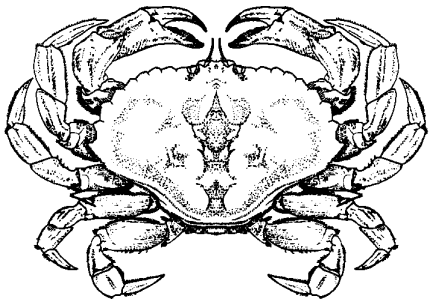
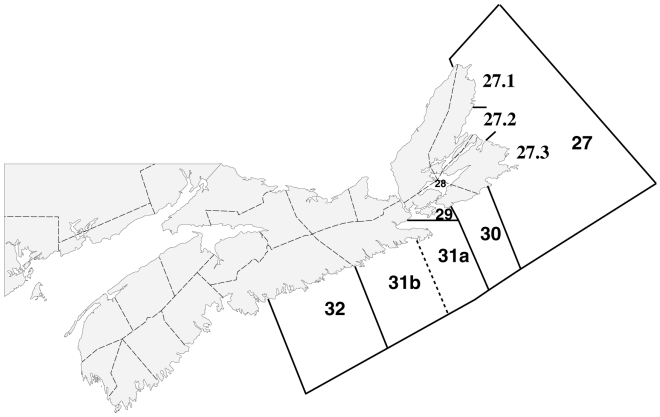




Rock Crab – Eastern Nova Scotia

Background

Rock crab (Cancer irroratus) have a broad, oval carapace with nine smooth "teeth" along the margin of each side. They concentrate in shallow water less than 20 m deep and prefer sandy bottom, although they can be found on all types of substrate. Molting occurs primarily in April and May and earliest maturity is around 25 mm carapace width (CW) for females and 40 mm CW for males. Average maturity occurs between 50 mm and 57 mm CW for females, and between 65 mm and 75 mm for males. Egg extrusion appears to occur in late October. A female of 60 mm CW can carry 125,000 eggs, while a 90 mm CW female may carry 500,000. The eggs hatch in the following spring or summer into larvae that are planktonic (free-floating) for 5-8 weeks depending on the temperature. Males grow larger than females with a maximum carapace width of 150 mm compared to 110 mm for females. Commercial size is reached in about 5-6 years; longevity is approximately 8 years. Rock crab below the legal size are a common prey item for lobster.

Rock crab are a by-catch in the lobster fishery, and they are commonly used as lobster bait in some areas. The price received for rock crab is not high, and the fishery is economically viable largely because of low operating costs and relatively high catch rates.

Summary

- Rock crab landings by the directed fishery off Eastern Nova Scotia (ENS, LFAs 27-32) increased 5-fold from 1994-1999.
- Removals of rock crab by the lobster fishery as a bycatch are difficult to quantify but could easily equal the directed fishery. Until these removals are known, the biological sustainability of the directed fishery cannot be evaluated.
- There are areas of local depletion of rock crab assuming trap catch rate is an index of abundance.
- A contrary indicator of stock status is the lack of change in the size of rock crabs captured in traps from 1996-1999. This suggests exploitation has not altered rock crab size structure, assuming such a change would be detectable by traps.
- In the directed fishery more fishing effort (e.g. increased participation rates, additional permits or additional traps) should be targeted to lightly fished areas to better evaluate the potential for a rock crab directed fishery.

The Fishery

The exploratory rock crab fishery for rock crab in Eastern Nova Scotia began in 1993 when one license was issued. By 1999 there were 27 active vessels. Exploratory licenses are distributed on the basis of Lobster Fishing Areas (LFA). LFA 27 has been further subdivided to encourage exploration of the potential rock crab grounds. Rock crab are also retained as a bycatch in the lobster fishery. Some are sold, while others are used directly as bait.

Key regulations include a limited number of licenses, a minimum size of 102 mm carapace width (CW), prohibition on female retention, trap limits of 150, and seasons outside the lobster fishing season. Rock crab removals as a bycatch by the lobster fishery are also limited to males greater than 102 mm CW.

Landings were sporadic prior to the exploratory fishery and have increased five fold since 1994, mainly in LFA 27.2. The weight of rock crab retained during the lobster fishery is poorly documented.

Landings (mt)

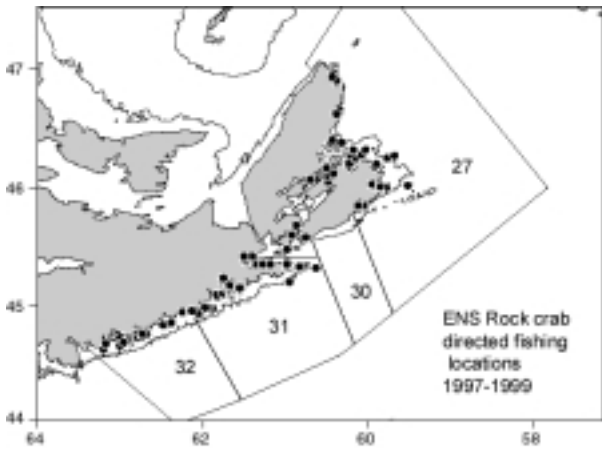
	27.1	27.2	27.3	29	31A	31B	32	Total
1984	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0
1987	0	9	0	6	5	0	0	20
1988	0	30	0	0	15	0	0	45
1989	0	2	1	0	5	0	0	8
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	2	0	0	2
1993	0	0	0	0	1	0	0	1
1994	0	37	14	0	4	0	0	55
1995	0	60	55	0	25	3	2	145
1996	4	78	20	0	10	2	4	118
1997	7	84	29	1	21	6	12	160
1998	9	171	38	2	11	10	36	277
1999	*10*	*152*	*39*	*2*	*35*	*3*	*10*	*251**

* provisional

Effort has increased since 1994 but remains low to moderate in most areas.

	Year	27.1	27.2	27.3	29	31a	31b	32	TOT
Number	1994	-	2	2	-	1	1	-	6
active	1995	-	2	1	-	-	-	-	3
vessels	1996	1	6	3	1	1	-	-	12
	1997	1	6	6	2	2	3	4	24
	1998	3	8	4	2	2	4	3	26
	1999	2	8	5	2	4	3	3	27
Mean	1994	-	38	25	-	2	18	-	
number of	1995	-	57	19	-	-	-	-	
days	1996	8	19	18	1	9	-	-	
fished	1997	10	16	17	2	21	9	13	
	1998	14	26	25	11	17	4	20	
	1999	13	32	21	10	15	5	14	

Fishing locations include much of the coast although there are some gaps, and some areas have been fished to a limited extent.



Resource Status

There are no fishery-independent surveys for this species, and this assessment is based on catch rates and size composition data from the commercial trap catch. Traps are highly selective, and crustacean catchability is affected by a variety of factors. The catch rate data have not been standardized for fisher, trap type, area and season, and standardization would be difficult because

the important variables are available for only a small subset of the data. Some of the variation in catch rate and size composition probably results from factors other than the abundance of rock crab.

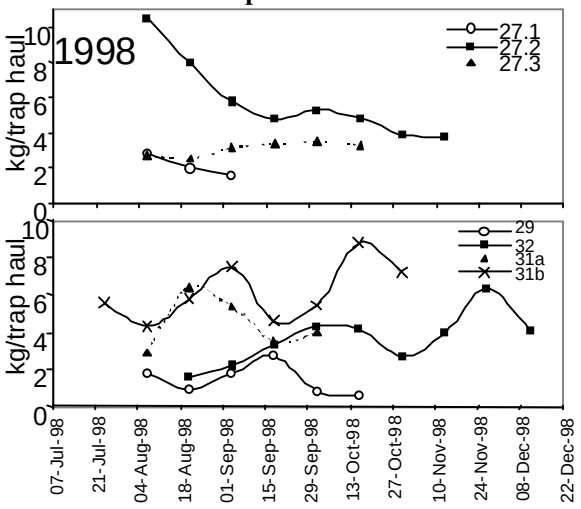
Catch rate variation over the last 5 years is partly due to different fishers and trap types. There is some indication of a decline in the last two years. In 5 of 7 areas the mean catch rate of 1998-99 was lower than that of 1996 to 1997.

Catch rate (kg per trap haul)

Year	27.1	27.2	27.3	29	31a	31b	32
1994	-	5.0	3.7	-	4.5	5.4	-
1995	-	4.6	1.5	-	-	-	-
1996	4.3	6.6	3.1	4.2	9.0	-	-
1997	7.3	7.2	2.5	5.6	5.4	4.7	4.4
1998	2.2	6.4	3.1	1.2	4.5	6.6	3.6
1999	3.3	4.4	2.6	1.2	4.8	5.2	2.3

Within-season catch rates decline in some areas but show no trend or even increase in others. 1998 is typical of the last 3 years:

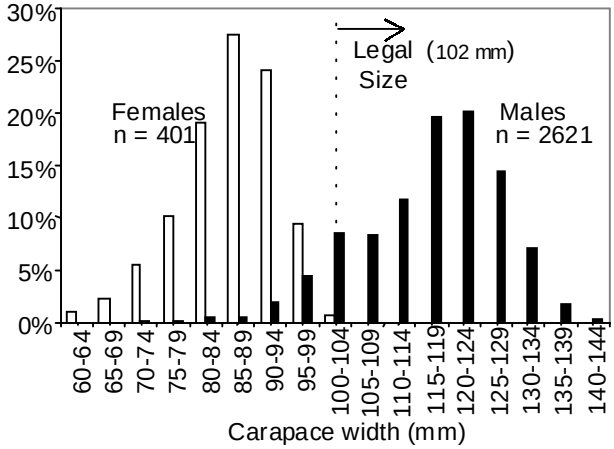
Catch rate for 2 week periods



This suggest some local depletion of rock crab, assuming catch rates are an index of abundance.

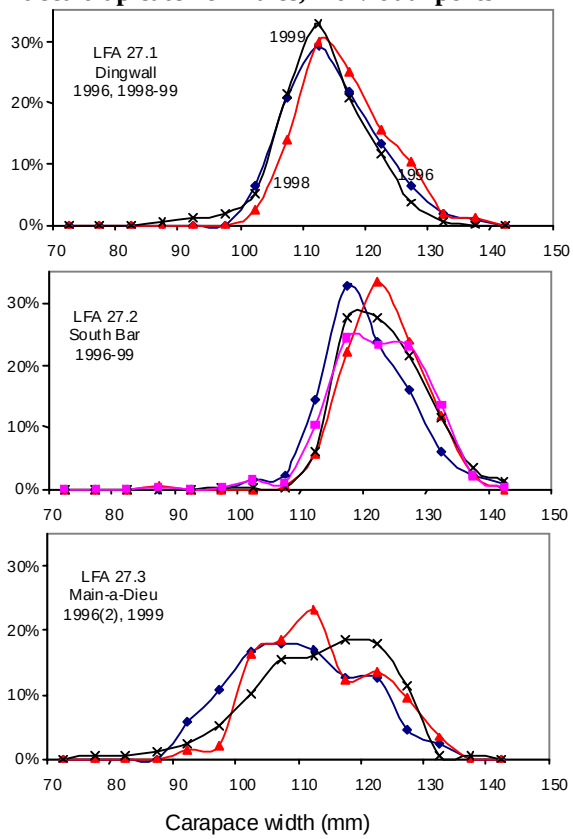
Females are smaller than males and are retained in traps to a much lesser extent.

At-sea trap catch, LFA 27 (10 samples, 1996-99)



The size of males in the trap catch at sea varies among areas but shows no change within 3 areas from 1996 to 1999.

At-sea trap catch of males, individual ports



It appears rock crab removals have not affected population size structure, assuming such a change would be reflected by the catch composition of commercial traps.

Bycatch of lobster in the directed rock crab fishery ranges from 0-12 per 100 trap hauls depending upon the area, and probably time of year and trap type. While there are trap designs that reduce the bycatch, they appear to also reduce the catch of legal crab. More study is needed of trap designs that reduce lobster bycatch.

Sources of Uncertainty

Total removals of rock crab in Eastern Nova Scotia are not known because the bycatch by the lobster fishery is not documented. Anecdotal evidence indicates few rock crab are retained by lobster fishers in some areas (e.g. LFA 27.1) but in other areas lobster traps are set specifically for rock crab to be used as bait. Total removals could easily equal the directed fishery, and could increase or decrease in response to economic factors.

Outlook

Although the directed fishery has relatively low effort, and there is good protection for all females and breeding males < 102 mm CW, the future sustainability of this fishery is dependent upon the quantity of rock crab removed by the lobster fishery. If these bycatch removals were to increase, catch rates in the directed fishery would decline, and overfishing could occur.

Management Considerations

Rock crab are fished by a directed fishery and as a bycatch in the lobster fishery. The potential effort by the lobster fishery is far greater than the directed fishery. The quantity of removals by the lobster fishery is a fundamental piece of information needed to assess rock crab stocks. Until this is known, biological sustainability cannot be evaluated. Lobster fishermen should be encouraged to report their bycatch, whether it is used directly as bait or sold.

As far as the directed fishery is concerned, management provisions such as trap design should remain flexible to reflect the developing nature of this fishery. More study is needed of trap designs that limit lobster bycatch. More fishing effort (e.g. increased participation rates, additional permits or additional traps) should be targeted to lightly fished areas to better evaluate the potential for a rock crab directed fishery.

Other Considerations

Smaller rock crab are an important component of the diets of lobster and some inshore groundfish. The directed fishery focuses on larger crab that are not as important as a food source. Thus the effect of rock crab removals on the production of lobsters and other species is likely small as long as small rock crab are not harvested, and removals are below the level at which overfishing occurs.

The rock crab fishery is male only (as are all Canadian crab fisheries), and there are some concerns that this could limit future egg production if large males are needed to mate females. More research in this area is needed.

For more Information

Contact: M. John Tremblay
Invertebrate Fisheries Division
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, N.S., B2Y 4A2
Tel: (902) 426-3986
Fax: (902) 426-1862
E-Mail:tremblayj@mar.dfo-mpo.gc.ca

References

Tremblay, M.J. and A. Reeves. 2000. Rock crab off Eastern Nova Scotia: stock status and evaluation of exploratory fishery. DFO *Can. Stock Assessment Secret. Res. Doc* 2000/023.

This report is available from the:

Maritime Provinces
Regional Advisory Process
Department of Fisheries and Oceans
P.O. Box 1006, Stn. B203
Dartmouth, Nova Scotia
Canada B2Y 4A2
Phone number: 902-426-7070
e-mail address: myrav@mar.dfo-mpo.gc.ca

Internet address: www.dfo-mpo.gc.ca/csas
ISSN: 1480-4913

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

Correct citation for this publication

DFO, 2000. Rock Crab – Eastern Nova Scotia. DFO Science Stock Status Report C3-05(2000).