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Literature review on stock delimitations pertaining to the Western Cape Breton Island snow crab (Chionoecetes opilio) and advice on a spring fishery in Area 18.

by

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Summary

The available literature on stock delimitations in the Gulf of St.Lawrence is limited. Studies on electrophoretic characteristics of snow crab showed no differences between the eastern and western coast of Cape Breton Island. Tagging studies showed no definite patterns of movement in the Gulf of St.Lawrence. Data collected from traps during the fishery showed different biological characteristics for Areas 18 and 19 of the western Cape Breton Island snow crab fishery. However, no conclusions can be drawn because the fishing seasons are different.

A fishery in the spring for Area 18 is being proposed by the industry due to low quality and price of crab in the fall. It is recommended to shift the fishing season to the spring but a proper transition must be developed.

Résumé

La littérature disponible traitant de la délimitation des stocks de crabe dans le Golfe du Saint-Laurent est limitée. Les études des caractéristiques électrophorétiques du crabe des neiges a démontré qu'il y avait aucune différence entre la côte ouest et est de l'Ile du Cap-Breton. Les études de marquage ont démontré aucun mouvement défini dans le sud du Golfe du Saint-Laurent. Des données recueillies à l'aide de casiers lors de la pêcherie ont démontré qu'il y avait différentes caractéristiques biologiques chez le crabe des neiges des régions 18 et 19 de la côte ouest du Cap-Breton. Cependant, aucune conclusion peut être tirée car les saisons de pêche sont différentes entre les deux régions.

Une pêcherie au printemps pour la région 18 est proposée par l'industrie dûe à la mauvaise qualité et bas prix du crabe pendant l'automne. Il est recommandé de changer la pêcherie d'automne pour une pêcherie de printemps mais la transition doit être développée.

Introduction

In recent years, several requests were received by DFO for changes in management measures in snow crab fishing Areas 18 and 19 (i.e. additional licenses, increased global quota, lower individual boat quotas, and season change). The delimitation of these populations, which has not been well investigated, is of utmost importance in order to develop proper management and conservation measures.

Throughout the history of the fishery, white (soft shell) crab has been a problem in Area 18. In 1981, an early spring season in addition to the fall season was attempted to avoid poor quality crabs. This experiment was not a success as the crab caught in the spring and early summer were soft shelled and had a low meat yield (Chiasson et al., 1989). Since 1982, the season has been set for late summer and early fall with the opening date being determined by the results of meat yield tests which were done on crab caught during pre-season sampling. However, in 1989, the average price per pound of crab paid to the fishermen in Area 18 dropped sharply as follows (data from Statistics and EDP Systems, Gulf Region):

	Area 18	Area 19
1987	$1.03	$1.48
1988	$1.03	$1.64
1989	$0.40	$1.03

The fishermen and processors of Area 18 therefore requested a spring snow crab fishery beginning in 1990.

This paper presents a review of the limited literature available on the delimitation of snow crab stocks in the Southern Gulf of St. Lawrence and provides comments on a spring fishery for Area 18.

Relation between snow crab population from western and eastern coast of Cape Breton Island.

Davidson et al. (1985) compared electrophoretic characteristics for snow crab from western and eastern Cape Breton Island. The two groups of crab did not exhibit electrophoretic differences which would suggest that they belong to a single stock.

Davidson et al. (1985) and Elner (1988) reported that recruitment to the commercial stock on eastern Cape Breton Island snow crab grounds is sporadic in contrast with the western coast of the Island. He suggested that the eastern Cape Breton Island population was established over time through pulses of larval recruitment from the western side of the Island.

Relation between snow crab population of Areas 18 and 19, on the western coast of Cape Breton Island.

Movement:

Studies from Coulombe et al. (1985) in Bay of Chaleur and the Gaspé Bay using trawling and trapping showed that immature male crab were localized in shallower water on gravelly mud whereas adults are found mainly on mud or sandy mud bottoms. They therefore hypothesized that young crab move down to the muddy bottom where recruitment to the fishery occurs. However, in a study on the west coast of Cape Breton (inside present Area 19), Robichaud et al. (1989) showed that young juvenile snow crab were most dense on mud bottoms and can inhabit the same substrate as adults. Tagging experiments on mature crabs in the Cape Breton area showed that 99% of tagged crabs were recaptured less than 20 kilometres from their release points up to five years after release (Dufour, 1988). Other tagging studies done in the past in the midshore fishery (Watson, 1970; Watson and

Wells, 1972) showed no definite patterns of movement. The majority (86%) of the tagged crabs were recaptured within 24 km of their release point.

Biological information:

Results from past sampling have shown a higher proportion of morphometrically immature crab in the catch of Area 18 compared to Area 19. The percentages of morphometrically immature crab were as follows: (N=total number of snow crab sampled)

	Area 18		Area 19	
Year (source)	Sea samples	Port samples	Sea samples	Port samples
	% (N)	% (N)	% (N)	% (N)
1986 (1)	39.9 (706)		24.4 (982)	22.1 (2892)
1987 (2)	51.4 (511)	34.3 (1140)	14.6 (1366)	18.6 (4417)
1988 (3)	60.1 (3305)		13.0 (1770)	
1989 (4)	63.3 (731)		11.6 (1201)	5.3 (1151)

(1) Davidson and Comeau (1987)
(2) Chiasson et al. (1988)
(3) Chiasson et al. (1989)
(4) Chiasson et al. (1990)

Since the fishing season in Area 19 is earlier than for Area 18 (Table 1 and 2), it is possible that the difference in the composition of the catch is due to trap selectivity. If Area 18 is really composed of a high proportion of morphometrically immature crab compared to Area 19, it would suggest that the area is a nursery zone and that a proportion of crab reaching morphometric maturity moves out of Area 18. Testing of this hypothesis is underway. However, recent tagging experiments of white mature and immature crab in Area 18 before the fishery have yielded low returns; 43/1484 in 1988 and 6/325 in 1989.

Area 18 spring fishery

Because of low prices of crab paid to the fishermen of Area 18 during the fall of 1989, mostly due to low quality (soft shelled crab), the fishermen are proposing a spring fishery for 1990.

There has been no studies on the molting season of crab in Cape Breton. However, if the molting season corresponds to that of the midshore zone (early March to mid April, M. Moriyasu, personal communication), a fishery in the spring of 1990 for Area 18, although exploiting crab of better quality than in the fall (caught nearly one year after molting), would probably yield low catches of hard shelled crab since the high proportion of immature crab found in the catches in the fall would be molting during the next spring.

The 1989 fall fishery, with a total catch of 666 t, represents the catch level at which the catch rates appear stable (Chiasson et al., 1990). A fishery in the spring of 1990 would therefore represent an increase in the present exploitation rate since there is no addition of biomass of hard shell crab between the two periods. Plans for transition from a fall fishery to a spring fishery will have to be developed in order to avoid an increase in exploitation level.

Further studies are needed in order to understand the stock composition and the biological relationship between snow crab populations in Areas 18 and 19 on the western coast of Cape Breton Island. Further data on biological characteristics and biomass estimates of snow crab in these fisheries will be provided by the annual snow crab trawl survey in 1990 .

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Table 1: Number of participants, trap limits, seasons, TAC regulations and total catch for the Area 19, western Cape Breton Island snow crab , Chionoecetes opilio, fishery: 1978-1989.

Year	# of Licensed boats	# of traps per boat *	Season	TAC (kg/license) (t)	catch (t)
1978	14	40	May 13 - Sept. 30	-	1941
1979	27	30	June 16 - Sept. 16	1406 (52164)	1390
1980	27	30	June 15 - Sept. 15	1225 (45360)	1158
1981	27	30	July 15 - Sept. 15	1004 (37195)	913
1982	27	30	July 15 - Sept. 15	1004 (37195)	953
1983	27	30	July 15 - Sept. 15	1004 (37195)	906
1984	61	20	July 15 - Sept. 15	1385 (22680)	1315
1985	61	20	July 15 - Sept. 15	1385 (22680)	1234
1986	59	20	July 15 - Sept. 15	1338 (22680)	1235
1987	59	20	July 15 - Sept. 15	1150 (19505)	1151
1988	59	20	July 15 - Sept. 15	1338 (22680) **	1337
1989	59	20	July 15 - Sept. 16	1338 (22680)	1334

* Standard box trap 1.5m x 1.5m x 0.6m or 1.8m x 1.8m x 0.6m

** Originally set at 1150 t, the TAC has increased to 1338 t during the season.

Table 2: Number of participants, trap limits, seasons, TAC regulations and total catch for the Area 18, western Cape Breton Island snow crab, Chionoecetes opilio, fishery: 1979-1988.

Year	# of Licensed boats	# of traps per boat *	Season	TAC (kg/license) (t)	catch (t)
(1) 1979	14	30	July 1 - Sept. 30	-	213
(1) 1980	23	30 **	July 15 - Sept. 15	-	519
(1) 1981	23	30	April 15 - June 15 Sept. 1 - Nov. 30	835 (36288)	494
(1) 1982	23	30	Aug. 20 - Nov. 30	835 (36288)	824
(1) 1983	23	30	Aug. 15 - Nov. 3	835 (36288)	822
(1) 1984	23	30	Aug. 25 - Nov. 10	835 (36288)	722
(1) 1985	23	30	Aug. 3 - Oct. 31	835 (36288)	537
(1) 1986	23	30	Aug. 4-8 ; 28 - Oct. 28	626 (27216)	618
(2) 1987	23	30	Aug. 16 - Oct. 10	626 (27216)	626
(3) 1988	27	30	Aug. 26 - Oct. 26	674 (24948)	669
1989	27	30	Sept. 4 - Nov. 4	674 (24948)	666

(1) Davidson and Comeau, 1987
(2) Chiasson et al. , 1988
(3) Chiasson et al., 1989

* Standard box traps - 1.5m x 1.5m x 0.6m or 1.8m x 1.8m x 0.6m
** 9 or 10 new exploratory permit holders were allowed 20 traps.