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Development of the Canadian Silver Hake Fishery, 1987-96

by

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Abstract

The chronology of directed silver hake fishing activity is documented from 1987-96. From 1987 to 1994 the fishery was essentially experimental or exploratory in nature. A commercial directed silver hake fishery was first seen in 1995 and 1996, and was conducted in Emerald and LaHave basins. Catch rates doubled in 1996 over those seen in 1995, but this increase is likely due to increased levels of experience in fishing this species rather than changes in abundance. Size composition of basin catches in both years was composed of slightly smaller fish than taken seaward of the SMGL in the same months. Bycatches, particularly of cod, haddock, and pollock, were very low.

Introduction

Canada has made attempts to harvest silver hake on the Scotian Shelf sporadically from the 1970s and with a concerted effort since the late 1980's (Bradshaw *et al.*, 1990). Initially, fishing activity was restricted to experimental trips to determine suitable gear configurations, to explore new fishing areas and to establish products for market. Various forms of government financial support was provided for these trials and sometimes chartered foreign vessels were involved. At the last review of the 4VWX silver hake resource (NAFO 1996), it was noted that the 1996 Canadian catch was likely to be much higher than in any previous year. It has become of importance therefore, to have more detailed data on Canadian fishing for silver hake from a stock assessment viewpoint.

The present study documents the development of the Canadian silver hake fishery from 1987, and examines catch rates, bycatch, and size of individuals in the catch in the years in which a true commercial fishery occurred.

Methods

Information on Canadian silver hake initiatives was obtained from DFO internal correspondence, as well as technical reports and observer trip reports. Data from commercial fishing was obtained from Canadian observer data. Sampling for length by observers was substantial in the 1996 Canadian fishery, with 43,000 fish measured. Commercial removals at age for 1996 were calculated using the length frequency data from the Canadian fishery and monthly age-length keys constructed from Canadian aging data from the foreign fishery.

Results

Chronology of fishing activities by commercial vessels

A summary of experimental and exploratory, and commercial, catches from 1987 to 1996 is presented in Table 1. "Official" statistics, i.e. those recorded in the DFO statistical system do not agree exactly with those collected from developmental and observer reports, because not all

developmental catches were reported as commercial landings and also there was some fishing other than that sponsored through the developmental program. However, both sources indicate that there was little fishing prior to 1996. Canada's activity in harvesting 4VWX silver hake progressed as follows:

1987: An experimental harvesting and processing project was conducted using 65' vessels and 90 mm diamond mesh codends (Canadian redfish gear). Fishing took place seaward of the Small Mesh Gear Line (SMGL) in close proximity to the USSR and Cuban fleets. This experiment ended after only a few sets, and was considered unsuccessful due to poor catch rates.

1988: A joint venture with foreign processors was attempted, using 65' vessels fishing seaward of the SMGL. The intention was for Canadian vessels to catch silver hake and transfer codends at-sea to foreign factory trawlers for processing. The total catch in this venture was 45 mt in five days of fishing. The experiment was ended due to unsatisfactory catch rates, thought to be caused by gear configuration or vessel power problems.

1989: A second codend transfer experiment was conducted. During April three 65' vessels fished seaward of the SMGL under charter arrangements with foreign factory vessels. Catches were modest, at 292 mt. In August, a single 45' vessel conducted experimental fishing on Georges and Browns banks. Total catch was 1 mt.

1990: A series of gear experiments were conducted using 45' and 65' vessels, fishing both seaward of the SMGL and in Emerald and LaHave basins. Three trawl designs were tested, with a total catch of approximately 50 mt.

1991: A single 45' vessel made several short trips to obtain silver hake for testing of surimi production. The total catch was 33 mt.

1992: A 170' trawler conducted an exploratory fishing trip for silver hake during which a series of gear experiments were conducted to determine the effectiveness of a separator grate in reducing bycatch of cod, haddock, and pollock while directing for silver hake. Sets were made both seaward of the SMGL and in Emerald and LaHave basins. Total catch of silver hake was 60 mt.

1993: No directed silver hake fishing was conducted by Canada.

1994: A gear experiment was conducted by 45' vessels to compare catches and size distribution of silver hake with 55 mm square and 60 mm diamond mesh codends. The total catch was 78 mt.

1995: This year was the first in which the Canadian fleet showed some signs of commercial success, with 45' and 65' vessels directing for silver hake in the Emerald and LaHave Basin area (Fig. 1). Use of a separator grate in the lengthening piece of the codend was mandatory to reduce incidental catches. Fishing occurred from July through October, with a total catch of 335 mt.

1996: A more intensive commercial fishery was conducted by the same fleet that participated in 1995, with 45' and 65' vessels fishing in the vicinity of Emerald and LaHave basins (Fig. 1). More than 100 trips were made, with a total catch of 3,485 mt. Vessels were permitted to use either 60 mm diamond mesh codends, or 55 mm square codends. Approximately half the vessels chose to use the square mesh gear. As was the case in 1995, a separator grate was mandatory.

1995 and 1996 commercial fisheries.

It is clear from the above chronology that it was only in 1995 and 1996 that a true commercial fishery developed, earlier efforts being of an experimental nature.

Catches: Reported catches of silver hake by Canadian vessels, from the DFO statistical system, are presented in Table 2, by month and vessel tonnage class for 1995 and 1996. In 1995 the domestic fishery commenced at a relatively late date, with most catches occurring in July and August. Catches were about equal between TC 2 and 3 vessels. In 1996, the fishery began in April and continued through August, with the bulk of the catches occurring in May and June. Catches by TC 3 vessels predominated, although TC 2 and 4 vessel catches were substantial also.

Catch rates: Observer coverage of domestic silver hake directed effort was relatively high in these years, at approximately 50% in 1995 and 25% in 1996, on a trip basis. In aggregate, the catch rate for this fleet was 0.5 mt/hour in 1995, doubling to 1.0 mt/hour in 1996; however, fishing activity occurred much later in the season in 1996 compared to 1995.

Bycatches: Bycatches of other species, based on observer data, were low, at less than 25 kg/hour (Table 3). As a percentage of silver hake bycatch was less than 3%.

Length compositions: A summary of sampling effort by Canadian observers, with observed and total catch, is presented in Table 4. Size distribution of the Canadian commercial fishery catch by month for 1995 and 1996 is shown in Fig. 2 and 3. Size of the catch varied in 1995, with a modal length of 26 and 25 cm for July and August, respectively, which represents age 2 fish. In August and October there was evidence of a shoulder at approximately 27 cm, which represents the catch of 3 year old silver hake. In 1996 the modal length varied from 24 to 26 cm. There was also evidence of the 1995 year class entering the fishery at age 1, with a peak of fish at 16-18 cm appearing in the catch during June and July.

Size distribution of the foreign catch seaward of the SMGL is also presented by month Fig. 2 and 3 for comparison with the Canadian size distribution in months where both fleets fished. The mode for both years was slightly larger for the foreign fishery, at 27 cm and 27-28 cm for 1995 and 1996 respectively. The 1995 year class was also seen in the 1996 foreign fishery, with a higher proportion of age 1 fish appearing in May, June, and July.

Square mesh codends were commonly used by the Canadian fleet in 1996, with the regulations permitting 60 mm diamond or 55 mm square. Square mesh was used for approximately 36% of the sets where the mesh type could be determined based on Observer data, with square mesh most commonly used in June and July (Fig. 4). The size distribution of the catch for each mesh type, weighted by the catch of sampled sets and aggregated over the entire fishery, is presented in Fig. 5. The modal length for both mesh types was 26 cm; however the square mesh caught about half the proportion of fish over the 14-20 cm range, implying greater escapement of age 1 fish.

Age compositions: The catch was composed mostly of age 2, 3, and 4 fish (Table 5), which is similar to the situation seen in the foreign fishery. However, in July, catches of age one fish were substantial, at 65% of the total number.

Conclusions

Canadian development of a commercial fishery for 4VWX silver hake over the period 1987 to 1994 was essentially experimental or exploratory in nature, while methods to achieve commercially viable catch rates and processing techniques were developed. A commercial directed silver hake fishery, conducted without subsidy, was first seen in 1995 and 1996.

Catch rates doubled in 1996 over those seen in 1995 in this basin fishery; however this increase is likely due to increased levels of experience in fishing this species rather than changes in abundance. Size composition of basin catches in both years was composed of slightly smaller fish than taken seaward of the SMGL in the same months. The modal age in 1996 catches was age 2, but 3 and 4 year olds were also important. There were also substantial number of age 1's caught. Bycatches, particularly of the traditionally fished gadoids, cod, haddock, and pollock, were very low.

References

- Bradshaw, V. et al. 1990. The 1989 Canadian fishery for silver hake. Can. Ind. Rep. Fish. Aquat. Sci. 203: 45p + appendices.
- NAFO 1996. Scientific Council Reports 1996. Northwest Atlantic Fisheries Organization, Dartmouth, N.S., Canada.

Table 1. 4VWX silver hake catches (mt) by Canada, for developmental (1987-94) and commercial (1995-96) fisheries.

Year	Developmental	Commercial	Official Statistics; NAFO & Canada*
1987	0.36		13
1988	45		9
1989	292		337
1990	89		10
1991	33		34
1992	2		133
1993	-		1
1994	78		76
1995		335	271*
1996		3,485	3480*

Table 2. Reported silver hake directed catches (mt) by Canadian vessels, by month and vessel tonnage class from Canadian landings data.

year	month	vessel tonnage class	catch
1995	July	2	55
		3	86
	August	2	40
		3	67
	September	3	1
		October	2
	1995 Total		271
1996	April	3	40
		2	185
		3	897
		4	298
	June	2	270
		3	1008
		4	380
		July	2
		3	144
		4	61
	August	2	16
		3	121
	1996 Total		3480

Table 3. Catches, bycatch and catch rates in the Canadian commercial silver hake fishery, from observer data.

year	species	catch (kg)	CPUE (kg/hour)	% silver hake
1995	cod	4	0.01	0.002
	haddock	46	0.14	0.032
	silver hake	145,925	456.51	--
	pollock	20	0.06	0.014
	redfish	100	0.31	0.069
	halibut	85	0.27	0.058
	<i>Illex</i>	277	0.87	0.190
	others	1,187	3.71	0.813
	1995 Total	1,719	5.38	1.178
1996	cod	52	0.07	0.006
	haddock	309	0.40	0.039
	silver hake	801,800	1038.13	--
	pollock	536	0.69	0.067
	redfish	415	0.54	0.052
	<i>Illex</i>	717	0.93	0.089
	others	16,645	21.55	2.076
	1996 Total	18,674	24.18	2.329

Table 4: Sampling levels, observed catch (mt) and total catch (mt) from the DFO statistical system, for the Canadian directed silver hake fishery, by month.

Month	observer l/f samples	total observed catch	total catch
April	7	2	40
May	67	425	1380
June	40	330	1658
July	20	34	265
August	8	18	137

Table 5: Commercial catch numbers at age for 4VWX silver hake in 1996, from the Canadian fishery, based on observer data.

age	April	May	June	July	August	total
1	19	1628	2521	2589	143	6900
2	202	8388	6587	1205	818	17200
3	78	1536	2922	100	90	4726
4	23	1042	2142	40	40	3287
5	7	47	468	1	3	526
6	2	18	24	5	5	54
7	0	0	3	3	2	8
8	0	3	0	0	0	3
9	0	0	0	0	0	0

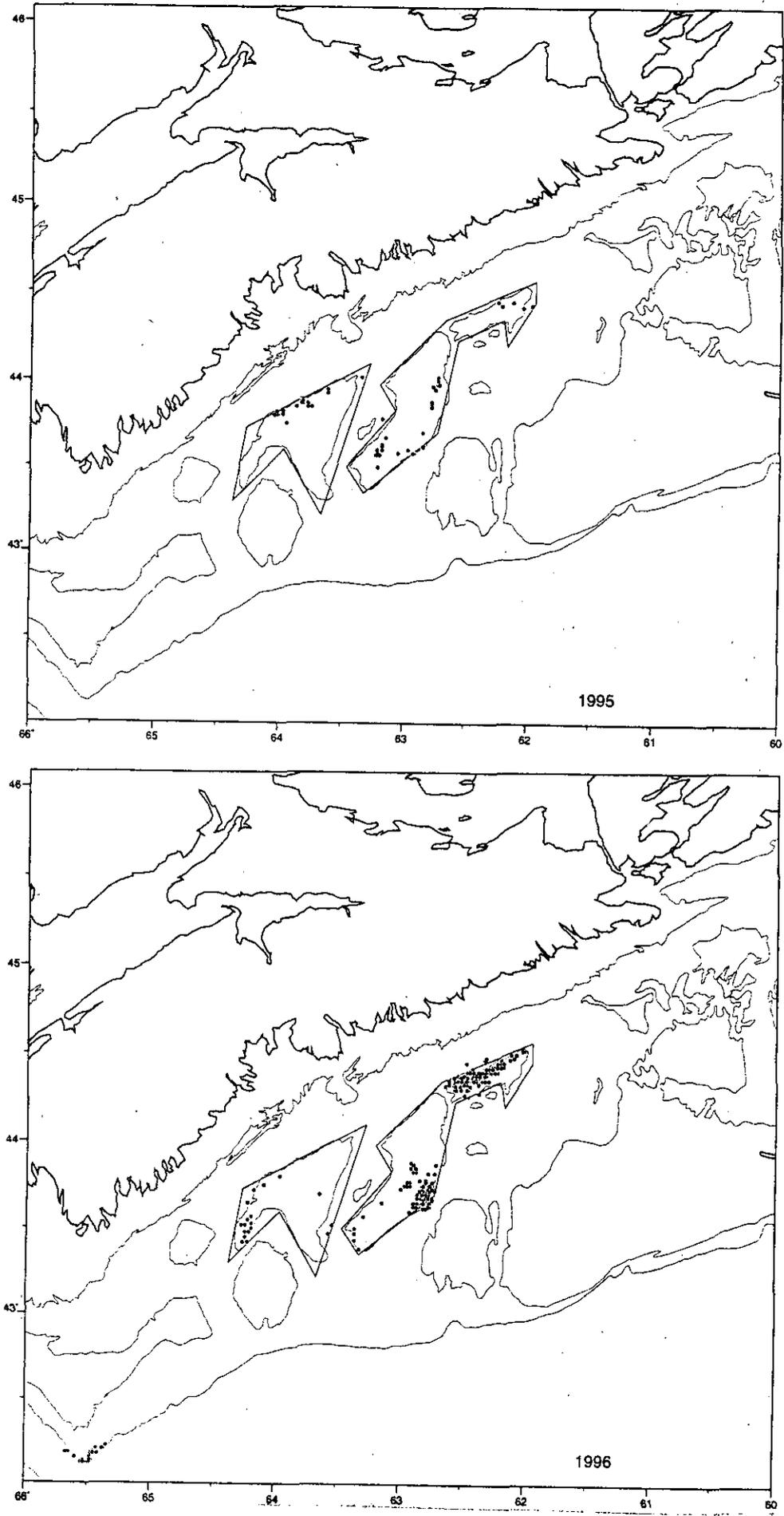


Fig. 1: Locations of silver hake directed fishing activity by Canadian vessels in 1995 and 1996, from observer data (coverage was 50% of trips in 1995 and 25% of trips in 1996).

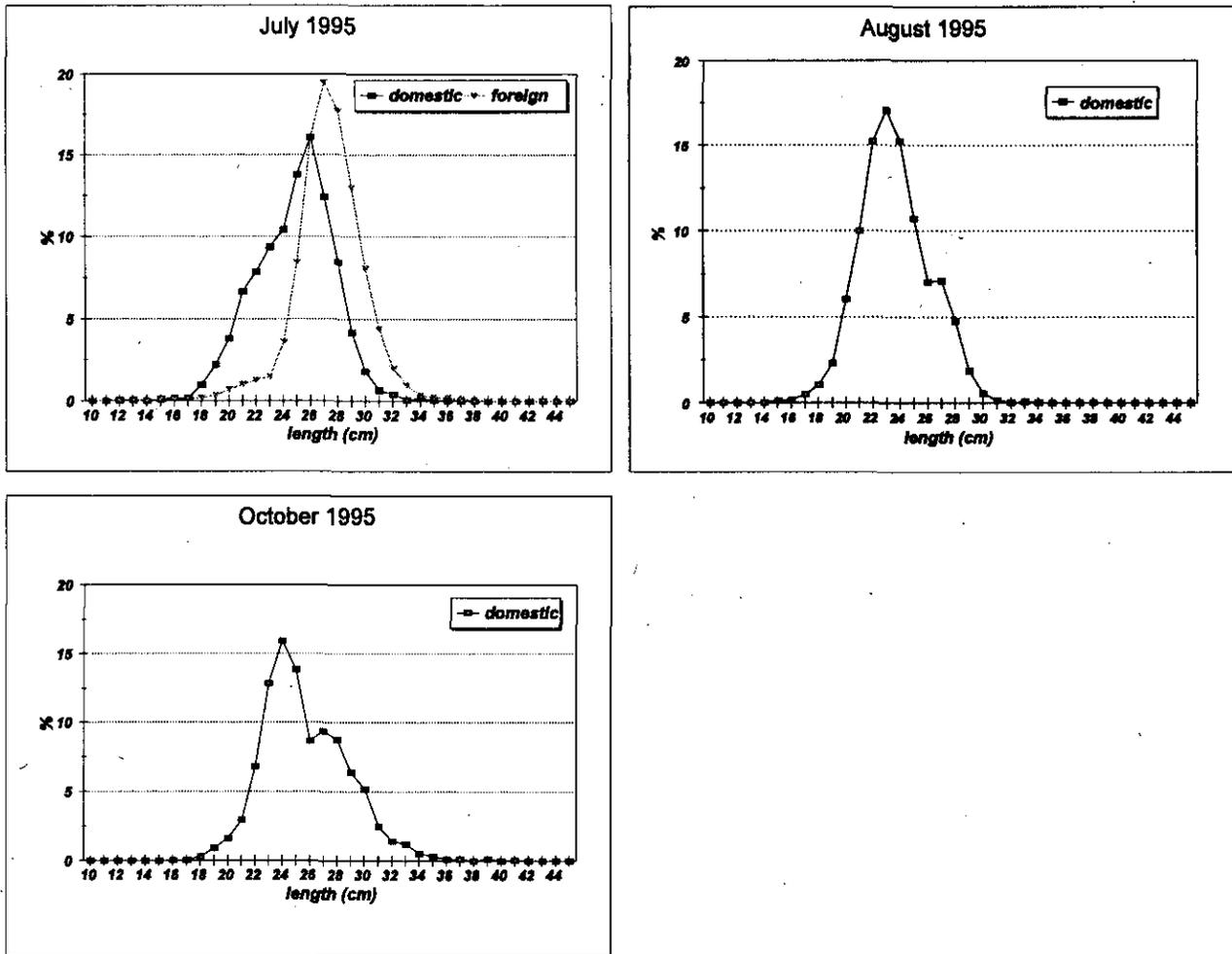


Figure 2. Proportion at length for the 1995 Canadian 4VWX silver hake fishery, by month from observer samples. Data from the foreign fishery are also presented where fishing activity occurred during the same months.

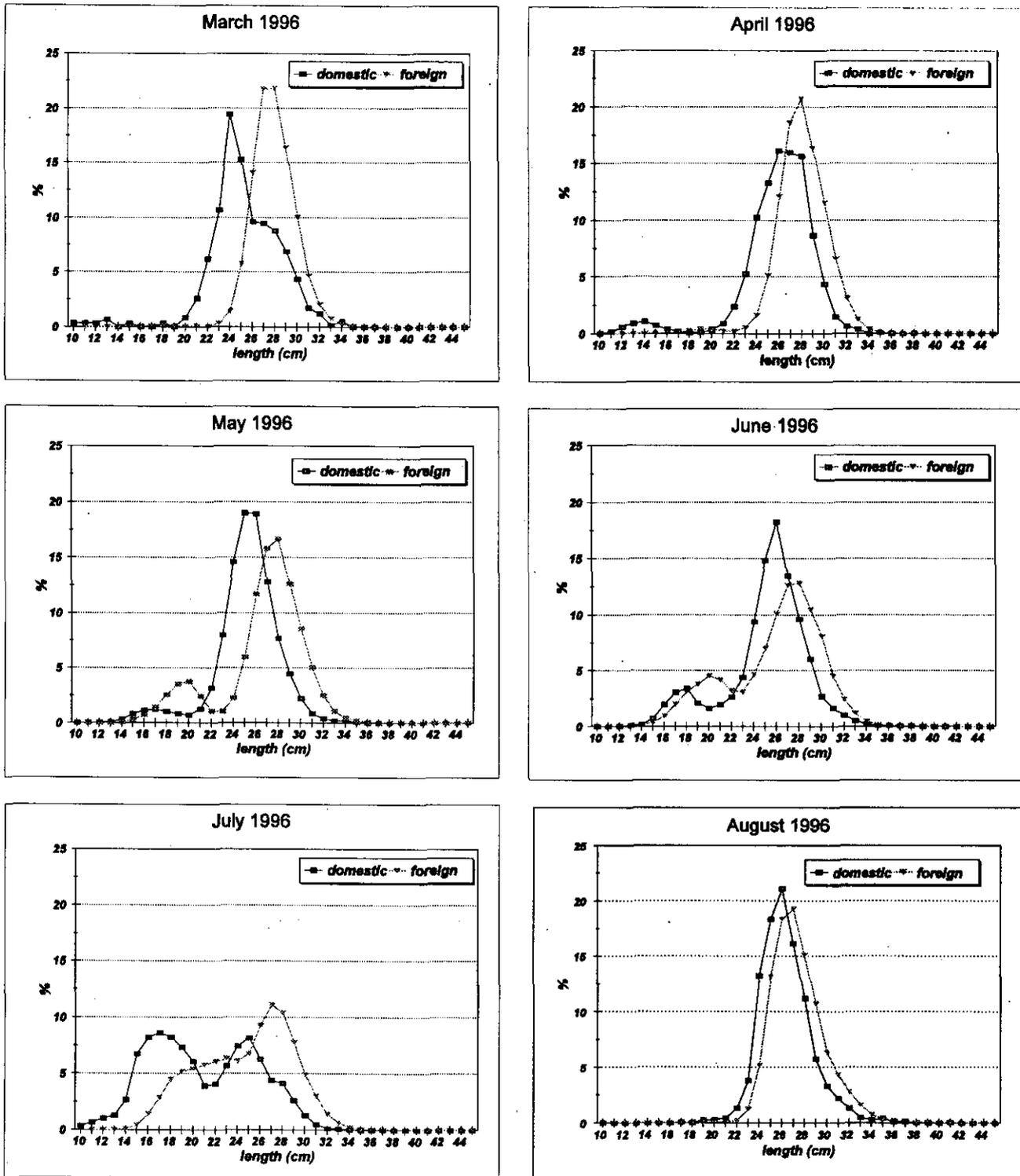


Figure 3. Proportion at length for the 1996 Canadian 4VWX silver hake fishery, by month from observer samples. Data from the foreign fishery are also presented where fishing activity occurred during the same months.

fishing sets: square vs diamond mesh

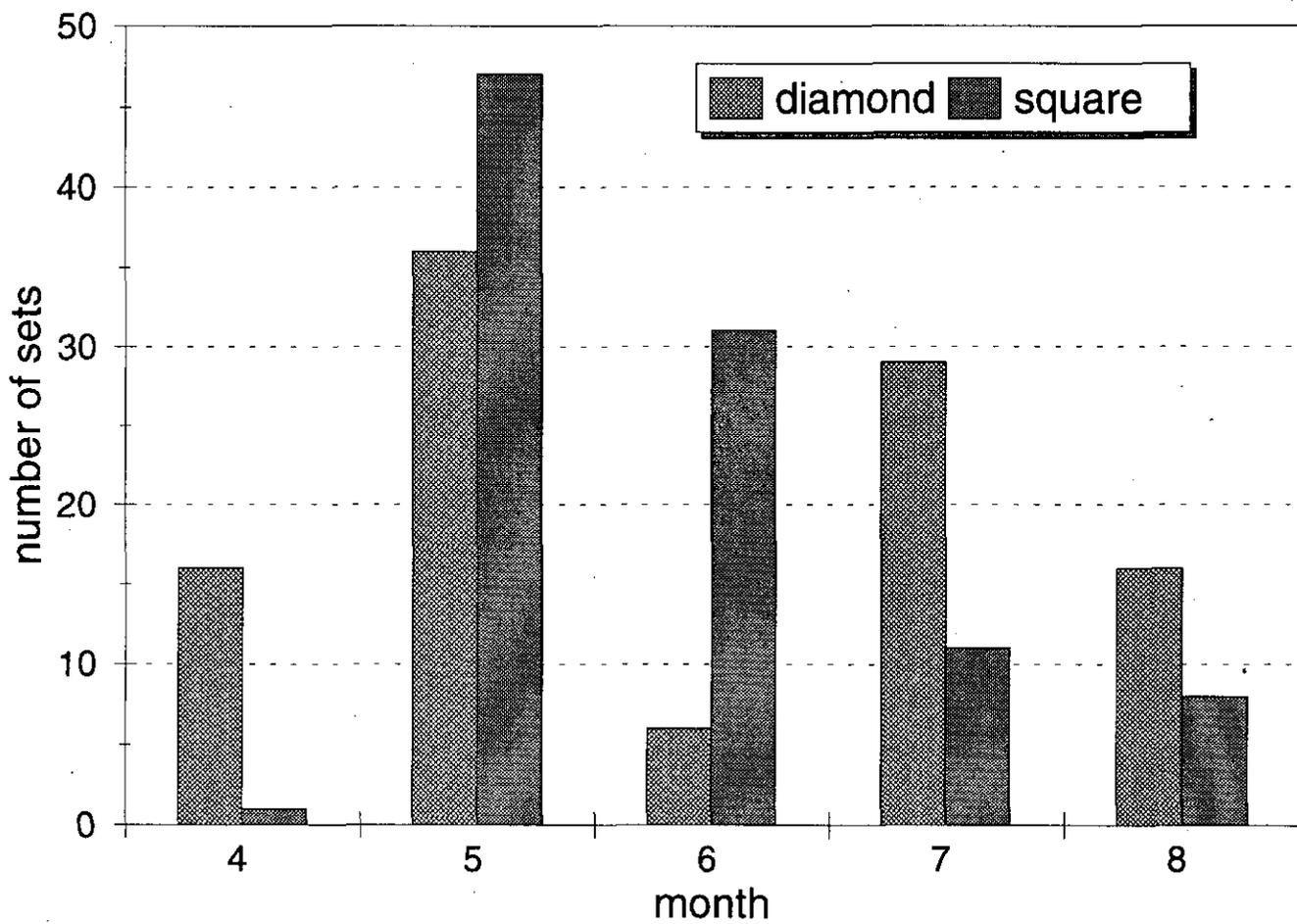


Figure 4. Comparison of number of observed fishing sets by gear type, by month, for the 1996 Canadian 4VWX silver hake fishery.

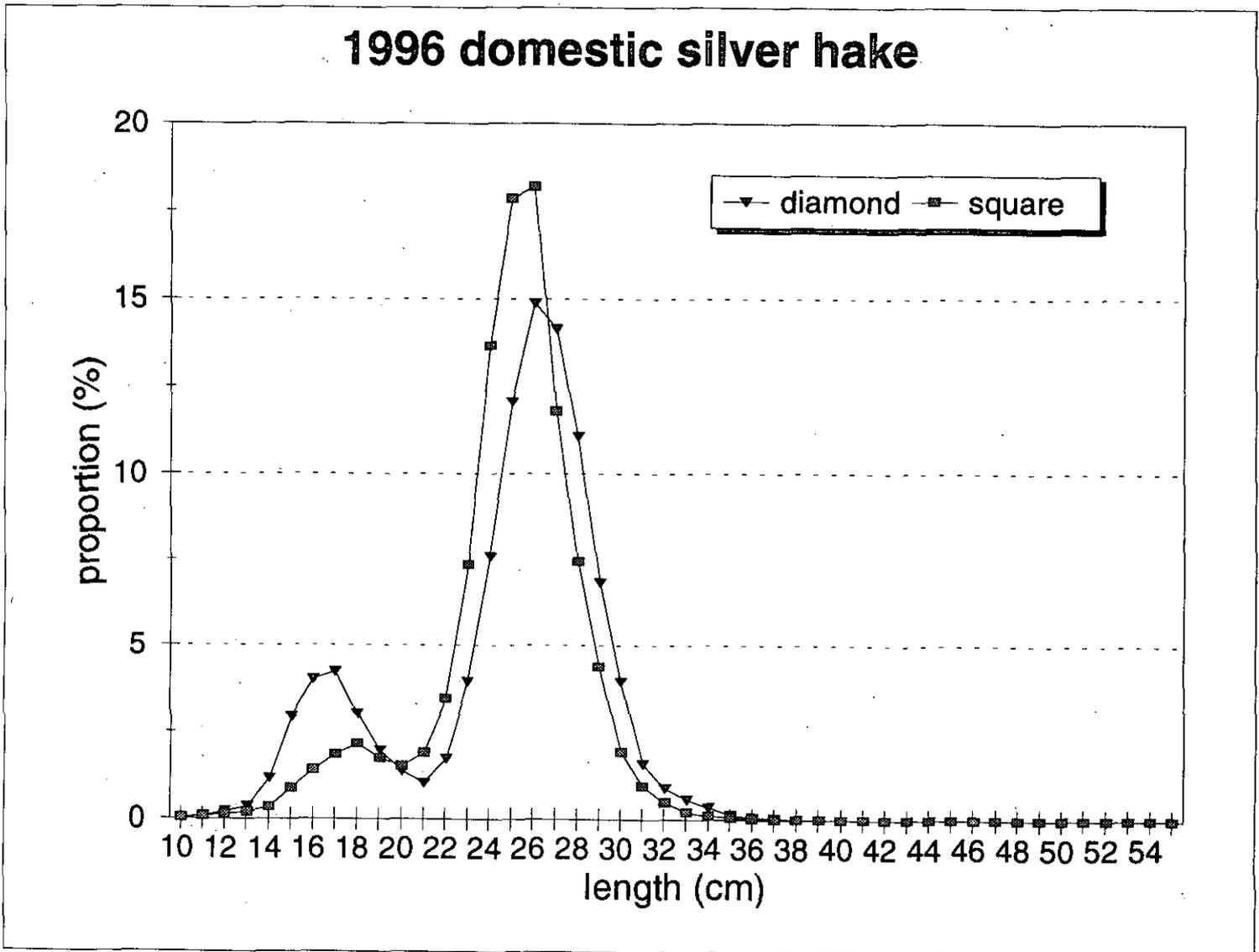


Figure 5. Proportion at length from the 1996 Canadian 4VWX silver hake fishery, for both 55 mm square and 60 mm diamond mesh codends. Samples were collected by Canadian observers.