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The 1985-86, 4Vn Herring Biological Update

by

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Abstract

As in previous years, the 4V herring fishery was restricted to the Sydney Bight area (4Vn). The offshore (purse seine) segment reported landings of 3470 t; against a TAC of 3500 t. The major portion of the purse seine fishery lasted only 2 weeks and catch rates were high. The 1980 year-class continued to dominate the catch both in number and weight.

The available biological information indicates that this fishery exploits herring from a mixture of stocks. As a result, no analytical assessment could be undertaken.

Résumé

Comme les années précédentes, les pêches du hareng dans 4V se limitaient à la région de Sydney Bight (sous-division 4Vn). Le segment du large (la senne coulissante) a indiqué le débarquement de 3 470 t, la TPA étant de 3 500 t. La majeure partie de la pêche avec la senne coulissante n'a duré que 2 semaines et les taux de capture étaient élevés. La classe d'âge de 1980 a continué à dominer les prises, à la fois en nombre et en poids.

L'information biologique disponible indique que ces pêches exploitent les harengs provenant d'une série de stocks. Pour cette raison, on n'a pu entreprendre d'évaluation analytique.

Introduction

History of the Fishery

The Sydney Bight herring fishery has two major components. A relatively small ($<500 \text{ t yr}^{-1}$; 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 4000 t since 1978 (Table 1).

Stock structure

Tagging studies (summarized by Simon and Stobo 1983) indicate 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 1985 Scotia-Fundy Region Herring Management Plan limited the 4Vn purse seine fishery:

- (i) to the period Nov. 7, 1985 - March 1, 1986;
- (ii) to a TAC of 3500 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. 13 and Dec. 17. The total reported catch (3470 t) was lower than that of the 1984/85 season and within the TAC; however, records based on fishery officer hauls (3964 t) indicate that the TAC was exceeded. Both figures are within the range in annual landings since 1978 (Table 1).

A total catch of 200 t was recorded from inshore gear in 1985, approximately half that of the previous year but near the mean (245 t) since 1973.

Logbook coverage of the purse seine fishery was good as a result of aggressive monitoring; logs were received from all vessels and accounted for 100% of the total nominal catch. Two indices of CPUE were calculated from logbook information: catch per successful night (108.4 t) and catch per set (53.0 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 1983 and 1984, 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 lasted only 2 wk and biological sampling was adequate for the single age length key required to generate numbers at age. Five detail samples resulted in 227 fish aged and a catch per detail sample ratio of 15.3 (t/detail fish).

Monthly numbers and weight at age are presented in Table 4 and, as in previous assessments, have been adjusted to assume a Nov. 1 birthday. The 1980 year-class (age 6) herring continued to make up the largest portion of the catch both by number (27.5%) and weight (29.3%); ages 5, 6 and 7 made up 65% of catch numbers and 70% of catch weights (Fig. 2). 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 recommend a TAC.

The TAC restricts catch to approximately 3500 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 (based upon tagging results) should have decreased the exploitation of 4WX fish and increased the proportion of 4T fish in the 4Vn catch.

Previous advice (CAFSAC Advisory Docs. 84/15 and 85/16) was that, based on biological considerations, it would be preferable that there be no fishery on the mixed aggregation of "overwintering" fish in 4Vn.

Literature Cited

- 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.
- 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 1985 are as in Stephenson and Power (1985). New data from DFO, Scotia-Fundy Region, Statistics Branch.

| Year | Cdn ^a "fixed gear" | Cdn ^b "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 ^c | 200 | 3470 | - | 3470 | 3500 ^d |

^aIncludes trap, gillnet and misc. gear types.

^bpurse seine only.

^cCalendar year 1985.

^dTAC for period Nov. 7, 1985-Mar. 1, 1986.

Table 2. Monthly distribution of herring catch (t) by gear type in area 4Vn (source DFO, Scotia-Fundy Region, Statistics Branch; MFD Tape EMF701).

| | 1984 | | 1985 | | | | | | | | | | | |
|-----------------|------|------|------|------|------|------|-----|------|------|------|-------|------|------|------|
| | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| 4Vn purse seine | 3372 | 553 | - | - | - | - | - | - | - | - | - | - | 2522 | 948 |
| 4Vn trap | 97 | - | - | - | - | - | 153 | 3 | - | - | - | - | 1 | - |
| 4Vn gillnet | - | - | - | 1 | - | 17 | 145 | 36 | 3 | - | - | 1 | - | - |

Table 3. CPUE indices for the 4Vn herring purse seine fishery. Values for 1971-85 are as in previous assessments (Simon and Campana 1984; Stephenson and Power 1985).

| 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 |

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

| Age ^a | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|------------------|---|-------|--------|--------|--------|---------|--------|--------|--------|--------|--------|---------|
| Nov./Dec. | | | | | | | | | | | | |
| Number | - | 1019 | 998 | 1515 | 3657 | 4137 | 2068 | 1210 | 251 | 54 | 142 | 15051 |
| Avg. wt. | - | 88.64 | 149.25 | 181.87 | 230.48 | 245.44 | 282.77 | 292.27 | 320.59 | 376.55 | 409.72 | 2577.58 |
| Catch wt. | - | 90.32 | 148.95 | 275.53 | 842.87 | 1015.39 | 584.77 | 353.65 | 80.47 | 20.33 | 58.18 | 3470.46 |
| % numbers | - | 6.8 | 6.6 | 10.1 | 24.3 | 27.5 | 13.7 | 8.0 | 1.7 | 0.4 | 0.9 | |
| % weight | - | 2.6 | 4.3 | 7.9 | 24.3 | 29.3 | 16.9 | 10.2 | 2.3 | 0.6 | 1.7 | |

^abirthday November 1.

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

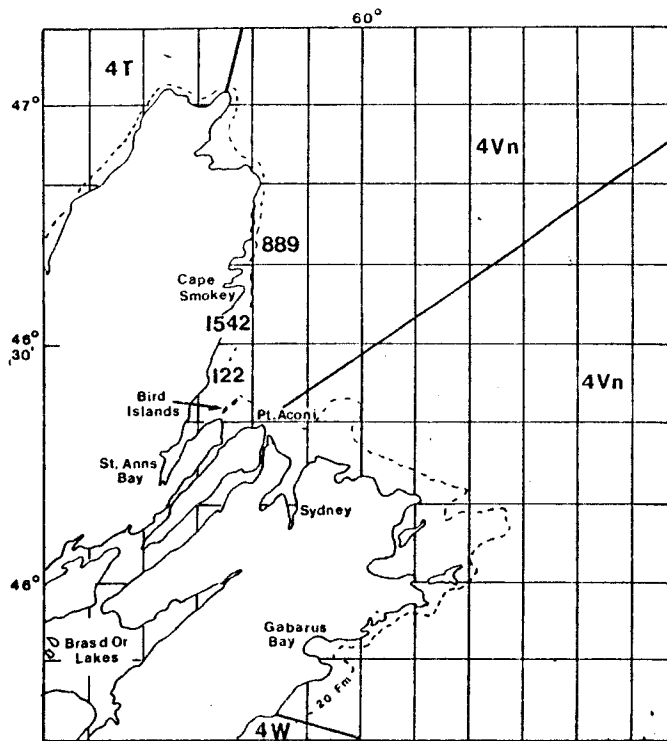
| Age ^a | 73-74 | 74-75 | 75-76 | 76-77 | 77-78 | 78-79 | 79-80 | 80-81 | 81-82 | 82-83 | 83-84 | 84-85 | 85-86 |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 43 | 116 | 1 | 0 | 0 | 0 | 0 | 43 | 104 | 82 | 189 | 0 | 1019 |
| 3 | 3798 | 5116 | 671 | 16 | 7 | 26 | 3172 | 518 | 945 | 2308 | 2263 | 901 | 998 |
| 4 | 43737 | 4156 | 1544 | 2986 | 110 | 441 | 3427 | 3791 | 1965 | 2733 | 5684 | 1158 | 1515 |
| 5 | 14264 | 33189 | 1848 | 5103 | 2377 | 1413 | 1671 | 3946 | 7192 | 3359 | 5078 | 5859 | 3657 |
| 6 | 4435 | 6430 | 7846 | 4136 | 2800 | 1443 | 741 | 1060 | 2982 | 5722 | 3238 | 3069 | 4137 |
| 7 | 2955 | 2417 | 2571 | 17602 | 1442 | 878 | 1004 | 645 | 844 | 1798 | 1559 | 3223 | 2068 |
| 8 | 3176 | 2304 | 1123 | 8379 | 7622 | 847 | 607 | 614 | - | 816 | 649 | 2228 | 1210 |
| 9 | 2841 | 2242 | 892 | 3401 | 4056 | 1701 | 873 | 717 | 77 | 37 | 287 | 639 | 251 |
| 10 | 3842 | 2842 | 1006 | 2431 | 1202 | 1838 | 879 | 1192 | 77 | 15 | 22 | 98 | 54 |
| 11+ | 4969 | 5401 | 3461 | 5451 | 3098 | 1915 | 750 | 2688 | 893 | 150 | 86 | 141 | 142 |
| Total nos. | 84060 | 64213 | 20963 | 49505 | 22714 | 10502 | 13124 | 15214 | 15079 | 17020 | 19055 | 17316 | 15051 |
| Total wt. | 16863 | 14354 | 5734 | 12831 | 7078 | 3332 | 2865 | 3952 | 3552 | 3648 | 4029 | 3926 | 3470 |

^aBirthday November 1.

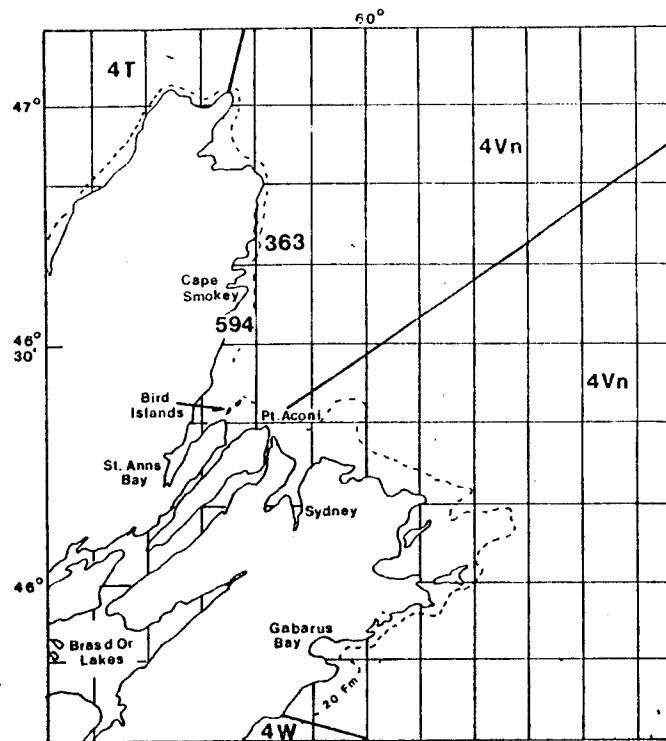
Table 6. 4Vn purse seine herring weight at age (g).

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

^aBirthday November 1.



November



December

Fig. 1. Monthly 4Vn herring purse seine catch (t) distribution by 10' square for 1985 (from log books weighted by nominal landings). Pt. Aconi management line is shown.

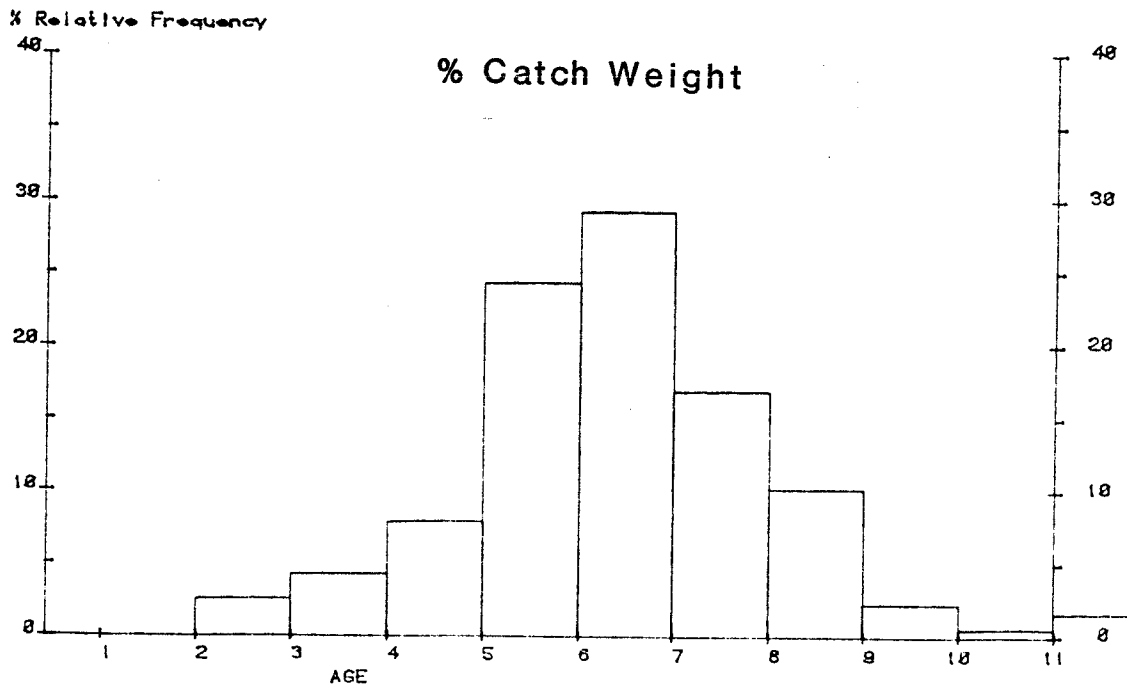
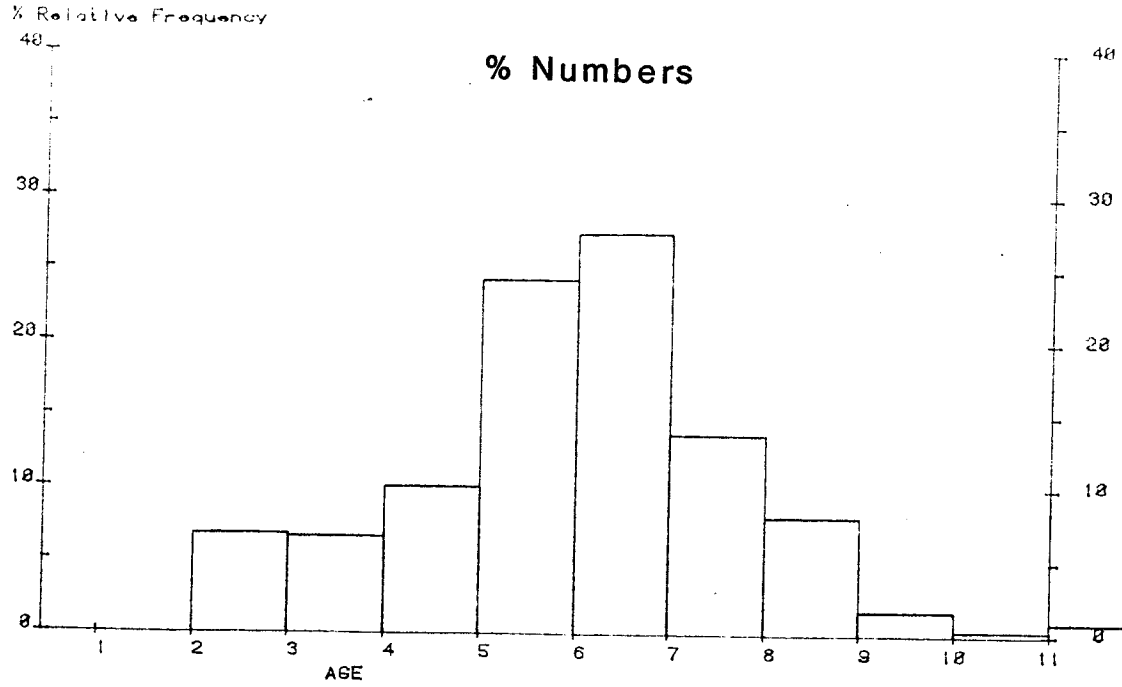


Fig. 2. Relative frequency (%) of catch numbers and catch weight by age for the 1985/86 4Vn purse seine fishery.