The Grand Manan Area Scallop Stock Assessment - 1985

by

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ABSTRACT

The scallop fishery of southwest New Brunswick, more particularly the Grand Manan Island area continued on a declining trend initiated after record landings, over 500t in 1981. Fishery catch-rates have also decreased steadily. More distant grounds in NAFO subdivision 5Yb are being exploited to maintain landing patterns. These stocks show limited productivity according to the catch statistics collected. Latest survey results revealed high numbers of prerecruits in the inside 7-mile fishing zone. These results may have overestimated the actual stock abundance because of survey objectives; it would therefore be premature to draw conclusions from the abundance of prerecruits. Catches are not expected to improve until the pulse of ages 2-3 animals, if as important as observed, recruits to the fishery.

RESUME

La pêche au pétoncle du sud-ouest du Nouveau-Brunswick, plus particulièrement la région de l'Ile de Grand-Manan continue à diminuer après les débarquements records de 1981, au-dessus de 500t. Les taux de capture ont aussi baissés graduellement. Des régions distantes de la subdivision 5Yb de l'OPANO sont exploitées pour soutenir les débarquements. Ces stocks semblent avoir une productivité limitée d'après les statistiques des prises. Des niveaux élevés de prérecrues sont apparus au cours du relevé de stock le plus récent dans la zone de pêche à l'intérieur de 7 milles. Ces résultats peuvent avoir surestimé l'état du stock à cause des objectifs multiples de l'inventaire. Conséquemment, il serait prématuré de tirer des conclusions sur l'abondance des prérecrues. Les prises ne devraient pas s'améliorer tant que les classes d'âge 2-3, si elles sont aussi importantes qu'on les a observées, se recrutent à la pêche.

INTRODUCTION

The performance of the scallop fishery of southwest New Brunswick, more particularly the Grand Manan Island area continue to decline, a trend initiated after the record landings of the early 1980's. The 1985 stock survey results indicate an improvement at the prerecruit level but these results have to be interpreted with caution.

METHODS

Fishery data

All vessels must be licensed for fishing scallops in this area (7-mile or Bay of Fundy license) and must maintain logbooks on a daily basis for tonnage over 25.5 G.T. and/or length overall greater than 14m. Daily log records supply information on the catch and its location, and fishing effort such as hours spent dragging, width of the gear, and number of crew. CPUE estimates may be computed when complete effort data are provided with respect to the catch; these data have been designated as Class 1 data.

The information provided by vessels over 25.5 G.T. form the basis of the fishery analysis presented here. It might not necessarily reflect the fishing performance of vessels under 25.5 G.T. Hence, landings from this sector of the fleet in that geographical area (Statistical Districts 48 to 53) (Fig. 1) are used to represent their contribution to this area's catches. Nevertheless, it is difficult to accurately assess effort and catch-rate values from the inshore fleet i.e. vessels under 25.5 G.T.

Survey data

Survey work took place in October, 1985. It was carried out to evaluate stock status but also to collect age 2 scallops for tagging purposes, the project was carried out from the St. Andrews Biological Station. Sampling locations (Fig. 2) were selected according to the knowledge of fishing areas by the survey crew and places where small scallops (for tagging) were known to occur. Survey data has been post-stratified two ways. Because of the management implications of the 7-mile line, survey stations have been clustered in two groups: 1) inside 7-mile line; and 2) outside 7-mile line as previously (Dadswell et al 1984; Robert et al 1984). Then, because the outside 7-mile was given limited geographical coverage in this survey, the data were further post-stratified in three areas: 1) southern area (shallow waters to the south of the Island); 2) western area (Grand Manan Channel and Seal Island); 3) northern area (Wolves Bank and vicinity) (Fig. 2).

A four-gang 76.5 cm Digby drag with 76 mm rings was used with the two middle buckets lined with 38 mm stretched mesh netting. Survey procedures followed the ones mentionned in Robert et al (1984).

RESULTS

Fishery performance

The number of Bay of Fundy licensed vessels is remaining quite constant (Table 1). The number of 7-mile licenses which had reached a maximum in 1981 (Robert et al 1984) remains stable at a fairly high level. The majority of the 7-mile licenses are vessels which do not have to report their fishing activities because of their size. It is further difficult to estimate their participation in the fishery which takes place mainly during the winter months. Most vessels over 25.5 G.T. hold a Bay of Fundy license and are actively involved in the fishery. Their involvement has been fairly constant for several years now, except that a greater number have declined to comply with log procedures during 1985. This reduction in log compliance diminishes the information data base for analysis of fishery performance.

Scallop landings from southwest New Brunswick continue to decline after the 1981 record breaking figures (Table 2); although they are still quite high, around the 300-t mark and have not reverted to pre-1980 landing figures. The geographical location of Statistical Districts 48 to 53 and designation of pertinent NAFO subdivisions are illustrated in Figure 1.

Tables 3 to 5 give recent (1983-1985) landings on a monthly basis by statistical district and by vessel size. The bulk of the landings is generated by inshore vessels using ports on Grand Manan Island (Statistical District 50). In comparison, other districts contribute relatively little. The Saint John district (48) has started a trend of considerably higher landings in 1984. Around the Grand Manan Island area, there is a marked seasonal trend in landing patterns with peak fishing activity taking place during the winter, from January to March inclusive.

Fishery characteristics in terms of effort and catch-rate are derived from Class 1 data. Over 70% of the logged catches contribute Class 1 data (Table 6). However, the proportion of logged catches versus offshore landings i.e. catches required to be logged, has been steadily declining from 48% in 1981 (Robert et al 1984) to 36% in 1985. Such a data base has to be interpreted with caution. Moreso when offshore landings represent less than 25% of the total (inshore plus offshore sectors of the fleet) landings for the area.

Southwest New Brunswick

Southwest New Brunswick by opposition to Grand Manan offshore waters designate the shallow waters to the south and southeast of Grand Manan Island, Wolves Bank, Campobello and Deer Islands, and Passamaquoddy Bay (NAFO subdivision 4Xs in part). According to log information (Table 7) while catches are declining, effort has remained high and catch-rates have concurrently decreased to low values. Tables 8 to 10 present fishery characteristics for individual fishing locations for 1983 to 1985. Table 11 is similar but covers Campobello, Deer Islands and Passamaquoddy

Bay areas. Scallop beds in the immediate vicinity of Grand Manan are most heavily exploited. Even though the Class 1 catch and catch-rate to a lesser extent, might vary greatly for a single fishing area depending, in part, on the information received for anyone year, there is a general trend of decline in both catches and catch-rates best shown when all fishing grounds are examined in a single group.

According to Class 1 data the productivity of the exploited grounds is decreasing markedly. Although the mean catch-rate of the five best yielding areas appears to have stabilised at a low value (Table 12), the catch contribution of the five best yielding areas rose over 80% in 1985. Exploitation of such scallop aggregations is very intensive and Duck Island Sound and Wolves Bank excepted, single fishing areas do not remain in the top five ranks for consecutive years.

Grand Manan offshore waters

Grand Manan offshore waters represent fishing areas outside the 7-mile line like Southwest Bank but also grounds in NAFO subdivision 5Yb such as Grand Manan Channel. Recently, vessels under 25.5 G.T. have been the main users of this resource (Table 13). Monthly profiles of subdivision 5Yb catches follow the same pattern as catches from grounds in the immediate vicinity of Grand Manan with fishing activity peaking in the early part of the year (Tables 14 and 15). The fishery performance of Grand Manan offshore waters indicates (Table 16) that this area stands no better than the scallop aggregations in shallow waters. A short increase in catches (6.26t logged catches in 1984) could not be sustained as catch-rates fell rapidly, dropping by almost 50% from 1983 to 1984.

Survey analysis

Survey data series was interrupted in 1984 because of ship breakdown and survey work could not be accommodated otherwise. It resumed in 1985 (Table 17). Sampling locations are shown in Figure 2. Average scallop catch at age per standard tow (Table 18) is greater inside the 7-mile line than outside for both recruits and prerecruits. 1985 results appear to be higher than 1983 ones. In 1985, the inside zone has a mode of age 7 scallops while in the outside zone a mode spreads over ages 5, 6, and 7. 1985 results were also post-stratified according to geographical areas. Whether one looks at the stratification by fishing zones or geographical areas, 1985 results show an increase of pre-recruits compared to previous years (Table 19) especially in the western area. These are the highest numbers observed since 1979. Traditionally, the number of recruits are greater inside than outside the 7-mile line; older recruits (age 8+) appear more importantly in 1985. They are the remains of the strong year-class that had brought record landings to the 1981 fishery.

DISCUSSION

The Grand Manan scallop fishery is a highly seasonal activity, peaking from January to March. This has many causes: gear conflict

with another lucrative fishery (lobster fishing), few other fisheries taking place so early in the year, to name a few. Inshore scallop grounds surrounded by a network of headlands and ledges at the southern end of Grand Manan provide sheltered conditions for scallop dragging, even in winter. Such a well established seasonal pattern has the added benefit to resemble the conditions of a management regime of fishing season or area closure. Furthermore, as scallops are not as heavily fished outside of the winter months, they may benefit from the full duration of the growing season and meat yields are thus improved.

Prior to 1980, scallop grounds in NAFO subdivision 5Yb had not been exploited. A few years of exploitation show limited productivity according to the catch statistics collected. The Grand Manan inshore fleet has sailed considerable distances (Southwest Bank) to get at stocks which could hardly sustain a fishery. From 140t in 1983, subdivision 5Yb catches have dropped to 39t in 1985.

Latest survey results revealed high numbers of prerecruits in the inside 7-mile fishing zone as well as potential improvement in recruited age-classes. These results may have overestimated the actual stock status. As Figure 2 illustrates, sampling locations are tightly clustered compared to previous catch-stratified surveys (Fig. 3). In addition, they emphasize scallop beds that traditionally were known to bring good catch-rates; other fishing areas may have been underrepresented. No locations were surveyed below a line from Gannet Rock to Seal Island, nor Southwest Bank. As the survey ship time was also allocated to tag young scallops, more tows may have been performed around aggregations of juvenile scallops than was required for a stock survey per se.

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Table 1.- Number of 1) licensed vessels plying Grand Manan waters (Source: Licensing Unit, Fisheries and Oceans, Halifax), 2) active fishing licenses for vessels over 25.5 G.T. supposed to follow log procedures, and 3) vessels complying with log procedures.

Year		1983	1984	1985
1)	7-mile licenses	253	249	249
	Bay of Fundy licenses	17	17	15
2)	active licenses supposed to log	19	23	20
3)	complied to log	14	17	14

Table 2.- Annual landings (t of scallop meats) by statistical district, by vessel tonnage, (1): ≤25.5 G.T., (2): >25.5 G.T.. Prior to 1967, landings were not divided by vessel tonnage. Source: Statistics Div., Fisheries and Oceans, Halifax.

District	48		49		50		51		52		53		Total
Tonnage	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1) + (2)
1960					2.8								2.8
1961					1.9								1.9
1962					4.2		5.5				3.8		13.6
1963					4.8		5.5				3.3		13.6
1964					0.8		4.7				2.4		8.0
1965		0.2			7.8		1.8				2.8		12.6
1966					0.9		0.9						1.8
1967							0.5			1.8	2.8		5.1
1968					14.5		2.3	1.3		0.5	1.8		20.4
1969											0.9		0.9
1970					7.7				1.3		1.3		10.4
1971					1.8		0.9		1.8		4.9		9.5
1972					1.8		0.5				3.6		5.9
1973					4.6		1.8				2.8		9.2
1974					1.3		1.3				2.4		5.1
1975					0.7		2.1				1.1		3.9
1976					0.2		1.3						1.6
1977					3.5		0.2		0.5				4.2
1978					3.9	6.3			1.7				11.8
1979					24.7		0.1	1.9	3.4				30.1
1980					137.7	7.5	5.3	3.7	6.6	2.9		0.2	164.0
1981		0.1	2.2		430.0	57.6	11.3	39.3	5.4	7.5	2.8	5.3	561.5
1982	3.1	0.4	3.1	0.4	197.0	43.6	10.8	11.2	14.8	7.8	1.8		294.2
1983	3.0	1.8	11.4	4.5	222.1	45.0	24.6	21.7	1.8	2.3	2.9	3.4	344.4
1984	16.1	4.4	10.4	2.5	168.2	38.8	25.6	25.4	1.8	0.8	9.7	2.2	305.9
1985	22.3	5.3	4.1	1.7	150.3	32.0	21.8	11.8	3.1	1.1	10.5	2.0	266.0

Table 3.- 1983 monthly landings (t of scallop meats) by statistical district and by vessel size. For statistical purposes, landings from vessels ≤25.5 G.T. are classified as 'inshore' and landings from vessels >25.5 G.T. as 'offshore'. Source: Statistics Div., Fisheries and Oceans, Halifax.

	48		49		50		51		52		53	
	IN	OFF	IN	OFF	IN	OFF	IN	OFF	IN	OFF	IN	OFF
		≤14m >14m		≤14m >14m		≤14m >14m		≤14m >14m		≤14m >14m		≤14m >14m
Jan			0.12		47.66	3.00	3.12	0.72	0.48	0.48		0.12 0.84
Feb			0.12		38.78	3.24	1.44	0.36	0.24	0.72	0.84	0.36
Mar					38.66	4.80	1.56	0.60	0.84	0.12	0.36 0.48	0.36
Apr			0.84	0.84	13.93	0.96	2.16	1.68	1.68	0.48	0.24	0.24
May			2.16	0.84	12.12	1.32	0.84	1.08	1.08	0.60	0.12	0.24
Jun		0.12	2.40	0.96	0.24	21.37	3.48	1.32	4.80	1.80	0.12	0.36 0.24
Jul.	12	0.12	0.72			23.53	1.20	1.80	4.56	2.76	0.60	0.24 0.48 0.36 0.24
Aug.	24	0.36	0.24	2.16	0.48	14.29	2.76	1.92	4.80	1.32	1.20	0.24 0.48 0.84
Se	2.64	0.84	0.12	1.92	0.36	8.40	1.20	0.96	3.48	1.44	2.16	0.12 0.12 0.24 0.72
Oct			0.84	0.36	0.36	3.12	2.64	1.80	0.96	0.24	2.28	0.12 0.12 0.12 0.36
Nov			0.12			0.24	0.12	0.24	0.84	1.20	0.12	
Dec						3.00	0.12	0.72	0.36	0.12		
Total	3.00	1.32	0.48	11.40	3.48	0.96	222.10	27.72	17.28	24.60	11.40	10.32	1.80	2.04 0.24 2.88 3.12 0.24

Table 4 .- 1984 monthly landings (t of scallop meats) by statistical district and by vessel size. For statistical purposes, landings from vessels ≤25.5 G.T. are classified as 'inshore' and landings from vessels >25.5 G.T. as 'offshore'. Source: Statistics Div., Fisheries and Oceans, Halifax.

	48			49			50			51			52			53.		
	IN	OFF		IN	OFF		IN	OFF		IN	OFF		IN	OFF		IN	OFF	
		≤14m	>14m		≤14m	>14m		≤14m	>14m		≤14m	>14m		≤14m	>14m		≤14m	>14m
Jan				0.72	0.12		45.74	5.88	3.12	2.16	0.96	0.36	0.12			0.12	0.12	
Feb				0.36			47.90	6.24	2.40	2.28	0.24	0.84				0.60		
Mar				0.48			36.85	5.76	0.72	2.04	0.36	0.36				0.12		
Apr				1.08	0.12		8.16	0.36	0.96	0.72	0.24					0.60		
May	.60	0.12		1.56	0.84		8.88	0.12	2.40	2.64	1.08	0.48				0.60		
Jun	.72	0.12	0.24	1.32	0.36	0.24	6.96	0.24	1.20	3.36	0.36	0.60	0.12			0.96	0.12	
Jul	.12			0.72		0.36	5.52	0.12	1.80	2.52	0.36	0.12				1.68	0.12	
Au	2.04	0.36		2.64		0.12	4.56	0.12	2.40	2.52	1.08	3.12	0.36			2.16	0.24	
Se	6.48	1.68	0.12	1.08			2.16		0.60	3.36	1.08	4.08	0.24			2.16	0.96	
Oc	5.88	1.32		0.48			1.08	1.44	2.40	3.12	0.60	8.88	0.36	0.60	0.12	0.48	0.60	
Nov	.24	0.48					0.24	0.36	0.12	0.60		0.12	0.48		0.12	0.24		
Dec					0.36		0.12			0.24		0.12	0.12					
Total				10.44	1.80	0.72				25.56	6.36	19.08				9.72	2.16	0.00
	16.08	4.08	0.36				168.17	20.64	18.12				1.80	0.60	0.24			

Table 5.- 1985 monthly landings (t of scallop meats) by statistical district and by vessel size. For statistical purposes, landings from vessels ≤25.5 G.T. are classified as 'inshore' and landings from vessels >25.5 G.T. as 'offshore'. Source: Statistics Division, Fisheries and Oceans, Halifax.

	48			49			50			51			52		53	
	IN	OFF		IN	OFF		IN	OFF		IN	OFF		IN	OFF	IN	OFF
		≤14m	>14m		≤14m	>14m		≤14m	>14m		≤14m	>14m		≤14m >14m		≤14m >14m
Jan				0.24	0.24		37.35	3.49	1.33	1.33	0.24	0.12	0.72		0.72	
Feb	0.12	0.24		0.24	0.24		42.05	3.86	1.45	3.73	0.60	0.48	0.36		0.36	
Mar	2.05	0.24	0.12	0.60	0.48		29.28	2.89	1.08	3.37	0.60	0.12	0.48		1.45	
Apr	4.82	0.84	0.36	0.24			8.80	1.45	1.20	2.53	0.36	0.84		0.12	1.57	0.24
May	9.52	1.81	0.60	0.48			9.52	0.60	1.93	2.53	0.84	1.93	0.60		0.36	0.36
Jun	1.81	0.96	0.12	0.24			5.42	0.96	0.72	1.57	0.72	0.72	0.48	0.60	0.12	
Jul	0.84						4.82	1.81	0.84	0.96			0.12	0.36	0.96	
Aug	1.08			0.12			6.14	1.45	3.49	1.33	1.81	0.24	0.36		1.69	0.12
Sep	1.33			0.72		0.36	4.22	0.48	0.48	2.77	0.72	0.36			1.57	1.08
Oct	0.72			1.08	0.36		1.81	0.36	1.69	1.33	0.48				1.69	0.24
Nov							0.36	0.24		0.12		0.12				
Dec				0.12			0.48	0.24		0.24	0.36	0.12				
Total	22.29	4.09	1.20	4.08	1.32	0.36	150.25	17.83	14.21	21.81	6.73	5.05	3.12	1.08	10.49	2.04

Table 6.- Percentage of catches (t of scallop meats) from log records for southwestern New Brunswick and Grand Manan offshore waters and landings (inshore and offshore) in Statistical Districts 48 to 53 inclusive.

	inshore	offshore			total
	landings	Class 1 catch	logged	landings	landings
1983	265.8	22.07	29.45	78.60	344.4
1984	231.8	19.54	26.76	74.16	305.9
1985	212.0	13.56	19.43	53.91	266.0

	Catches		landings
	% Class 1 / logged	% logged / landed	% offshore / total
1983	75	37	23
1984	73	36	24
1985	70	36	20

Table 7.-Summary of fishery characteristics for southwest New Brunswick. Effort pertaining to logged catch is prorated according to the effort which generated Class 1 catch.

	Catch		Effort			Cpue		
	kg	t	days	hours	hour-meters (hm)	kg/d	kg/h	kg/hm
1983 data								
Class 1	17243	17.24	236	1358	6043	73.1	12.7	2.85
Logged	22647	22.65	310	1785	7946			
1984 data								
Class 1	13281	13.28	164	1158	5487	81.0	11.5	2.42
Logged	18791	18.79	232	1638	7765			
1985 data								
Class 1	10080	10.08	123	876	4340	82.0	11.5	2.32
Logged	14882	14.88	182	1293	6415			

Table 8.- Fishery characteristics around Grand Manan Island, by area in 1983. Effort data not prorated to logged catch.

Area	Catch	Effort			CPUE		
	kg	days	hours	hour-meters	kg/d	kg/h	kg/hm
Duck I. Sound	4008	31	178	632.5	129	22.0	4.47
Gannet Rock	647	5	26	115.8	129	24.8	5.11
Green Island	337	3	14	66.1	112	25.0	5.10
Little Shoal	594	3	7	39.8	198	53.8	9.81
Middle Ground	943	9	39	213.0	105	24.3	4.43
Ox Head	519	4	15	79.6	130	35.8	6.52
Prangle Point	709	7	42	268.2	101	16.9	2.64
Shag Head Breaker	339	2	12	56.0	170	27.7	6.05
Ship Head	263	7	33	212.8	38	7.9	1.24
Sloop Cove	136	2	9	40.0	68	15.5	3.40
Three Island	745	7	21	48.0	106	36.1	5.62
West Isles	142	4	28	126.5	36	5.1	1.12
White Head	296	3	14	78.6	99	21.1	3.76
Wolves Bank	5482	86	586	2361.6	64	9.4	2.32
Grand Manan offshore waters:							
Bradford Cove	193	7	10	45.7	28	4.9	1.07
Bull Rock	298	4	16	72.7	75	19.2	4.10
Grand Manan Chann	473	14	52	236.6	34	5.8	1.26
Long Ledge	446	3	20	89.2	149	22.9	5.00
Murr Ledge	511	5	27	-	102	15.8	-
Southwest Head	136	1	-	-	136	-	-
2 miles "	145	2	10	46.2	73	14.4	3.14
3 miles "	138	1	7	31.7	138	19.9	4.35
Wallace Rock	411	3	17	84.7	137	23.7	4.85
Western Ledge	2007	13	70	317.7	154	28.9	6.32
445664	402	7	31	198.4	57	13.0	2.03
445670	249	7	21	132.8	36	9.9	1.54

Table 9.- Fishery characteristics around Grand Manan Island, by area in 1984. Effort data not prorated to logged catch.

Area	Catch	Effort			CPUE		
	kg	days	hours	hour-meters	kg/d	kg/h	kg/hm
CrossJack Ledge	102	2	9	38.9	51	6.0	1.31
Dixon Rocks	207	2	-	-	104	-	-
Duck I. Sound	2058	15	125	572.2	137	15.9	3.43
Eastern Ledge	108	1	-	-	108	-	-
Gannet Rock	1147	6	52	283.4	191	22.1	4.05
2 miles "	193	1	11	57.6	193	18.4	3.35
Green Island	221	3	15	77.7	74	14.7	2.84
Middle Grounds	561	5	27	153.7	112	21.0	3.65
Ox Head	481	4	27	137.6	120	18.2	3.50
Shag Head Breaker	132	1	-	-	132	-	-
Ship Head	265	7	35	157.7	38	7.7	1.68
St. Mary's Ledge	722	8	44	201.5	90	16.4	3.58
White Horse Head	3024	28	57	297.4	108	15.5	2.98
Wolves Bank	1693	42	231	952.9	40	7.3	1.78
443664	1065	8	43	212.2	133	23.8	4.81
444664	66	1	6	35.2	66	12.0	1.87
445663	25	1	3	13.7	25	8.3	1.82
442665	2295	21	189	979.3	109	12.1	2.34
Grand Manan offshore waters:							
Bradford Cove	332	7	48	238.5	47	6.9	1.39
Bull Rock	946	9	42	205.4	105	16.6	3.36
Long Ledge	121	1	-	-	121	-	-
Murr Ledge	680	10	54	297.4	68	11.9	2.16
Southwest Head	1141	13	68	374.4	88	12.9	2.35
2 miles "	326	4	30	147.5	82	11.0	2.21
3 miles "	272	2	32	173.7	136	8.6	1.57
Seal Island	717	3	34	206.2	239	21.1	3.48
Western Ledge	640	7	9	39.6	91	5.2	1.14
2 miles "	234	2	13	68.6	117	18.7	3.41
Yellow Ledge	522	4	30	183.0	131	17.5	2.85
443665	178	3	13	58.3	59	14.0	3.05
444665	86	2	5	24.2	43	16.4	3.56
443670	536	9	73	381.0	60	7.3	1.41
441673	99	2	6	29.0	50	15.6	3.42

Table 10.- Fishery characteristics around Grand Manan Island, by area in 1985. Effort data not prorated to logged catch.

Area	Catch	Effort			CPUE		
	kg	days	hours	hour-meters	kg/d	kg/h	kg/hm
Dixon Rocks	81	1	5	22.9	81	16.2	3.54
Duck I. Sound	3152	25	172	873.6	126	17.4	3.41
Gannet Rock	583	6	35	169.4	97	16.7	3.44
Green Island	109	2	10	43.7	55	11.5	2.50
Middle Ground	410	4	26	144.0	103	15.6	2.85
Ox Head	64	2	5	26.1	32	13.5	2.46
Ship Head	937	25	189	862.2	37	4.9	1.06
Southeast Ledge	1454	25	-	-	58	-	-
Southern Ledge Shoal	490	8	31	139.4	61	14.1	3.09
St.Mary's Ledge	268	5	28	125.7	54	9.8	2.13
Three Island	67	1	6	25.1	67	12.2	2.66
White Head	1307	16	77	357.3	82	17.0	3.66
Wolves Bank	1389	9	89	452.3	154	15.6	3.07
443664	183	3	10	49.7	61	19.1	3.69
Grand Manan offshore waters:							
Grand Manan Channel	1435	25	177	811.0	57	6.1	1.33
Seal Island	1691	13	63	286.6	130	19.3	4.22
Southwest Head	210	3	13	68.6	70	16.8	3.06
1 mile " "	95	1	5	27.4	95	19.0	3.46
Wallace Rock	491	3	50	228.6	164	9.8	2.15
Western Ledge	315	5	25	112.0	63	12.9	2.81
442670	175	4	5	24.2	44	9.6	1.86
443670	36	1	7	38.0	36	4.9	0.95

Table 11.- Fishery characteristics of Campobello Island and Passamaquoddy Bay in 1983, 1984, and 1985. Effort data not prorated to logged catch.

Area	Catch	Effort			CPUE		
	kg	days	hours	hour-meters	kg/d	kg/h	kg/hm
1983							
Campobello I.:							
Adams Island	360	10	58	263.6	36	6.2	1.37
1 mile "	223	7	38	174.1	32	5.9	1.28
2 miles "	96	1	8	38.1	96	11.5	2.52
Campobello I.	276	4	49	312.0	69	5.7	0.88
Herring Cove	61	3	13	80.5	20	4.9	0.76
Letete Passage	36	2	6	35.2	18	6.6	1.02
Eastern Bay	306	7	34	156.6	44	8.9	1.95
Maces Bay	2005	51	-	-	39	-	-
Roger's Head	58	2	8	29.7	29	7.7	1.95
St. Andrews	11	1	3	15.2	11	3.3	0.72
1984							
Deer Island:							
Deer I.	77	4	22	121.2	19	3.5	0.64
Herring Cove	13	1	3	16.0	13	5.2	0.81
Merry-go-round	1204	12	-	-	100	-	-
Eastern Bay	147	6	22	102.1	25	6.6	1.44
Letete Passage	183	5	22	109.7	37	8.3	1.67
St. Andrews	323	9	50	233.4	36	6.4	1.38
1985							
Campobello I.:							
Adams Island	19	1	5	22.9	19	3.8	0.83
1 mile "	50	2	12	54.5	25	4.2	0.92
Deer Island:							
Cook Shoal	151	6	25	114.3	25	6.0	1.32
Deer I.	37	1	4	19.1	37	8.9	1.94
Merry-go-round	51	1	5	24.0	51	9.7	2.12
Maces Bay	98	3	14	64.0	33	7.0	1.53
Saint Andrews	191	2	-	-	96	-	-

Table 12.- Percent of the total class 1 catches and CPUE (kg/hm) from the five most productive areas as reported in log records.

1983			1984		
Area	%	CPUE	Area	%	CPUE
Wolves Bank	25	2.32	442665	17	2.34
Duck I. Sound	13	4.47	Duck I. Sound	15	3.43
Western Ledge	9	6.32	Wolves Bank	13	1.78
Middle Ground	4	4.43	Gannet Rock	9	4.05
Prangle Point	3	2.64	443664	8	4.81
	54	3.68*		62	3.04*

* weighted by catch

1985		
Area	%	CPUE
Duck I. Sound	34	3.41
Wolves Bank	16	3.07
White Head	15	3.66
Ship Head	10	1.06
Gannet Rock	7	3.44
	82	3.11*

Table 13.- Catches (t of scallop meats) for NAFO Subdiv. 5YB by year and by vessel size. Source: Statistics Division, Fisheries and Oceans, Halifax.

Year	Vessel size			Total
	under 25.5G.T.	over 25.5G.T.		
		under 19.8m	over 19.8m	
1980	0.00	0.00	18.47	18.47
1981	0.00	4.85	0.00	4.85
1982	3.57	3.00	6.57	13.14
1983	116.77	14.44	9.95	141.16
1984	80.60	9.30	6.88	96.78
1985	35.88	2.92	-	38.80

Table 14.- Monthly profile in catches from NAFO Subdiv. 5YB for 1983 by vessel size. Source: Statistics Division, Fisheries and Oceans, Halifax.

AREA	YEAR	MONTH	INSHORE	OFFSHORE ≤19.8 M	OFFSHORE >19.8 M	TOTAL
5YB	1983	1	1.75	0.47	0.00	2.23
5YB	1983	2	10.86	0.89	0.00	11.75
5YB	1983	3	24.63	2.39	0.00	27.02
5YB	1983	4	11.42	0.66	0.00	12.08
5YB	1983	5	11.72	0.54	0.00	12.27
5YB	1983	6	18.97	1.26	0.00	20.23
5YB	1983	7	15.86	0.21	0.00	16.07
5YB	1983	8	11.92	0.96	4.95	17.83
5YB	1983	9	7.56	1.20	2.71	11.48
5YB	1983	10	1.86	2.43	2.29	6.58
5YB	1983	11	0.14	0.27	0.00	0.41
5YB	1983	12	0.06	3.15	0.00	3.21
5YB	1983	13	116.77	14.44	9.95	141.16

Table 15.- Monthly profile in catches from NAFO Subdiv. 5YB for 1984 by vessel size. Source: Statistics Division, Fisheries and Oceans, Halifax.

AREA	YEAR	MONTH	INSHORE	OFFSHORE ≤19.8 M	OFFSHORE >19.8 M	TOTAL
5YB	1984	1	7.58	1.98	0.00	9.56
5YB	1984	2	23.22	1.60	0.00	24.82
5YB	1984	3	19.69	3.30	0.00	22.99
5YB	1984	4	6.23	0.10	0.00	6.33
5YB	1984	5	7.00	0.10	0.13	7.22
5YB	1984	6	6.40	0.00	0.00	6.40
5YB	1984	7	5.33	0.53	6.75	12.60
5YB	1984	8	3.09	1.71	0.00	4.80
5YB	1984	9	2.06	0.00	0.00	2.06
5YB	1984	10	0.00	0.00	0.00	0.00
5YB	1984	11	0.00	0.00	0.00	0.00
5YB	1984	12	0.00	0.00	0.00	0.00
5YB	1984	13	90.60	9.30	6.88	96.78

Table 16.- Fishery characteristics according to log records provided by vessels under 19.8m L.O.A. for Grand Manan offshore waters (NAFO 5YB).

	Catch	% logged catch	Effort			CPUE		
	t	total catch	days	hours	hour-meters	kg/d	kg/h	kg/hm
1983	4.83	33	53	332	1570	91.1	14.5	3.87
1984	6.26	67	69	518	2711	90.7	12.1	2.31
1985	4.55	100?	56	351	1630	72.4	9.9	2.13

Table 17.- Number of survey stations by year and by area.

Year	Inside 7-mile line	Outside 7-mile line	Total
1983	50	24	74
1984	-	-	0
1985	66	36	102

Table 18.- Average scallop catch at age per tow for a 4-gang Digby drag for lined middle buckets and unlined outside buckets. N: total number of scallops per tow.

Year and gear type	Age (years)										N	s.d.
	2	3	4	5	6	7	8	9	10	11+		
1983 inside 7-mile												
lined gear	1	2	2	5	9	19	12	7	4	3	89	96
unlined gear	1	4	3	3	6	11	7	5	2	2	58	63
1985 inside 7-mile												
lined gear	15	23	5	5	5	7	8	6	3	5	98	122
unlined gear	5	11	6	5	8	13	9	8	3	6	87	96
1985 outside 7-mile												
lined gear	9	7	4	7	10	6	3	0	0	0	57	66
unlined gear	2	5	7	15	17	11	4	2	0	0	70	76

Table 19.- Average scallop catch per tow by age grouping in each area by year. Abundance of recruits (age 4+) was estimated from the catch of the unlined gear, while prerecruits (1-3 years inclusive) abundance was estimated from the catch of a lined gear.

Year/Area	Prerecruits 1-3 yr	Recruits 4-7 yr	Recruits 8+ yr
1979			
Inside 7-mile line	4	46	8
Outside 7-mile line	2	19	0
1980			
Inside 7-mile line	8	66	10
Outside 7-mile line	2	180	0
1981			
Inside 7-mile line	6	49	11
Outside 7-mile line	1	25	4
1982			
Inside 7-mile line	10	31	19
Outside 7-mile line	2	35	6
1983			
Inside 7-mile line	3	23	16
Outside 7-mile line	1	7	9
1985			
Inside 7-mile line	38	32	26
Outside 7-mile line	16	27	3
or			
Southern area	26	28	27
Western area	67	56	5
Northern area	11	54	3

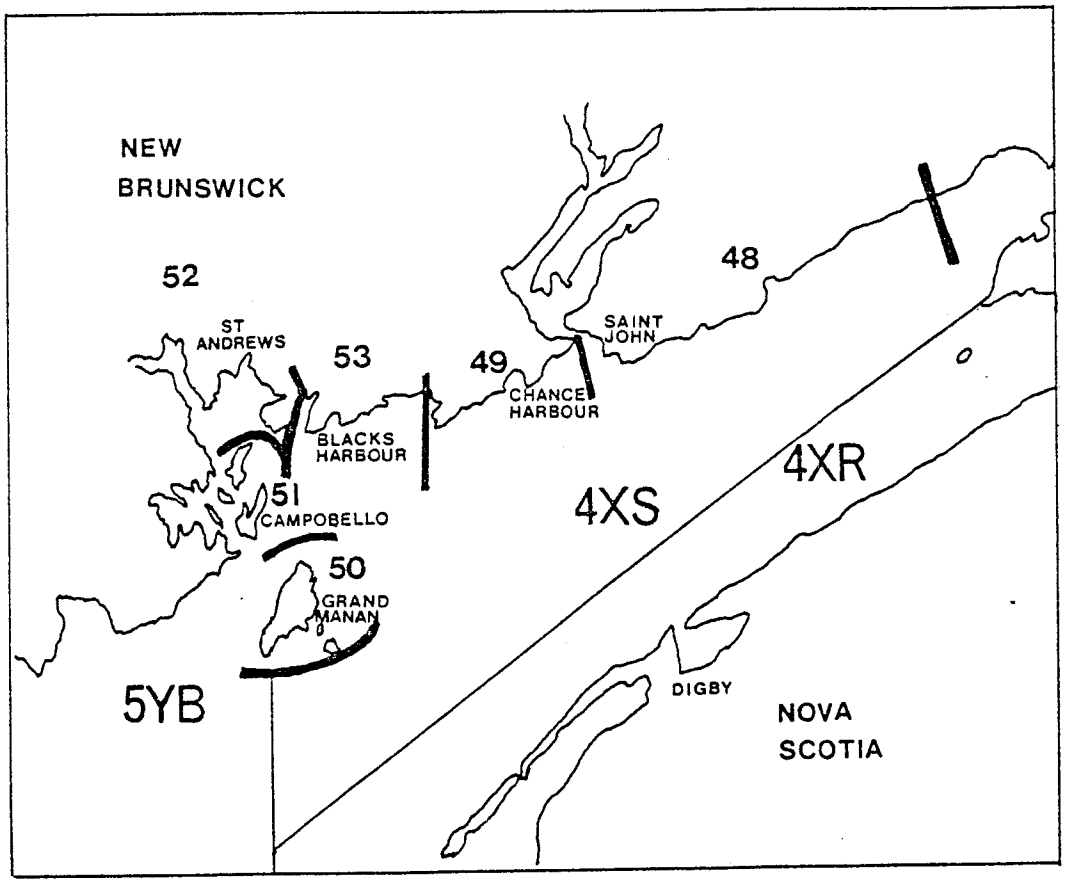

Figure 1.- Geographical location of New Brunswick Statistical Districts 48 to 53 and extent of NAFO sub-areas 4XR, 4XS, and 5YB in the Bay of Fundy and its outer reaches.

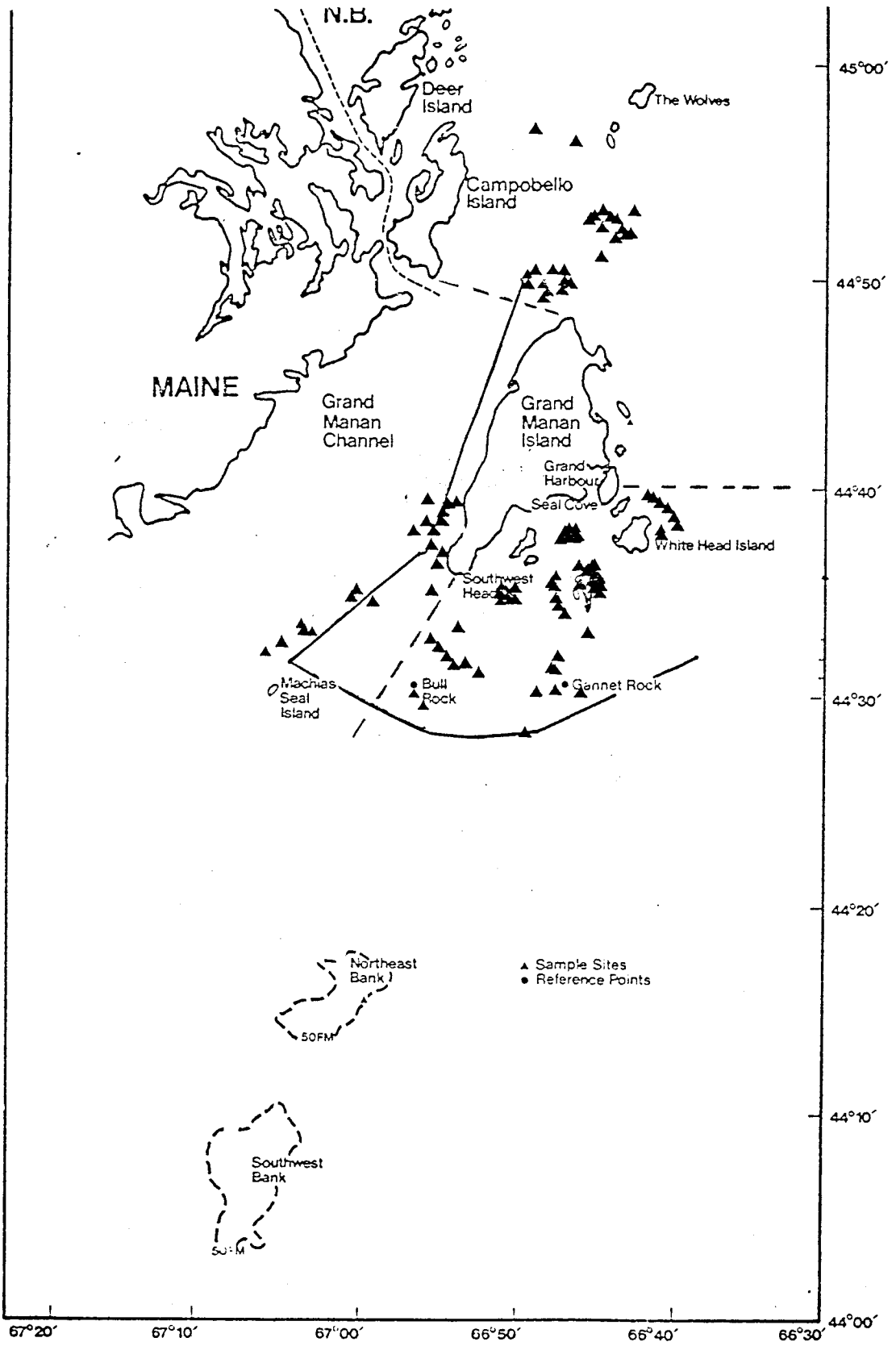

Figure 2.- Sampling locations of the 1985 stock survey and post-stratification designs by fishing zones (solid line) and by geographical areas (dashed line).

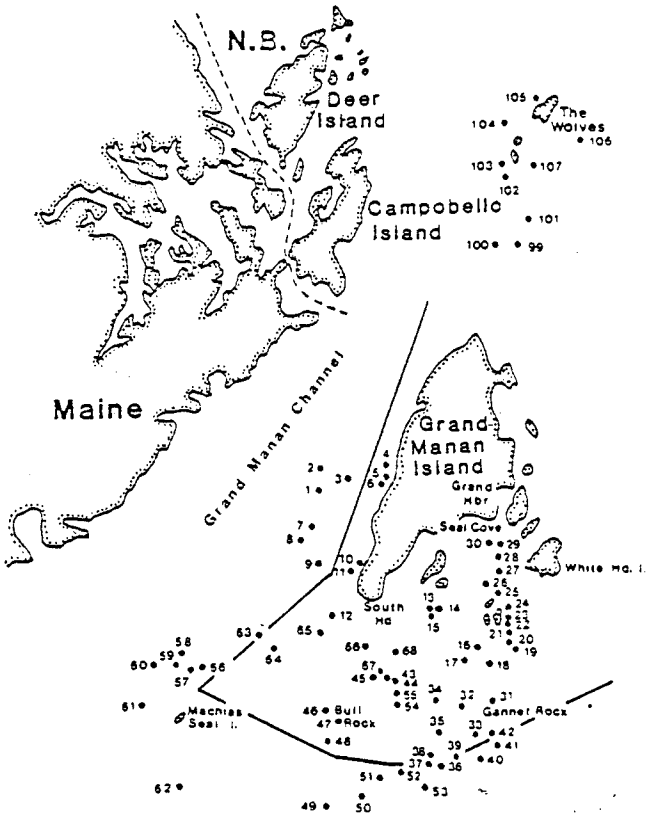

Figure 3.- Sampling locations of the 1983 survey.