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# A Preliminary Analysis of the New Brunswick Snow Crab (*Chionoecetes opilio*) Fishery in the southwestern part of the Gulf of St. Lawrence

By

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Abstract

The 1984 total landings for the southwestern part of the Gulf of St. Lawrence were 26062 mt. The percentage of biomass removed from the initial biomass, estimated by the Leslie regression is 65.9% for area 3 and 63.1% for area 4.

Résumé

Le débarquement total de 1984 pour le sud-ouest du Golfe Saint-Laurent est de 26062 tm. Le pourcentage de biomasse prélevé sur la biomasse initiale est estimé par l'analyse de Leslie à 65.9% pour la région 3 et 63.1% pour la région 4.

## Introduction

Quebec and maritime based vessels have been exploiting snow crab (Chionoecetes opilio) in the southwestern part of the Gulf of St. Lawrence since the mid-1960's. During the 1970's, landings were in the range of 5000 mt to 6000 mt. These later increased to reach a high of 28000 mt in 1982. Landings have remained at this level since then (Bailey & Cormier, 1983a, b). For the past three years, the fishing season has been closed when the level of soft-shell crab in the catch produced a meat yield lower than 20%.

In 1984, a total allowable catch (TAC) of 26000 mt was establised for the southwestern Gulf stock. The TAC was caught by July 2nd before the level of soft-shell crab became critical.

The following is an outline of the New Brunswick fleet activities during the 1984 fishing season. Data from the Quebec fleet were not available when this document was prepared.

## Materials and Methods

To calculate catch and catch per unit of effort, only properly filled out log records with three days or less of soaktime were used. Total landings were derived from sale slips and statistics branch data.

The biomass at the beginning of the season was estimated using the Leslie method described in Ricker (1975). Confidence limits were calculated using the DeLury equation, also described in Ricker (1975). To calculate the relative level of removal, the total catch of a given area was divided by its corresponding biomass.

## Results

Landings for the New Brunswick and Quebec fleets are presented in table 1. Catch, effort and C.P.U.E. data for areas 1,2,3 and 4 (figure 1) are presented in tables 2,3,4 and 5.

Leslie regressions were only performed on data from areas 3 and 4 (Figure 2, 3). Data from areas 1 and 2 were not analysed because only 7% of the total landings was caught by the New Brunswick fleet. The analysis shows that by the end of the season, 65.9% (42.7% - 81.5%) and 63.1% (52.7% - 71.8%) of the estimated initial biomass for areas 3 and 4 was caught by the fleet.

## Discussion

Most of the fishermen were probably anxious to get their share of the 26000 mt total allowable catch. This rush may have been the reason why some isolated cases of small sized crab landings were reported. Nevertheless, effort in number of traps may not have increased significantly, but an atmosphere of competition like this one pushes individuals to increase their work load and consequently the level of effort directed towards the stock.

In general, approximately 65% of the initial biomass estimated by the Leslie method was removed during the fishing season. This is slightly higher than the 60% removed during the 1983 fishing season. This could suggest that the level of effort and initial biomass has not changed much and that the fishery has attained a plateau. On the other hand, using this index may not be the best way to monitor effort or stock production. Effort could increase or decrease and the percentage of biomass removed from the stock would not change as long as the ratio between initial biomass, calculated from the Leslie regression, and catch stay the same. Therefore, this figure should not be considered as an exploitation rate as defined by $E=F/Z$ (E: exploitation rate; F: instantaneous rate of fishing mortality; Z: instantaneous rate of total mortality) (Ricker, 1975) but rather as a level of removal. Consequently, past advice would have been stating that the fishery should only remove 50-60% of the available biomass.

Using the Leslie method to assess the snow crab stock of the southwestern part of the Gulf of St. Lawrence has been questioned in the past (Bailey & Cormier, 1983; Bailey, 1983). It should also be mentioned again that several conditions for the Leslie analysis are not met. Effort is not distributed randomly over the fishing grounds. The fleet is continuously moving its effort to sustain a good level of catch rate. The individuals in the stock are not necessarily distributed randomly and the size distribution of individuals caught changes during the fishing season. Finally, it is difficult to determine the accuracy of the information in log records. Furthermore, this problem may become greater with the imposition of a quota.

## Acknowledgements

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References

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Table 1. Annual landings of Snow Crab from the Southwestern part of the Gulf of St. Lawrence.

| | Landings (mt) | | |
|---|---|---|---|
| Year | New Brunswick | Quebec | Total |
| 1968 | 3 477 | 462 | 3 939 |
| 1969 | 6 323 | 1 257 | 7 580 |
| 1970 | 4 969 | 665 | 5 634 |
| 1971 | 4 588 | 786 | 5 374 |
| 1972 | 4 719 | 673 | 5 392 |
| 1973 | 5 908 | 1 061 | 6 969 |
| 1974 | 5 694 | 1 010 | 6 704 |
| 1975 | 4 050 | 582 | 4 632 |
| 1976 | 6 086 | 1 482 | 7 568 |
| 1977 | 7 466 | 2 071 | 9 537 |
| 1978 | 7 935 | 2 527 | 10 462 |
| 1979 | 10 950 | 4 844 | 15 793 |
| 1980 | 9 994 | 4 860 | 14 854 |
| 1981 | 14 083 | 5 984 | 20 067 |
| 1982 | 19 892 | 8 603 | 28 495 |
| 1983 | 17 200 | 7 142 | 24 342 |
| 1984* | 18 262 | 7 800 | 26 062 |

(From 1968 to 1983; Bailey & Cormier, 1983b)
(*Fisheries and Oceans statistics)

Table 2. Catch and effort data for area 1.

| Weeks (M/D) | No.trips | Catch(Kg) | Effort(trap hauled) | C.P.U.E.(Kg/trap) |
|---|---|---|---|---|
| 05/31-06/13 | 16 | 62055 | 1535 | 40.4 |
| 06/14-06/27 | 8 | 25153 | 747 | 33.7 |
| 06/28-07/11 | 2 | 4792 | 101 | 47.4 |
| Total | 26 | 92000 | 2383 | 38.6 |

Table 3. Catch and effort data for area 2.

| Weeks (M/D) | No.trips | Catch(Kg) | Effort(trap hauled) | C.P.U.E.(Kg/trap) |
|---|---|---|---|---|
| 04/05-04/18 | 2 | 36258 | 238 | 152.3 |
| 04/19-05/02 | 19 | 176766 | 1868 | 94.6 |
| 05/03-05/16 | 24 | 174141 | 2499 | 69.7 |
| 05/17-05/30 | 22 | 112540 | 2020 | 55.7 |
| 05/31-06/13 | 24 | 109267 | 2519 | 43.4 |
| 06/14-06/27 | 23 | 102055 | 2580 | 39.6 |
| 06/28-07/11 | 15 | 18786 | 846 | 22.2 |
| Total | 129 | 729813 | 12570 | 58.1 |

Table 4. Catch and effort data for area 3.

| Weeks (M/D) | No.trips | Catch(Kg) | Effort(trap hauled) | C.P.U.E.(Kg/trap) |
|---|---|---|---|---|
| 04/05-04/18 | 14 | 201093 | 1379 | 145.8 |
| 04/19-05/02 | 239 | 2794004 | 32182 | 86.8 |
| 05/03-05/16 | 224 | 2404516 | 30452 | 79.0 |
| 05/17-05/30 | 142 | 1155182 | 18526 | 62.4 |
| 05/31-06/13 | 103 | 556714 | 12487 | 44.6 |
| 06/14-06/27 | 86 | 403592 | 10604 | 38.1 |
| 06/28-07/11 | 22 | 46473 | 1664 | 27.9 |
| Total | 830 | 7561575 | 107294 | 70.5 |

Table 5. Catch and effort data for area 4.

| Weeks (M/D) | No.trips | Catch(Kg) | Effort(trap hauled) | C.P.U.E.(Kg/trap) |
|---|---|---|---|---|
| 04/05-04/18 | 4 | 76285 | 595 | 128.2 |
| 04/19-05/02 | 50 | 686471 | 6941 | 98.9 |
| 05/03-05/16 | 86 | 1205422 | 14403 | 83.7 |
| 05/17-05/30 | 95 | 826543 | 14315 | 57.7 |
| 05/31-06/13 | 56 | 298224 | 7282 | 41.0 |
| 06/14-06/27 | 36 | 204473 | 4352 | 47.0 |
| 06/28-07/11 | 14 | 41051 | 964 | 42.6 |
| Total | 341 | 3338470 | 48852 | 68.3 |

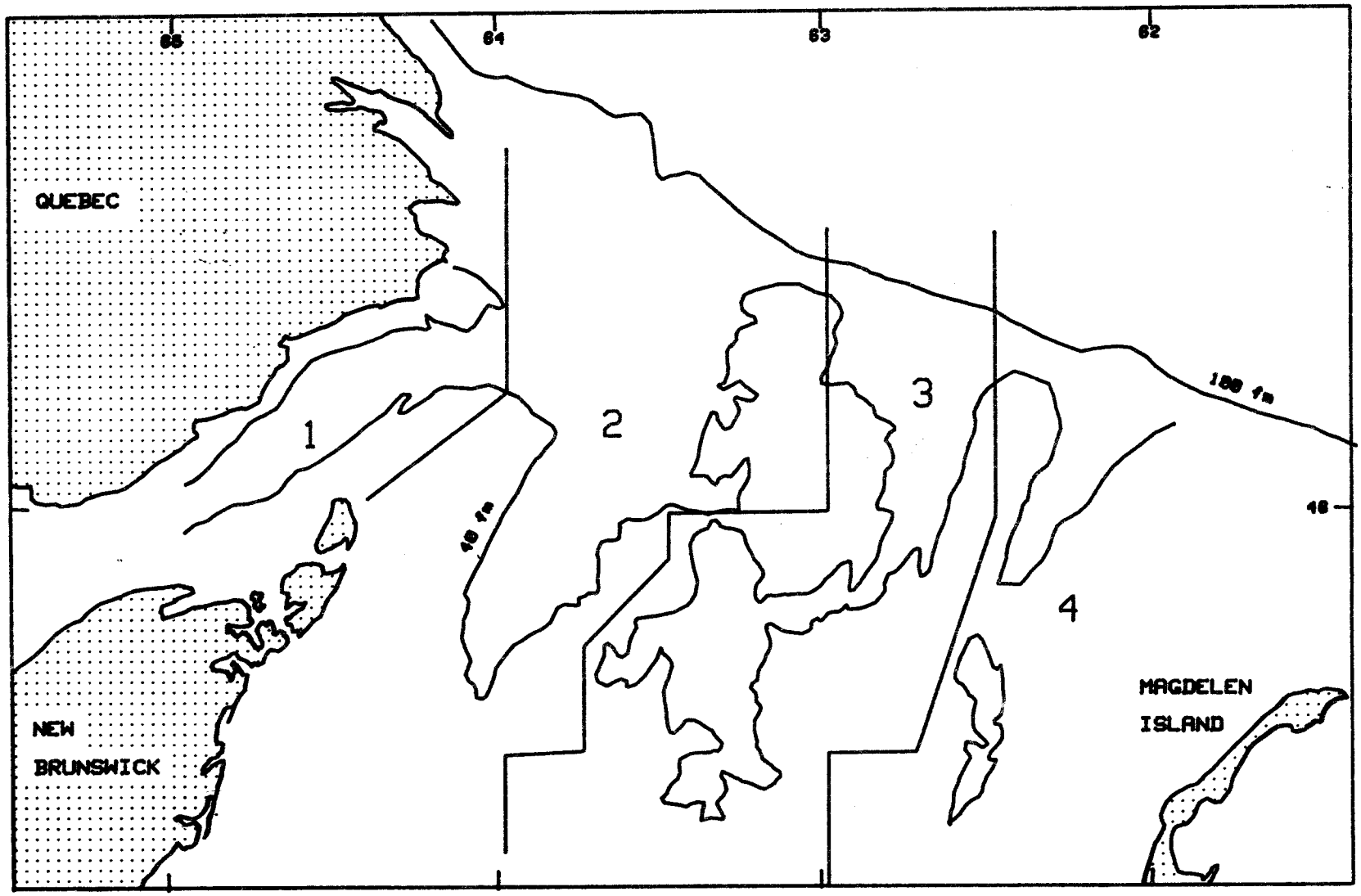


Figure 1. Distribution of the 4 fishing grounds of the southwestern part of the Gulf of St. Lawrence.

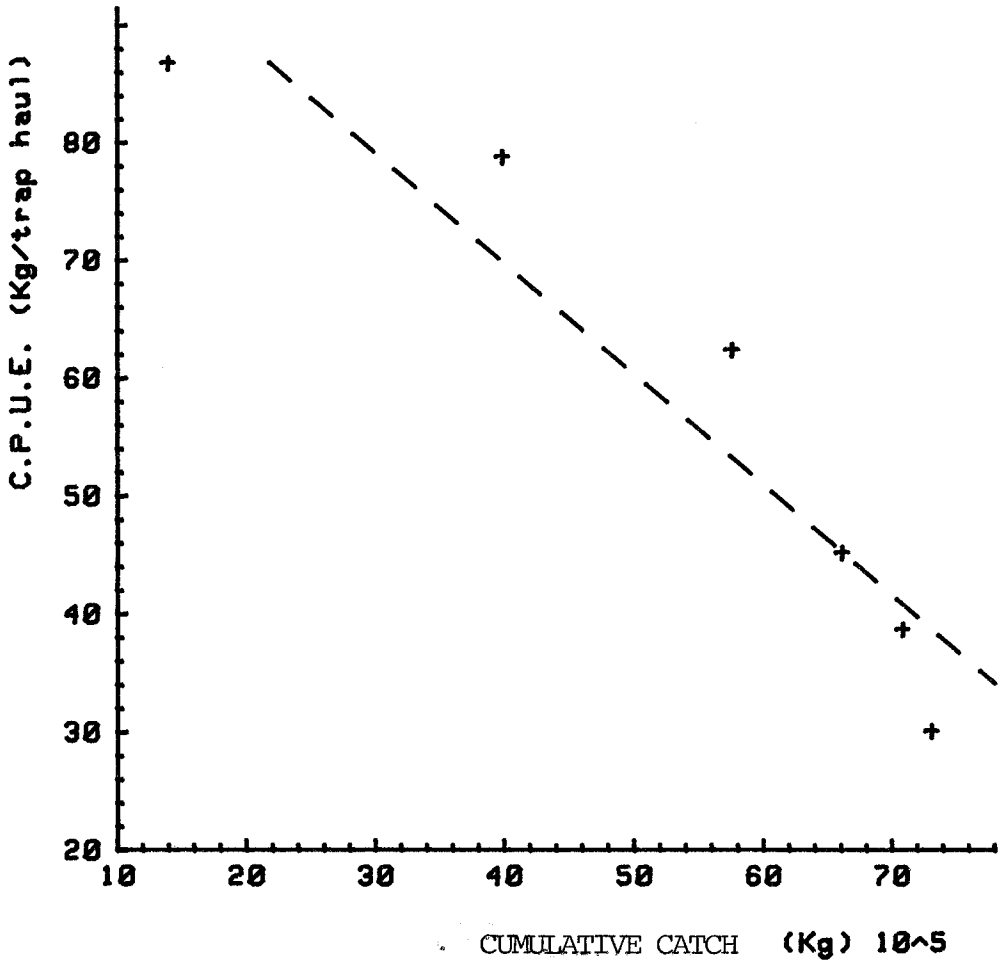


Figure 2. Leslie's analysis of catch and effort data from area 3 in 1984.

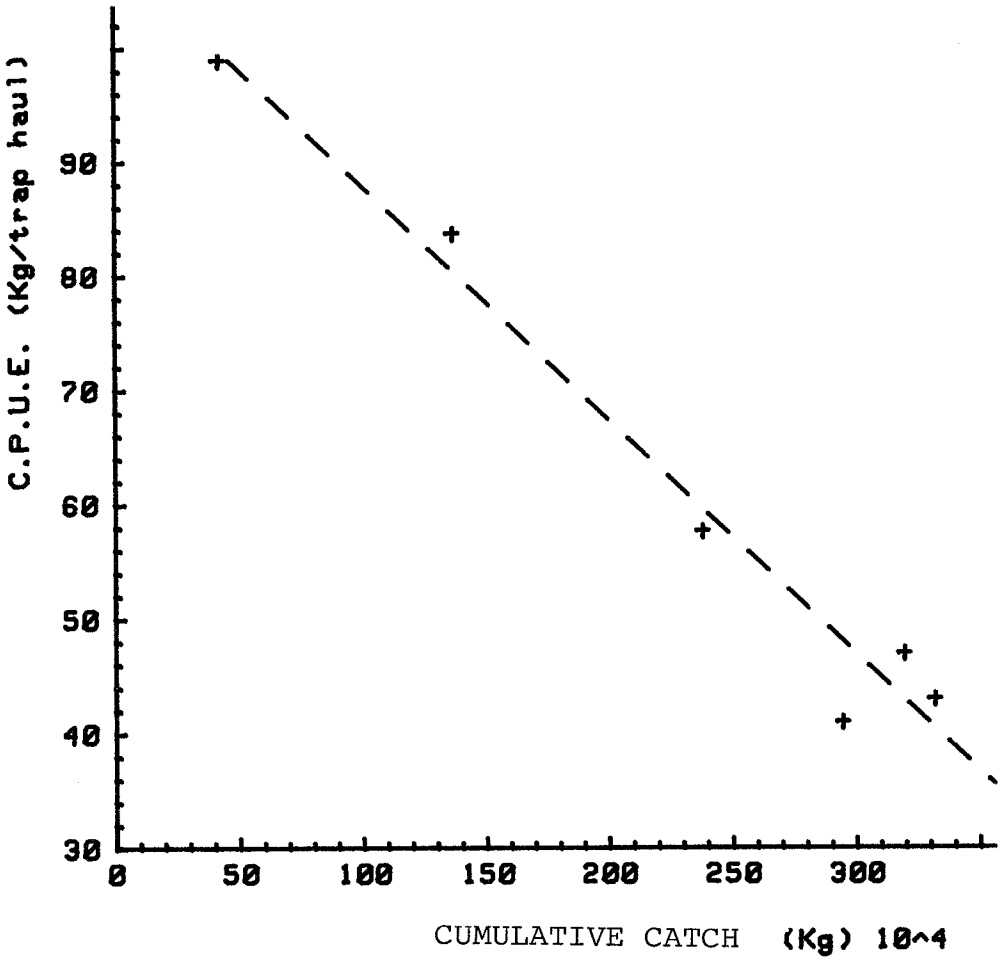


Figure 3. Leslie's analysis of catch and effort data from area 4 in 1984.