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Report on the discarding of fish in the Canadian offshore fishery
in ICNAF Subareas 4 and 5

by

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At the 1977 Annual Meeting, STACRES expressed great concern about the continued inadequacy of information on discards in the Northwest Atlantic. STACRES and CWP requested that each country appoint a scientist to investigate and report on the aspects of discarding in their fisheries in the Northwest Atlantic.

In response to this request, the present paper deals with discards by offshore Canadian (Maritimes) vessels in Subareas 4 and 5. According to previous studies, the trawl and Danish seiner fleets operating in the Gulf of St. Lawrence traditionally catch and discard considerable quantities of plaice which are under marketable size. In fact, in some fishing areas during the 1960's, up to 50% of the weight and 70 to 80% of the numbers of captured plaice were discarded (Jean 1963; Powles 1969). A recent study of the Gulf groundfish fishery shows similar results (MacLaren Atlantic Limited, MS 1977). There is however, very little information about the weights and numbers of fish that are discarded at sea on the Scotian Shelf.

An examination of the 1977 fishing logbooks of Maritime commercial fishing vessels, indicated that few fishermen bother reporting wastage at sea. Table I summarizes the 1977 discard information derived from the log records of vessels from which discards at sea were consistently reported.

In the spring of 1978, a preliminary study was undertaken to examine the importance of discards on the Scotian Shelf. At the end of February, biological observers were placed on the regular 10-12 day commercial groundfish fishing trips. Information gathered at sea included species composition for both the retained and discarded portion of the catch for as many sets as possible. Length and age samples were also collected. This information on a per-trip basis, is presented in this paper.

I. Information from Logbooks

Information available from fishing logbooks pertain only to species of commercial importance, thus no estimate on the discarding of non-commercial species can be derived. Most of the information discussed in this report was collected in ICNAF Divisions 4T and 4Vn (see Table I).

1) COD

According to the 1977 fishing logbooks for Canada (Maritimes), the discard of cod in Div. 4T was 5% by weight for Danish seiners and 20% by weight for Scottish seiners. Discards at sea by vessels using otter trawls in this area were quite low (about 2% by weight).

In Div. 4Vn, about 15% by weight, of the catch was discarded by both Danish and Scottish seiners of the 51-150 tonnage class. There is no information available concerning 4Vn cod discard at sea by otter trawlers. Log coverage for other areas was too low to estimate a discard rate.

Otter trawlers in Div. 4R discarded about 3% of the cod caught.

ii) PLAICE

Discarding of plaice in Div. 4T amounted to 16-17% by weight for Danish seiners in the 26-50 and 51-150 tonnage class; discarding by Scottish seiners of the 51-150 tonnage class was 33% by weight. Otter trawlers of the 26-50 tonnage class discarded up to 31% by weight and those of the 51-150 tonnage class up to 23% by weight.

In Div. 4Vn, discard levels are similar to that in 4T. The Scottish seiners and Danish seiners discarded 15 to 48% of their catches. Lack of information, unfortunately does not allow us to make any comments on discard levels in other areas.

iii) OTHER SPECIES

Although very limited information is available, it is important to note that according to the fishing vessel logs, about 20% by weight of winter flounder caught by Danish seiners (51-150 tonnage class) and about 29% (by weight) of redfish caught by shrimp otter trawlers (51-150 tonnage class) were discarded.

II. Information from Biological Observer Trips

Observers onboard vessels estimated (by sight) weight of fish caught on a set-by-set basis. This estimate was compared with the crews estimate and an average was recorded (in kilograms). Tables II, III and IV show estimated catch composition from three commercial fishing trips conducted on the Scotian Shelf in February-March 1978. A total of 69 sets were made on trip A, every one was observed. On trips B and C however, only 45 sets of 68 and 22 sets of 40, respectively, were observed.

Cod and pollock were the target species for the first two trips (A and B) while flatfish were the prime species sought on trip C.

When flatfish were the directed species, approximately 9% (by weight) of the American plaice and 5% (by weight) of the witch caught were discarded. However, as a bycatch (trips A and B), discards of these species may appear significant in percentage (by weight) but not necessarily important in quantity removed because of the relatively small total catch of the vessels for those species. In fact, we note that 80% and 100% (by weight) of the American plaice discarded on trips A and B corresponds to a weight of only 30 kg.

There are few discards of cod and pollock. Species such as monkfish, skates, sculpins, lumpfish, ocean pout, eel pout, and dogfish were always discarded. White hake, silver hake, herring, shad and yellowtail were caught in small quantities and were also discarded.

Although haddock was not a directed species, substantial numbers were caught and quite a few were discarded. Length frequency distribution for retained and discarded haddock are shown in Figures I and II. Large amounts of commercial haddock discarded on those vessels were primarily due to the fact that the monthly boat quota had been reached.

On the other hand, redfish is a species that was occasionally discarded. Figure III shows length frequencies for redfish (Trip A). The graph shows length distribution when all redfish in the set were discarded. The second graph shows both retained and discarded fish, the last graph being the shore sample. When the majority of the catch is small fish, there is a tendency to discard total catch rather than picking out commercial size fish. About 38%, by weight, of the total trip catch has been discarded this way. However, when the majority of the catch is of large fish, fishermen will sort out and discard the smaller ones. This represents about 34% and 19% by weight the total of trip A's catch respectively, for retained and discarded fish. The remaining (9% by weight) is kept without discard occurring.

Shore sampling indicated that sampling only landed fish results in underestimating numbers of small fish really caught.

DISCUSSION

Available records represent a very small proportion of Canada Maritimes fleet activity and the representativeness of these data for the fleet as a whole cannot be evaluated. The two primary discard problems of the Canada Maritimes fleet are identified. The American plaice fishery in Div. 4T is predominated by small Scottish and Danish seiners and otter trawlers. The fishery is directed to both cod and plaice with cod being the preferred species. The present mesh size, which is calculated to be optimal for cod (for which discards are negligible), results in substantial quantities of plaice of 20-30 cm being caught. Plaice of this size are presently not acceptable to shore-based processing plants and hence are discarded at sea. The economic dependance of these vessels on cod complicates solution of the plaice discard problem.

Haddock stocks, particularly in Div. 4X and to some extent in Div. 5Z, are recovering from the low productivity levels of the late 1960's and early 1970's but these stocks are still under restrictive catch regulations to obtain as rapid a recovery as possible. This has resulted in periodic discard problems in some sectors of the fleet. In the spring of 1978 (as in 1977) the offshore, large vessel fleet encountered large bycatches of haddock, particularly while fishing for pollock, which resulted in monthly bycatch allowances being exceeded and the excess being discarded. At-sea observation was initiated to investigate the problem at its peak and hence Tables II, III and IV do not represent the overall situation. Preliminary analysis of a confidential interview system suggests that about 10% of the offshore fleet catch of haddock in February-March, 1978 was discarded at sea.

The results in Tables II, III and IV are the first from an at-sea observer programme to investigate bycatch and discard problems in the Canada Maritimes fleet and this programme will continue throughout most of 1978. This will allow a more comprehensive evaluation of the importance of discards at sea to potential yield assessments.

REFERENCES

- Jean, Y. 1963. Discards of fish at sea by northern New Brunswick draggers. J. Fish. Res. Bd. Canada 20: 497-524.
- McLaren Atlantic Ltd. MS 1977. Analysis of discards in the Gulf of St. Lawrence plaice fishery.
- Powles, P.N. 1969. Size changes, mortality and equilibrium yields in an exploited stock of American plaice (Hippoglossoides platassoides). J. Fish. Res. Bd. Canada 26: 1205-1235.

Table 1. Statistics on discarding in the Canadian groundfish fishery in Subarea 4 in 1977 by gear and tonnage class of vessels, based on information available from logbooks.

Gear	Otter trawl				Otter trawl										
	26-50 GRT				51-150 GRT										
Tonnage	Div.: 4T Nominal catch	Div.: 4X Nominal catch	Div.: 4R Nominal catch	Div.: 4S Nominal catch	Div.: 4T Nominal catch	Div.: 4W Nominal catch	Div.: 4X Nominal catch	Div.: 5Y Nominal catch							
Species	Dis- cards	Dis- cards	Dis- cards	Dis- cards	Dis- cards	Dis- cards	Dis- cards	Dis- cards							
Cod	61	3	0.07	116	3	2.8	0.45	171	3	2.1	0.14	0.9	-	1.45	0.05
Haddock		20	0.17					0.36	0.27	14	0.23	4.54	0.9	0.41	0.05
Redfish		3.6	3.6	0.68	-	41		58	0.45						
S. hake								0.51							
R. hake								11							
Pollock		+	-												
A. plaice	181	83	0.20	11.1	1.25	2	0.68	154	45					1.4	
Witch															
Yellowtail															
G. halibut						0.18		6	-						
Winter Flo.						0.23	0.14								
RN grenadier															
Other gro'fish															
Catfish		-	0.2												
Herring															
Mackerel															
Other Pelagics															
Skate															
Capelin						1.45		0.67							
Other Fish															
Squids															
Shrimp															
Sampling (%) Rate*															

Table 1 continued.

Gear Tonnage	Otter trawl 151-500 GRT		Otter trawl (shrimp) 51-150 GRT		Scottish seine 26-50 GRT		Scottish seine 26-50 GRT	
	Div.: 4R Nominal Dis- catch cards	Div.: 4S Nominal Dis- catch cards	Div.: 4T Nominal Dis- catch cards	Div.: 4W Nominal Dis- catch cards	Div.: 4X Nominal Dis- catch cards	Div.: 4T Nominal Dis- catch cards	Div.: 4Vh Nominal Dis- catch cards	
Cod	136 0.36	18 0.68	7.3 0.05			114 29	55 10	
Haddock				0.23 0.05				
Redfish		55 23	6 1.77					
S. hake								
R. hake						1.54 0.45		
Pollock								
A. plaice		0.11 0.05			0.09 0.02	86 43	24 22	
Witch								
Yellowtail								
G. halibut		3.2 0.18						
Winter Flo.						33 4		
RN grenadier								
Other gro'fish								
Skate								
Herring								
Mackerel								
Other Pelagics								
Argentine								
Capelin								
Other Fish								
Squids								
Shrimp		60 4.5						
Sampling (%) Rate*								

Table 1 continued.

Gear	Danish seine				Danish seine			
	26-50 GRT				51-150 GRT			
Tonnage	Div.: 4T Nominal Dis- catch cards	Div.: 4Vn Nominal Dis- catch cards	Div.: 4T Nominal Dis- catch cards	Div.: 4Vn Nominal Dis- catch cards	Div.: 4M Nominal Dis- catch cards	Div.: 4X Nominal Dis- catch cards	Div.: Nominal Dis- catch cards	
Species								
Cod	101	6	8	596	29	4		
Haddock	6	0.68						
Redfish								
S. hake								
R. hake				10				
Pollock								
A. plaice	347	64	1.36	720	146	19		
Witch			0.23	2	2	1	2	
Yellowtail				16	1		3	
G. halibut								
Winter Flo.				90	25	8	0.41	
RN grenadier							0.02	
Other gro'fish								
Herring								
Mackerel								
Other Pelagics								
Argentine								
Capelin								
Other Fish								
Squids								
Shrimp								
Sampling Rate*								

Table 2. Estimated catch composition (kg) obtained from three commercial fishing trips conducted in ICNAF Subareas 4 and 5 on Canadian (Maritime) commercial otter trawlers during February-March 1978.

TRIP A : O.T., engel 130 mm, February 1978							
Div. Unit	4X		5Z		Total		
# hr fished/#set	97.7 hr/44 set		51.3/25 set				
Depth range (m)	85-175 m		46-128 m				(Kg)
	Kept	Discard	Kept	Discard	Kept	Discard	
POLLOCK	41557	3	4019	45	45576	48	
HADDOCK	1913	1810	16172	56	18085	1866	
REDFISH	724	970	-	-	724	970	
WITCH	150	4	-	-	150	4	
COD	3208	-	5148	45	8356	45	
HALIBUT	843	30	28	15	871	45	
WOLFFISH	36	-	521	30	557	30	
W. FLOUNDER	23	-	529	-	552	-	
YELLOWTAIL	-	-	85	-	85	-	
CUSK	19	4	-	-	19	4	
WHITE HAKE	2	-	-	-	2	-	
PLAICE	-	7	-	7	-	14	
MONKFISH	-	3	-	-	-	3	
DOGFISH	-	-	-	16	-	16	
SCULPIN	-	42	-	895	-	937	
SKATE	-	869	-	1240	-	2109	
OCEAN POUT	-	-	-	8	-	8	
SILVER HAKE	-	5	-	-	-	5	
LUMPFISH	-	2	-	-	-	2	

Table 3. Estimated catch composition (kg) obtained from three commercial fishing trips conducted in ICNAF Subareas 4 and 5 on Canadian (Maritime) commercial otter trawlers during February-March 1978.

TRIP B : O.T., engel 130 mm, February 1978

Div. Unit	: 4X	5Ze	4W	Total
# hr fished/#set	: 38.7 hr/29 set	24.7 hr/11 set	5.7 hr/5 set	(Kg)
Depth range (m)	: 87-160 m	94-130 m	119-146 m	

	Kept Discard		Kept Discard		Kept Discard		Kept Discard	
POLLOCK	26200	-	10125	-	1115	-	37440	-
HADDOCK	1600	1805	-	1834	-	1255	1600	4894
REDFISH	127	33	-	-	-	13	127	46
WITCH	15	-	-	-	2	-	17	-
COD	1478	-	1885	-	147	-	3510	-
HALIBUT	374	-	9	-	6	4	389	4
WOLFFISH	13	16	299	50	-	-	312	66
W. FLOUNDER	-	-	-	-	-	-	-	-
YELLOWTAIL	-	29	20	1	-	-	20	30
CUSK	4	1	11	4	-	-	15	5
WHITE HAKE	-	108	-	-	-	-	-	108
PLAICE	3	10	-	6	2	-	5	16
MONKFISH	4	26	-	1	-	4	4	31
DOGFISH	-	129	-	2	-	-	-	131
SCULPIN	-	4	-	53	-	-	-	57
SKATE	-	81	-	93	-	-	-	174
OCEAN POUT	-	2	-	31	-	-	-	33
SILVER HAKE	-	-	-	-	-	-	-	-
LUMPFISH	-	-	-	-	-	-	-	-
HERRING	-	10	-	-	-	-	-	10
SHAD	-	7	-	-	-	-	-	7

Table 4. Estimated catch composition (kg) obtained from three commercial fishing trips conducted in ICNAF Subareas 4 and 5 on Canadian (Maritime) commercial otter trawlers during February-March 1978.

TRIP C : O.T., engel 130 mm, March, 1978								
Div. Unit	4Vs		4Vn		4W		Total	
# hr fished/#set	34.7 hr/13 set		15.7 hr/7 set		4.5 hr/2 set		(Kg)	
Depth range (m)	85-400 m		268-420 m		150-196 m			
	Kept	Discard	Kept	Discard	Kept	Discard	Kept	Discard
POLLOCK	500	1	-	-	20	-	520	1
HADDOCK	-	250	-	-	-	300	-	550
REDFISH	343	35	-	30	500	-	843	65
WITCH	1361	55	1316	80	-	-	2677	135
COD	3703	-	665	-	5	-	4373	-
HALIBUT*	598	45	605	-	10	-	1213	45
WOLFFISH	-	102	-	100	-	-	-	202
W. FLOUNDER	-	-	-	-	-	-	-	-
YELLOWTAIL	-	-	-	-	-	-	-	-
CUSK	20	-	-	-	-	-	20	-
WHITE HAKE	-	5	-	30	-	-	-	35
PLAICE	3724	292	4025	450	-	-	7749	742
MONKFISH	-	-	-	340	-	35	-	375
DOGFISH	-	-	-	-	-	-	-	-
SCULPIN	-	151	-	-	-	-	-	151
SKATE	-	1864	-	1750	-	5	-	3619
OCEAN POUT	-	-	-	-	-	-	-	-
SILVER HAKE	-	10	-	-	-	-	-	10
LUMPFISH	-	30	-	20	-	-	-	50
HERRING	-	.5	-	-	-	-	-	.5
EEL POUT	-	24	-	5	-	-	-	29

* Halibut includes both Greenland and Atlantic halibut.

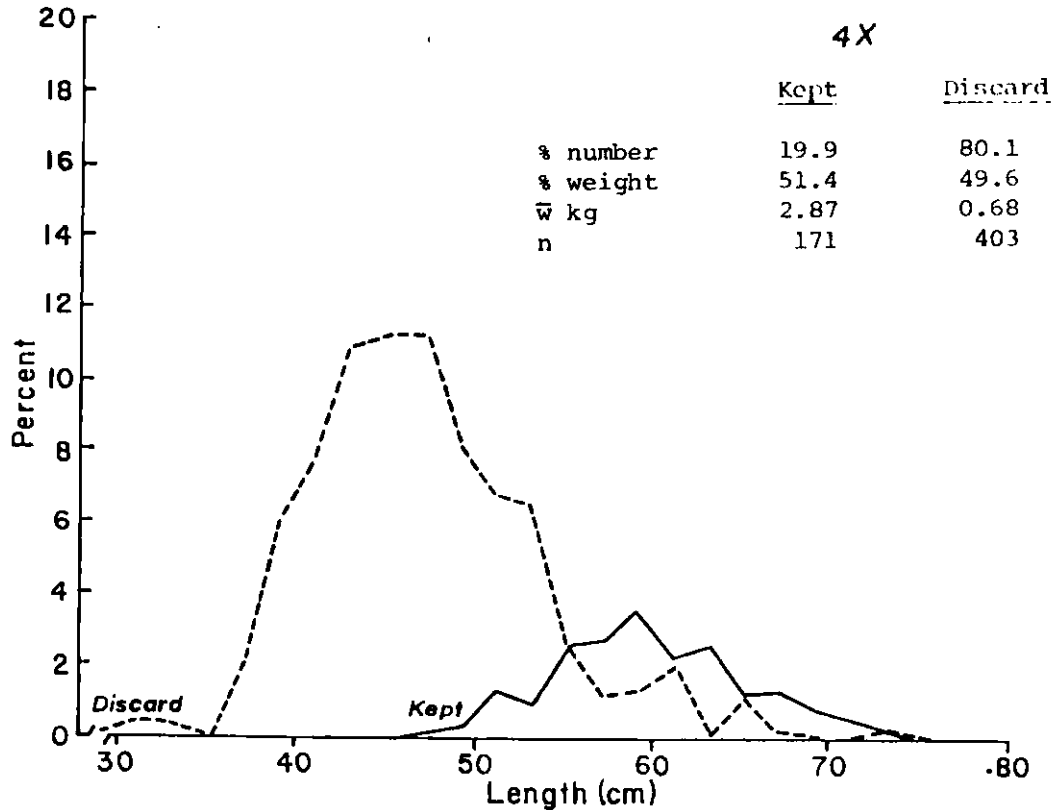
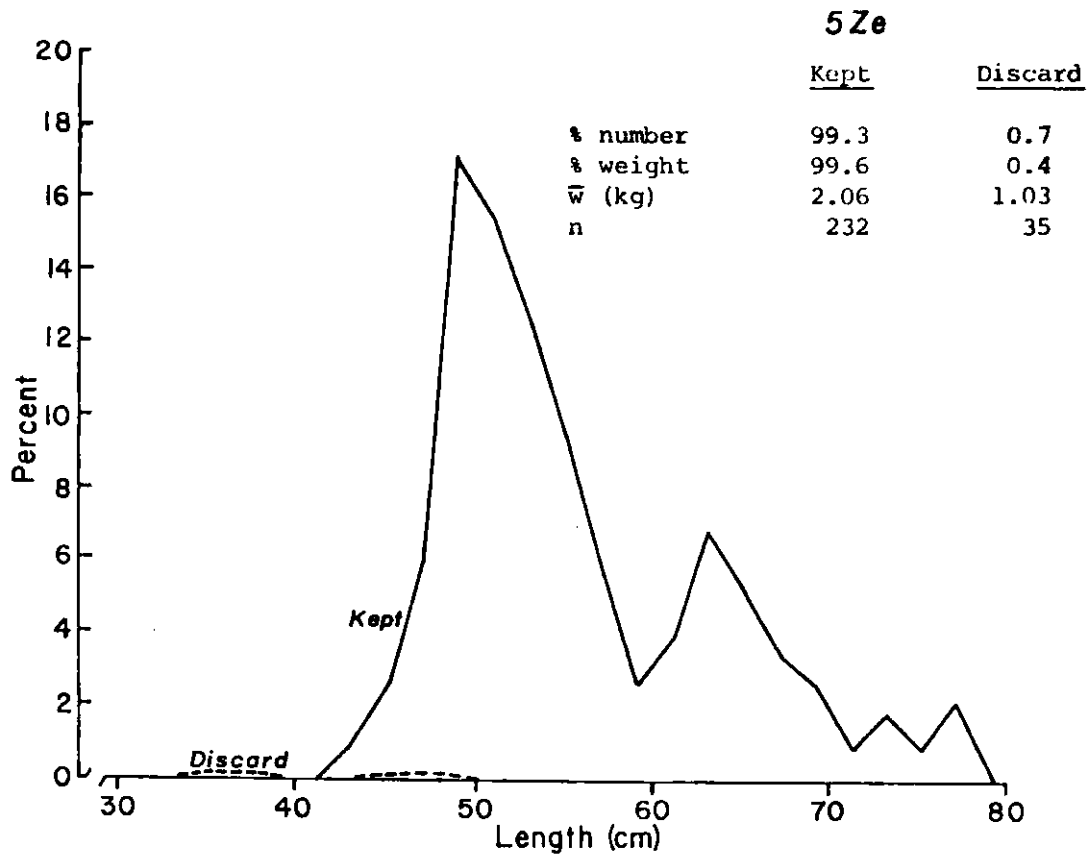


Fig. 1. Length distribution of haddock measured on Canadian fishing vessel in 5Ze and 4X (trip A).

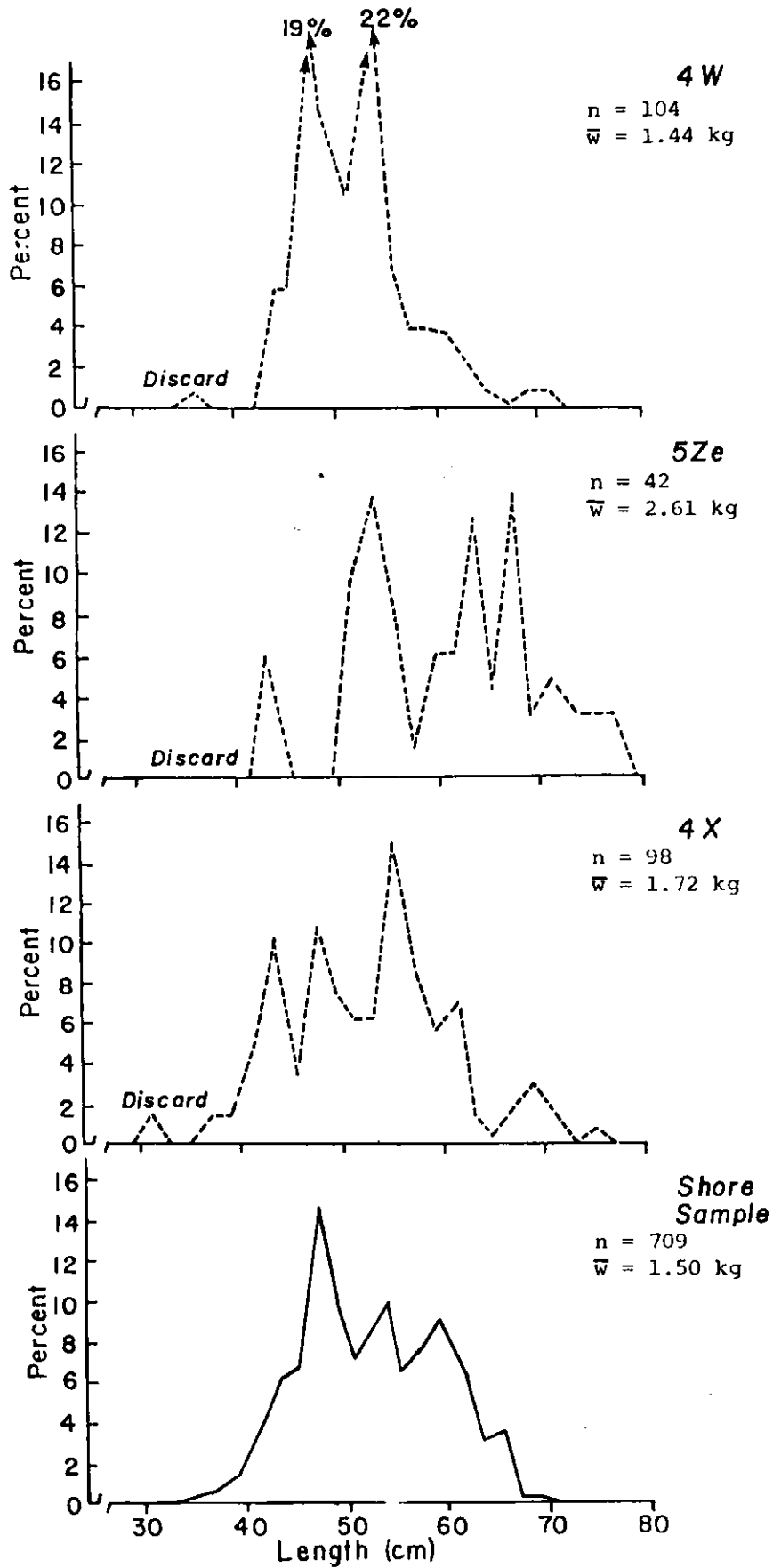


Fig. 2. Length distribution of discarded haddock measured on Canadian fishing vessel (trip B) and on-shore.

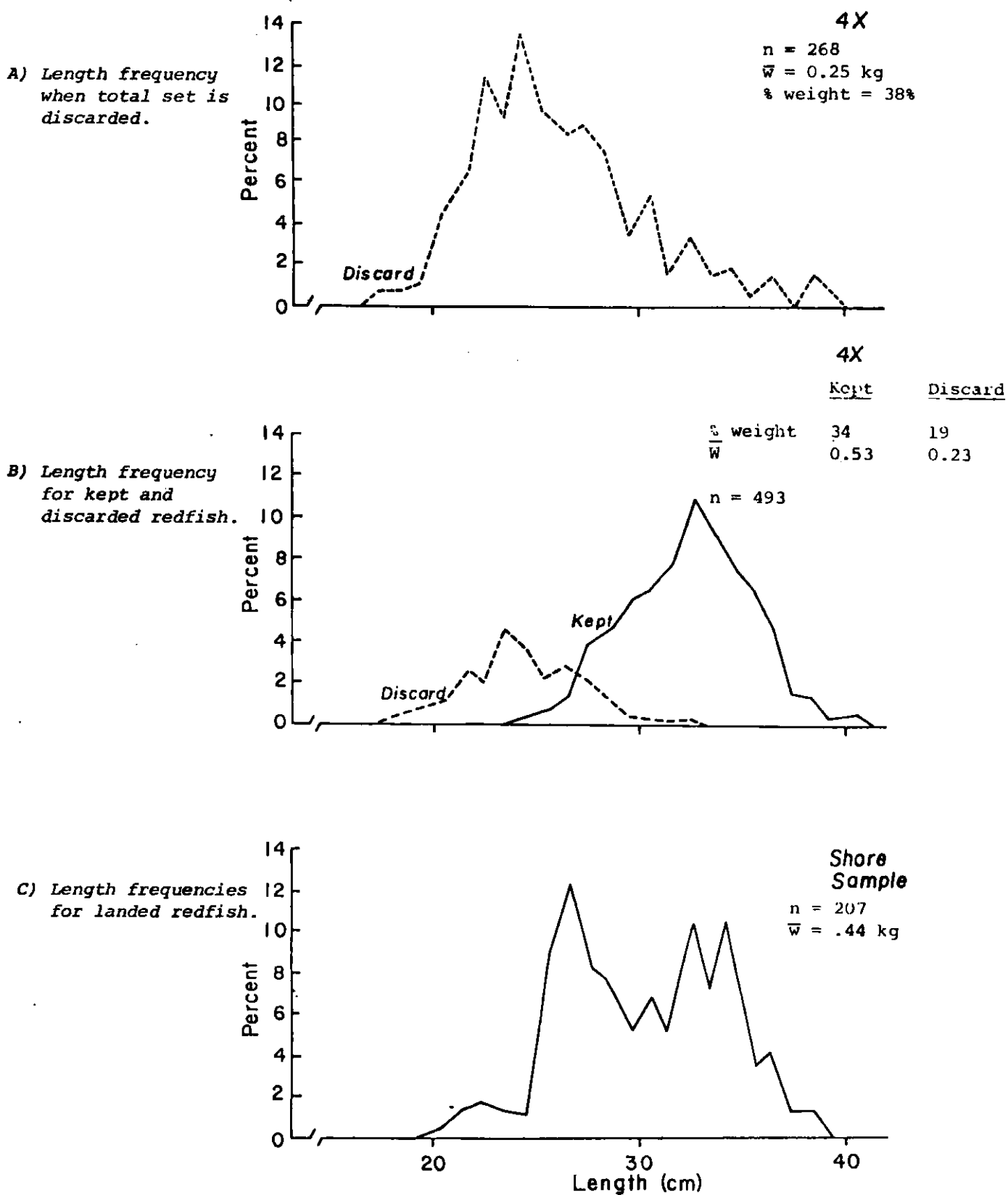


Fig. 3. Length frequency of redfish caught by Canadian commercial vessels in 4X (trip A).