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The Canadian Fishery for Northern Shrimp (*Pandalus borealis*)
on Flemish Cap (NAFO Division 3M), 1993

by

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INTRODUCTION

The fishery for northern shrimp on Flemish Cap (Fig. 1) began in late April, 1993 when two Canadian vessels were granted exploratory permits to fish the species in NAFO Division 3M. Catch rates and size of shrimp were acceptable by industry standards but there were some initial problems with soft shell and pale colour. Despite these problems, word spread quickly to both sides of the Atlantic and, by late July, about 50 vessels from up to nine nations were reported fishing for shrimp in the area. Preliminary reports (to August 23) indicate that over 21,000 tons of shrimp have been taken so far in 1993 and that, as of August 31, 18 vessels were still active in the fishery.

The remainder of the Canadian northern shrimp fleet was given access to the area shortly after the exploratory fishery demonstrated the potential of the resource. Overall, twelve Canadian vessels participated in the fishery from about late April to early August, taking approximately 3800 tons of shrimp during that period. By-catches of redfish increased substantially over time and, on July 27, Canadian licence holders were instructed that fishing for shrimp on the Cap could only be continued if the Nordmore grate was used to minimize by-catch. Faced with declining catch rates of shrimp, increased redfish by-catch and access to the traditional fishing areas to the north, the remaining Canadian vessels departed at this time or shortly thereafter.

Data from the Canadian fishery on Flemish Cap are available (albeit incomplete) from vessel hauls, fishing log books and observer reports for the May to early August period. Distribution of effort, catch per unit effort (CPUE) and size composition data are presented along with information on by-catches and shrimp discards.

MATERIALS AND METHODS

Catch (kilograms) and effort (hours fished) were compiled from vessel and observer reports over the fishing period. The distribution of effort over the grounds was examined over various time periods and unstandardized CPUE's (kg/hr) were calculated by day. Size composition of the shrimp catches sampled by observers were summarized by area/time and depth and a single length frequency distribution representing the total Canadian catch at carapace length (CL) also was constructed.

Data on by-catches were compiled as percentages of the total observed catch and, for redfish, as kg per kg shrimp. The data available on the size composition of the redfish by-catches were summarized by area/time and depth. Estimates of the proportions of discarded shrimp also were obtained from the observer data.

RESULTS

Distribution of effort

Fishing positions of Canadian vessels reported for the May to early August period indicated a concentration of activity north of 47°N in an arc extending from approximately 46°30'W to 44°W, in close association with the 400 m contour (Fig. 2). The data were segregated into six periods of varying duration which describe changes in the distribution of fishing effort over time (assuming that the information available is representative of overall fleet operations). During the first three weeks of May, fishing was limited to a small area on the northwest slope of the Cap. In late May and early June, effort was again concentrated along the northwestern slope but was more widespread along a southwest - northeast axis. More activity was reported in northernmost areas during the second week of June and effort throughout the remainder of the month was widely distributed over the Cap, north of 47°N. The limited activity reported for most of July occurred in the northwestern area, previously fished in May. Effort shifted again during the last week of July and the first week of August to the northernmost grounds at 48°N. In all instances, effort was concentrated near the 400 m contour. Positions remote from the main clusters likely represent errors in reporting.

CPUE

Daily catch rates for early May, when fishing was reported from the northwestern slope, were high, averaging over 1000 kg/hr (Fig. 3). In late May and early June, CPUE's dropped to about 700 kg/hr, subsequently declining steadily to late July. Catch rates, although highly variable, improved thereafter when effort shifted to the northernmost part of the Cap. The displacement of fishing effort to the north, east, west and north again, as noted above, might reflect the fleet's response to declining catch rates and/or increasing redfish by-catches over time (see below).

Length distributions

The estimated size composition of the Canadian catches up to the second week in June shows that large, female shrimp with a modal length of about 26 mm CL dominated both by number and weight (Fig. 4). Three size/age groups of males also were evident at approximately 16, 20 and 23 mm. A more detailed analysis of these data is given in Parsons and Veitch (this meeting).

Separation of the length frequency data by 50 m depth intervals (Fig. 4) shows a decrease in the proportion of male shrimp (<25 mm) with increasing depth, typical for the species. Catches from depths greater than 450 m were composed almost exclusively of large, female shrimp but catch rates were too low to attract significant effort.

Size composition data (Fig. 5) for the first three periods of fishing activity (refer Fig. 2) show that the females were most prevalent in the catches both over time and space. The proportion of males appeared to decline slightly from May to early June, possibly reflecting differences in distribution between fishing areas.

By-catches

A summary of catch composition by species and month from observer records (Table 1) clearly shows that redfish (*Sebastes* spp.) occur most frequently as by-catch. Other commercially valuable species, such as cod and Greenland halibut, are taken in small quantities. Redfish by-catch for the May - June period was estimated at approximately 10 to 15% of the total catch of all species.

The catch (kg) of redfish per kilogram of shrimp (Fig. 6) available from daily vessel hauls provides a longer time series and indicates that redfish by-catch was fairly constant through May and most of June. By late June, however, catches of redfish began to increase sharply and remained high throughout July, the ratio exceeding one on several occasions.

Measurements of redfish obtained by observers (Fig. 7) showed a single mode of small fish at 14 cm. This group (year class?) occurred consistently over time and throughout the depth range fished.

Shrimp discards

Shrimp discards were estimated by observers at 15% of the total shrimp catch in May and 20% in June. These figures might not be representative of the Canadian fishery since they represent less than 500 tons of catch compared to the total catch of approximately 3800 tons. No length measurements of discarded shrimp are currently available to infer whether discarding is due to size or quality. The problems with colour and, especially, soft shell, encountered early in the fishery, suggest the latter.

DISCUSSION

The fishery for northern shrimp on Flemish Cap is new and the data available at this point are incomplete. Aside from data collected during Spanish groundfish surveys from 1988 to 1992 (Sainza, 1993; Vazquez, 1993), there is very little historical information on the biology of the species in this area. Points worth noting, based on what we have seen so far, include:

1. Total removals of shrimp to date in 1993 exceed 20,000 tons, which is more than the annual allowable catch for either the Gulf of St. Lawrence fishery or the northern (Div. 3K - 0B) fishery in Canadian waters. Lacking information on population biology, it is difficult to speculate how a removal of this magnitude will impact on the resource.
2. Catch rates declined substantially over the season, reflecting fishing mortality and/or seasonal changes in distribution.
3. Quality of shrimp, at least for Canadian operations, has been reported to be inferior because of poor colour and/or soft shell, and has apparently been the cause, at times, for high levels of discarding.
4. Redfish by-catch is a problem. Because of the small sizes encountered in 1993, Nordmore grates might not have been effective for excluding the smallest of these. They will, however, become increasingly effective as these animals (single year class?) grow.

REFERENCES

Parsons, D.G. and P.J. Veitch, 1993. Age and growth of northern shrimp (*Pandalus borealis*) on Flemish Cap (NAFO Division 3M). (This meeting).

Sainza, C. 1993. Northern shrimp (*Pandalus borealis*) stock on Flemish Cap. NAFO SCR Doc. 93/22, Serial No. N2199: 5p.

Vazquez, A. 1993. Results from bottom trawl surveys of Flemish Cap in July 1992. NAFO SCR Doc. 93/19, Serial No. N2196: 22p.

Table 1. By-catch information from the Canadian fishery for shrimp on Flemish Cap, 1993, obtained by observers.

	April		May		June	
	WT.(t)	%	WT.(t)	%	WT.(t)	%
SHARK (NS)	0.25	0.10
SKATE (NS)	0.00	0.18	0.44	0.16	0.58	0.22
COD	0.00	0.06	0.16	0.06	0.08	0.03
WOLFFISH (NS)	.	.	1.29	0.46	0.60	0.23
EELPOUTS (NS)	.	.	0.11	0.04	0.10	0.04
REDFISH (NS)	1.40	82.55	32.47	11.49	38.09	14.51
G. HALIBUT	.	.	0.23	0.08	0.46	0.17
SHRIMP (P.B)	0.27	16.16	246.90	87.34	220.64	84.04
OTHER	0.02	1.06	1.09	0.39	1.76	0.67
Total	1.70	100.00	282.70	100.00	262.55	100.00

FLEMISH CAP NAFO DIVISION 3M

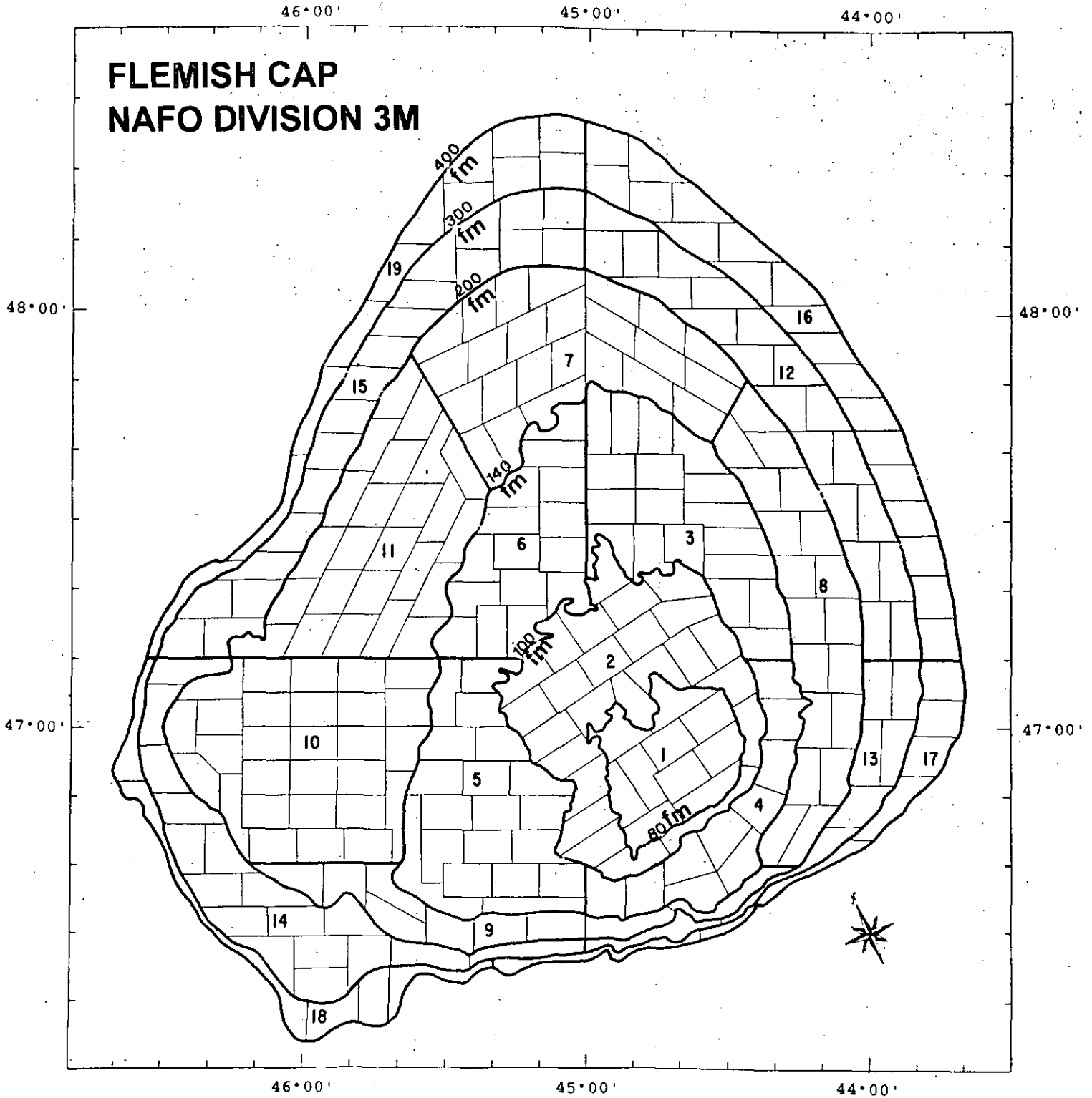


Figure 1

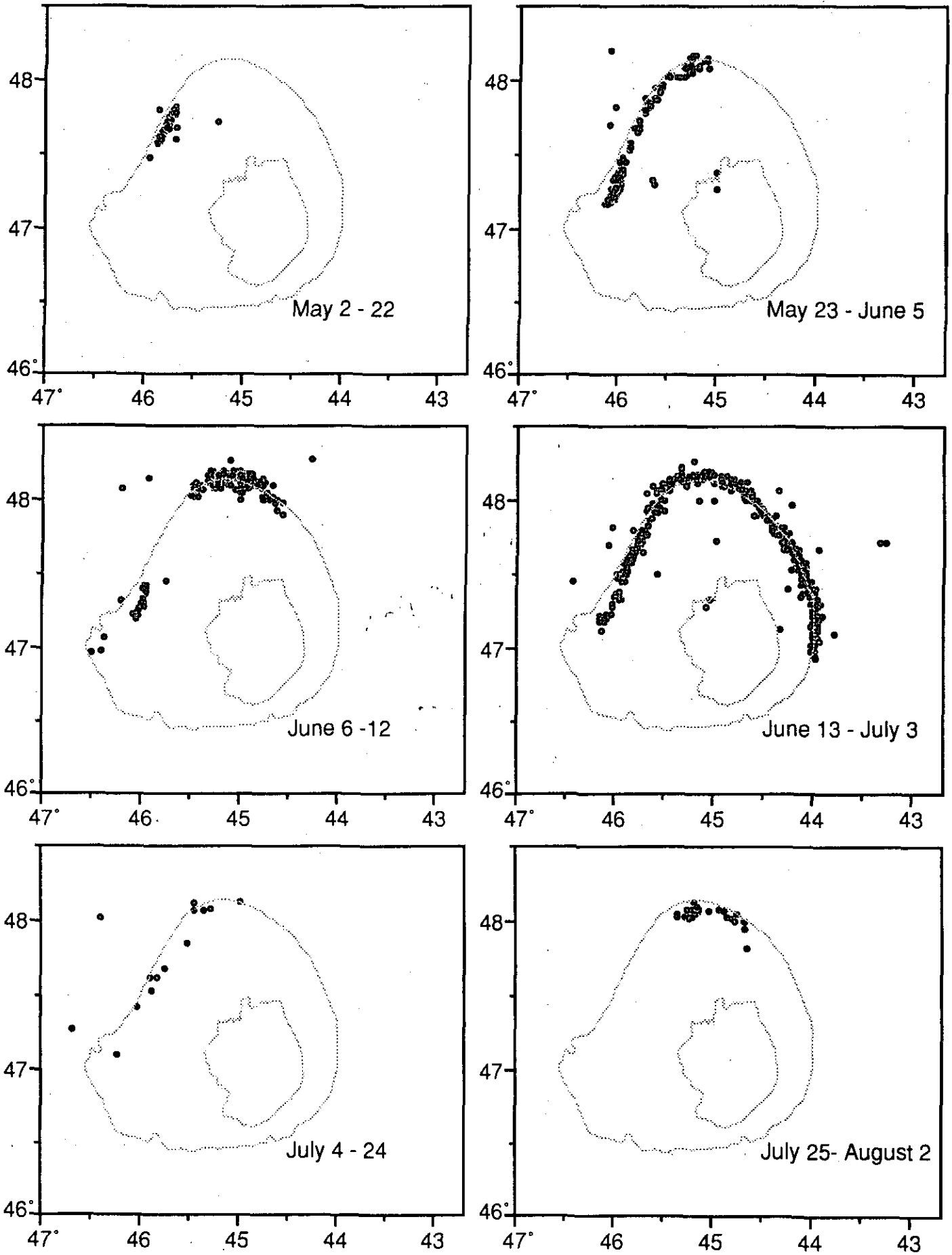


Fig. 2 Fishing positions on the Flemish Cap from May 2 - August 2, 1993.

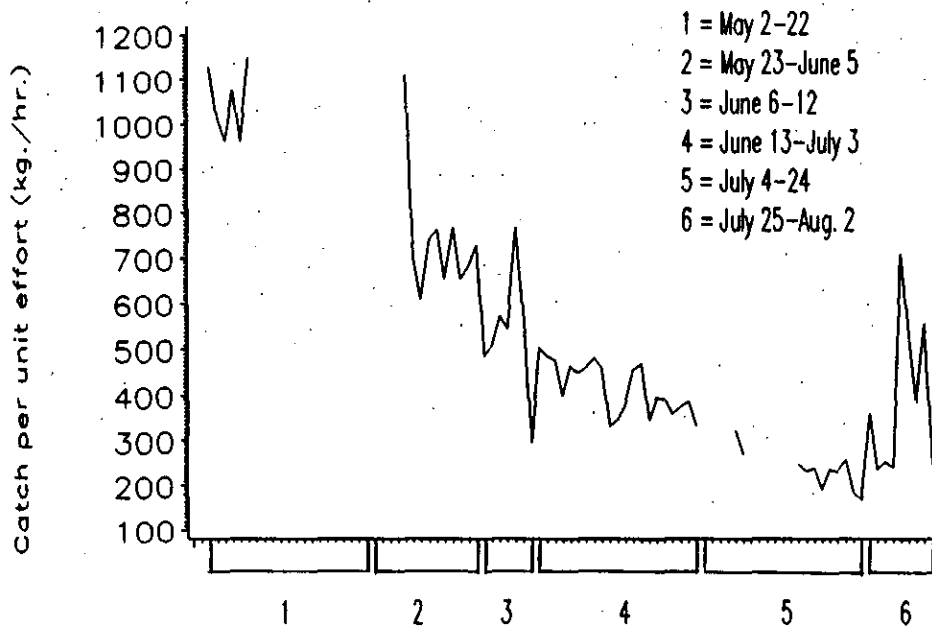


Fig. 3 Catch per unit effort (kg./hr.) by day for Canadian shrimp vessels - NAFO Div. 3M, 1993.

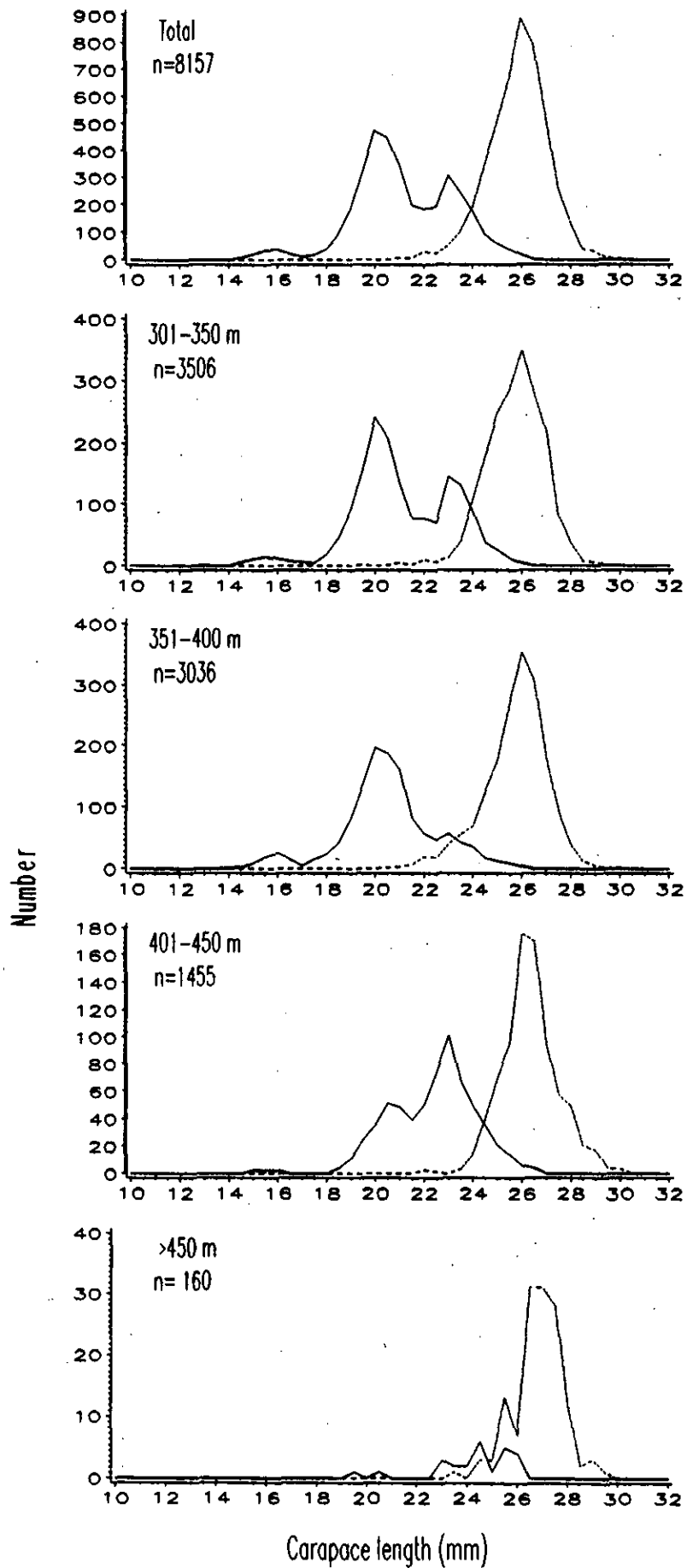


Fig. 4 Commercial length distributions by sex (Canada), from observers, Div.3M, 1993 (solid line=male, broken line = female, n=number measured).

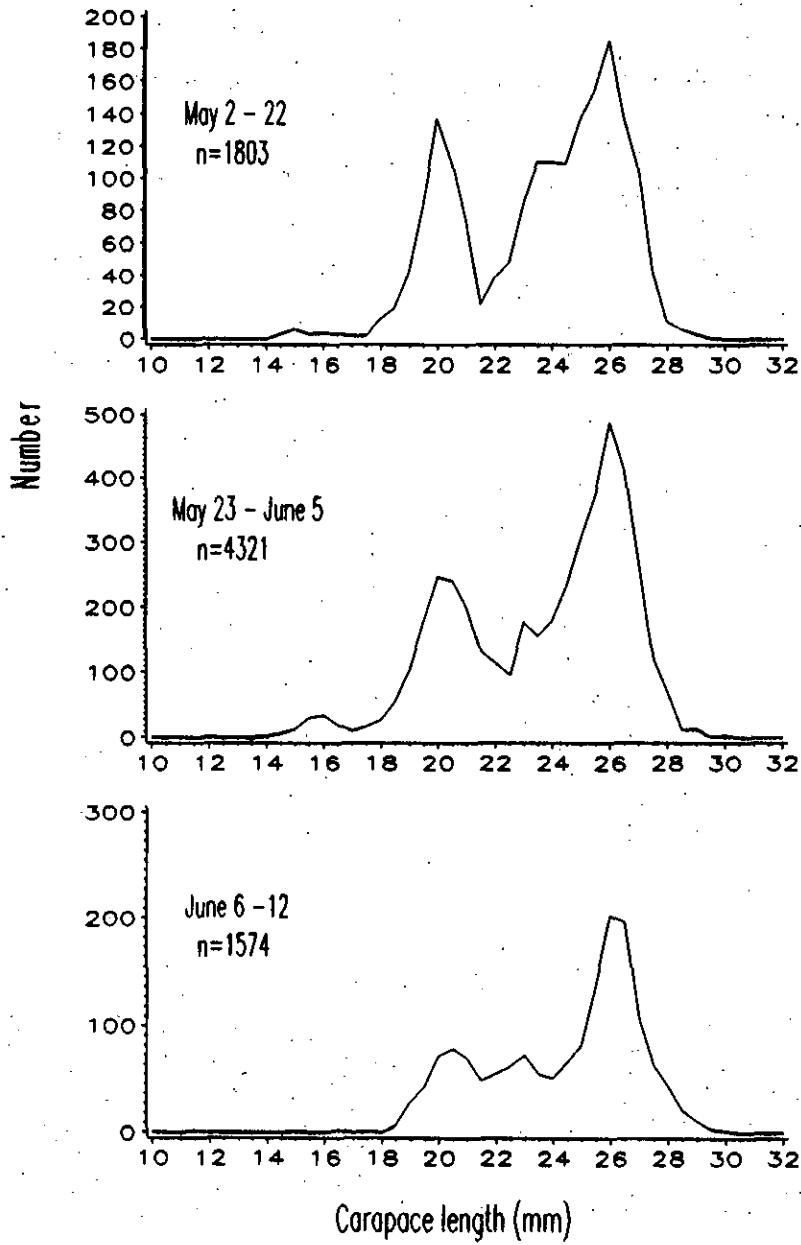
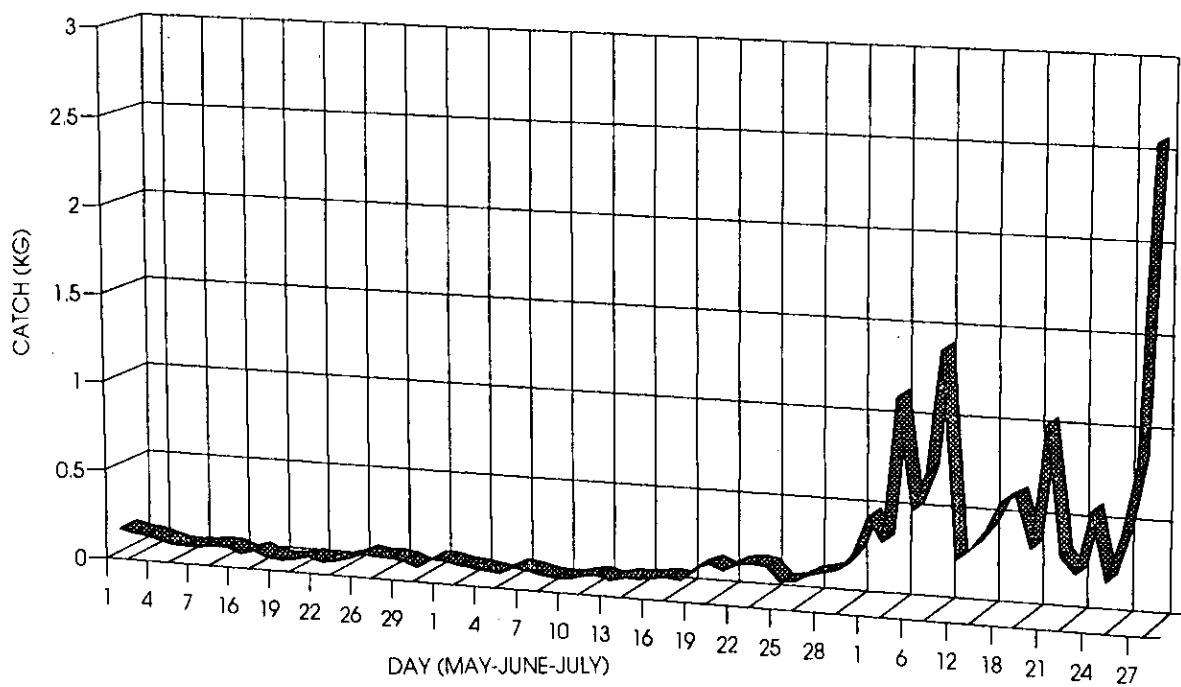


Fig. 5 Commercial length distribution by period (Canada), 1993, from observer data, 1993 (n=number measured).

Fig. 6. Kg. Redfish per Kg. Shrimp, NAFO Div. 3M, May-July, 1993.



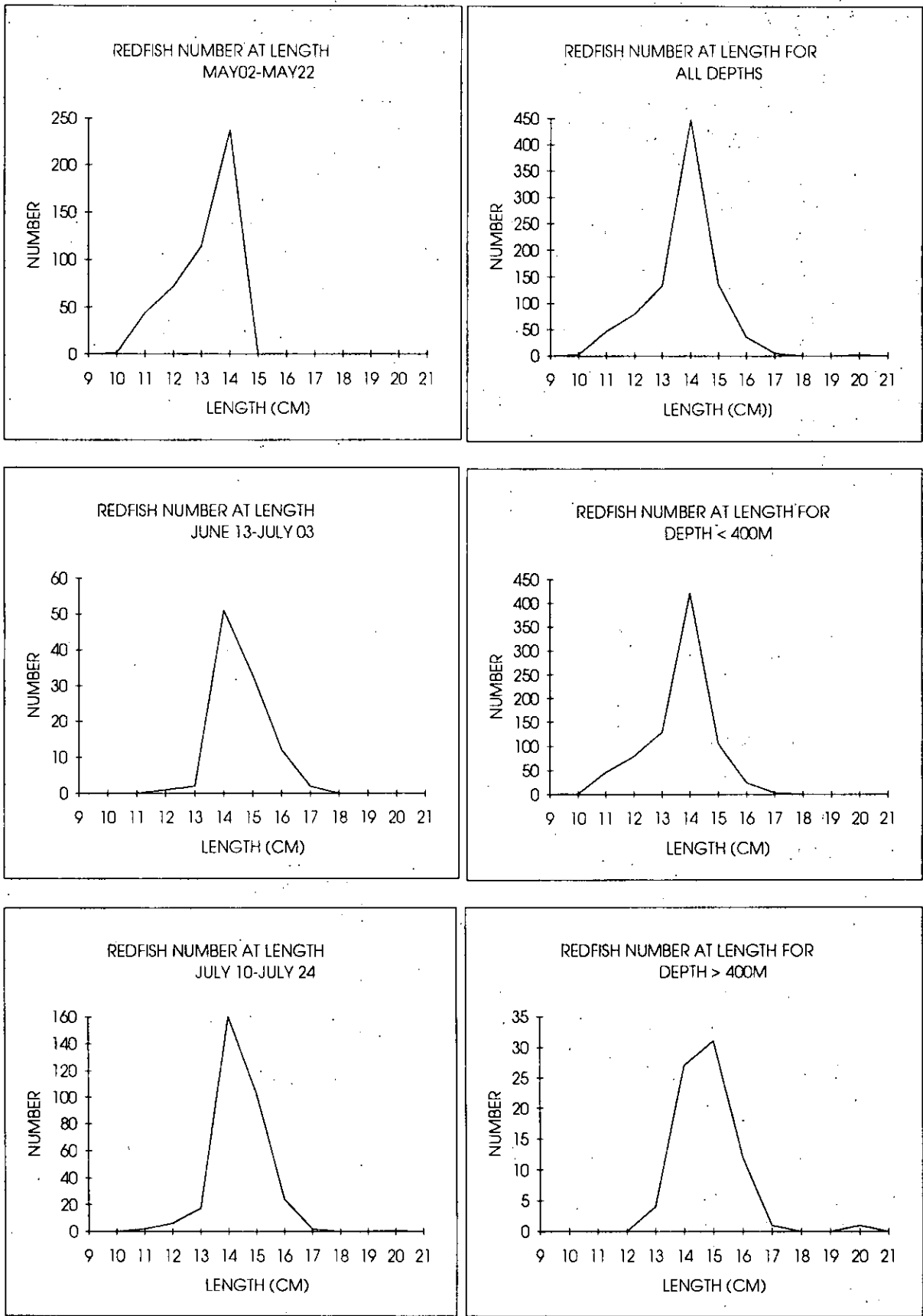


Fig. 7. Redfish length composition data from NAFO Div.3M by time and depth intervals.