 and 1996, where between 10,000-20,000 trap hauls were made monthly in the spring (April-July), as compared to approximately 5,000 trap hauls per month during 1985, and again in 1993.

There is less seasonal variation in CPUE in recent years, and catch rates have declined by about half of initial values on all banks. The longest catch series is from LaHave Bank, which also yielded the highest initial catch rates (15-20 kg/th); initial catch rates from other banks were approximately 10 kg/th.



The average size (median CW) of crab measured in **port samples** has not declined since the fishery began. However, crab landed from Emerald and LaHave banks tends to be smaller than that from Georges and Browns banks. Although the current Canadian minimum size limit is 100 mm CW, the percentage of crab between this size and the US measure (114 mm CW) has varied from 4% to 47% in port samples.

At-sea sampling has been limited, but suggests that highgrading may be occurring. While initial catches from Georges Bank included crab down to 100 mm CW, subsequent landings are skewed towards larger-sized crab, although at-sea samples show these crab to be present and trappable on the grounds.

Sources of uncertainty: The longest catch series (LaHave Bank) shows a progressive reduction and dampening in monthly CPUE's. However, from inception of the current phase of exploratory fishing on LaHave Bank in July 1993 there are only three "years" of fishery data. For Emerald Bank there are two full years, while from Georges and Browns banks there is less than two years of fishery information, which is insufficient to determine if repeatable, seasonal patterns exist in landings to support a permanent fishery.

The initial biomass estimate, and derivation of TAC did not include Georges Bank, and the relevance of that assessment, conducted over ten years ago, is problematic. If landings from Georges Bank are not considered, expanded levels of fishing effort in the

areas of initial biomass estimation have not yielded landings anywhere close to the original quota. Based on earlier resource surveys and initial catch rates on LaHave Bank, it is known that red crab will enter traps in high numbers, so these lower annual landings and monthly CPUE's may reflect a lower population abundance. Research on red crab fisheries in South Africa suggests that "effective fishing area" trap survey approaches may over-estimate biomass, compared to survey techniques such as underwater photographic and video transects, or mark-recapture programs.

Outlook

The offshore red crab fishing zone is very narrow (380 - 760m), and all known commercial grounds are now fully exploited. Catch rates have declined since the inception of the fishery in 1984, and the current TAC has never been reached. The fishery is no longer exploratory and there should not be any increase in fishing effort.

The rapid expansion of effort and landings from Georges Bank is of concern, particularly as this area was not included in the initial biomass estimation on Canadian offshore fishing grounds, yet now contributes substantially to annual catches.

Recent landings, port and (limited) at-sea sampling, indicates a market preference for a minimum size larger than 100 mm CW. However, if minimum size was increased, e.g. to 114 mm CW (the US size limit) one of the immediate impacts may be to lower catch rates.

While the harvest experience to date suggests that there is potential for a permanent fishery for a limited number of vessels, conversion to a permanent fishery may be premature for the 1997 season. The following factors suggest that management should take a cautious approach:

1. The fishery is prosecuted within a narrow depth range, and based on the distribution of fishing effort, all known commercial grounds are being fully exploited.
2. The initial TAC set for the exploratory phase of the fishery has never been met and may reflect unrealistic initial assumptions about available commercial biomass. Current year landings (to September 30) are 533 mt, of which 171 mt, or 32% is from Georges Bank, which was not included in the initial biomass estimate. This fishery should not continue to be managed on the basis of a TAC until better estimates of stock size are available.
3. The present minimum size was derived from studies undertaken in the southern portion of the red crab's range, and should be revised based on maturity estimation from crabs sampled on Canadian fishing grounds. Additionally, it is not known if this species has a terminal molt which could influence biological recommendations. Although there is an indication of a market preference for larger crab, any change in minimum size should await a clear biological reference size.

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