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The 1988 4Vn Herring Fishery; Biological Update

by

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#### Abstract

A purse seine fishery involving six vessels took place in Sydney Bight between Nov. 4 and Dec. 10, 1988. A total catch of 2572 t was reported - but Fishery Officer hauls indicate landings in excess of 4800 t by the purse seine fleet. The traditional inshore (trap and gillnet) fishery reported landings of 340 t.

Samples from the purse seine fishery indicated continued dominance by the 1983 year-class (age 5). As in previous years, no analytical assessment was undertaken for 4Vn because of the assumed mixture of fish from neighbouring stocks in the Sydney Bight aggregation.

#### Résumé

Du 4 novembre au 10 décembre 1988, une flotte de six navires a effectué une pêche à la seine coulissante dans la baie de Sydney. On a enregistré des prises totales de 2 572 tonnes, mais d'après les rapports verbaux des agents des pêches, les débarquements de la flotte de senneurs se situaient au-delà de 4 800 tonnes. La pêche côtière traditionnelle (au casier et au filet maillant) a rapporté des débarquements de 340 tonnes.

Les échantillons prélevés à partir de la pêche à la seine coulissante ont indiqué le maintien d'une prédominance de la classe annuelle de 1983 (âgée de 5 ans). Comme par les années précédentes, aucune évaluation analytique n'a été entreprise pour la subdivision 4Vn à cause d'un mélange présumé de poissons provenant des stocks avoisinants dans l'agrégation de la baie de Sydney.

## Introduction

### History of the Fishery

The Sydney Bight herring fishery has two components. A relatively small (less than 500 t yr<sup>-1</sup>; Table 1) trap and gillnet fishery has historically taken place inshore, including the Bras d'Or Lakes, during the spring and summer. A large vessel mobile fishery began in 1968. This was dominated by foreign fleets for the first 2 yr but subsequently has been almost exclusively a Canadian purse seine fishery operating during the late autumn and early winter months. Annual landings peaked at 17,547 t in 1972/73 (Fig. 1) but, with TAC regulation, have been less than 5000 t since 1978 (Table 1).

### Stock structure

Previous tagging studies (summarized by Simon and Stobo 1983) indicated that the winter purse seine fishery exploits overwintering herring which are a mixture of Gulf of St. Lawrence (4T), local (4Vn) and Nova Scotia (4WX) stocks. The relative affinity with other stocks was different in fish tagged at different locations within 4Vn. Of those tagged to the north and west of the area (north of Bird Island) a higher proportion was returned from area 4T; of those tagged in the southeast, a higher proportion was returned from area 4WX. Herring tagged during the spring fishery (April-May; St. Ann's Bay) were returned primarily from 4Vn (including Bras d'Or Lakes) but also from area 4T.

### Description of the 1988 Fishery

#### Management Plan

The 1989 Scotia-Fundy Region Herring Management Plan limited the 4Vn purse seine fishery:

- (i) to the period Nov. 1, 1988 - March 1, 1989;
- (ii) to a TAC of 4200 t (by "Gulf-based" vessels); and
- (iii) to the area north and west of a line drawn from Pt. Aconi in Cape Breton to the 3Pn/4Vn intersection.

Inshore (trap and gillnet) effort was not under TAC management, except that no effort increase was allowed.

#### Catch and CPUE

Monthly landings by gear type are presented in Table 2.

The purse seine fishery involved six vessels and took place between Nov. 4 and Dec. 10 1988; with all catches except for one after Nov. 28. The total reported catch (2572 t) is very similar to that recorded in 1987 but a summary of Fishery Officers' hauls provided by DFO Fisheries Habitat Management Branch (Moncton) totalled 4837 mt. The haul estimate in 1987, however, was equal to the reported catch.

A total catch of 340 t was recorded from inshore gear in 1988, approximately three times that of the previous year but within the range observed over the past decade.

Logbook coverage of the purse seine fishery was good. Logs were received from all vessels for all trips, and accounted for 84% of the total nominal catch but only 45% of haul reports. Catch per successful night was 77.4 t (Table 3).

The spatial pattern of catch (by 10' square) was calculated from logbook information and is shown in Fig. 2. As in recent years (1983-present), catches were concentrated along the north shore of St. Ann's Bay, around Cape Smokey. The Pt. Aconi line of the Management Plan restricts purse seine activity to the northern section of 4Vn, but Stobo and Simon (1982) pointed out that the centre of the fishery had already shifted northward over the historical period of the fishery and before the line was imposed.

The major portion of the purse seine fishery was again concentrated within a 3-wk period. Biological sampling was adequate for a single age length key to generate numbers at age. Ten detail samples resulted in 493 fish aged and a catch per detail sample ratio of 5.2 (t/detail fish).

Monthly catch numbers and weight at age are presented in Table 4. The 1983 year-class (age 5) again dominated in number and also in weight. The historical catch at age matrix is given in Table 5, and mean weights at age weighted by numbers caught in Table 6.

One gillnet sample was available but it was not used to generate numbers at age.

#### Research Survey Data

An acoustic survey of Subdiv. 4Vn in November/December 1988 recorded aggregations of herring estimated at 172,885 t in the northwest portion of Subdiv. 4Vn, but found no herring south of the Pt. Aconi line, where a large aggregation had been found the previous year (Chadwick et al. 1989). The 1988 survey was approximately three weeks later in the year than the 1987 survey. An additional survey was conducted in January 1989 from Gabarus Bay to Ingonish (Buerkle 1989). No herring were found on the survey although it included most of the area where herring concentrations were found in the December 1988 survey.

#### Management Considerations

The prevailing view has been that the summer fixed gear fishery exploits local stocks but that the winter purse seine fishery involves fish from neighbouring assessment areas. Since 1981, CAFSAC has repeatedly stated that because of this mixing an analytical assessment of Subdiv. 4Vn herring is impossible and that until the stock affinity has been more confidently established, it is preferable that there be no fishery on the overwintering Subdiv. 4Vn mixture.

Literature Cited

- Buerkle, U. 1989. Results of the 1989 winter acoustic surveys of NAFO division 4WX stocks. Can. Atl. Fish. Sci. Advis. Comm. Res. Doc. 89/41 : 22 p.
- Chadwick, E. M. P., D. K. Cairns and H. M. Dupuis. 1989. 4T herring assessment. Can. Atl. Fish. Sci. Advis. Comm. Res. Doc. in preparation.
- Simon, J., and S. Campana. 1984. The 1983 - 84, 4Vn herring biological update. Can. Atl. Fish. Sci. Advis. Comm. Res. Doc. 84/66: 17 p.
- Simon, J., and W. T. Stobo. 1983. The 1982 - 83, 4Vn herring biological update. Can. Atl. Fish. Sci. Advis. Comm. Res. Doc. 83/49: 28 p.
- Stephenson, R. L., and M. J. Power. 1985. The 1984-85, 4Vn herring biological update. Can. Atl. Fish. Sci. Advis. Comm. Res. Doc. 85/72: 13 p.
- Stephenson, R. L., and M. J. Power. 1986. The 1985-86, 4Vn herring biological update. Can. Atl. Fish. Sci. Advis. Comm. Res. Doc. 86/45: 13 p.
- Stephenson, R. L., and M. J. Power. 1987. The 1986-87, 4Vn herring biological update. Can. Atl. Fish. Sci. Advis. Comm. Res. Doc. 87/74: 13 p.
- Stephenson, R. L., and M. J. Power. 1988. The 1987 4Vn herring fishery. Can. Atl. Fish. Sci. Advis. Comm. Res. Doc. 88/68: 13 p.
- Stobo, W. T., and J. Simon. 1982. Biological update for 4Vn herring, 1981-82. Can. Atl. Fish. Sci. Advis. Comm. Res. Doc. 82/39: 23 p.

Table 1. Historical annual (Oct.-Oct.) herring landings (t) in area 4Vn by major gear segment. All values prior to 1988 are as in Stephenson and Power (1988). New data from DFO, Scotia-Fundy Region, Statistics Branch.

Year	Cdn <sup>a</sup> "fixed gear"	Cdn <sup>b</sup> "mobile gear"	Foreign "mobile gear"	Total "mobile gear"	TAC
62-63	492	-	-	-	
63-64	407	-	-	-	
64-65	252	-	18	18	
65-66	91	-	-	-	
66-67	296	-	17	17	
67-68	235	2	-	2	
68-69	225	2044	11465	13509	
69-70	74	5335	11050	16385	
70-71	142	2917	344	3261	
71-72	162	10681	1	10682	
72-73	116	17537	10	17547	
73-74	212	16285	578	16863	
74-75	226	14297	270	14567	
75-76	74	5546	188	5734	
76-77	120	12831	-	12831	
77-78	310	7078	-	7078	11000
78-79	327	3332	-	3332	8000
79-80	261	2865	-	2865	3000
80-81	328	3952	-	3952	4500
81-82	248	3552	-	3552	3000
82-83	342	3648	-	3648	3000
83-84	483	3980	-	3980	5000
84-85		3925	-	3925	3500
85 <sup>c</sup>	200	3470	-	3470	3500 <sup>d</sup>
86 <sup>c</sup>	123	4352	-	4352	4200 <sup>d</sup>
87 <sup>c</sup>	103	2372	-	2372	4200 <sup>d</sup>
88 <sup>c</sup>	340	2572	-	2572*	4200 <sup>d</sup>

<sup>a</sup>Includes trap, gillnet and misc. gear types.

<sup>b</sup>Purse seine only.

<sup>c</sup>Calendar year.

<sup>d</sup>TAC for period Nov. 7-Mar. 1.

\*4837 t according to Fishery Officers' hauls (Fisheries Habitat Management Branch, Moncton)

Table 2. Monthly distribution of herring catch (t) by gear type in area 4Vn (source DFO, Scotia-Fundy Region, Statistics Branch).

	1987			1988											
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
4Vn purse seine	-	1873	499	-	-	-	-	-	-	-	-	-	-	1088	1484
4Vn trap/misc.	-	1	-	-	-	-	-	77	13	20	-	-	-	-	-
4Vn gillnet	1	-	-	-	-	-	9	12	5	203	1	-	-	-	-

Table 3. CPUE indices for the 4Vn herring purse seine fishery. Values for 1971-87 are as in previous assessments (Simon and Campana 1984; Stephenson and Power 1985, 1986, 1987, 1988).

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Year	Logged catch (t)	Logged number (sets)	Days fished	Catch (t) per successful night	Catch (t) per set
71-72				115.0	-
72-73				90.8	45.4
73-74				82.0	43.2
74-75				85.8	37.8
75-76				52.4	33.5
76-77				78.1	37.7
77-78				70.4	35.0
78-79				23.6	12.8
79-80				77.5	33.7
80-81				45.6	20.6
81-82				31.3	17.4
82-83				58.6	22.5
83-84				73.1	46.3
84-85				45.9	36.9
85-86	3511	46	32	108.4	76.3
86-87	4486	64	42	106.8	70.1
87-88	1751	40	25	70.0	43.8
88-89	2168	38	28	77.4	57.1

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Table 4. 4Vn herring numbers at age (thousands) and weight at age (g) for the 1988 purse seine fishery.

Age	1	2	3	4	5	6	7	8	9	10	11+	Total
Numbers (thousands)	6	476	1071	1389	3204	2350	648	830	443	278	89	10784
Weight (t)	0.2	51	167	281	749	602	185	261	147	96	33	2572
Avg. weight (gm)	32	108	156	202	234	256	285	314	332	347	370	-
Avg. length (cm)	16.3	24.2	27.5	30.0	31.5	32.5	33.7	34.8	35.5	36.0	36.8	-
% numbers	(85) -	6.8	6.6	10.1	24.3	27.5	13.7	8.0	1.7	0.4	0.9	
	(86) -	5.6	30.3	25.4	8.3	14.4	8.7	4.6	1.8	0.3	0.2	
	(87) 1.0	7.2	18.3	36.3	12.0	6.4	9.7	6.2	1.5	0.9	0.5	
	(88) 0.1	4.4	9.9	12.9	29.7	21.8	6.0	7.7	4.1	2.6	0.8	
% weight	(85) -	2.6	4.3	7.9	24.3	29.3	16.9	10.2	2.3	0.6	1.7	
	(86) -	2.7	23.1	23.7	8.8	17.6	12.3	7.1	3.0	0.4	1.4	
	(87) 0.3	3.1	13.7	34.5	13.0	8.1	12.7	9.6	2.5	1.5	1.0	
	(88) 0.0	2.0	6.5	10.9	29.1	23.4	7.2	10.1	5.7	3.8	1.3	

Table 5. 4Vn purse seine herring catch-at-age matrix (thousands).

Age <sup>a</sup>	73-74	74-75	75-76	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	125	6
2	43	116	1	0	0	0	0	43	104	82	189	901	1019	1251	887	476
3	3798	5116	671	16	7	26	3172	518	945	2308	2263	1158	998	6801	2253	1071
4	43737	4156	1544	2986	110	441	3427	3791	1965	2733	5684	5859	1515	5696	4470	1389
5	14264	33189	1848	5103	2377	1413	1671	3946	7192	3359	5078	3069	3657	1863	1473	3204
6	4435	6430	7846	4136	2800	1443	741	1060	2982	5722	3238	3223	4137	3225	786	2350
7	2955	2417	2571	17602	1442	878	1004	645	844	1798	1559	2228	2068	1962	1196	648
8	3176	2304	1123	8379	7622	847	607	614	-	816	649	639	1210	1023	769	830
9	2841	2242	892	3401	4056	1701	873	717	77	37	287	98	251	401	188	443
10	3842	2842	1006	2431	1202	1838	879	1192	77	15	22	128	54	60	114	278
11+	4969	5401	3461	5451	3098	1915	750	2688	893	150	86	13	142	163	63	89
Total nos.	84060	64213	20963	49505	22714	10502	13124	15214	15079	17020	19055	17316	15051	22445	12324	10784
Total wt.(t)	16863	14354	5734	12831	7078	3332	2865	3952	3552	3648	4029	3926	3470	4350	2372	2572

<sup>a</sup>Results prior to 1983/84 are presumed to be based upon Nov. 1 birthday. Since 1984, Jan. 1 birthday has been assumed.

Table 6. 4Vn purse seine herring weight-at-age (g).

Age <sup>a</sup>	73-74	74-75	75-76	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55	32
2	34	52	41	-	-	-	-	36	16	-	108	98	89	93	82	108
3	85	102	93	105	110	120	103	104	113	107	153	148	149	148	144	156
4	162	145	157	141	175	189	152	146	182	167	180	201	182	181	183	202
5	182	203	203	187	220	211	207	201	217	207	217	234	230	205	210	234
6	218	235	249	219	245	258	255	252	264	247	247	263	245	237	246	256
7	251	256	273	256	272	289	289	267	310	280	267	289	283	273	252	285
8	302	287	292	275	308	302	324	332	-	307	287	307	292	301	296	314
9	325	314	332	295	346	338	366	361	375	362	336	303	321	326	310	332
10	350	334	361	319	377	376	400	395	375	391	342	378	377	320	316	347

<sup>a</sup>Results prior to 1983/84 are presumed to be based upon Nov. 1 birthday. Since 1984, Jan. 1 birthday has been assumed.

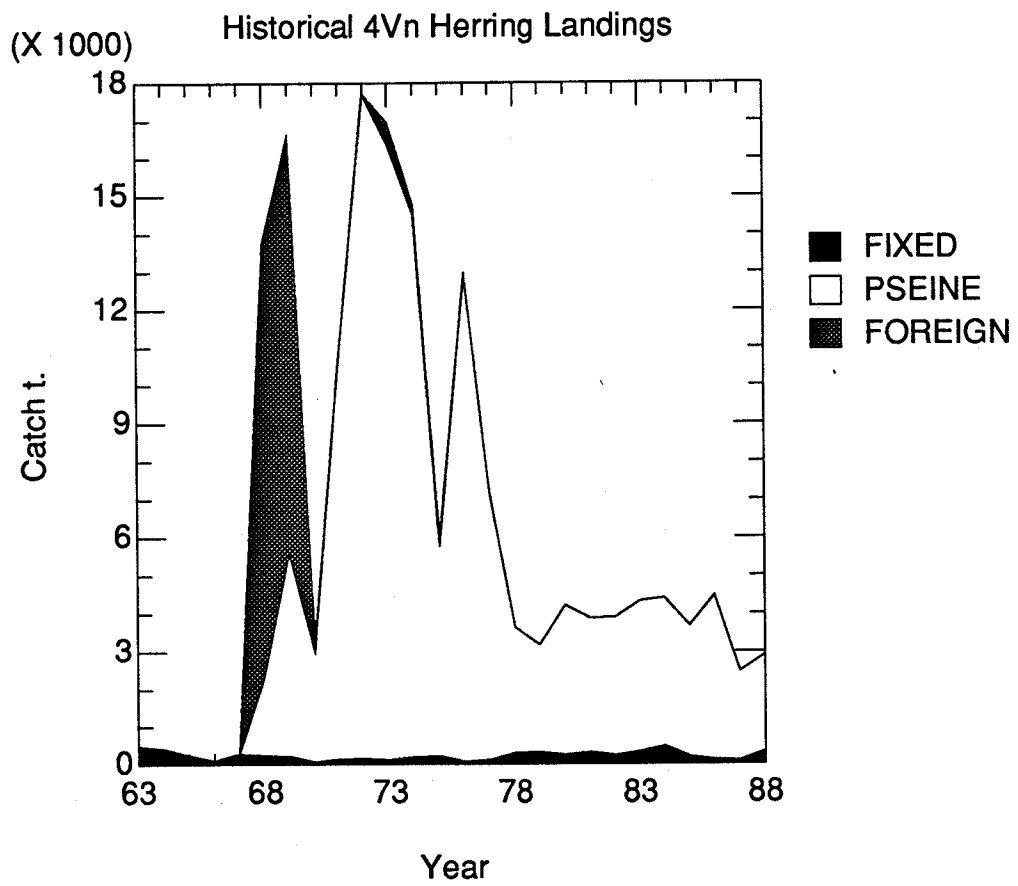


Fig. 1. 1963 to 1988 4Vn herring catches by gear

## November

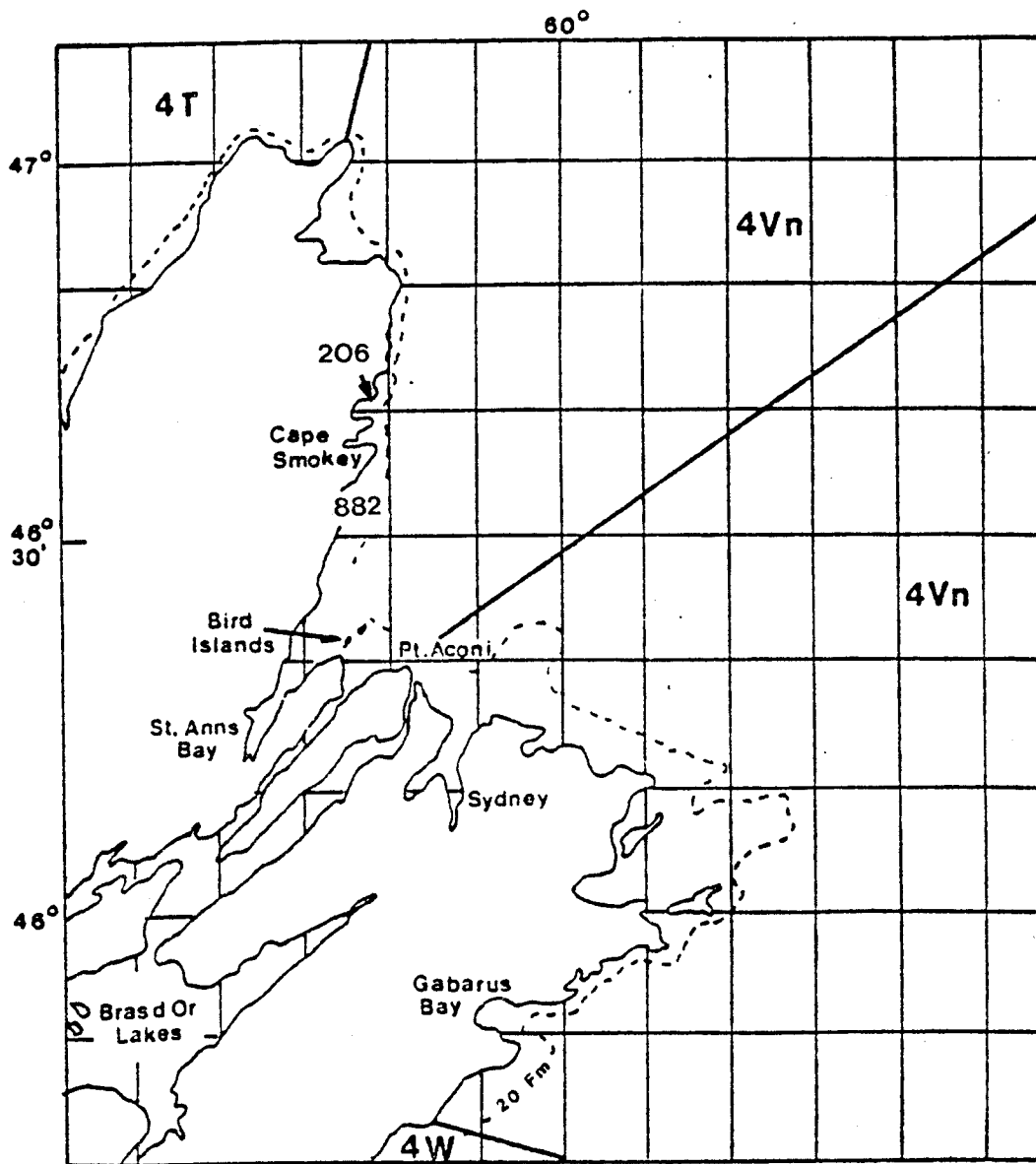


Fig. 2a. 4Vn herring purse seine catch (t) by 10' square in Nov. 1988 (from logbooks weighted by nominal landings).

## December

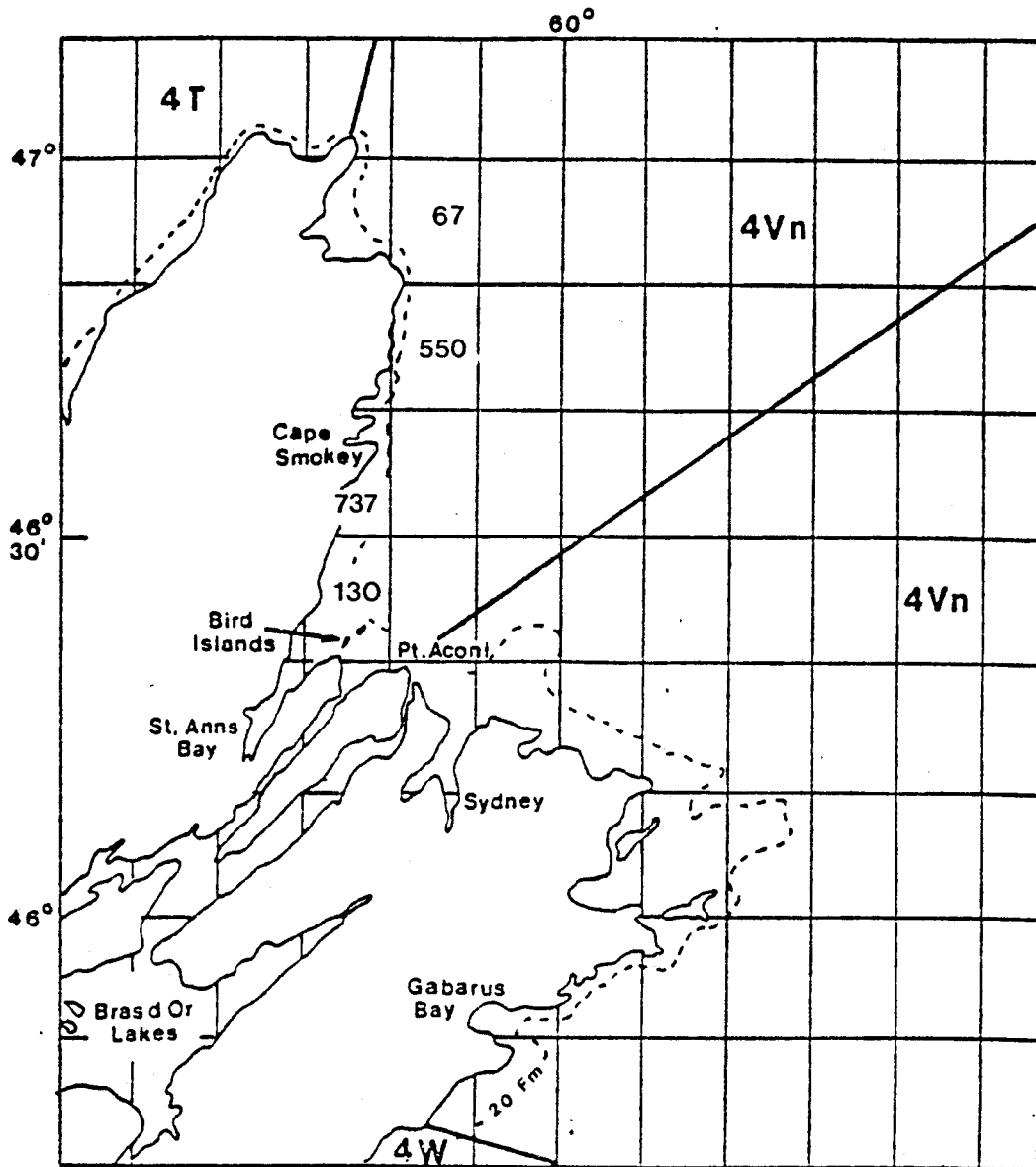


Fig. 2b. 4Vn herring purse seine catch (t) by 10' square in Dec. 1988 (from logbooks weighted by nominal landings).