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Analysis of the Snow Crab, Chionoecetes opilio, Fishery in Newfoundland for 1983

by

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Abstract

Population size estimates for snow crab (Chionoecetes opilio) off the east coast of Newfoundland, based on Leslie analyses, are presented for the 1983 fishing season. Within given crab management areas, estimates of population size ranged from 209 to 2023 mt and exploitation rates from 36 to 91%.

Résume

On présente des estimations de l'effectif de la population de crabes des neiges (Chionoecetes opilio) au large de la côte est de Terre-Neuve pour la saison de pêche 1983. Ces estimations sont fondées sur les analyses de Leslie. Selon la zone de gestion considérée, l'effectif de la population varie de 209 à 2023 tm et le taux d'exploitation, entre 36 et 91 %.

Introduction

Snow crab (Chionoecetes opilio) landings peaked in 1981 at 13,838 mt. Despite an increase in effort and the discovery of new offshore fishing grounds, landings declined in 1982 to 13,178 mt along with a corresponding decrease in CPUE in almost every management area (Fig. 1). This trend in the fishery continued in 1983 with landings further reduced to 11,180 mt. This dramatic drop in landings can largely be attributed to a great reduction in effort and CPUE in the Southern Zone (Areas 8-25, Fig. 1). The reduction in effort (trap hauls) is due to severe ice conditions and inclement weather. However, the dramatic reduction in CPUE experienced by vessels prosecuting the fishery in the southern zone certainly affected overall landings. Several vessels indicated that CPUE became so low that they gave up crab fishing in order to fish mackerel.

Effort and landings in the northern zone (Areas 28-40) increased markedly in 1983 primarily due to the issuance of nine new permits, the holders of which directed most of their efforts at previously unfished areas. There was also some expansion of effort within Area 34 caused by movement of vessels that traditionally fished in Area 32 onto Area 34 grounds.

Generally, the outlook for the southern zone, particularly in the offshore areas, is worse than the bleak forecast expressed by the authors prior to the commencement of the 1983 season (Taylor and O'Keefe 1983).

It is too early as yet to forecast the overall future of the fishery in the northern zone until the extent and viability of the new fishing grounds is determined.

Materials and Methods

Catch/effort data from fishermen's logbooks were analyzed and data for each management area compared to processors' sales slips in order to check the accuracy of the logbooks. From these data biweekly catch/effort tables were constructed for each management area in order to determine whether Leslie analysis was feasible.

In previous assessments of Newfoundland snow crab populations the authors reported excellent logbook coverage for all management areas (Taylor and O'Keefe 1981, 1983). Unfortunately, during 1983 certain factors which have been discovered have caused us to doubt the veracity of many of the logbooks submitted, in particular, those from the southern zone.

Due to the sporadic nature of fishing effort and reduced CPUE and landings, fish processors have been forced to average, on a weekly basis, fishermen's landings. This ensures that fishermen qualify for maximum unemployment benefits in the off-season. As a result of the processor's misreporting of landings, data on CPUE must be viewed as suspect. Also, many fishermen admitted during interviews that due to low CPUE they had been forced to disregard the regulation which limits fishing activity to 800 traps per day, and out of fear of prosecution had felt it necessary to misreport daily effort in their log books.

Nevertheless, Leslie analysis has been carried out for eight management areas. The results of these analyses are summarized in Table 1 and individual analyses are illustrated in Figures 2-9.

Results and Discussion

Southern Zone

Examination of Table 1 shows that in 1983, not only is the CPUE for all areas drastically reduced but in areas where Leslie analyses have been conducted, biomass estimates are much lower than in previous years.

It was impractical to attempt Leslie analyses for Areas 18 and 15 due to a drastic reduction in effort.

An attempt was made to perform Leslie analyses for Area 16, however, the necessary decline in catch per effort over the course of the fishery did not occur in 1983 due to the fact that many vessels landed large numbers of soft-shelled animals, which, in spite of prohibitive regulations, were purchased by the processors.

Again in 1983 all inshore areas experienced a high incidence of soft-shelled animals for much of the season.

Once again, we recommend a reduction in effort in Areas 8, 12, 14, 19, and 25.

Although the biomass estimate for Bonavista Bay indicates an increase over the 1982 estimate, it is noteworthy that effort more than doubled over 1982 while CPUE was almost halved.

Northern Zone

Three areas, 28, 30, and 38, were fished for the first time in 1983. Initial results are encouraging; particularly so in that almost all fishing was conducted by nine newly licenced vessels with inexperienced crews.

Effort dropped in Area 32, as did landings since much of the effort traditionally directed at this area switched to Area 34. Despite this decline in effort and landings, CPUE was also reduced over 1982 levels (Table 1).

In both Areas 34 and 36 effort doubled while CPUE dropped from 1982 levels. Effort should be held at current levels in Area 34. Fishermen from both areas experienced a high incidence of soft-shelled animals.

Conclusions

1983 was a disasterous year for the crab fleet in the southern zone. The dramatic drop in CPUE for all management areas plus an apparent lack of

recruitment in the offshore areas indicate that the fishery may be in a state of decline.

The Northern Zone appears to be very productive but declining CPUE in all areas indicates that in traditionally fished areas effort should not be increased.

References

Taylor, D. M., and P. G. O'Keefe. 1981. Assessment of snow crab (Chionoecetes opilio) stocks in Newfoundland, 1979. CAFSAC Res. Doc. 81/57.

1983. Assessment of snow crab (Chionoecetes opilio) stocks in Newfoundland in 1980. CAFSAC Res. Doc. 83/3.

1984. Assessment of Newfoundland snow crab (Chionoecetes opilio) stocks, 1982. CAFSAC Res. Doc. 84/13.

Table 1. Summary of statistics for the Newfoundland Snow Crab fishery, 1979-83.

Area	Year	Effort (trap hauls)	Landings (mt)	CPUE (kg/trap haul)	Estimated biomass (mt) (confidence limits)	Exploitation rate (%)
8	1979	1,260	8	6.7	-	-
	1980	-	-	-	-	-
	1981	11,150	168	15.0	-	-
	1982	48,350	506	10.5	551 (500-646)	92
	1983	37,780	274	7.3	341 (306-409)	80
10	1983	3,080	43	13.9	-	-
12	1980	13,825	292	21.1	377 (311-728)	78
	1981	45,455	854	18.9	1291 (1114-1639)	66
	1982	49,975	732	14.7	974 (938-1017)	75
	1983	99,280	955	9.6	1045 (948-1316)	91
13	1982	7,295	114	15.6	-	-
	1983	61,089	733	12.0	-	-
14	1979	37,950	762	20.1	1095 (891-1681)	70
	1980	5,860	121	20.6	-	-
	1981	27,113	434	16.0	614 (506-1043)	71
	1982	32,320	465	14.4	-	-
	1983	23,165	190	8.2	209 (181-260)	91
15	1981	18,128	404	22.3	-	-
	1982	66,949	1056	15.8	1861 (1465-3024)	56
	1983	1,320	138	10.5	-	-
16	1979	28,845	464	16.1	1351 (951-3204)	34
	1980	56,393	869	15.4	1571 (1214-2890)	55
	1981	43,546	502	11.2	689 (619-747)	73
	1982	60,753	694	11.4	1073 (951-1255)	65
	1983	64,175	564	8.8	-	-
18	1979	398,939	6870	17.2	14359 (11,778-19,792)	44
	1980	236,417	4944	20.9	14166 (9348-59867)	46
	1981	413,815	6769	16.4	11289 (910-17067)	60
	1982	153,238	1847	12.1	-	-
	1983	71,905	473	6.7	-	-
19	1981	65,978	1840	28.0	-	-
	1982	218,356	4194	19.2	7744 (5983-12022)	54
	1983	150,432	1662	11.0	2016 (1684-2739)	82
20	1979	4,165	67	16.0	-	-
	1980	4,550	59	12.9	-	-
	1981	14,970	110	7.4	-	-
	1982	10,535	65	6.1	-	-
	1983	12,120	72	6.0	-	-
22	1979	56,887	569	9.9	1467 (1011-3233)	39
	1980	58,160	494	8.5	912 (788-1103)	54
	1981	24,782	178	7.2	-	-
	1982	13,755	95	6.9	-	-
	1983	20,065	107	5.3	-	-

Table 1. Continued.

Area	Year	Effort (trap hauls)	Landings (mt)	CPUE (kg/trap haul)	Estimated biomass (mt) (confidence limits)	Exploitation rate (%)
24 & 26	1979	173,305	1586	9.2	-	-
24 & 26	1980	191,754	1905	9.9	-	-
24 & 26	1981	171,685	1376	8.0	-	-
25	1982	96,330	905	9.4	1391 (1054-2445)	65
25	1983	205,353	1101	5.4	1802 (1434-2914)	61
28	1983	28,169	387	13.7	-	-
30	1983	163,138	1470	9.0	-	-
32	1979	46,183	491	10.6	882 (76-1077)	56
	1980	33,261	374	9.9	787 (583-1229)	43
	1981	54,416	650	11.9	1845 (1193-6615)	35
	1982	130,305	1352	10.4	2213 (1605-4284)	42
	1983	88,288	537	6.1	1097 (845-1874)	49
34	1979	11,830	141	11.9	-	-
	1980	7,330	96	14.3	106 (74-273)	91
	1981	19,250	322	16.7	604 (502-792)	53
	1982	51,347	735	14.3	1016 (839-7423)	68
	1983	105,756	1210	11.5	2023 (1632-3023)	60
36	1979	21,298	156	7.3	383 (265-887)	41
	1980	17,864	158	8.8	276 (218-412)	57
	1981	19,840	230	11.6	504 (403-710)	46
	1982	32,917	418	12.7	-	-
	1983	68,497	583	8.5	1619 (1099-4692)	36
38	1983	66,123	681	10.3	-	-

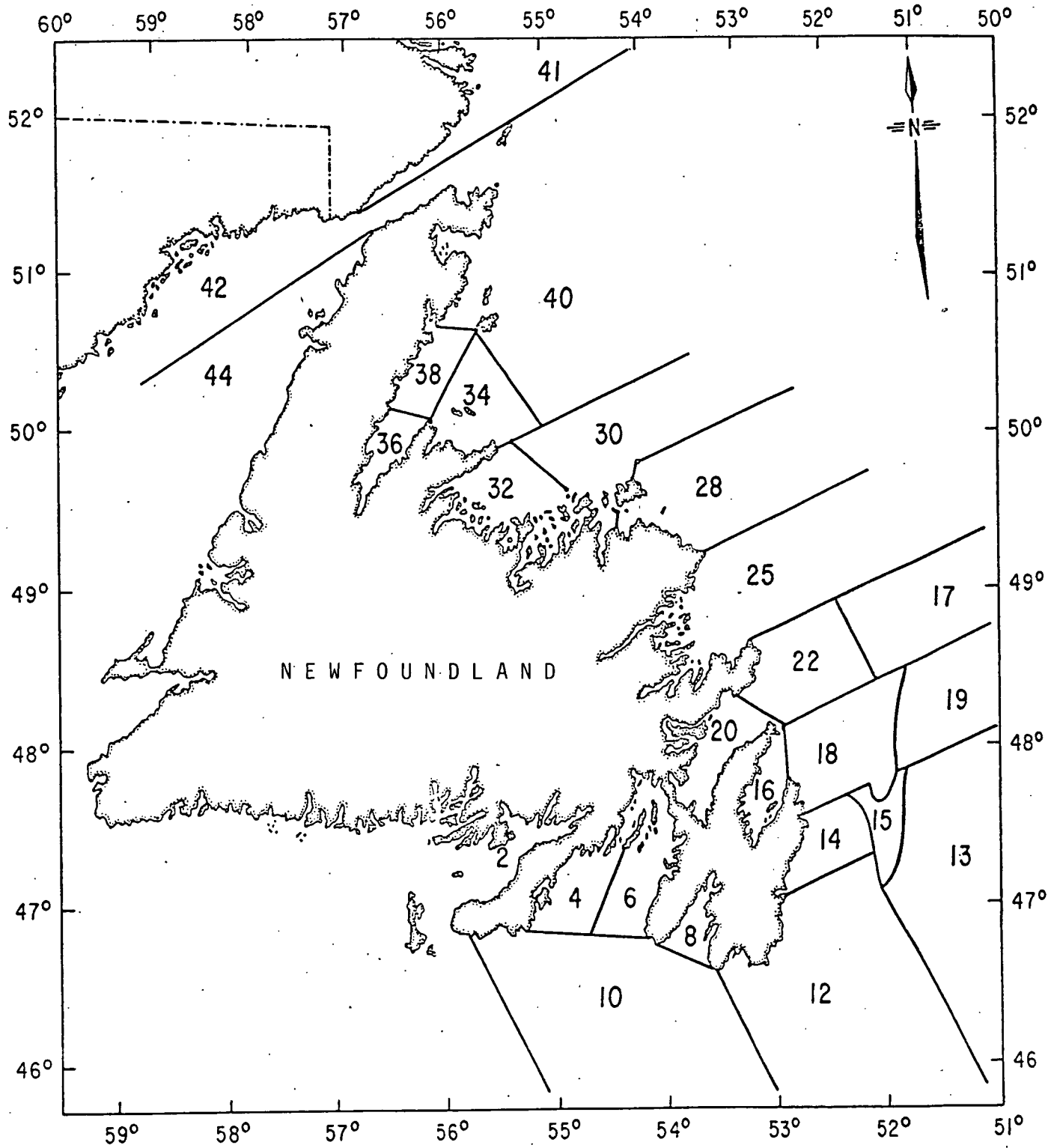

Fig. 1. Newfoundland snow crab management areas.

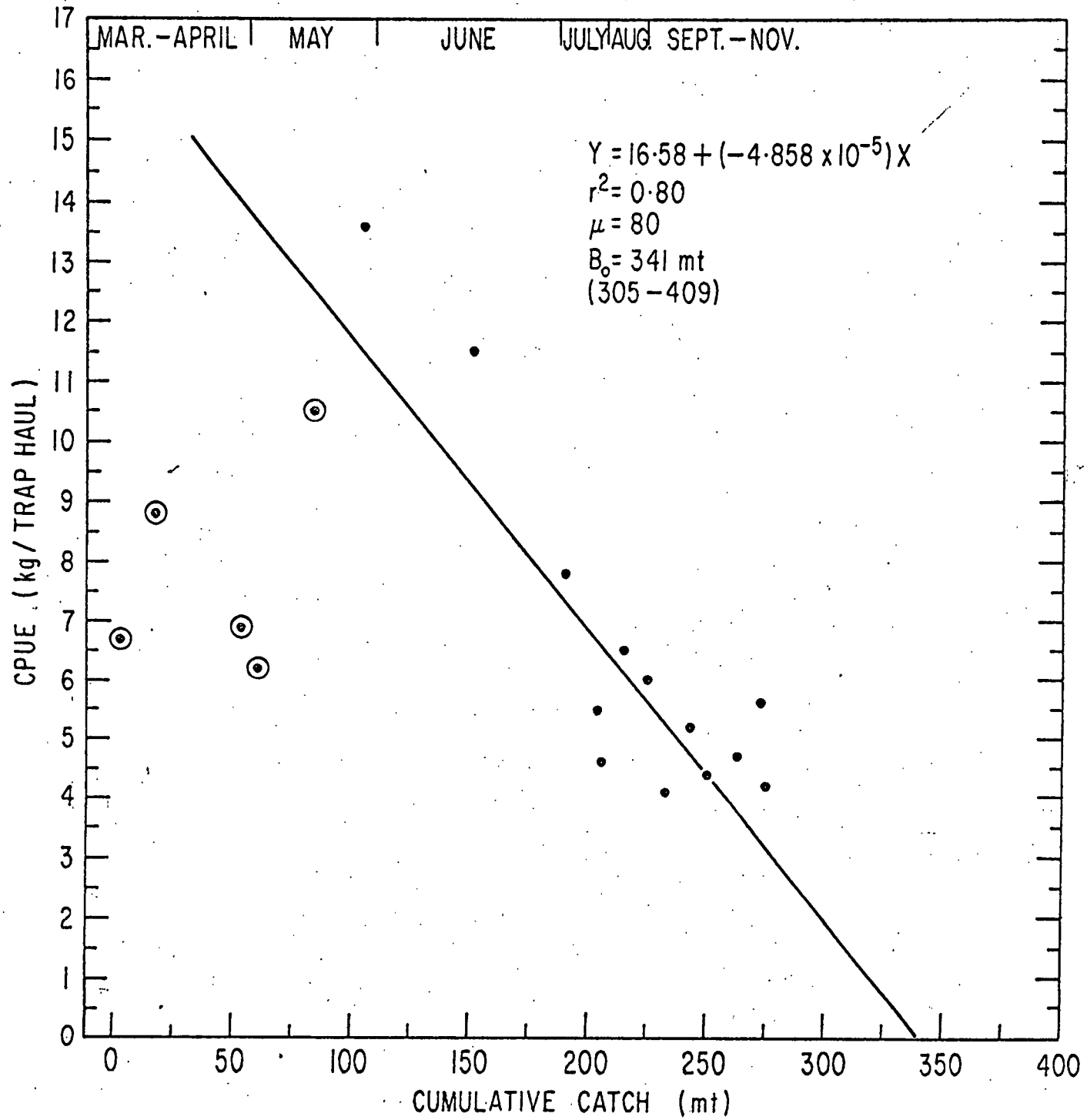

Fig. 2. Leslie graph of biweekly catches of snow crab from St. Mary's Bay (Area 8) Newfoundland, 1983.

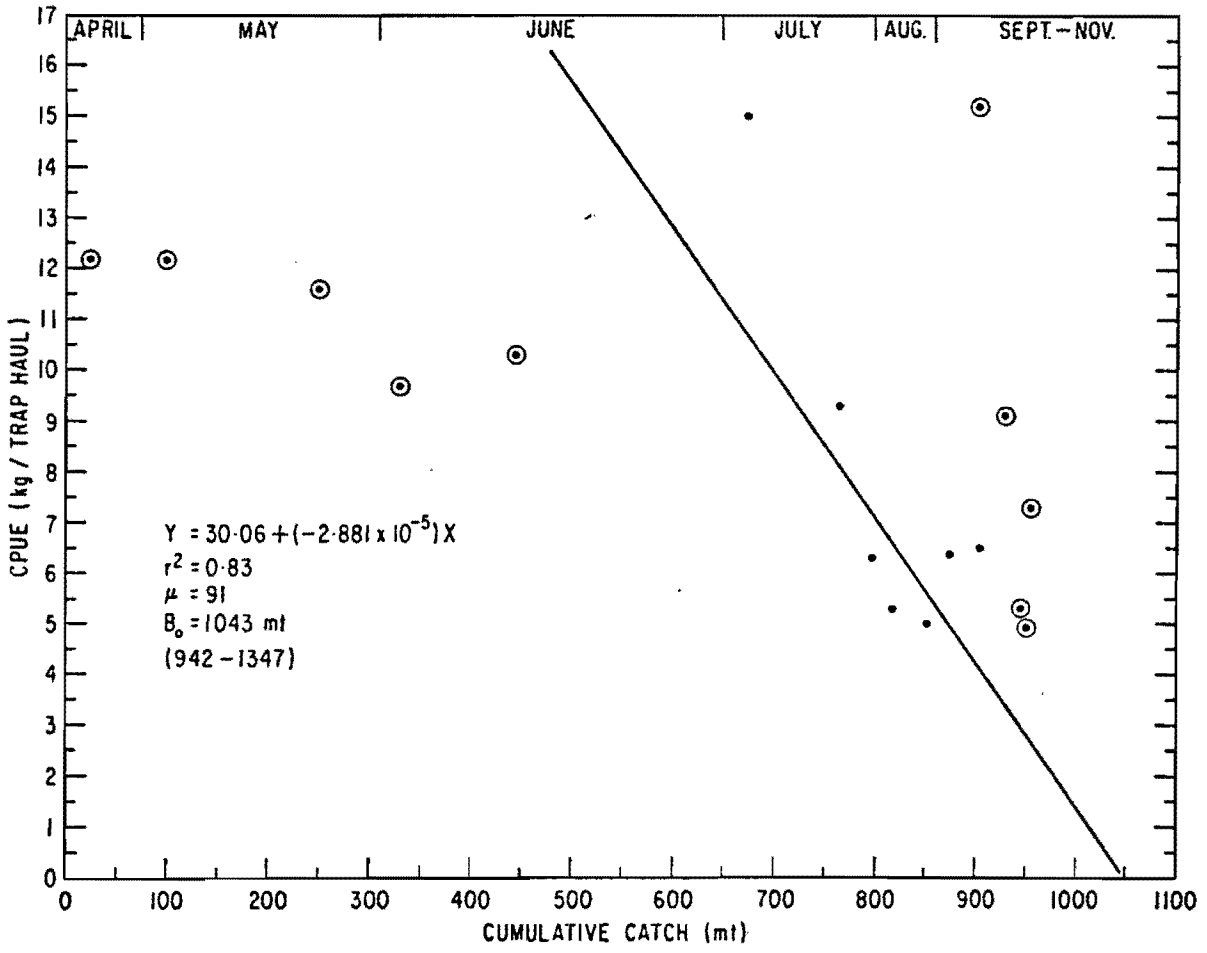

Fig. 3. Leslie graph of biweekly catches of snow crab from Southeastern Avalon (Area 12) Newfoundland, 1983.

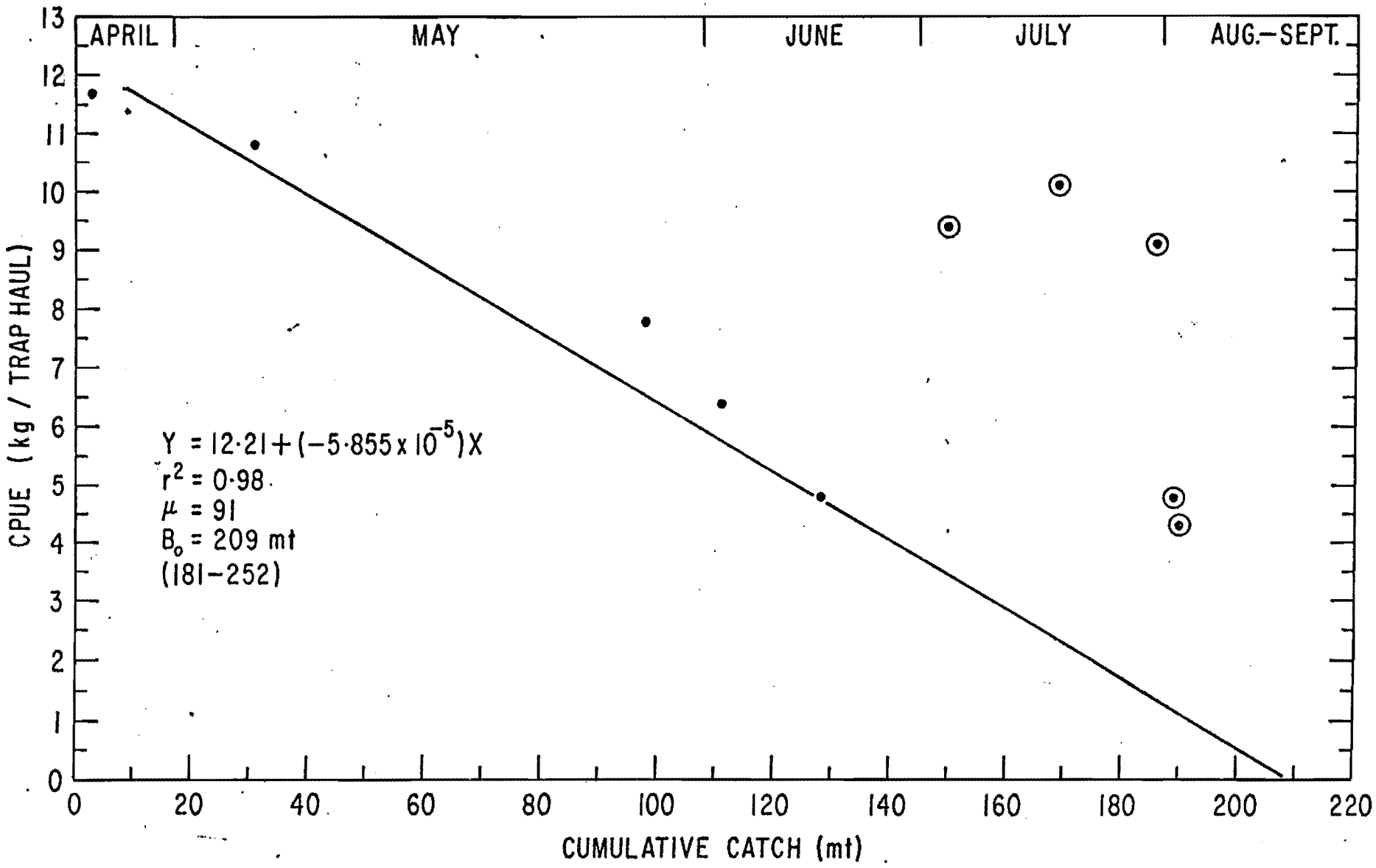

Fig. 4. Leslie graph of biweekly catches of snow crab from Eastern Avalon (Area 14) Newfoundland, 1983.

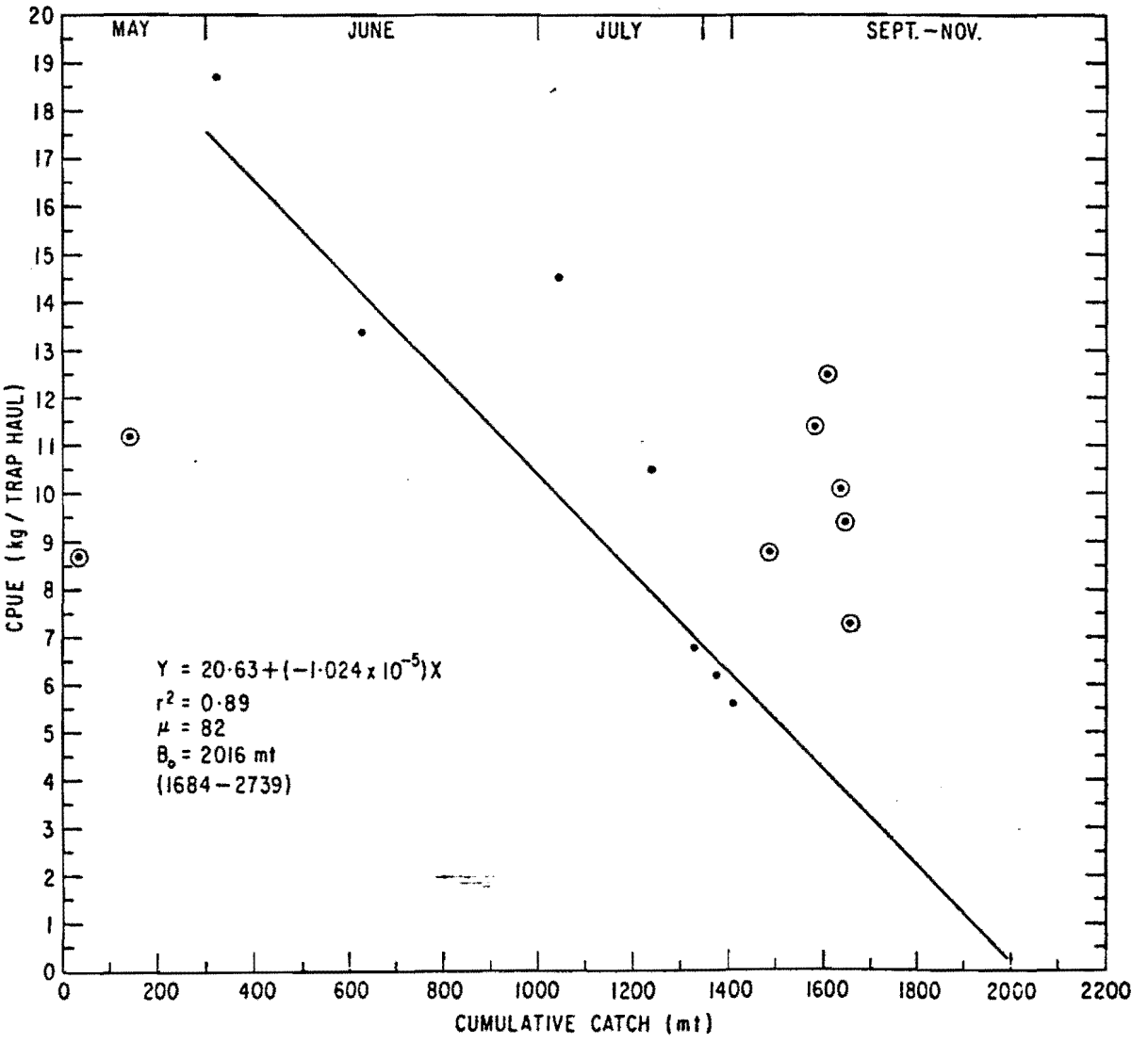

Fig. 5. Leslie graph of biweekly catches of snow crab from the outer portion of Northeastern Avalon (Area 19) Newfoundland, 1983.

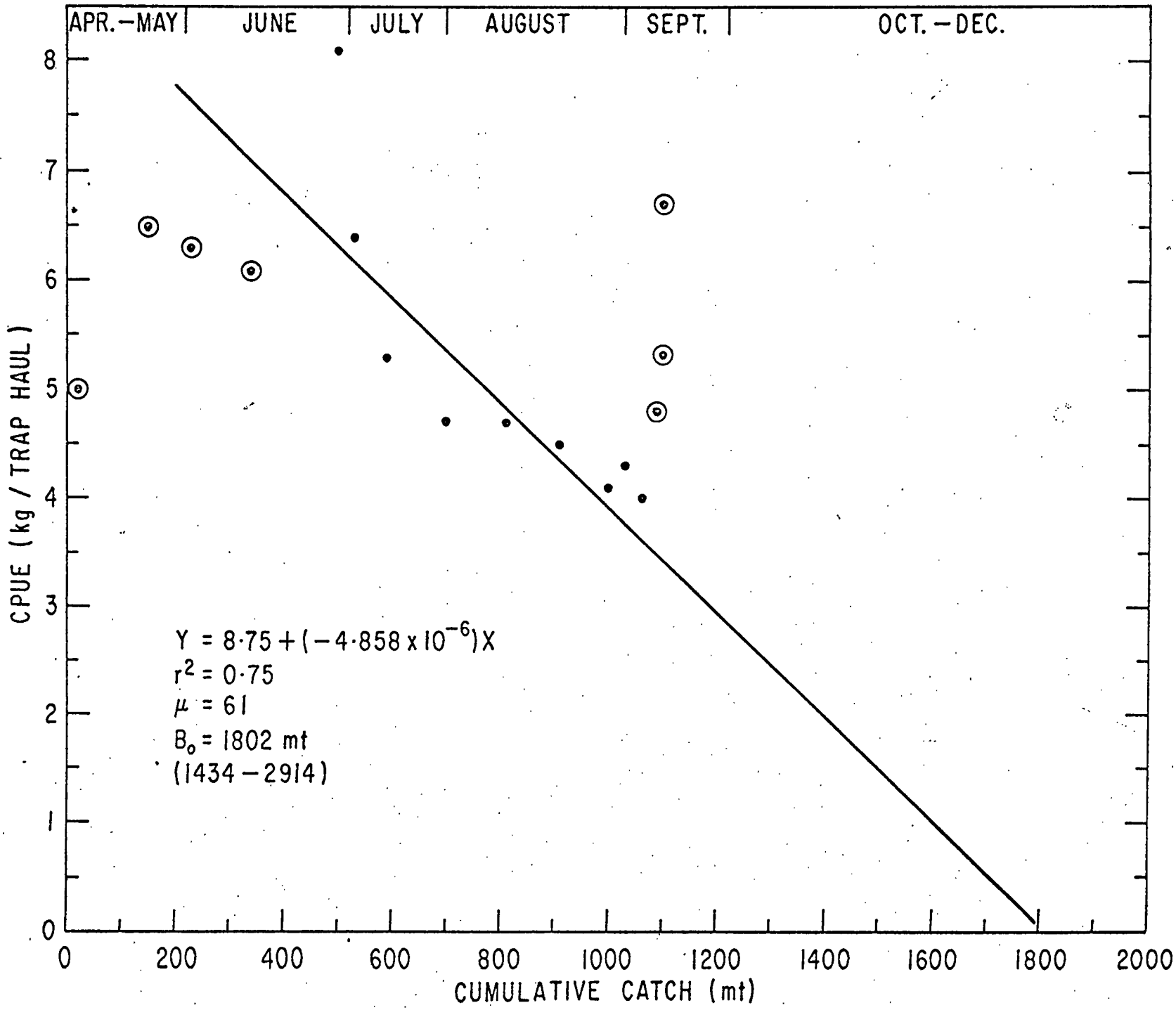

Fig. 6. Leslie graph of biweekly catches of snow crab from Bonavista Bay (Area 25) Newfoundland, 1983.

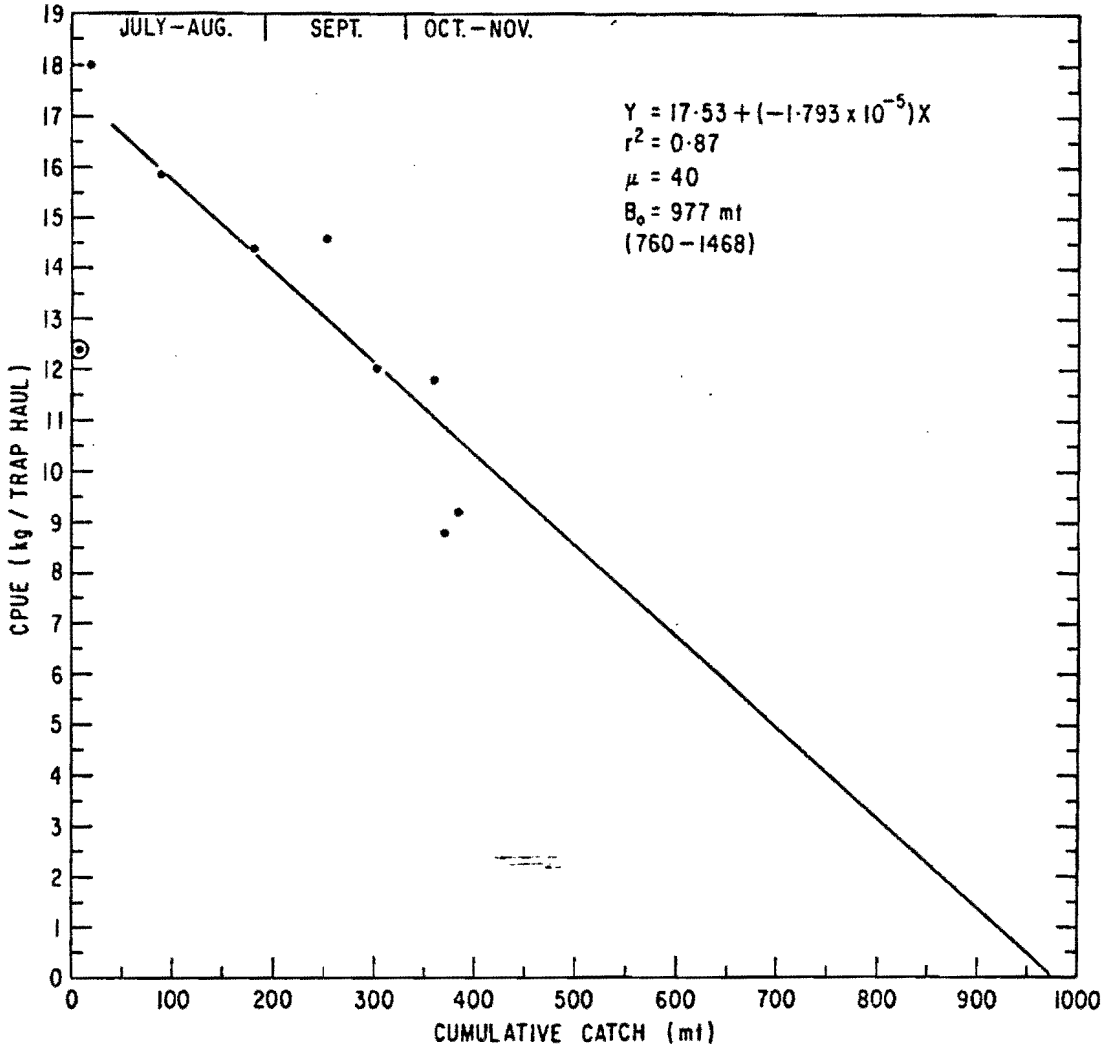

Fig. 7. Leslie graph of biweekly catches of snow crab from Fogo-Cape Freels (Area 28) Newfoundland, 1983.

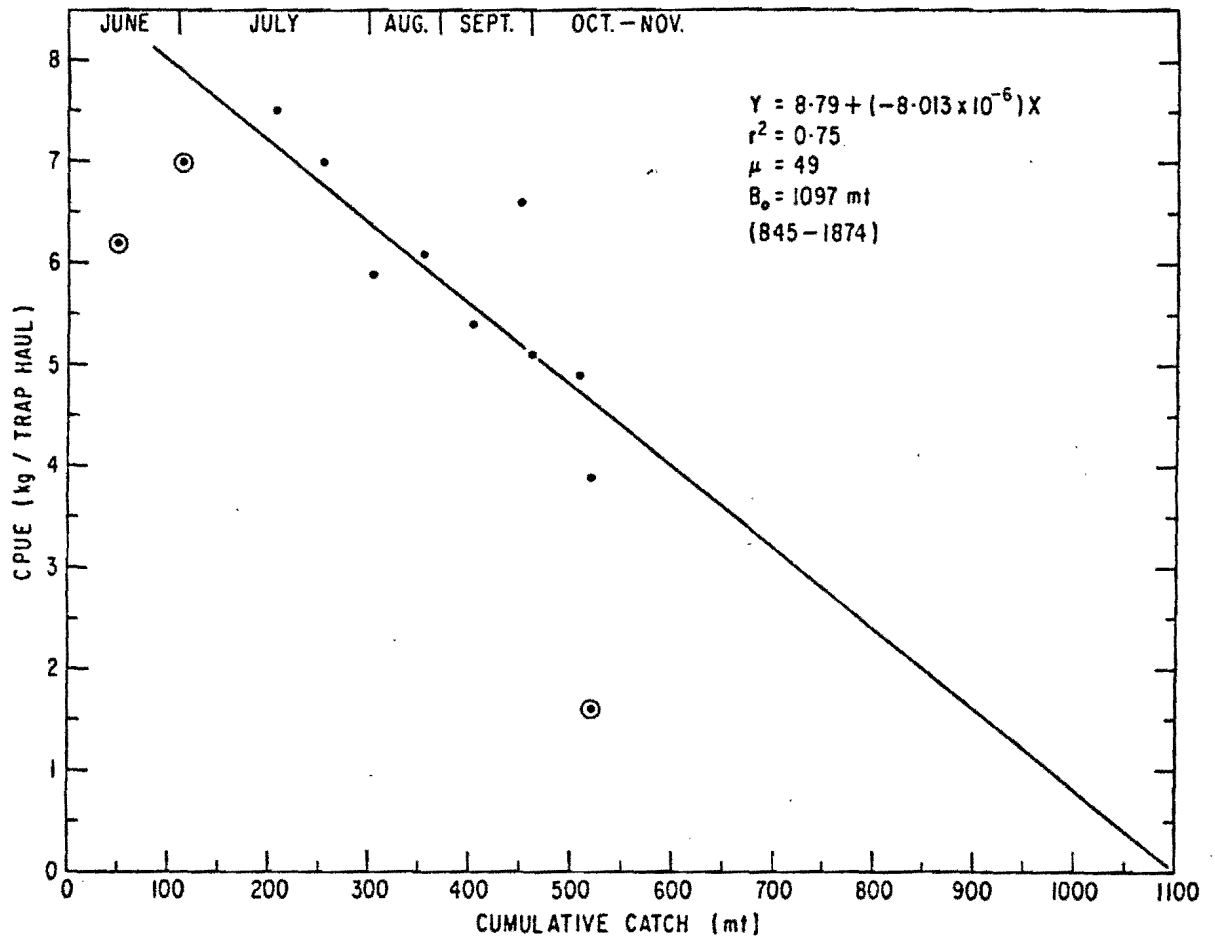

Fig. 8. Leslie graph of biweekly catches of snow crab from Notre Dame Bay (Area 32) Newfoundland, 1983.

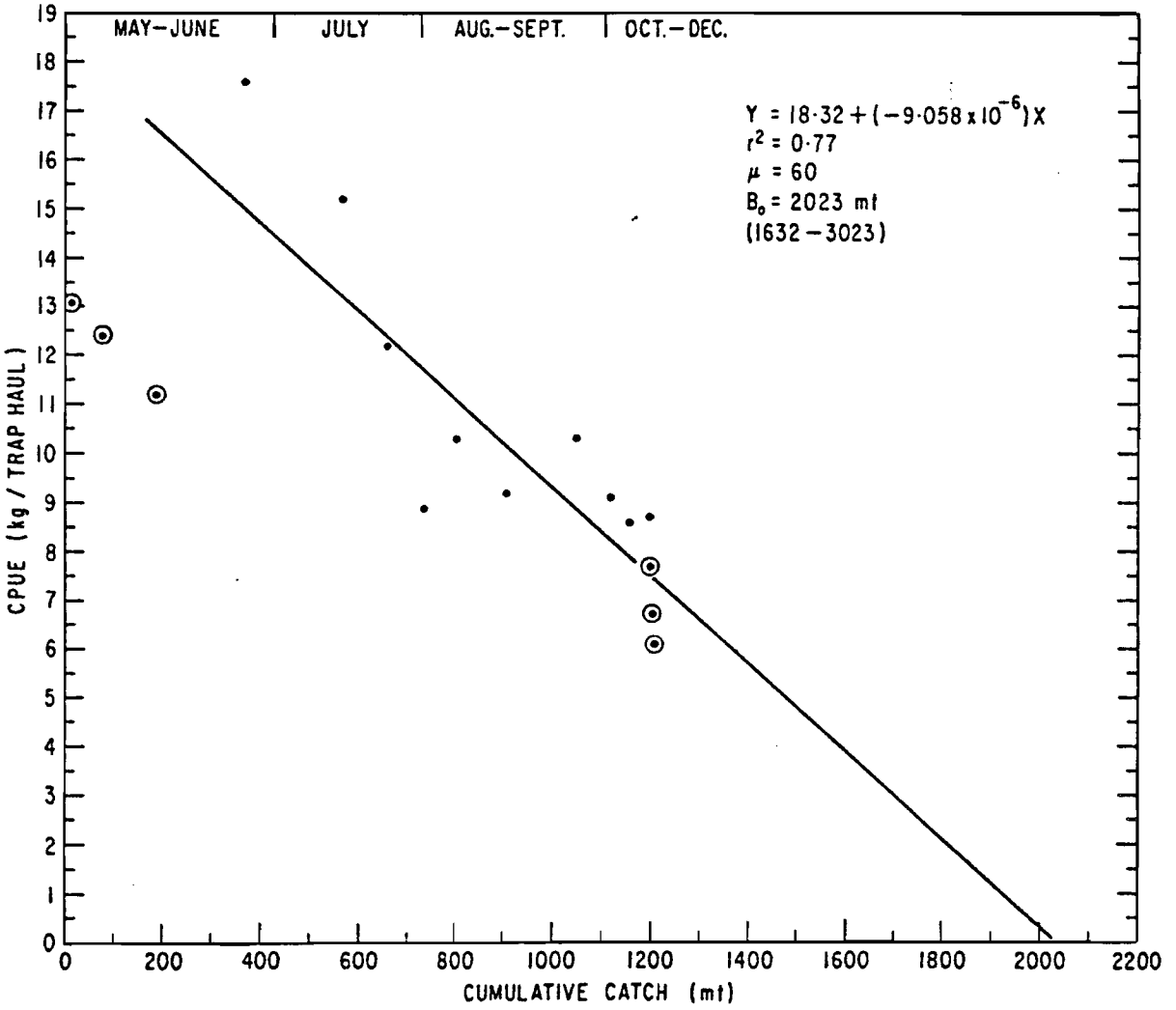

Fig. 9. Leslie graph of biweekly catches of snow crab from Horse Islands (Area 34) Newfoundland, 1983.

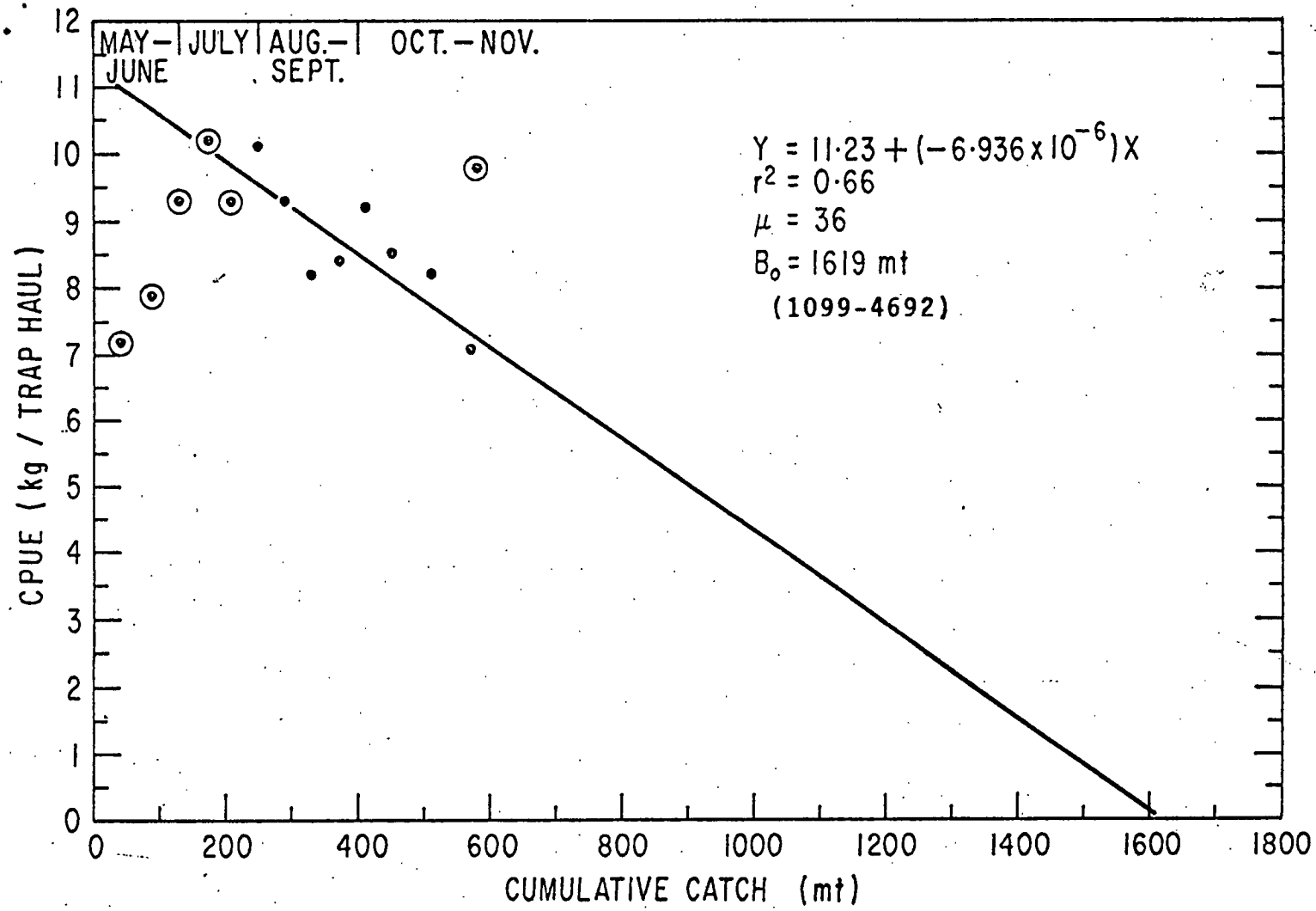

Fig. 10. Leslie graph of biweekly catches of snow crab from White Bay (Area 36) Newfoundland, 1983.