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Summary of Discarding and Estimates of Total Removals
by Canadian (Nfld.) Trawlers during the 1982
Divisions 3LNO American Plaice Fishery

by

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Abstract

The results of a program aimed at monitoring the discarding of American plaice by Canadian (Nfld.) otter trawlers in Div. 3LNO during 1982 is presented. Estimates indicate that the discarding of undersized American plaice remains significant, with an overall discard rate for Div. 3LNO of 11.4% by weight and 26.9% by numbers. This estimate amounts to some 22.6 million fish, weighing about 5800 t, being discarded during 1982.

Introduction

Studies aimed at monitoring the discarding of American plaice in Div. 3LNO, by Canadian (Nfld.) trawlers between 1978 and 1981, indicated that the discarding of small fish was significant (Stevenson 1980, 1981, and 1982). A discard survey program was again carried out during 1982 to continue monitoring this situation. It involved sending pairs of observers out on nine Canadian (Nfld.) trawlers during regular 10-12 day fishing trips to determine the numbers and weights of fish discarded at sea and to obtain length and age data on these fish.

Results obtained from these trips are applied to the total Canadian (Nfld.) otter trawl fishery and estimates of total catch removals by weight, numbers, size, and age composition made. These estimates are compared to actual Canadian (Nfld.) landings (by weight) and to estimates of these landings in terms of numbers, size, and age composition, based on the results of the survey trips.

Methods

Set and catch details were collected on a set by set basis onboard the trawlers. The discard portions of the catches were actually weighed, while the market portions were estimated for each set. These estimates were adjusted on the basis of actual turnout weights at the end of each trip.

Length frequencies of market and discarded fish were determined separately and, whenever possible, corresponding market and discard frequencies were completed for a particular set. Average weights were obtained for each sample completed by actual weighings. Some 16,800 discard and 23,000 market length measurements were collected during 1982. A summary of sampling, by division, is given in Table 1.

In arriving at catch estimates for the total Canadian (Nfld.) fishery, sets were first of all combined for each month within a unit area and discard rates calculated. These discard rates were applied to the actual Canadian (Nfld.) landings for the corresponding months and unit areas. The resulting catch estimates were combined to give weighted annual catch

estimates for each unit area. Unit area catch estimates were then combined to arrive at final weighted annual catch estimates for each division. Data were available from 24 month/unit area strata. Landings from these strata amounted to approximately 30% of total 1982 3LNO Am. plaice otter trawl landings.

In arriving at estimated catch length frequencies for the total Canadian (Nfld.) fishery, market and discard frequencies were weighted by set and combined separately for each month within a unit area. These market and discard frequencies were then combined on the basis of discard rates to give estimated catch frequencies which were applied to the estimated Canadian (Nfld.) catches for each month within a unit area. Monthly frequencies were combined to give weighted annual catch frequencies for each unit area. Unit area frequencies were then combined to give a final weighted annual catch frequency for each division.

Age keys used in estimating age compositions were composite keys, combining otoliths collected from discarded fish at sea with otoliths collected from landings onshore for a particular division and year.

Results and Discussion

Percentages discarded (by weight) in terms of strata which are used in the stratified-random survey design for Grand Bank (Doubleday 1981) are presented in Fig. 1. Market and discard estimates were weighted on a set basis to arrive at a final mean discard rate for a particular stratum. Discarding was most prominent in strata on the northern slope (92-274 m), the western slope (92-183 m), and to a lesser degree, in 56-91 m strata, along the eastern and southeastern portion of Grand Bank. These areas of high discarding compare relatively well with areas of high pre-recruit (i.e. fish <30 cm) abundance, as determined by Walsh (1982) in his analysis of 10 years of research survey data from the area.

Discard rates (by weight) and estimates of Canadian (Nfld.) American plaice otter trawl catches, based on these rates, are presented in Table 2. The overall discard rate in Div. 3LNO is estimated at 11.4%, with the lowest rate occurring in Div. 30 (5.6%). A comparison of actual landings and catch estimates indicate some 5800 t of undersized American plaice being discarded in Div. 3LNO during 1982.

Estimates of numbers of Div. 3LNO American plaice landed and caught by Canadian (Nfld.) otter trawlers, based on discard survey results, are presented in Table 3. It is estimated that 26.9% (by numbers) of Div. 3LNO American plaice caught were discarded during 1982, which would have amounted to some 22.6 million undersized fish being thrown overboard with an average weight of .26 kg.

Compared to estimates derived from previous years' surveys (Table 4), the overall discarding of American plaice in Div. 3LNO during 1982 has decreased only slightly from the 1981 level. Indeed, for the 5 year period, 1978-82, overall 3LNO discard estimates have been relatively consistent (between 8-14% by weight and 20-30% by numbers).

Length compositions of 1982 American plaice catch estimates, with discarded and market portions indicated, are given in Fig. 2. A higher proportion of males than females was discarded in all divisions, which is consistent with results from previous years. Overall, an estimated 39.0% of the males and 17.3% of the females were discarded during 1982. Discarding generally began at around 35-40 cm for both sexes with almost all fish below 30 cm being discarded.

A comparison of 1982 American plaice catch and landing age composition estimates for the Canadian (Nfld.) otter trawl fishery in Div. 3LNO is presented in Table 5. These estimates are based entirely on the results of the discard survey trips. Ninety-eight percent of the males discarded and ninety-four percent of the females discarded were between ages 5 and 11. The average age for discarded males was 8.2 years, while for females, it was 8.6 years. Catch/landing ratios by age group and, based on these estimates, are also presented in Table 5.

Conclusions

Estimates derived from 1982 discard survey trips indicate that the discarding of undersized American plaice, by Canadian (Nfld.) trawlers fishing in Div. 3LNO, continues to be significant. Results indicate an overall discard rate for Div. 3LNO of 11.4% by weight and 26.9% by numbers. This estimate amounts to some 22.6 million fish weighing about 5800 t being discarded during 1982. For the 5 year period, 1978-82, overall 3LNO American plaice discard estimates have been relatively consistent (between 8-14% by weight and 20-30% by numbers).

Although a detailed study aimed specifically at monitoring Div. 3LNO American plaice discarding is not planned in 1983, more generalized information collected by the Observer Program should be used to monitor the situation.

References

- Doubleday, W. G. (Ed.). 1981. Manual on groundfish surveys in the Northwest Atlantic. NAFO Sci. Coun. Studies, 2: 1-55.
- Stevenson, S. C. 1980. Summary of discarding and estimates of the total removals by Canadian trawlers during the 1978 and 1979 Divisions 3LNO American plaice fishery. NAFO SCR Doc. 80/VI/86.
1981. Summary of discarding and estimates of total removals by Canadian trawlers during the 1980 Divisions 3LNO American plaice fishery. NAFO SCR Doc. 81/VI/55.
1982. Summary of discarding and estimates of total removals by Canadian trawlers during the 1981 Divisions 3LNO American plaice fishery. CAFSAC Res. Doc. 82/19.
- Walsh, S. J. 1982. Distribution and abundance of pre-recruit and commercial-sized American plaice on the Grand Bank. J. Northw. Atl. Fish. Sci., Vol. 3: 149-157.

Table 1. Summary of Division 3LNO American plaice sampling during 1982 discard survey.

| Division | Number of trips: 9 Discards | | | Tonnage class: 5 (500-999 t) Market | | |
|----------|--------------------------------|-----------|-------------|--|-----------|-------------|
| | Male | Female | No. samples | Male | Female | No. samples |
| | No. meas. | No. meas. | | No. meas. | No. meas. | |
| 3L | 5,102 | 3,753 | 52 | 4,128 | 8,595 | 48 |
| 3N | 4,172 | 2,606 | 35 | 3,596 | 3,801 | 29 |
| 30 | 616 | 585 | 12 | 1,136 | 1,709 | 13 |
| Total | 9,890 | 6,944 | 99 | 8,860 | 14,105 | 90 |

Table 2. Comparison of total Canadian (Nfld.) American plaice otter trawl landings from Div. 3LNO with catch estimates derived from 1982 discard survey results.

| Division | Total Can. (N) OT landings (t) | Estimated Can. (N) OT catch (t) | % Catch discarded by weight | Observed number of sets (hours fishing) |
|--------------------|-----------------------------------|---------------------------------------|-----------------------------------|--|
| 3L | 28,178 | 32,019 | 12.0 | 97 (241.6) |
| 3N | 11,955 | 13,594 | 12.1 | 76 (193.1) |
| 30 | 4,803 | 5,086 | 5.6 | 17 (45.4) |
| 3LNO (combined) | 44,936 | 50,699 | 11.4 | 190 (480.1) |

Table 3. Estimates of numbers of Div. 3LNO American plaice landed and caught by Canadian (Nfld.) otter trawlers, based on 1982 discard survey results (x 10³).

| Division | Male | | | Female | | | Male+Female |
|--------------------|------------------|------------------|----------------|------------------|------------------|----------------|----------------|
| | Est. # landed | Est. # caught | % Discarded | Est. # landed | Est. # caught | % Discarded | % Discarded |
| 3L | 14,853 | 24,833 | 40.2 | 27,857 | 32,960 | 15.5 | 26.1 |
| 3N | 5,701 | 9,701 | 41.2 | 7,868 | 10,445 | 24.7 | 32.6 |
| 30 | 2,043 | 2,515 | 18.8 | 3,100 | 3,548 | 12.6 | 15.2 |
| 3LNO (combined) | 22,597 | 37,049 | 39.0 | 38,825 | 46,953 | 17.3 | 26.9 |

Table 4. Comparison of Div. 3LNO American plaice discard rate estimates by Canadian (Nfld.) otter trawlers for the years 1978-82.

| Year | 3L | | 3N | | 30 | | Total | |
|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | % By weight | % By number |
| 1978 | 11.5 | 28.0 | 2.6 | 6.6 | 7.3 | 18.1 | 8.6 | 22.0 |
| 1979 | 12.9 | 29.4 | 18.6 | 37.1 | 3.4 | 10.3 | 14.0 | 30.9 |
| 1980 | 4.8 | 13.7 | 13.9 | 30.8 | 4.2 | 9.4 | 8.1 | 20.2 |
| 1981 | 16.1 | 35.7 | 3.5 | 11.5 | 0.0 | 0.0 | 13.1 | 31.6 |
| 1982 | 12.0 | 26.1 | 12.1 | 32.6 | 5.6 | 15.2 | 11.4 | 26.9 |

Table 5. 1982 Div. 3LNO American plaice catch and landing age composition estimates for Canada (Nfld.) otter trawl fishery, based on discard survey results (X 10³).

| Age | 3L | | | 3N | | 30 | | | | 3LNO (Combined) | | |
|----------------|--------|----------|-------------------|--------|----------|-------------------|-------|----------|-------------------|-----------------|----------|-------------------|
| | Catch | Landings | Catch landings | Catch | Landings | Catch Landings | Catch | Landings | Catch Landings | Catch | Landings | Catch Landings |
| <u>Males</u> | | | | | | | | | | | | |
| 3 | | | | 21 | | - | | | | 21 | | - |
| 4 | 8 | | - | 187 | 3 | 62.33 | | | | 195 | 3 | 65.00 |
| 5 | 124 | 4 | 31.00 | 642 | 44 | 14.59 | 9 | | - | 775 | 48 | 16.15 |
| 6 | 486 | 71 | 6.85 | 1,033 | 146 | 7.08 | 26 | 1 | 26.00 | 1,545 | 218 | 7.09 |
| 7 | 2,036 | 623 | 3.27 | 1,282 | 483 | 2.65 | 161 | 86 | 1.87 | 3,479 | 1,192 | 2.92 |
| 8 | 3,695 | 1,705 | 2.17 | 2,077 | 1,157 | 1.80 | 377 | 254 | 1.48 | 6,149 | 3,116 | 1.97 |
| 9 | 4,714 | 2,049 | 2.30 | 2,041 | 1,589 | 1.28 | 457 | 326 | 1.40 | 7,212 | 3,964 | 1.82 |
| 10 | 5,940 | 3,498 | 1.70 | 1,492 | 1,378 | 1.08 | 658 | 562 | 1.17 | 8,090 | 5,438 | 1.49 |
| 11 | 4,818 | 4,016 | 1.20 | 682 | 661 | 1.03 | 466 | 454 | 1.03 | 5,966 | 5,131 | 1.16 |
| 12 | 2,506 | 2,387 | 1.05 | 209 | 205 | 1.02 | 251 | 250 | 1.00 | 2,966 | 2,842 | 1.04 |
| 13 | 435 | 429 | 1.01 | 24 | 24 | 1.00 | 87 | 87 | 1.00 | 546 | 540 | 1.01 |
| 14 | 68 | 68 | 1.00 | 11 | 11 | 1.00 | 23 | 23 | 1.00 | 102 | 102 | 1.00 |
| 15 | 3 | 3 | 1.00 | | | | | | | 3 | 3 | 1.00 |
| Total | 24,833 | 14,853 | | 9,701 | 5,701 | | 2,515 | 2,043 | | 37,049 | 22,597 | |
| <u>Females</u> | | | | | | | | | | | | |
| 2 | | | | 1 | | - | | | | 1 | | - |
| 3 | | | | 16 | | - | | | | 16 | | - |
| 4 | 4 | | - | 125 | 2 | 62.50 | | | | 129 | 2 | 64.50 |
| 5 | 52 | 1 | 52.00 | 394 | 36 | 10.94 | 12 | 1 | 12.00 | 458 | 38 | 12.05 |
| 6 | 141 | 16 | 8.81 | 529 | 106 | 4.99 | 30 | 8 | 3.75 | 700 | 130 | 5.38 |
| 7 | 623 | 122 | 5.11 | 646 | 196 | 3.30 | 69 | 26 | 2.65 | 1,338 | 344 | 3.89 |
| 8 | 1,504 | 679 | 2.22 | 1,165 | 545 | 2.14 | 261 | 151 | 1.73 | 2,930 | 1,375 | 2.13 |
| 9 | 3,985 | 2,637 | 1.51 | 1,591 | 1,138 | 1.40 | 526 | 376 | 1.40 | 6,102 | 4,151 | 1.47 |
| 10 | 4,776 | 3,596 | 1.33 | 1,582 | 1,449 | 1.09 | 716 | 637 | 1.12 | 7,074 | 5,682 | 1.24 |
| 11 | 6,297 | 5,586 | 1.13 | 1,425 | 1,425 | 1.00 | 566 | 541 | 1.05 | 8,288 | 7,552 | 1.10 |
| 12 | 6,895 | 6,606 | 1.04 | 1,230 | 1,230 | 1.00 | 489 | 483 | 1.01 | 8,614 | 8,319 | 1.04 |
| 13 | 4,814 | 4,753 | 1.01 | 773 | 773 | 1.00 | 326 | 325 | 1.00 | 5,913 | 5,851 | 1.01 |
| 14 | 2,534 | 2,526 | 1.00 | 516 | 516 | 1.00 | 195 | 194 | 1.01 | 3,245 | 3,236 | 1.00 |
| 15 | 922 | 922 | 1.00 | 283 | 283 | 1.00 | 153 | 153 | 1.00 | 1,358 | 1,358 | 1.00 |
| 16 | 317 | 317 | 1.00 | 120 | 120 | 1.00 | 108 | 108 | 1.00 | 545 | 545 | 1.00 |
| 17 | 70 | 70 | 1.00 | 31 | 31 | 1.00 | 72 | 72 | 1.00 | 173 | 173 | 1.00 |
| 18 | 26 | 26 | 1.00 | 13 | 13 | 1.00 | 24 | 24 | 1.00 | 63 | 63 | 1.00 |
| 19 | | | | 5 | 5 | 1.00 | 1 | 1 | 1.00 | 6 | 6 | 1.00 |
| Total | 32,960 | 27,857 | | 10,445 | 7,868 | | 3,548 | 3,100 | | 46,953 | 38,825 | |
| Weight (t) | 32,019 | 28,178 | | 13,594 | 11,955 | | 5,086 | 4,803 | | 50,699 | 44,936 | |

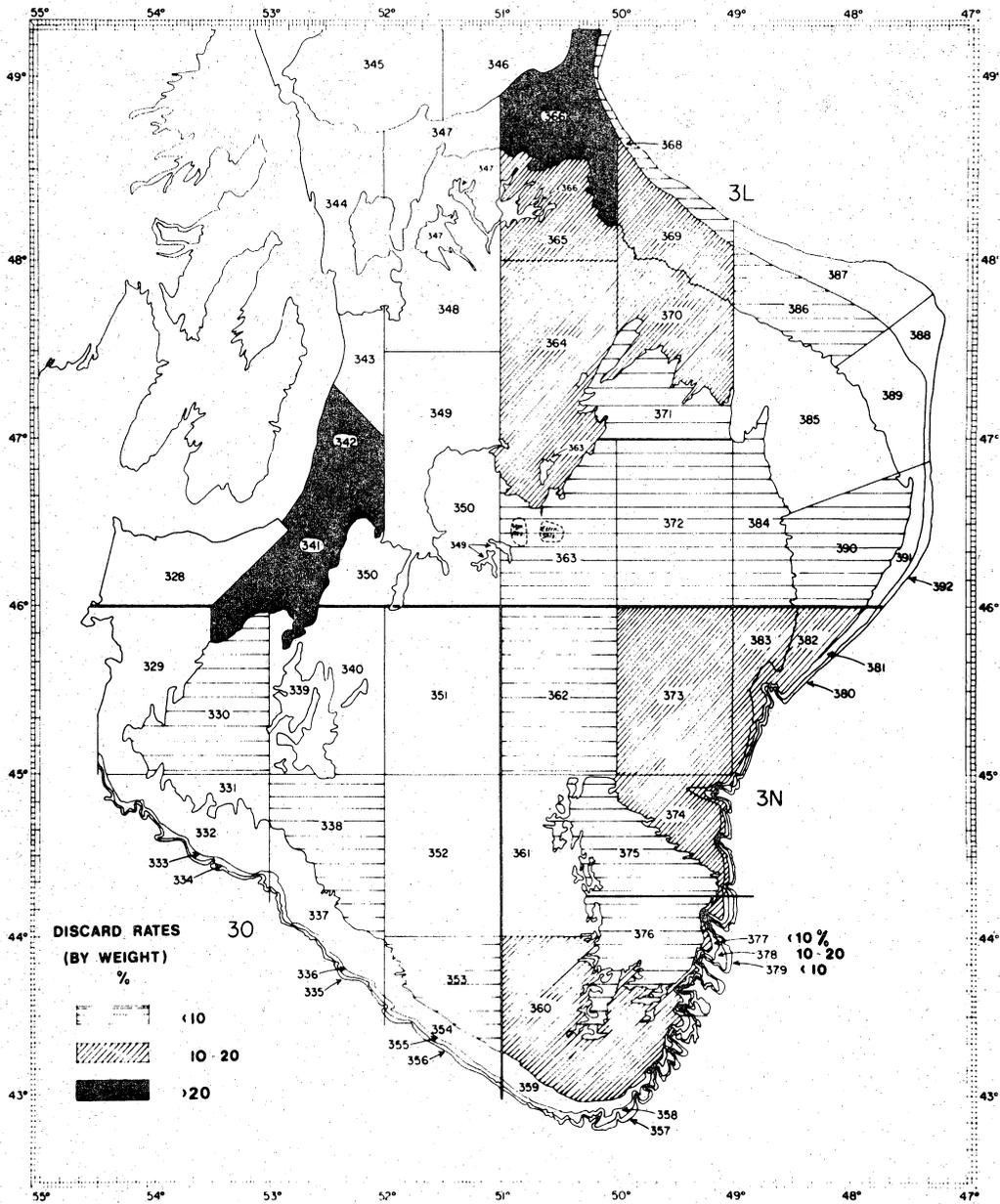


Fig.1. Summary of 1982 American plaice discard rates in terms of research survey strata.

1982 AMERICAN PLAICE

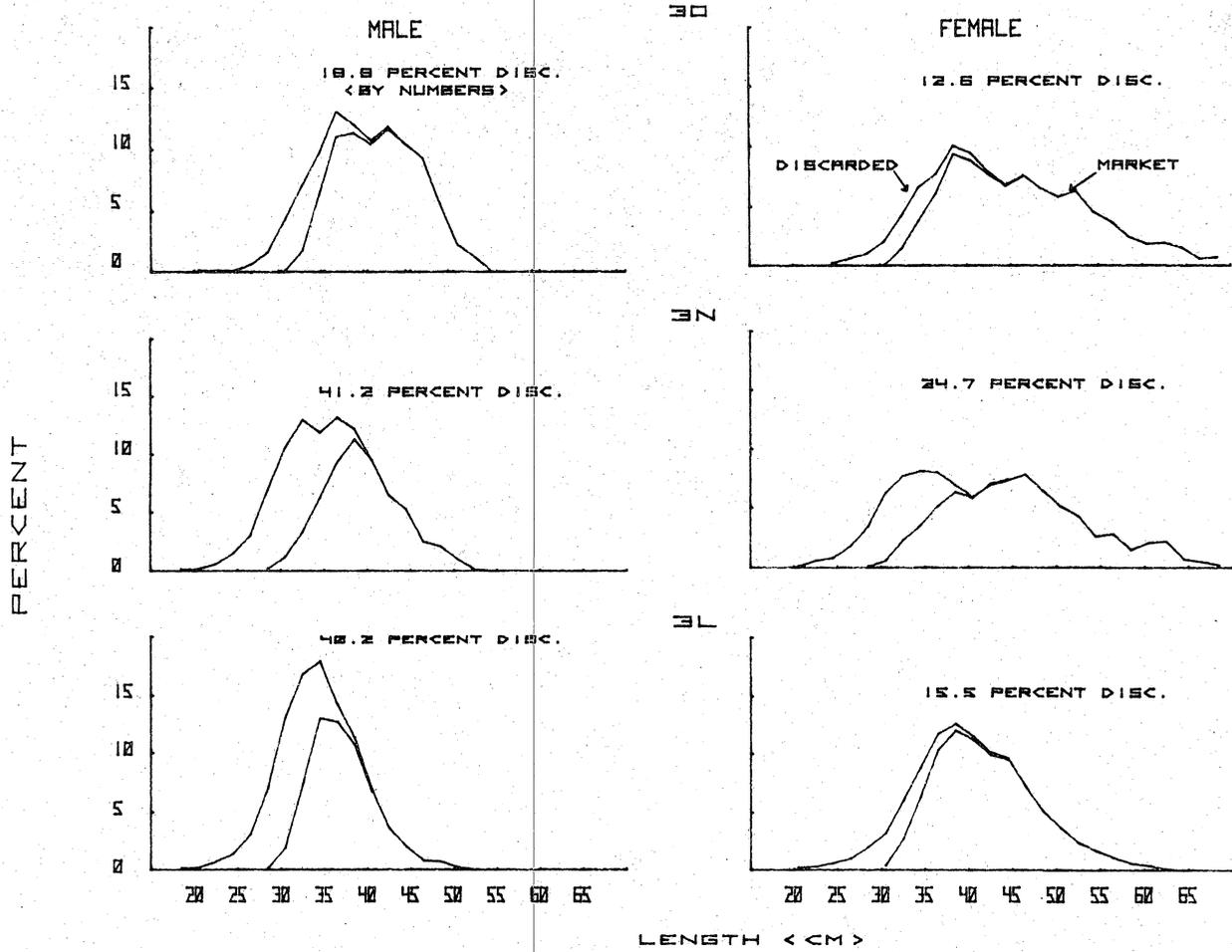


Fig. 2. Length compositions of market and discarded American plaice caught by Canadian (Nfld.) trawlers during 1982.

