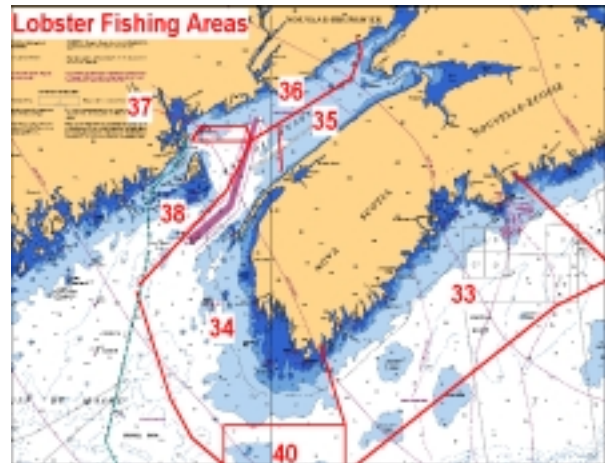


Inshore Gulf of Maine Jonah Crab (*Cancer borealis*)



Background

The Jonah crab, *Cancer borealis*, is found from Nova Scotia to South Carolina and in the Bermudas at depths ranging from intertidal to 800 m. In the waters off Nova Scotia the crabs are found primarily at depths of 50-300 m and temperatures of 8-14°C. The Jonah crab's substrate of preference ranges from rocky off the coast of Maine to sand and clay off Chesapeake Bay.

As with lobsters, the female broods her eggs on the swimmerets under the abdomen. The larvae develop through several plankton stages in the water column before settling to the bottom. Most male Jonah crabs are physiologically mature at 90-100 mm carapace width (CW) and most females mature at 85 mm CW. Maximum carapace width for males is approximately 180 mm with a weight of 0.9 kg. Females usually do not exceed 150 mm (CW) and 0.5 kg in weight.

Inshore Gulf of Maine exploratory rock and Jonah crab fisheries were initiated in southwest New Brunswick (Lobster Fishing Areas, LFA's 36 & 38) in 1995 and in southwest Nova Scotia (LFA's 34 & 35) in 1996. Two Developing Species Advisory Boards (DSAB's) were created to manage these new crab fisheries as well as other developing fisheries. One was initiated in southwest New Brunswick in 1995 and the other in southwest Nova Scotia in 1996. The crab permits were distributed by Lobster Fishing Areas (LFA's).

Summary

- Jonah crab landings in the exploratory fishery in LFA 34 peaked at 146 t in 1997. Preliminary landings in 1999 were 119 t. Based on logbook analysis, annual average catch rate ranged between 4.1 and 4.8 kg. per trap haul (kg/th) from 1996 to 1998 and increased to 6.3 (kg/th) during the 1999 season.
- Reported landings of Jonah crab under the bycatch provision in the inshore lobster fishery surpass those of these new exploratory fisheries. Removals through this bycatch are considered to be underestimated. Until the quantity of Jonah crab removals by the lobster fishery is evaluated, biological sustainability of the directed fishery cannot be evaluated.
- Jonah crab landings in LFA 38, after the addition of four more permits in 1998, increased to 61 t. Preliminary landings, in 1999 were 51 t. Based on logbook analysis, annual catch rates ranged between 4.8 and 6.5 kg/th from 1995 to 1999.

- Although no commercial concentration of Jonah crab was found in LFA 35, preliminary exploratory fishing results (up to 0.7 kg/th) in the southwestern part of LFA 36 shows some potential.
- Based on at sea sampling of trap contents, monthly mean size of males and females were larger in LFA 34 compared to LFA 38. This is due to different trap types and smaller minimum legal size in LFA 38.
- Lobster by-catch in the inshore Jonah crab fishery was negligible.

The Fishery

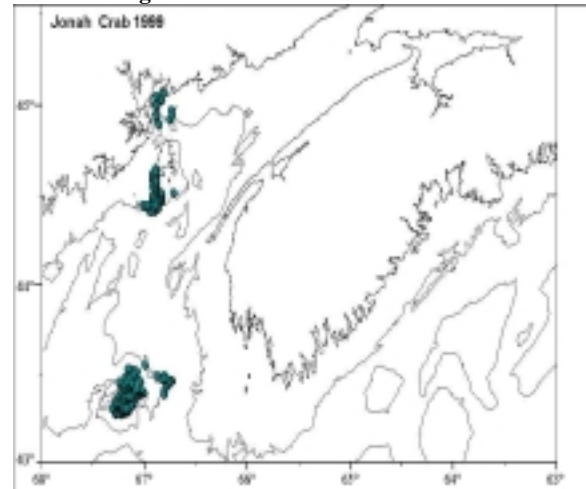
Evolving from two separate Developing Species Advisory Boards (DSAB's), the present management regime has various regulations. Presently, in LFA 34 and 35 participants are allowed to land Jonah crab only. The minimum size limit for male Jonah crab was set at 130 mm CW. Modified lobster traps were permitted to be used as well as conical crab traps, with a trap limit of 375. Traps were to include a minimum of two escape gaps of a minimum diameter of 79 mm (3.125 inches). They were only allowed to begin fishing for crab one week after the closer of the spring lobster fishing season, and had to remove their traps one week before the opening of the fall lobster fishing season. In order for participants to retain their exploratory permits, they had to land and sell a minimum of 10,000 kg of Jonah crab.

In LFA's 36 & 38, exploratory crab permit holders were allowed to land rock and Jonah crab. The minimum size limit for male Jonah was set at 121 mm CW. The trap limit was set at 200 in LFA 36 and 300 in LFA 38. Only conical traps were allowed, and were required to have a minimum of two circular openings of 63.5 mm (2 1/2") in diameter. Also the crab fishing season is

open all year. For participants to retain their exploratory fishing permits, they were required to complete 15 fishing trips and had to land at least 30 % of the average landings (in weight) of all fishers within a given year for their respective LFA.

The exploratory Jonah crab fishery, in operation since 1995, has located two commercial concentrations. One is located in LFA 34, off southwestern Nova Scotia in the midshore (yearly catch rates of 4.1 to 6.3 kg/th), and the other is located in LFA 38 off southern Grand Manan (yearly catch rates of 4.8 to 6.5 kg/th). Jonah crab were found in the southwestern New Brunswick (LFA 36) but due the low yearly catch rates there (0.3 to 0.7 kg/th), have not yet been proven commercially viable.

Distribution of Jonah crab fishing locations as reported in fishers' logbooks



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 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 the catch rate and size composition probably results from factors other than the abundance of Jonah crab.

Jonah crabs were found in commercial concentration in only two areas; a midshore area in LFA 34 (4.0 to 6.3 kg/th) and off southern Grand Manan in LFA 38 (4.8 to 6.5 kg/th). In LFA's 34 and 38, most of the fishing took place between June and the end of October even though the crab season was open all year in LFA 38.

In LFA 34, between 2 & 8 crab fishers have been fishing for Jonah crab since 1996. Jonah crab landings obtained from logbooks peaked in 1997 at 146 t. However, the 1999 landings of 119 t are not complete due to missing logbooks. From 1996 to 1998 yearly average catch rates have varied between 4.1 and 4.8 kg/th and during the 1999 season the yearly average catch rate increased to 6.3 kg/th. Monthly average catch rates showed an increasing trend in CPUE between months from July to September of each year.

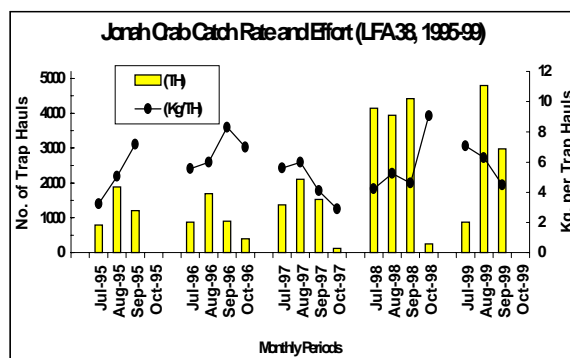
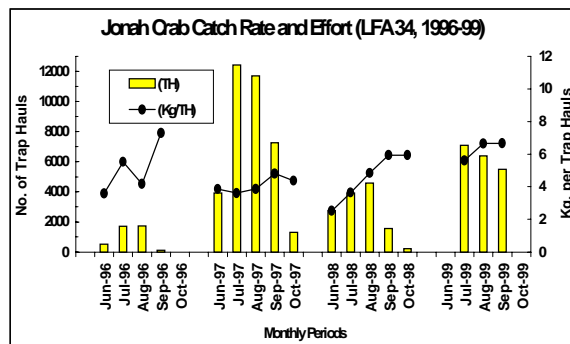
Jonah crab		1995	1996	1997	1998	1999
LFA 34 (Midshore)	Trap Hauls		4079	36598	13035	18966
	Landings (t)		19	146	54	119
	Mean CPUE		4.8	4.0	4.1	6.3
	No. of Logbooks		2	8	6	5
	By-catch (t)	**	**	**	289	152
LFA 35	Trap Hauls		3010	4165	2550	
	Landings (t)		0.2	0.2	0.2	
	Mean CPUE		0.07	0.05	0.09	
	No. of Logbooks		3	4	2	
	By-catch (t)		**	**	0	
LFA 36	Trap Hauls	1359			3422	3210
	Landings (t)	0.04			1.8	2.3
	Mean CPUE	0.03			0.5	0.7
	No. of Logbooks	4			6	5
	By-catch (t)	**			0	0
LFA 38	Trap Hauls	3875	3875	5125	12760	8939
	Landings (t)	21	25	27	61	51
	Mean CPUE	5.3	6.5	5.3	4.8	5.7
	No. of Logbooks	1	1	1	5	4
	By-catch (t)	**	**	**	27	86

** Unknown

In LFA 38, only one Jonah crab fisher was active between 1995 and 1997. In 1998 and 1999, five and four logbooks were received respectively. Landings remained between 20 and 27 t until 1997. During 1998, landings increased to 61 t and preliminary landings in 1999 were 51 t. Since 1995, yearly catch

average rates varied between 4.8 and 6.5 kg/th. Monthly catch rates varied between months and did not follow any trend.

Yearly average catch rates were similar in both LFA's despite the fact that different trap types were used. Low concentrations of Jonah crabs were also found in LFA 35 (Annapolis Basin) (0.05 to 0.09 kg/th) and LFA 36, off Campobello (0.3 to 0.7 kg/th).

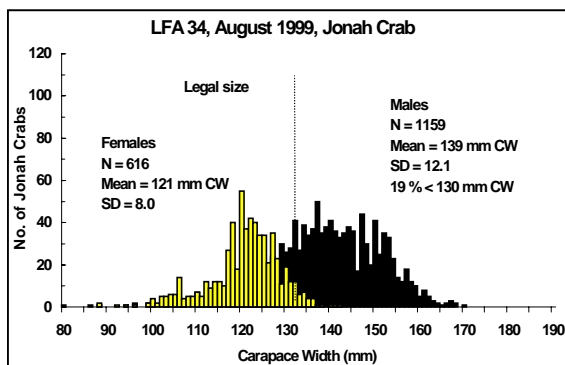
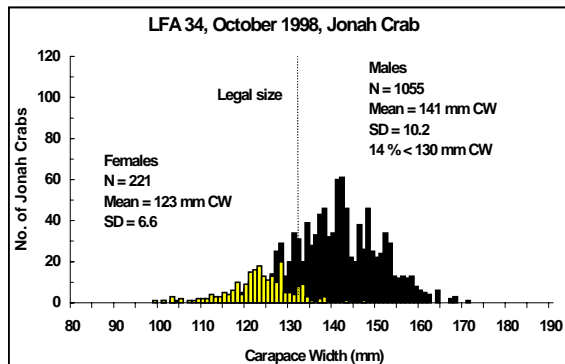
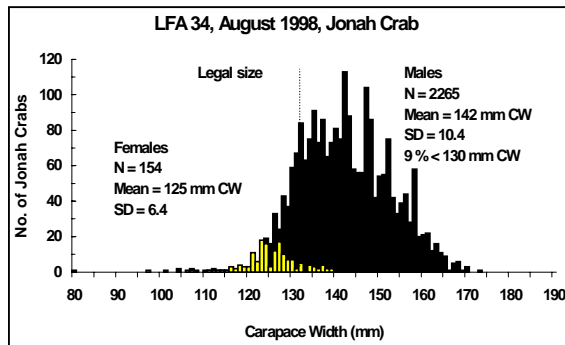


At-sea sampling provides detailed information on crab size structure in the traps. All crabs retained in individual trap hauls are measured (carapace width, CW in mm), and examined to determine species, sex, molt condition and egg development stage for berried crabs. As the exploratory rock/Jonah crab fisheries were evolving in the various LFA's, emphasis was placed in sampling a series of representative ports in areas and at time periods when high fishing activity occurred.

All the sampling was done during July, August and September. In some instances, when several samples that were taken during

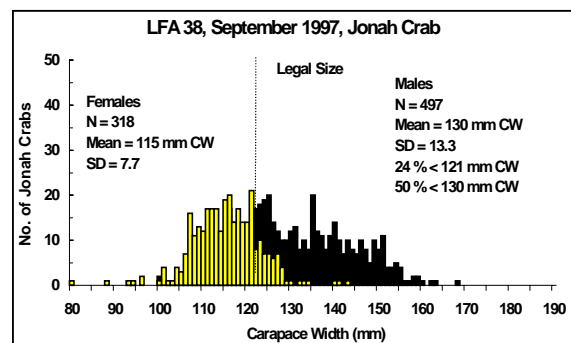
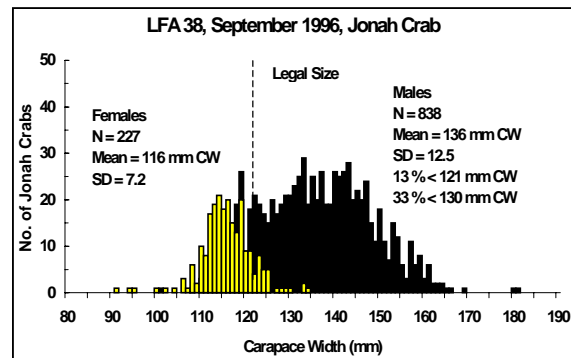
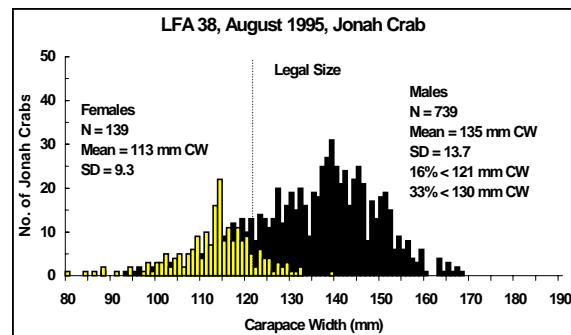
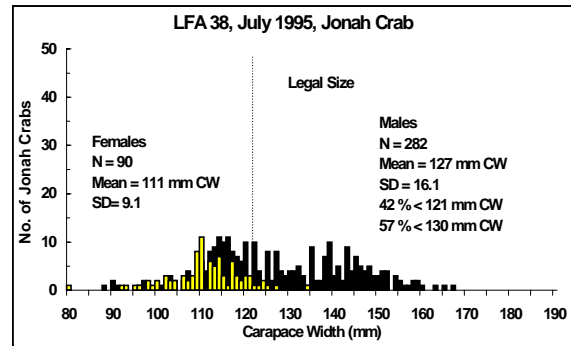
the same month in the same location, the samples were combined into one monthly sample.

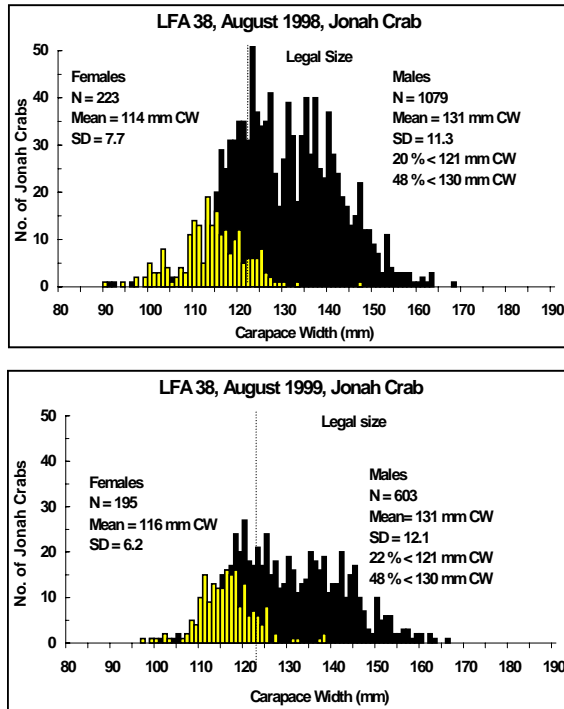
Sea samples obtained from LFA 34 in the midshore area during August and October 1998 and August 1999 yielded mean sizes for males ranging from 139-142 mm CW. The mean size of females varied between 121 & 125 mm CW. The percentage of females captured that were berried was less than one percent.



In LFA 38, samples obtained between July and September 1995 and August 1999 indicated a mean size for males ranging

from 127-136 mm CW. The lower mean size of 127 mm CW observed in July 1995 was taken at the infancy stage of this exploratory crab fishery. The mean size of females varied between 111 and 116 mm CW. Over the five years of sampling an average of 5% of females were berried.





One reason, for the larger mean size of males and females in LFA 34 compared to LFA 38, is that the minimum size limit in LFA 34 is 130 mm CW compared to 121 mm CW for LFA 38. Regulation in gear design (larger size of escape vents in LFA 34) was set to select the size of crab targeted. In LFA 34, the percentage of crabs below the legal size limit of 130 mm CW varied between 9 and 19% compared to 33-57 % in LFA 38.

Lobster bycatch has been a management concern since the introduction of the exploratory crab fishery. However, restrictions on the type of traps used and limitations on the size and shape of the entrances, seem to have reduced the incidence of lobster bycatch. Yearly average number of lobsters per trap haul varied between 0.0 and 0.01 in LFA 34 and between 0.0 and 0.04 in LFA 38.

Sources of Uncertainty

Total removals of Jonah crab in the Gulf of Maine are not known because the bycatch of Jonah crab by the lobster fishery is not well documented. Anecdotal evidence indicates few Jonah crab are retained by lobster fishers in some areas (e.g. LFA's 35 & 36) but in other areas lobster traps are set specifically for Jonah crab to be used as bait or sold. Reported landings in LFA's 34 and 38 have shown that bycatch of Jonah crabs surpassed landings from the directed fishery in 1999, and could increase or decrease in response to economic factors.

Outlook

There is still some room for limited expansion in unexplored areas in LFA 34 & 38. However in the Bay of Fundy (LFA 35 & 36) it is unlikely that any further commercial concentrations of Jonah crab can be found. The current level of effort does not appear to be having any obvious impact on the resource such as a reduction in average catch size or reduction in catch rates. The economic feasibility of this fishery is marginal and very dependent on the value and the demand for the product.

Removals of Jonah crab by the lobster fishery as a bycatch, are currently underestimated and under no limitation. Reported landing statistics shows that Jonah crab landings as a bycatch to the lobster fishery have surpassed the directed fishery in 1999. Until the quantity of Jonah crab removals by the lobster fishery has been further evaluated, biological sustainability of the directed fishery cannot be evaluated.

The by-catch of lobsters does not seem to be a problem for the Jonah crab fishery.

Management Considerations

Jonah crabs 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 current directed fishery. Removals by the lobster fishery are a fundamental piece of missing information needed for the assessment of Jonah crab stock(s). Until the quantity of Jonah crab removals by the lobster fishery is evaluated and controlled, biological sustainability of the directed fishery cannot be evaluated. The bycatch issues should be look at on an LFA by LFA basis since in some LFA's these issues could be more easily resolved than in others. 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 should remain flexible to reflect the developing nature of the fishery.

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Correct citation for this publication

DFO, 2000. Inshore Gulf of Maine Jonah (Cancer borealis). DFO Science Stock Status Report C3-66(2000).