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Larval Cod and Redfish from Flemish Cap,  
1-3 August 1982

by

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As part of the Flemish Cap Project 20 grid stations were sampled for fish eggs and larvae during 1-3 August 1982. This represented the fifth consecutive year that ichthyoplankton samples had been collected during late July or early August by a Canadian research vessel. Reported here are the results of larval cod and redfish size and abundance distributions.

Methods

Ichthyoplankton sampling was done at 20 grid stations over central Flemish Cap during 1-3 August 1982. At each station double, oblique bongo tows were made to 200 m, or within 5 m of the bottom, using paired 61-cm bongo frames and 0.333 mm mesh size nets. All fish eggs and larvae from both sides were removed and counted, measuring larvae to the nearest mm standard length. Processing of samples and calculation of abundances has previously been outlined (Anderson and Akenhead 1981).

Results

One larval cod, 41 mm in length, was captured over central Flemish Cap (47°00'N; 44°30'W) during this survey.

Larval redfish were observed in all except three of the 20 stations sampled. There was little pattern in the abundance distribution, other than the fact all three zero observations occurred at the margins of the area sampled (Fig. 1). Abundances ranged from 0.0 to 6.9 larvae m<sup>-2</sup> and 0.0 to 0.035 larvae m<sup>-3</sup> (Table 1). Total abundance for the 20 stations sampled was 8.2 x 10<sup>10</sup> larvae. Assuming these 20 stations represented 86% of all redfish larvae present in the 42-station area (cf. Anderson, MS 1981), then total comparative abundance was 9.5 x 10<sup>10</sup> larvae during this period.

The length frequency data indicated three distinct modes: 6-7 mm; 10-11 mm; and 16-28 mm (Fig. 2). The majority of larvae observed were from the largest category, with larvae from this group averaging 20.2 mm in length. Larvae in the remaining two groups averaged 6.5 mm and 10.7 mm, respectively.

Discussion

The occurrence of larval cod on Flemish Cap continued to be a rare event. Larval redfish were observed over central Flemish Cap, as in previous years. Differences in sampling dates makes direct comparison of station abundances between years difficult. However, station abundances in 1982 were about an order of magnitude greater compared to the same sampling date in 1981 (Anderson MS 1982). Comparison of total abundance estimated for the 42-station survey area indicated larvae ≥13 mm were an order of magnitude more abundant (Table 2).

Some comparison to other years can also be made. Abundance during 16-28 July 1980 was 8.4 x 10<sup>10</sup> larvae (Anderson, MS 1981). Only 7 days earlier, chronologically, this compares closely to the value of 8.7 x 10<sup>10</sup> estimated for 1982. Using the estimated mortality coefficient of 0.05 for 1980 (ibid.), then abundance 7 days later (i.e. the same mid-date as 1982) would have been ≈ 5.9 x 10<sup>10</sup> larvae, slightly lower than 1982.

A direct comparison to 1978 abundance is not possible; there was no mortality estimate for 1978 and the survey occurred 14 days earlier than 1982. However, given the high abundance estimated for 1978 and assuming even relatively high mortality coefficients, it appears 1978 was a more abundant year for larval redfish. For instance, mortality coefficients from a number of studies have ranged from 0.03 to 0.08 (cf. Anderson 1981). Using the highest coefficient 1978 abundances on Julian day 214 would have been  $\approx 9.2 \times 10^{10}$  larvae. Using a value of 0.05, as estimated for 1980 redfish, would give  $\approx 14.1 \times 10^{10}$  larvae for that date.

Based on these comparisons one might rank abundance of April/May released larvae during five years of surveys on Flemish Cap, in decreasing order of abundance, as: 1978, 1982, 1980, 1981 and 1979. In this case the years 1978, 1980 and 1982 were all an order of magnitude greater than in 1981, while 1979 larvae  $\geq 13$  mm were not observed on Flemish Cap in July. Speculation on causes resulting in such values is discussed elsewhere (Anderson, this session).

The length frequency distribution is very similar to all years except 1979. Mean population size of April/May released larvae in 1982 was similar to that in 1981, being 20.2 and 21.4 respectively. Distinct in the 1982 data were larvae at 10 and 11 mm length (Fig. 2). These represent larvae released earlier in June and May, in fact, represent larvae from a peak release period reported for that time (Templeman 1976). Larvae at 6 and 7 mm length indicate some extrusion of new larvae is still ongoing at this time, as reported in other years (Anderson and Akenhead 1981, Anderson MS 1981, MS 1982).

#### References

- Anderson, J. T. MS 1981. Larval fish surveys on Flemish Cap, 1980. NAFO SCR Doc. 81/IX/116.
- Anderson, J. T. MS 1982. Distribution, abundance and growth of cod (*Gadus morhua*) and redfish (*Sebastes* sp.) larvae on Flemish Cap, 1981. NAFO SCR Doc. 82/VI/37. Ser. No. N526.
- Anderson, J. T., and S. A. Akenhead. 1981. Distribution and abundance of redfish and cod larvae on Flemish Cap in 1978 and 1979. NAFO Sci. Coun. Studies, No. 1: 57-63.

Table 1. Larval fish data from Flemish survey, July-August 1982.

Sta.	Date	GMT	Position		Depth (m)	Species	No. per m <sup>3</sup>	No. per m <sup>2</sup>
			Lat.	Long.				
23	1 Aug 1982	1030	46°40'	44°30'	238	Redfish	0.010	1.2
24	"	1113	46°41'	44°30'	238	"	0.005	1.1
25	"	1848	47°00'	44°30'	137	Cod	0.002	0.1
"	"	"	"	"	"	Redfish	0.035	1.8
26	"	2040	47°20'	44°30'	220	"	0.020	4.0
27	"	2300	47°40'	44°30'	263	"	0.022	4.4
28	2 Aug 1982	0145	48°00'	44°30'	480	"	0.012	2.5
29	"	0415	48°00'	45°00'	311	"	0.013	3.3
31	"	0642	47°40'	45°00'	247	"	0.023	4.7
32	"	0845	47°20'	45°00'	168	"	0.019	2.9
33	"	1130	47°00'	45°00'	150	"	0.013	1.7
34	"	1336	46°40'	45°00'	190	-	-	-
35	"	1556	46°40'	45°30'	249	-	-	-
36	"	1827	47°00'	45°30'	267	Redfish	0.024	4.8
37	"	2100	47°20'	45°30'	260	"	0.030	6.6
38	"	2305	47°40'	45°30'	293	"	0.029	5.8
40	3 Aug 1982	0120	48°00'	45°30'	368	"	0.024	4.7
42	"	0335	48°00'	46°00'	878	"	0.033	6.9
43	"	0555	47°40'	46°00'	750	-	-	-
45	"	0815	47°20'	46°00'	329	Redfish	0.005	1.0
47	"	0705	47°00'	46°00'	322	"	0.012	2.2
49	"	0920	46°40'	46°00'	351	"	0.006	1.3

Table 2. July-August abundances estimated for larval redfish (*Sebastes* sp.) >13 mm on Flemish Cap.

Year	Sample Mid-date	42-station Abundance	42-station abundance for Julian day 214
1978	201	$2.8 \times 10^{11}$	$1.4 \times 10^{11}$ *
1979	193	Nil	Nil
1980	207	$8.4 \times 10^{10}$	$5.9 \times 10^{10}$ *
1981	215	$7.9 \times 10^9$	$7.9 \times 10^9$
1982	214	$8.7 \times 10^{10}$	$8.7 \times 10^{10}$

\*Estimated by extrapolation using  $N_1 = N_2 e^{-Zt}$ , where  $Z = 0.05$ .

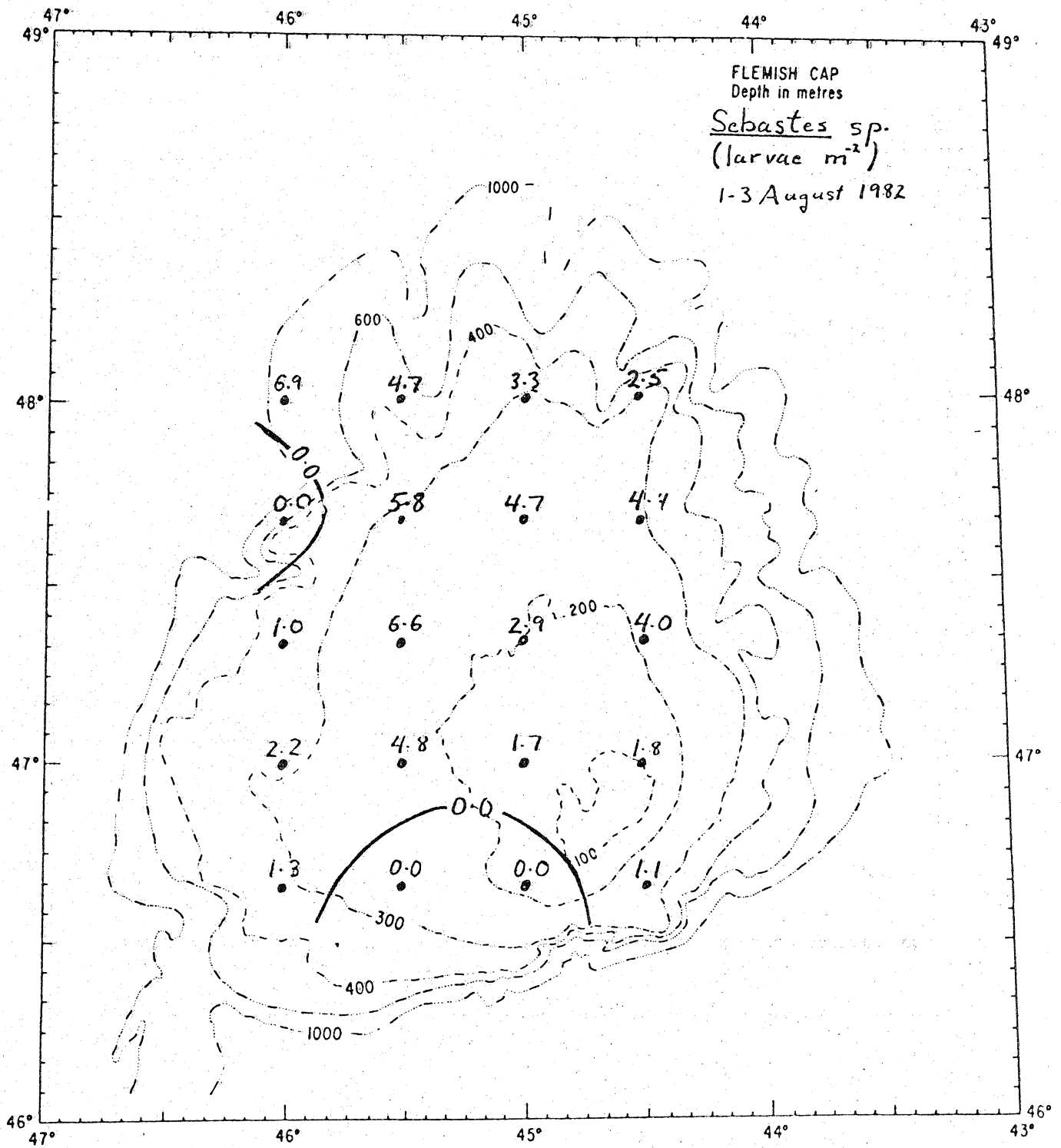
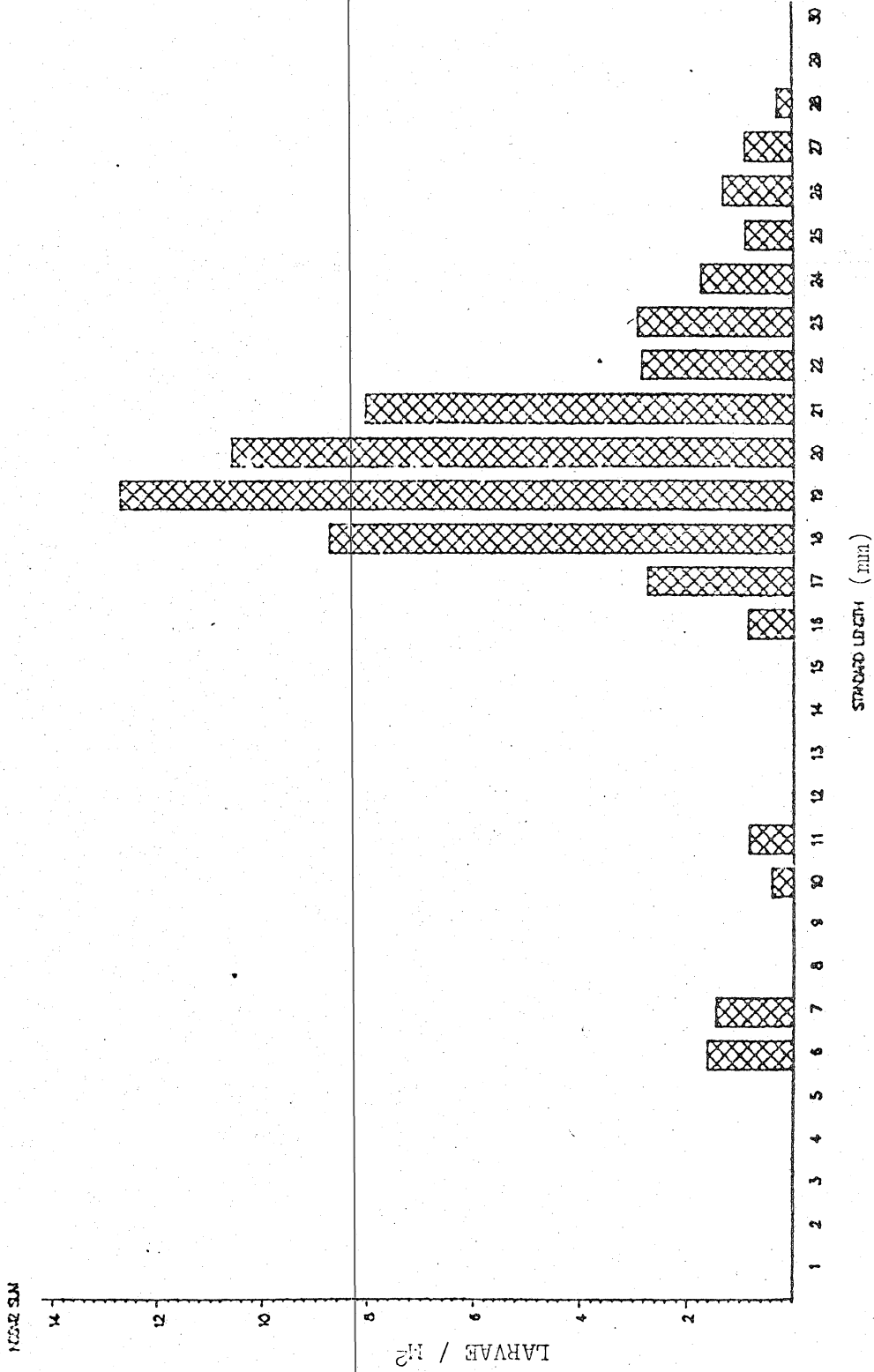


Figure 1. Distribution and abundance of larval redfish (*Sebastes* Sp.) on Flemish Cap, 1-3 August 1982 (larvae m<sup>-2</sup>).

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FIGURE 1



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Figure 2. Length composition of larval redfish (*Sebastes* sp.) on Flemish Cap, 1-3 August 1982.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

In the second section, the author outlines the various methods used to collect and analyze the data. This includes both primary and secondary data collection techniques. The primary data was gathered through direct observation and interviews, while secondary data was obtained from existing reports and databases.

The third section provides a detailed description of the data analysis process. This involves identifying trends, patterns, and anomalies within the dataset. Statistical tools and software were used to facilitate this process, ensuring that the results are both accurate and reliable.

Finally, the document concludes with a summary of the findings and their implications. It highlights the key insights gained from the study and offers recommendations for future research and practice. The author notes that while the current study provides valuable information, there are still several areas that require further investigation.