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The 1986-87, 4Vn Herring Biological Update

by

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### Abstract

The major purse seine segment of the 4Vn herring fishery took place between Nov. 10 and Dec. 12, 1986 in the northwestern portion of Sydney Bight. The total reported catch (4352 t) was the highest since 1978, and exceeded the TAC (4200 t). Fish from the 1982 and 1983 year-classes dominated the catches both in number (56%) and weight (47%) and catch rates were high.

An additional 123 t was recorded from inshore gear.

### Résumé

La pêche à la senne coulissante, qui est une composante importante de la pêche au hareng dans la division 4Vn, a été pratiquée entre le 10 novembre et le 12 décembre 1986 dans la partie nord-ouest de Sydney Bight. Le total des prises signalées (4352 t) est le plus élevé enregistré depuis 1978 et a dépassé le TPA (4200 t). Les poissons des classes d'âge 1982 et 1983 ont dominé les prises, aussi bien en nombre (56 %) qu'en poids (47 %), et les taux de prise ont été élevés.

À cette quantité, il faut ajouter 123 t récoltées à l'aide d'engins de pêche côtière.

## Introduction

### History of the Fishery

The Sydney Bight herring fishery has two major components. A relatively small (4500 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 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 1984/85 Fishery

### Management Plan

The 1987 Scotia-Fundy Region Herring Management Plan limited the 4Vn purse seine fishery:

- (i) to the period Nov. 7, 1986 - March 1, 1987;
- (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 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 which were active between Nov. 10 and Dec. 12. The total reported catch (4352 t) was higher than that of the 1985/86 season and higher than the TAC. Log catch records totalled 4486 t but included 871 t released due to mixed size of fish.

A total catch of 123 t was recorded from inshore gear in 1986, lower than that of the previous year and about half of the mean (245 t) since 1973.

Logbook coverage of the purse seine fishery was good; logs were received from all vessels and accounted for more than the total nominal catch. Two indices of CPUE were calculated from logbook information: catch per successful night (106.8 t) and catch per set (70.1 t) (Table 3). Both indices are the highest they have been since 1972. This is consistent with skippers reports of high abundance of herring in the area.

The spatial pattern of catch (by 10' square) was calculated from logbook information and is shown in Fig. 1. As in recent years (1983-85), 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 spread over 5 wk. Biological sampling was adequate for the generation of two age length keys to generate numbers at age. Six detail samples resulted in 281 fish aged and a catch per detail sample ratio of 15.5 (t/detail fish).

Monthly numbers and weight at age are presented in Table 4. Since the fishery now occurs within a single calendar year, there has been no adjustment of assumed birthday (Jan. 1). The 1986 catch was dominated by younger fish than were apparent in the 1985 catch. The 1983 (age 3) and 1982 (age 4) year-classes dominated both in number (56%) and weight (47%). The historical catch at age matrix is given in Table 5, and mean weights at age weighted by numbers caught in Table 6.

No sampling of inshore gear was undertaken.

#### Management Considerations

The available biological information indicates that the inshore spring and summer fixed-gear fishery exploits local stocks, but that the winter purse seine fishery exploits a stock mixture which includes fish from other management units (primarily 4T and 4WX). As a result of this mixing no rigorous biological method can be used to assess the fishery and advise a catch level.

The TAC restricts catch to less than 5000 t in a fishery that has, in the past, exceeded 17,000 t. The Pt. Aconi line which restricts fishing to the northwest portion of 4Vn should (based upon tagging results) have decreased the exploitation of 4WX fish and increased the proportion of 4T fish in the 4Vn catch.

Previous advice CAFSAC (Anon. 1984, 1985) stated that, based on biological considerations, it would be preferable that there be no fishery on the mixed aggregation of "overwintering" fish in 4Vn.

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Table 1. Historical annual (Oct.-Oct.) herring landings (t) in area 4Vn by major gear segment. All values prior to 1986 are as in Stephenson and Power (1986). 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>e</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, 1985-Mar. 1, 1986.

<sup>e</sup>TAC for period Nov. 7, 1986-Mar. 1, 1987.

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

	1985			1986											
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
4Vn purse seine	-	2522	948	-	-	-	-	-	-	-	-	-	-	2547	1805
4Vn trap/misc.	-	1	-	-	-	-	5	57	-	-	-	-	-	-	-
4Vn gillnet	1	-	-	-	-	-	46	8	5	-	-	-	-	-	-

Table 3. CPUE indices for the 4Vn herring purse seine fishery. Values for 1971-86 are as in previous assessments (Simon and Campana 1984; Stephenson and Power 1985, 1986).

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Year	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	108.4	53.0
86-87	106.8	70.1

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Table 4. 4Vn herring numbers at age (thousands) and weight at age (g) for the 1985 purse seine fishery.

Age	1	2	3	4	5	6	7	8	9	10	11+	Total
Nov./Dec.												
Number	-	1251	6801	5696	1863	3225	1962	1023	401	60	163	22445
Avg. wt.	-	93	148	181	205	237	273	301	326	320	364	
Catch wt.	-	116	1004	1033	381	764	535	308	131	19	59	4350
% numbers (85)	-	6.8	6.6	10.1	24.3	27.5	13.7	8.0	1.7	0.4	0.9	
% numbers (86)	-	5.6	30.3	25.4	8.3	14.4	8.7	4.6	1.8	0.3	0.2	
% weight (85)	-	2.6	4.3	7.9	24.3	29.3	16.9	10.2	2.3	0.6	1.7	
% weight (86)	-	2.7	23.1	23.7	8.8	17.6	12.3	7.1	3.0	0.4	1.4	

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
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	43	116	1	0	0	0	0	43	104	82	189	901	1019	1251
3	3798	5116	671	16	7	26	3172	518	945	2308	2263	1158	998	6801
4	43737	4156	1544	2986	110	441	3427	3791	1965	2733	5684	5859	1515	5696
5	14264	33189	1848	5103	2377	1413	1671	3946	7192	3359	5078	3069	3657	1863
6	4435	6430	7846	4136	2800	1443	741	1060	2982	5722	3238	3223	4137	3225
7	2955	2417	2571	17602	1442	878	1004	645	844	1798	1559	2228	2068	1962
8	3176	2304	1123	8379	7622	847	607	614	-	816	649	639	1210	1023
9	2841	2242	892	3401	4056	1701	873	717	77	37	287	98	251	401
10	3842	2842	1006	2431	1202	1838	879	1192	77	15	22	128	54	60
11+	4969	5401	3461	5451	3098	1915	750	2688	893	150	86	13	142	163
Total nos.	84060	64213	20963	49505	22714	10502	13124	15214	15079	17020	19055	17316	15051	22445
Total wt.	16863	14354	5734	12831	7078	3332	2865	3952	3552	3648	4029	3926	3470	4350

<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
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	34	52	41	-	-	-	-	36	16	-	108	98	89	93
3	85	102	93	105	110	120	103	104	113	107	153	148	149	148
4	162	145	157	141	175	189	152	146	182	167	180	201	182	181
5	182	203	203	187	220	211	207	201	217	207	217	234	230	205
6	218	235	249	219	245	258	255	252	264	247	247	263	245	237
7	251	256	273	256	272	289	289	267	310	280	267	289	283	273
8	302	287	292	275	308	302	324	332	-	307	287	307	292	301
9	325	314	332	295	346	338	366	361	375	362	336	303	321	326
10	350	334	361	319	377	376	400	395	375	391	342	378	377	320

<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.

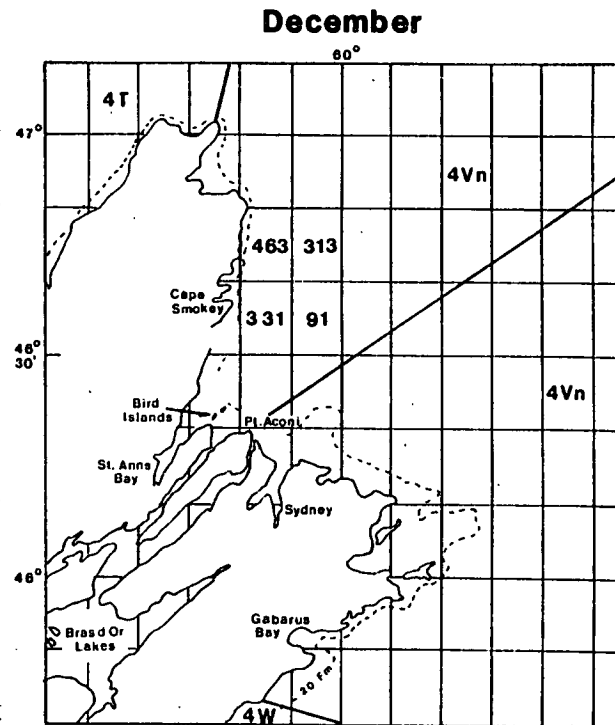
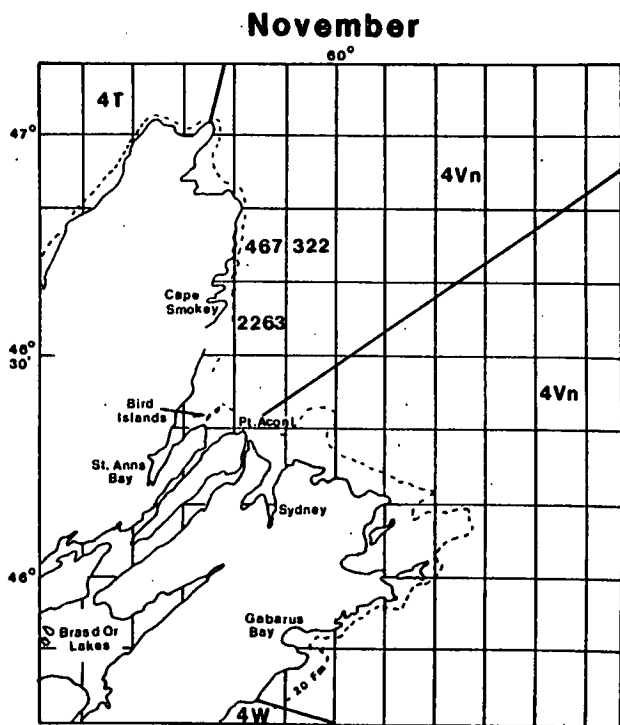


Fig. 1. Monthly 4Vn herring purse seine catch (t) distribution by 10' square for 1986 (from log books weighted by nominal landings). Pt. Aconi management line is shown.

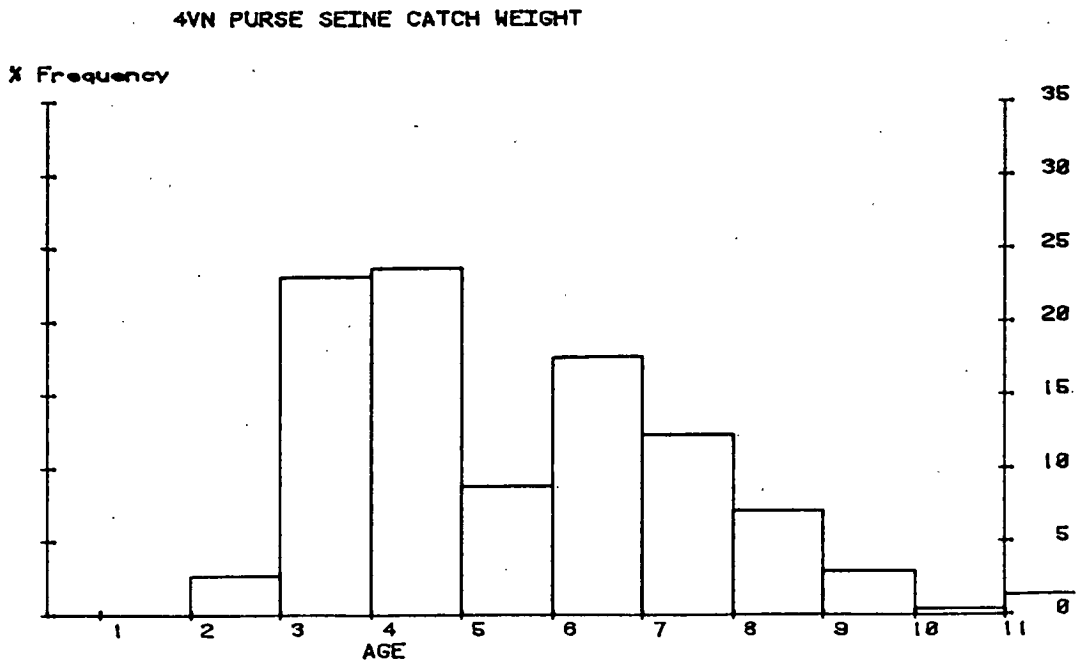
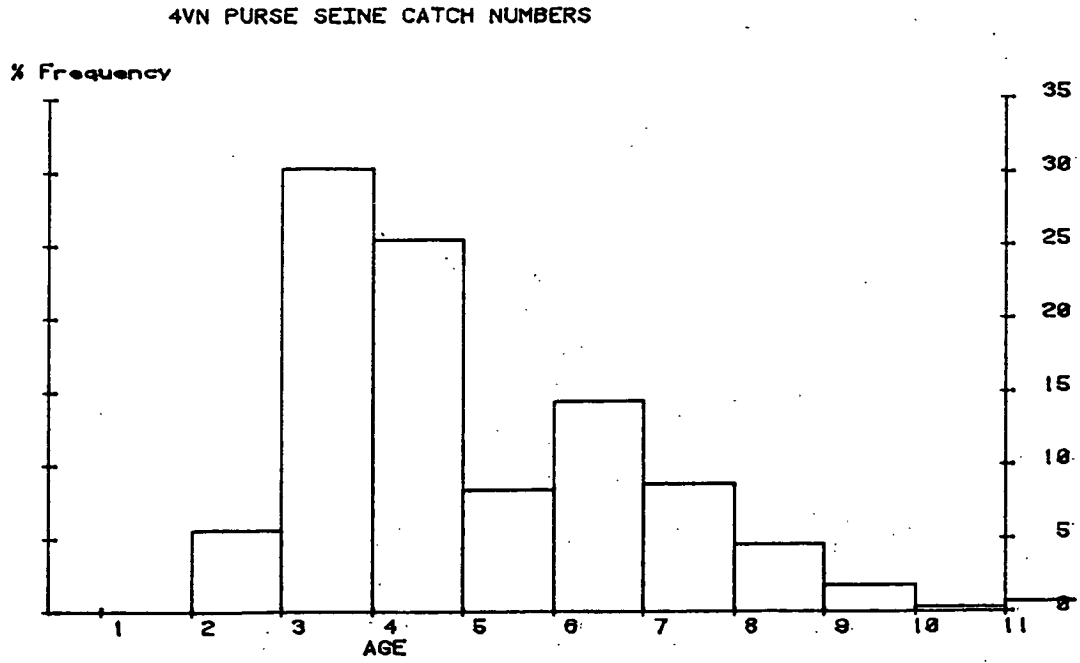


Fig. 2. Relative frequency (%) of catch numbers and catch weight by age for the 1986/87 4Vn purse seine fishery.