Potential discarding in the inshore Divisions 2J3KL cod trap fishery

by

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ABSTRACT

Information is available on discarding of Division 2J3KL cod by the offshore domestic fleet through observer and logbook reports, however, little information is available regarding discarding by the inshore fishery. An examination is made of available catch and landing length composition data collected during 1982-86 from the inshore cod trap fishery in order to estimate what the potential for unreported discarding of undersize (less than 16 inches) fish might be. For years and Divisions where data are available, the proportion of undersize fish occurring in landing samples are consistently and at times substantially lower than in catch frequencies, implying that not all undersize fish are sold and thus potentially go unreported in landing statistics. Based on the available data, it appears that 50% or more of undersize fish caught by traps goes unreported as discards. The quantity of discards varies considerably within a range of less than 1 to 14% of reported trap landings, depending on the particular Division and year.

RESUME

Il existe des données sur le rejet de la morue de la Division de 2J3KL par la flotte hauturière domestique grâce aux rapports des observateurs et aux journaux de bord; cependant, il existe peu d'information sur les rejets par la pêche côtière. On a analysé les données de 1982 à 1986 sur les prises et la longueur des poissons capturés dans le cas de la pêche de la morue aux trappes dans les eaux côtières pour estimer quelles pourraient être les possibilités en ce qui concerne le rejet non signalé de poissons de taille trop petite (moins de 16 pouces). Dans le cas des années et des divisions pour lesquelles des données existent, la proportion de poisson de taille trop petite dans les échantillons de poisson débarqué est constamment, et parfois substantiellement, plus faible que dans les fréquences de prise, ce qui laisse entendre que les poissons de taille trop petite ne sont pas tous vendus et qu'ainsi, ils peuvent ne pas être signalés dans les statistiques concernant les quantités débarquées. A partir des données connues, il semblerait que 50 % ou plus des poissons de taille trop petite capturés dans les trappes ne sont pas signalés comme faisant partie des poissons rejetés. La quantitié de poissons rejetés varie considérablement (moins de 1 % à 14 % des débarquements signalés) selon la Division et l'année en cause.

INTRODUCTION

Information on discarding by offshore domestic trawlers fishing Div. 2J3KL cod is available from captains' estimates recorded on logbook reports and from data obtained firsthand by fishery observers working onboard these offshore vessels (Kulka 1986). There is little information available, however, as to potential discarding by the inshore sector of the Div. 2J3KL cod fishery which accounts for a large portion of overall landings in recent years (Baird and Bishop 1986). Collection of discard information on a large scale in the form of formal logbook reports or through the use of observers is impractical because of the nature of the inshore fishery in terms of its general diversity, types and sizes of vessels used and large number of fishermen involved (Stevenson 1983).

The minimum acceptable commercial size of inshore cod for production purposes used by most processing plants in the Newfoundland Region is 16 inches (approx. 41 cm). There are some companies that buy and process fish smaller than this for market purposes, however, these are in the minority. The fate of undersize cod caught varies: it can be discarded directly by fishermen, it can be culled out before purchase and discarded by plants, it can be kept by fishermen for personal use, it can be purchased by plants for market purposes as stated above, or it can be bought by some plants as shack for meal production at very low prices. Only in the latter two cases would undersize fish show up on purchase slips and be included in landing statistics. What portion of this undersize fish actually goes unreported is unknown.

An examination is made here of available commercial catch and landing length composition data collected by the Commercial Sampling Section, Nfld. Region from the inshore cod trap fishery over the past 5 years in order to estimate what the potential for unreported discarding of undersize fish might be. In this paper a catch sample refers to one where no prior culling of fish has taken place and a landing sample refers to a sample of fish actually sold to a plant (i.e., there may have been discarding of undersized fish). Catch length composition data were not available for other inshore gears such as gillnets, linetrawls and handlines to enable a similar examination. However, because of the nature of the cod trap fishery which generally catches larger numbers of smaller fish than the other gear types, it has the greatest potential in terms of discarding of undersize fish.

METHODS AND RESULTS

Catch frequencies collected from the Div. 2J3KL cod trap fishery during 1982-86 are examined in order to get a measure of the percentage (by number and weight) of fish caught that were less than 16 inches. Individual frequencies were first weighted by vessel turnouts before being combined to give final per mille frequencies for a particular Division and year. The per mille catch compositions are given in Tables 1-3 and presented graphically in Fig. 1 (upper half of figure), with the percentage of fish less than 16 inches indicated both by weight and number. Division 2J catches show the smallest percentage of undersize fish for the 3 years for which catch data are available. Overall, catches in 1982 and 1986 show the highest percentages of undersize fish

occurring, especially in Div. 3K and 3L. Catches for Div. 3L in 1985 also appear to have a high percentage of undersize fish, however there were no catch frequencies available for Div. 3K in 1985. These differences in catch composition for fish less than 16 inches are reflected in trends in average lengths for cod trap catches during the 5 year period, as outlined in Fig. 2.

As stated in the introduction, it is not known what portion of undersize fish caught is discarded without being reported in landing statistics. Scenarios for underreporting by 50% and 100% of undersize fish (based on percentages derived from available catch samples) are presented in Table 4 for Div. 2J3KL for the years 1982-85. The potential for underreporting appears minimal for Div. 2J. The worst scenarios for Div. 3K and 3L at 100% underreporting would amount to 18.1%, 17.6%, and 16.0% of the total reported landings for Div. 3K (1982), Div. 3L (1985), and Div. 3L (1982) respectively (again no catch data are available for Div. 3K in 1985).

A substantial number of landing frequencies collected from the Div. 2J3KL cod trap fishery are available for 1982-86 (Tables 5-7). These per mille landing compositions are presented graphically in Fig. 1 (lower half of figure), with percentages of fish less than 16 inches indicated by weight and number. Percentages of undersize fish occurring in these landing frequencies are compared to catch frequency percentages in Table 8. Proportions of less than 16 inch fish were consistently and sometimes substantially lower than for catch frequencies, implying that not all undersize fish is sold and therefore is potentially unreported. Estimated underreporting of these small fish based on differences between catch and landing length compositions collected are given in Table 9. In order to determine these differences, catch sampling data had to be adjusted to estimated total catch by assuming that total catch length compositions were identical to total landing length composition for fish greater than 16 inches (41 cm) and by estimating total catch length composition for fish less than 16 inches based on proportions taken directly from catch sampling data. Again, these data indicate Div. 2J discarding appears minimal, with unreported discarding showing highest levels in Div. 3K and Div. 3L. The quantity of discards varies considerably within a range of <1 to 14% of reported trap landings, depending on the particular Division and year. When compared to scenarios for various levels of reporting based on estimated percentages from catch samples as previously presented in Table 4, these data would suggest potential underreporting of 50% or more for Div. 2J3KL trap cod less than 16 inches.

DISCUSSION

Although the numbers of landings samples available were substantial, the numbers of catch samples available for this study were sometimes small. However, even with this limited amount of catch sampling data results of this study were fairly consistent and should provide reasonable estimates as to potential discarding in the cod trap fishery. If the tendency towards greater utilization of undersize cod by industry continues, the quantities of discarded cod going unreported in landing statistics should decrease proportionally.

REFERENCES

Baird, J. W., and C. A. Bishop. MS 1986. Assessment of the cod stock in NAFO Divisions 2J+3KL. NAFO SCR Doc. 86/47, Ser. No. N1163. 48 p.

Kulka, D. W. MS 1986. Estimates of discarding by the Newfoundland offshore fleet in 1985 with reference to trends over the past 5 years. NAFO SCR Doc. 86/95, Ser. No. N1221. 20 p.

Stevenson, S. C. 1983. A review of the sampling of commercial groundfish catches in Newfoundland, p. 29-38. In W. G. Doubleday and D. Rivard [ed.] Sampling commercial catches of marine fish and invertebrates. Can. Spec. Publ. Fish. Aquat. Sci. 66.

Table 1. Division 2J cod trap catch compositions (% by number).

Length (cm)	1986	1985	1984	1983	1982
30-32					
33-35	1				
36-38	20	15	2		
39-41	102	43	29		
42-44	206	53	80		
45-47	211	108	112		
48-50	169	155	168		
51-53	112	153	171		
54-56	84	155	120		
57-59	54	116	104		
60-62	19	74	77		
63-65	9	57	59		
66-68	6	25	33		
69-71	4	26	17		
72-74		10	17		
75-77	1	5	5		
78-80	1	3	2		
81-83			2		
84-86	1	2	1		
87-89			1		
90+					
Total	1000	1000	1000		
No. samples	19	3	6	Nil	Nil
No. measured	6214	1127	2800		
Ave. length	47.93	53.50	53.57		

Table 2. Division 3K cod trap catch compositions (% by number).

Length (cm)	1986	1985	1984	1983	1982
30-32			1		4
33-35	13		10	8	30
36-38	101		35	45	88
39-41	153		80	98	151
42-44	186		129	115	245
45-47	180		177	134	184
48-50	166		199	154	120
51-53	91		144	129	59
54-56	70		89	116	43
57-59	25		60	101	32
60-62	13		33	38	21
63-65	2		18	28	11
66-68			10	15	6
69-71			6	9	3
72-74			4	4	1
75-77			1	5	
78-80			2		1
81-83			2		1
84-86					
87-89				1	
90+					
Total	1000		1000	1000	1000
No. samples	1	Nil	11	3	4
No. measured	514		4298	1740	2472
Ave. length	45.66		49.11	49.97	45.41

Table 3. Division 3L cod trap catch compositions (% by number).

Length (cm)	1986	1985	1984	1983	1982
30-32	3	5	1	1	2
33-35	35	32	5	10	15
36-38	134	106	30	32	66
39-41	202	153	79	48	166
42-44	176	157	148	61	239
45-47	154	142	163	80	197
48-50	100	136	127	137	115
51-53	71	97	117	174	62
54-56	55	66	104	182	47
57-59	33	36	110	106	30
60-62	19	27	62	72	20
63-65	11	18	31	42	18
66-68	4	12	13	23	11
69-71	2	6	8	17	5
72-74	1	3	2	6	5
75-77		2		4	1
78-80		1		3	1
81-83		1		1	
84-86					
87-89				1	
90+					
Total	1000	1000	1000	1000	1000
No. samples	11	20	9	22	8
No. measured	5547	8259	3575	5995	3437
Ave. length	44.85	46.55	50.08	52.64	46.13

Table 4. Scenarios for various levels of reporting of trap cod less than 16 inches in landings statistics. Based on estimated % by weights less than 16 inches from available catch samples. (Division 2J3KL, 1982-85).

	1985	1984	1983	1982
	Division 2J			
Reported trap landings (MT)	4607	5327	3870	4464
Estimated underreporting if 50% of fish <16" not included in reported landings (MT)	51	32	NK	NK
Estimated underreporting if 100% of fish <16" not included in reported landings (MT)	104	65	NK	NK
	Division 3K			
Reported trap landings(MT)	13391	9872	10490	16415
Estimated underreporting if 50% of fish <16" not included in reported landings (MT)	NK	290	358	1360
Estimated underreporting if 100% of fish <16" not included in reported landings (MT)	NK	597	741	2965
	Division 3L			
Reported trap landings (MT)	21775	23000	25690	24248
Estimated underreporting if 50 % of fish <16" not included in reported landings (MT)	1766	590	431	1797
Estimated underreporting if 100% of fish <16" not included in reported landings (MT).	3843	1211	877	3882

Table 5. Division 2J cod trap landing compositions (% by number).

Length (cm)	1986	1985	1984	1983	1982
30-32					
33-35	1			5	4
36-38	17	3	3	22	53
39-41	93	18	18	56	153
42-44	195	60	76	142	186
45-47	207	145	135	184	203
48-50	172	211	178	139	114
51-53	120	193	152	123	56
54-56	89	150	114	98	46
57-59	59	96	99	67	53
60-62	23	56	75	60	60
63-65	11	32	57	43	32
66-68	7	17	38	29	20
69-71	3	10	22	16	10
72-74	1	5	13	9	6
75-77	1	2	8	4	2
78-80	1	1	5	2	1
81-83			4	1	1
84-86		1	1		
87-89			1		
90+			1		
Total	1000	1000	1000	1000	1000
No. samples	22	21	16	11	5
No. measured	7458	6931	7168	3522	1541
Ave. length	48.31	52.26	53.82	51.00	48.15

Table 6. Division 3K cod trap landing compositions (% by number).

Length (cm)	1986	1985	1984	1983	1982
30-32					
33-35					
36-38	4	8		2	1
39-41	59	86	6	34	31
42-44	201	150	54	131	165
45-47	259	136	141	164	221
48-50	199	133	210	149	175
51-53	125	128	180	129	123
54-56	77	103	138	135	95
57-59	42	77	113	103	77
60-62	18	60	69	66	56
63-65	9	48	42	40	27
66-68	4	29	20	22	14
69-71	2	17	11	11	9
72-74		11	8	6	3
75-77	1	6	3	4	2
78-80		3	3	2	1
81-83		2	1	1	
84-86		2		1	
87-89			1		
90+		1			
Total	1000	1000	1000	1000	1000
No. samples	40	39	24	43	20
No. measured	10195	13284	7900	17367	8296
Ave. length	48.16	51.56	53.06	51.92	50.43

Table 7. Division 3L cod trap landing compositions (% by number).

Length (cm)	1986	1985	1984	1983	1982
30-32	2				
33-35	25	1	1	2	5
36-38	95	12	5	11	19
39-41	152	55	27	47	74
42-44	193	158	124	106	212
45-47	172	193	195	166	259
48-50	129	181	157	198	165
51-53	89	139	132	172	90
54-56	63	95	116	136	62
57-59	38	58	103	75	39
60-62	21	43	69	41	27
63-65	12	29	35	22	23
66-68	5	18	18	13	14
69-71	2	9	11	6	6
72-74	1	4	4	3	4
75-77	1	3	1	1	1
78-80		1	1	1	
81-83		1	1		
84-86					
87-89					
90+					
Total	1000	1000	1000	1000	1000
No. samples	34	43	40	110	35
No. measured	14283	17241	14893	33831	10715
Ave. length	46.01	50.05	51.48	50.64	48.18

Table 8. Percentage trap cod less than 16 inches (41 cm) - catch vs landings.

Div.	Type	1986	1985	1984	1983	1982
			By numbers			
2J	Catch	12.3	5.8	3.1	-	-
	Landing	11.1	2.1	2.1	8.3	21.0
3K	Catch	26.7	-	12.6	15.1	27.3
	Landing	6.3	9.4	0.6	3.6	3.2
3L	Catch	37.3	29.6	11.5	9.1	24.9
	Landing	27.4	6.8	3.3	6.0	9.8
			By weight			
2J	Catch	6.5	2.2	1.2	-	-
	Landing	5.7	0.9	0.8	3.4	10.3
3K	Catch	15.4	-	5.7	6.6	15.3
	Landing	3.5	4.0	0.2	1.6	1.5
3L	Catch	21.8	15.0	5.0	3.3	13.8
	Landing	14.9	3.1	1.4	2.7	5.0

Table 9. Estimated underreporting of less than 16 inch trap cod in landing statistics, based on differences between catch and landing length compositions collected. (Divisions 2J3KL, 1982-85).

		1985	1984	1983	1982
	Division 2J				
Reported trap landings (MT)		4607	5327	3870	4464
Estimated underreporting of fish <16"	By weight (MT)	68	26	NK	NK
	By number (000's)	(135)	(36)	NK	NK
	Division 3K				
Reported trap landings (MT)		13391	9872	10490	16415
Estimated underreporting of fish <16"	By weight (MT)	NK	497	549	2244
	By number (000's)	NK	(959)	(1060)	(4481)
	Division 3L				
Reported trap landings (MT)		21775	23000	25690	24248
Estimated underreporting of fish <16"	By weight (MT)	2903	872	312	2385
	By number (000's)	(5887)	(1642)	(716)	(4583)

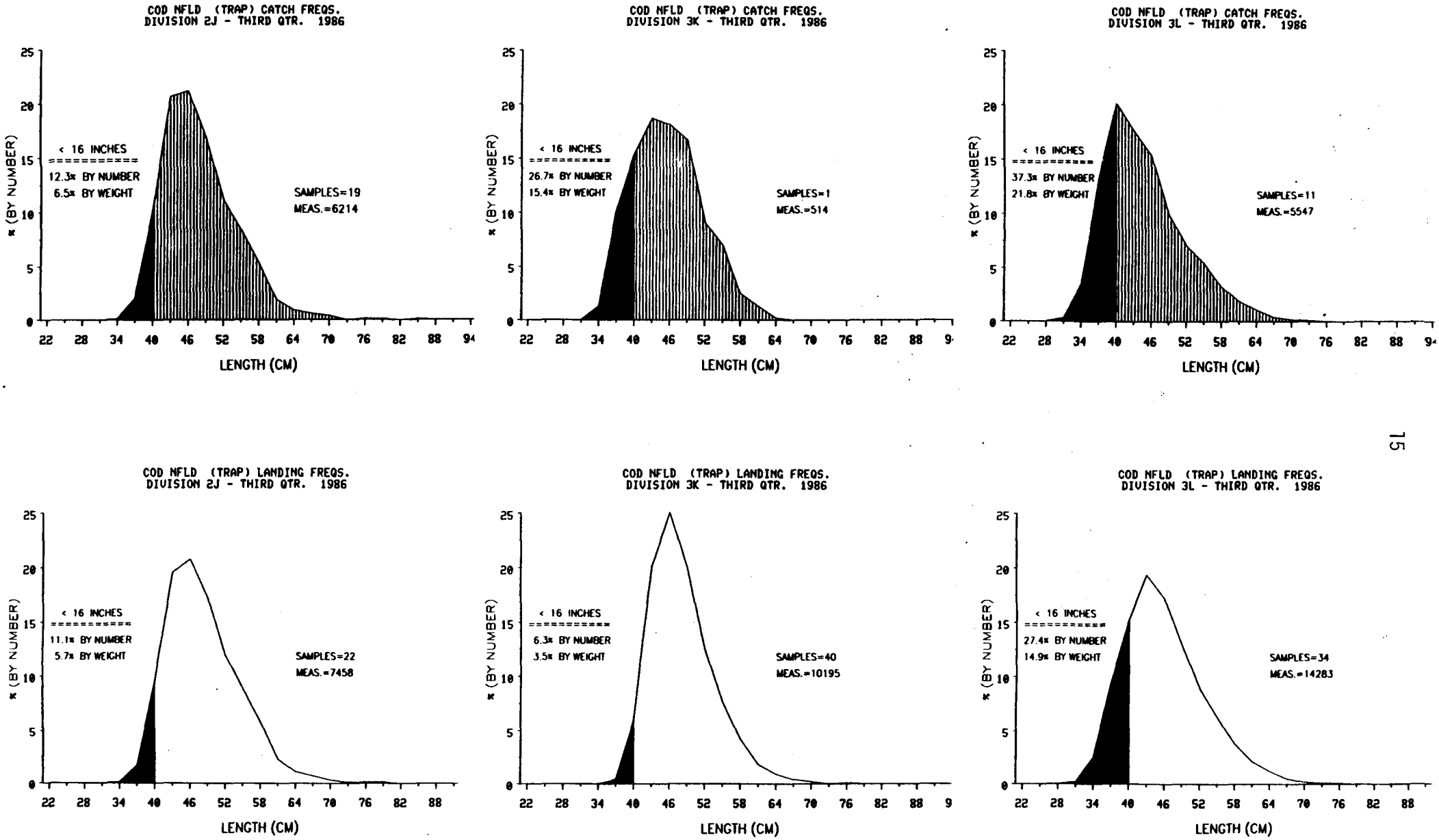
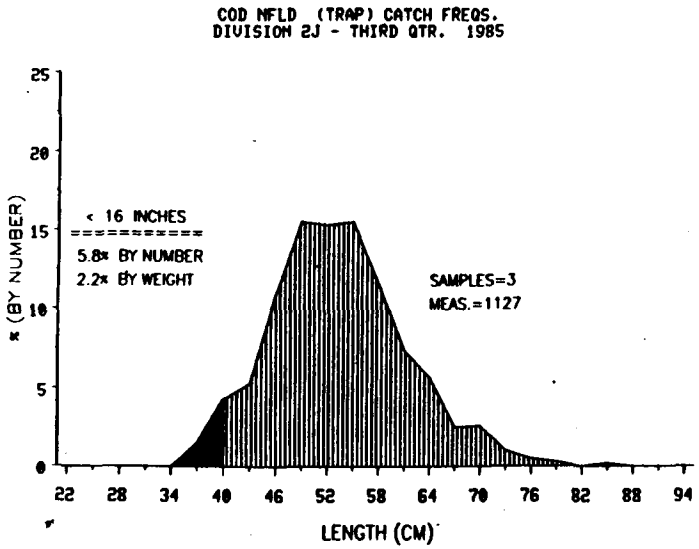
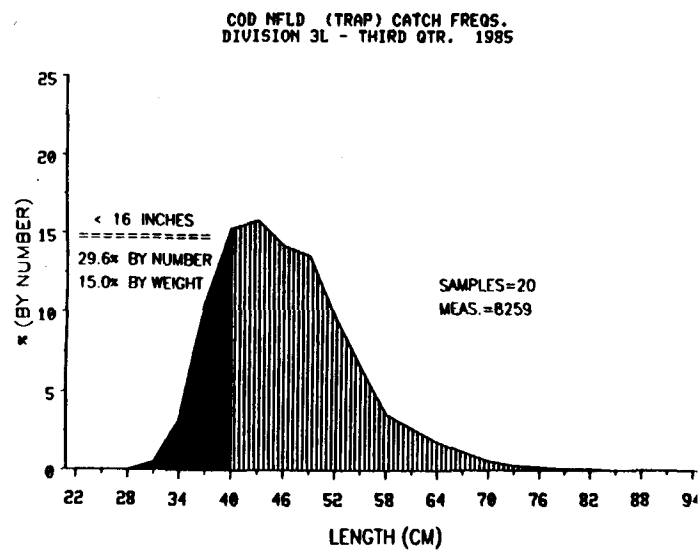
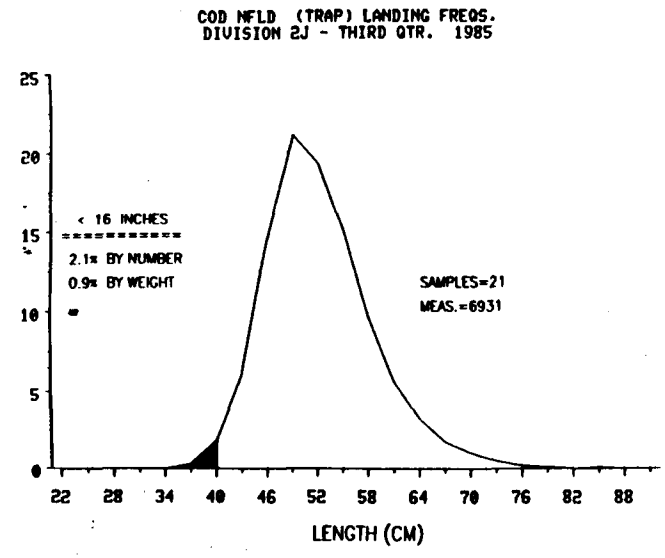
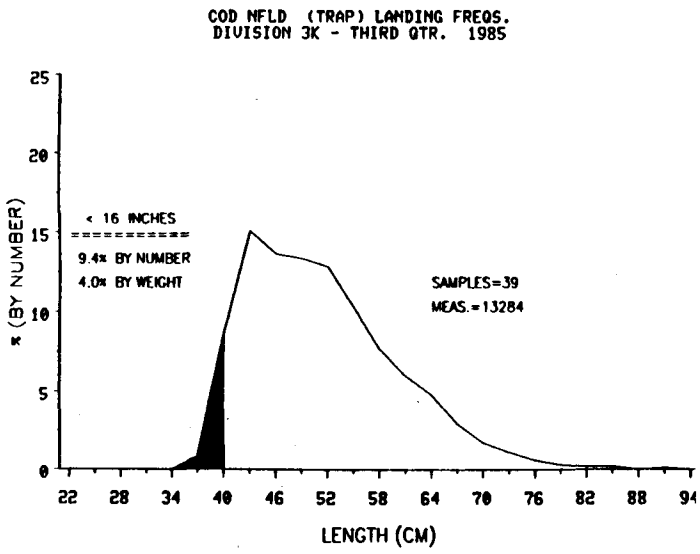


Fig. 1. Comparison of catch vs landing length compositions for Division 2J3K3L trap cod for years 1982-86, with portions less than 16 inches (41 cm) indicated.


COD NFLD (TRAP) CATCH FREQS.
DIVISION 2J - THIRD QTR. 1985
% (BY NUMBER)
< 16 INCHES
5.8% BY NUMBER
2.2% BY WEIGHT
SAMPLES=3
MEAS.=1127
LENGTH (CM)


COD NFLD (TRAP) CATCH FREQS.
DIVISION 3L - THIRD QTR. 1985
% (BY NUMBER)
< 16 INCHES
29.6% BY NUMBER
15.0% BY WEIGHT
SAMPLES=20
MEAS.=8259
LENGTH (CM)


COD NFLD (TRAP) LANDING FREQS.
DIVISION 2J - THIRD QTR. 1985
% (BY NUMBER)
< 16 INCHES
2.1% BY NUMBER
0.9% BY WEIGHT
SAMPLES=21
MEAS.=6931
LENGTH (CM)


COD NFLD (TRAP) LANDING FREQS.
DIVISION 3K - THIRD QTR. 1985
% (BY NUMBER)
< 16 INCHES
9.4% BY NUMBER
4.0% BY WEIGHT
SAMPLES=39
MEAS.=13284
LENGTH (CM)

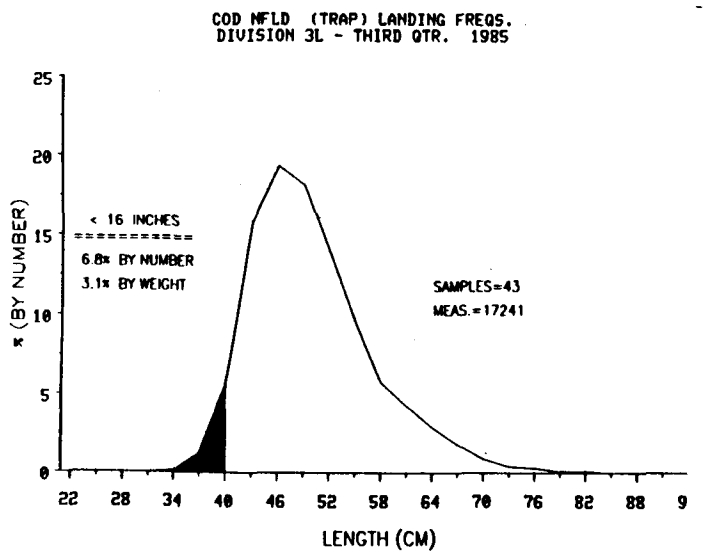
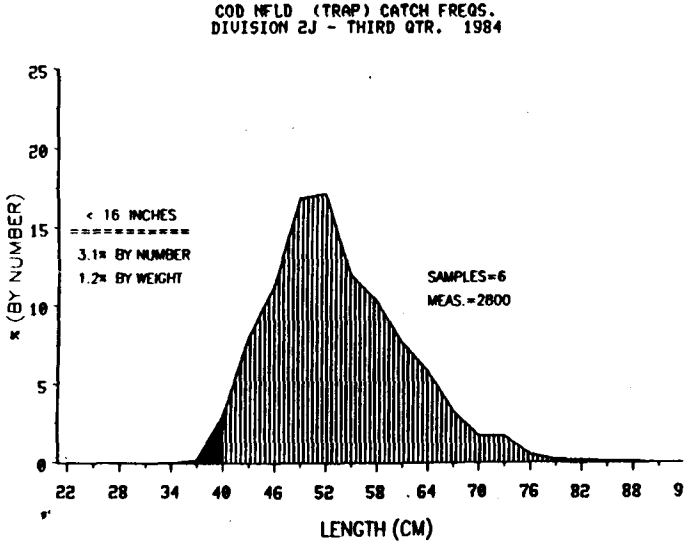
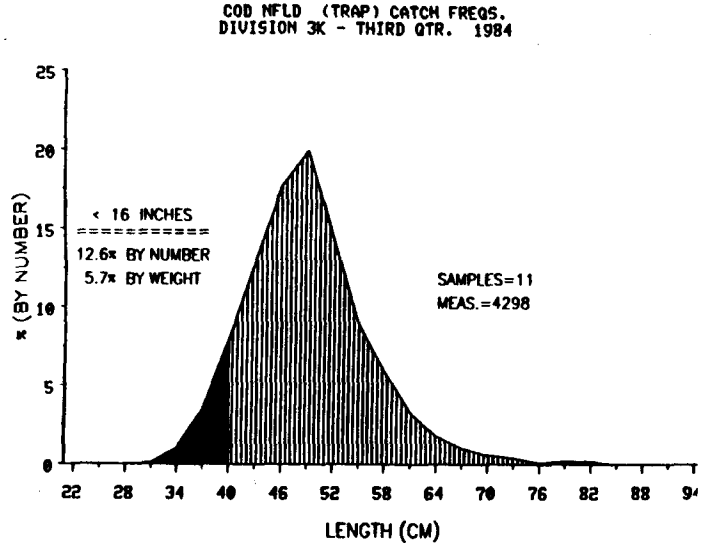

COD NFLD (TRAP) LANDING FREQS.
DIVISION 3L - THIRD QTR. 1985
% (BY NUMBER)
< 16 INCHES
6.8% BY NUMBER
3.1% BY WEIGHT
SAMPLES=43
MEAS.=17241
LENGTH (CM)

Fig. 1. (Cont'd.)


COD NFLD (TRAP) CATCH FREQS.
DIVISION 2J - THIRD QTR. 1984
< 16 INCHES
3.1% BY NUMBER
1.2% BY WEIGHT
SAMPLES=6
MEAS.=2800
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) CATCH FREQS.
DIVISION 3K - THIRD QTR. 1984
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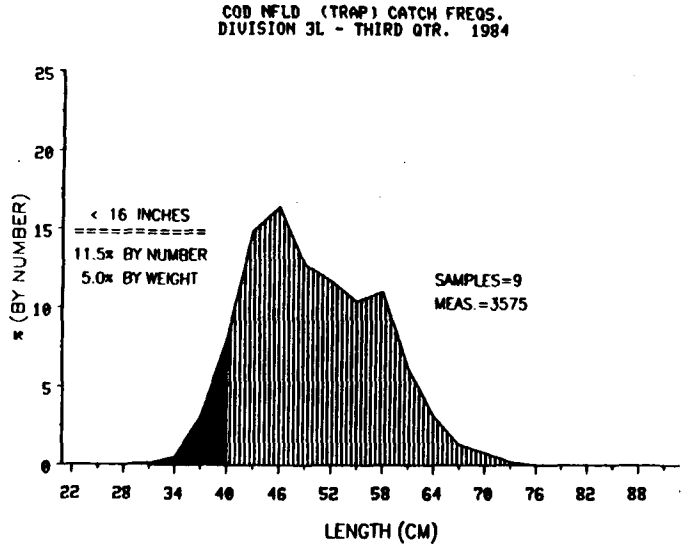
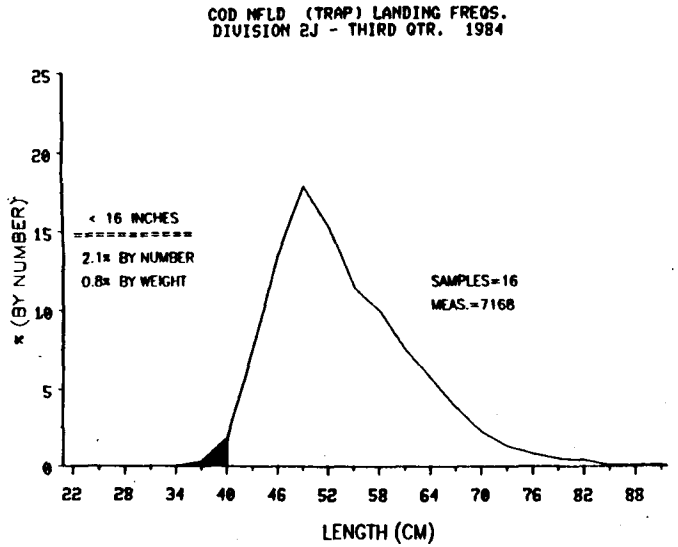
12.6% BY NUMBER
5.7% BY WEIGHT
SAMPLES=11
MEAS.=4298
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) CATCH FREQS.
DIVISION 3L - THIRD QTR. 1984
< 16 INCHES
11.5% BY NUMBER
5.0% BY WEIGHT
SAMPLES=9
MEAS.=3575
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) LANDING FREQS.
DIVISION 2J - THIRD QTR. 1984
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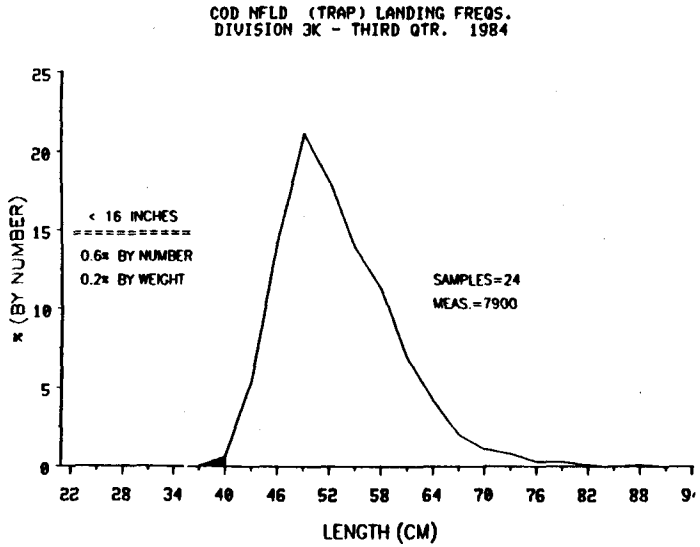
2.1% BY NUMBER
0.8% BY WEIGHT
SAMPLES=16
MEAS.=7168
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) LANDING FREQS.
DIVISION 3K - THIRD QTR. 1984
< 16 INCHES
0.6% BY NUMBER
0.2% BY WEIGHT
SAMPLES=24
MEAS.=7900
% (BY NUMBER)
LENGTH (CM)

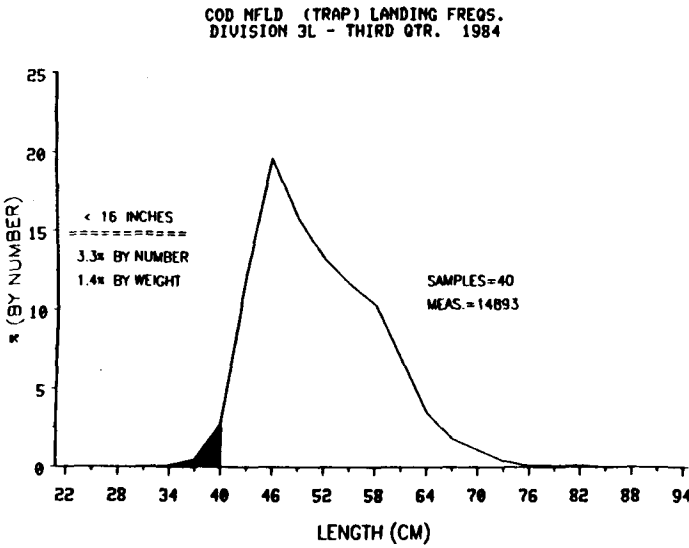
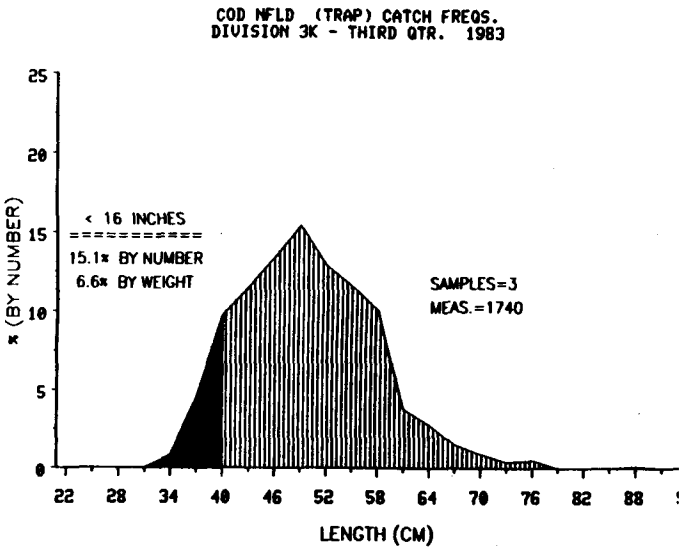
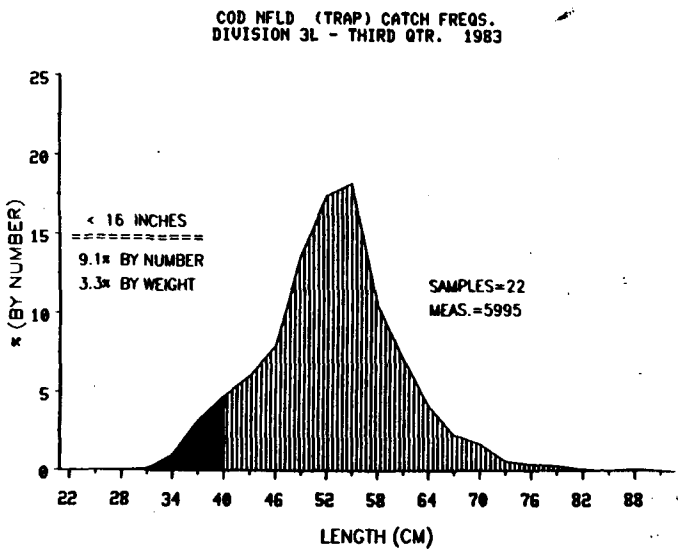
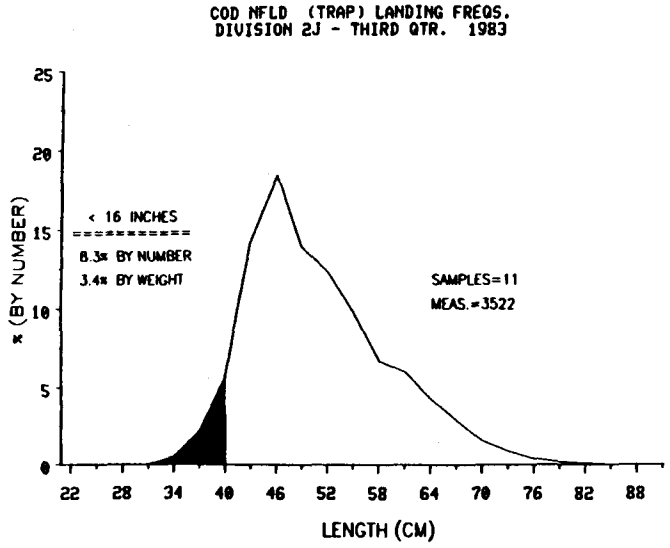
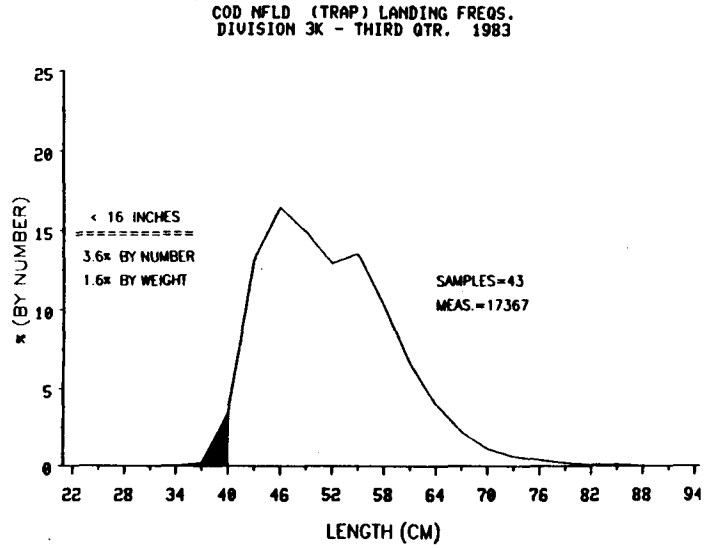

COD NFLD (TRAP) LANDING FREQS.
DIVISION 3L - THIRD QTR. 1984
< 16 INCHES
3.3% BY NUMBER
1.4% BY WEIGHT
SAMPLES=40
MEAS.=14893
% (BY NUMBER)
LENGTH (CM)

Fig. 1. (Cont'd.)


COD NFLD (TRAP) CATCH FREQS.
DIVISION 3K - THIRD QTR. 1983
< 16 INCHES
15.1% BY NUMBER
6.6% BY WEIGHT
SAMPLES=3
MEAS.=1740
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) CATCH FREQS.
DIVISION 3L - THIRD QTR. 1983
< 16 INCHES
9.1% BY NUMBER
3.3% BY WEIGHT
SAMPLES=22
MEAS.=5995
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) LANDING FREQS.
DIVISION 2J - THIRD QTR. 1983
< 16 INCHES
8.3% BY NUMBER
3.4% BY WEIGHT
SAMPLES=11
MEAS.=3522
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) LANDING FREQS.
DIVISION 3K - THIRD QTR. 1983
< 16 INCHES
3.6% BY NUMBER
1.6% BY WEIGHT
SAMPLES=43
MEAS.=17367
% (BY NUMBER)
LENGTH (CM)

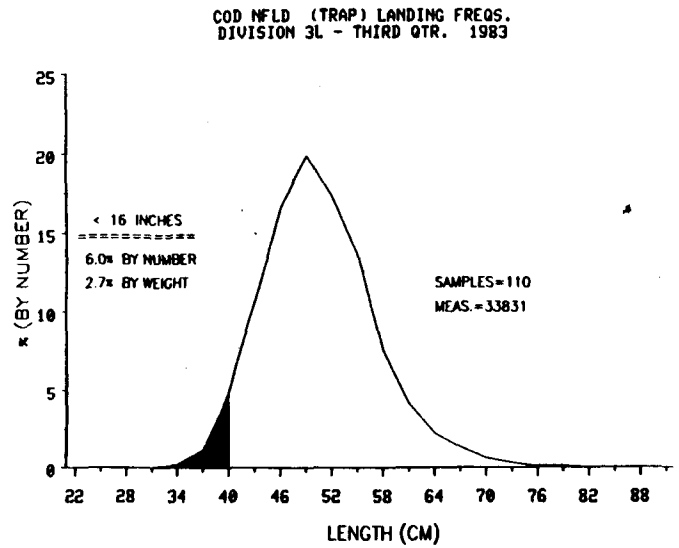
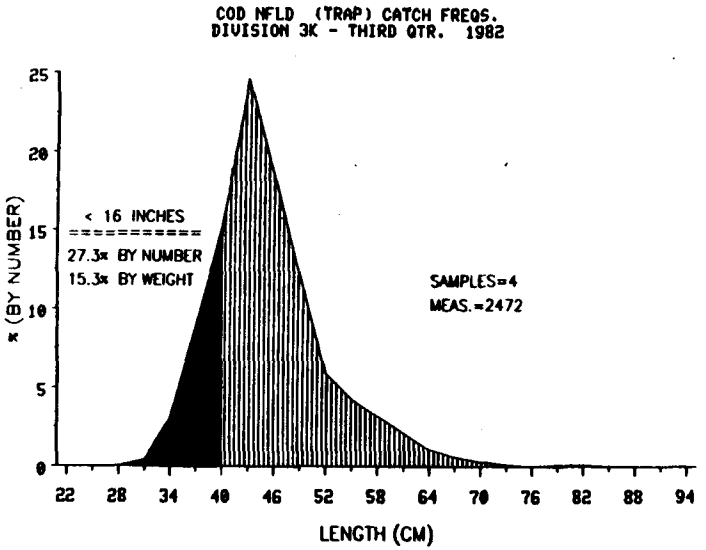
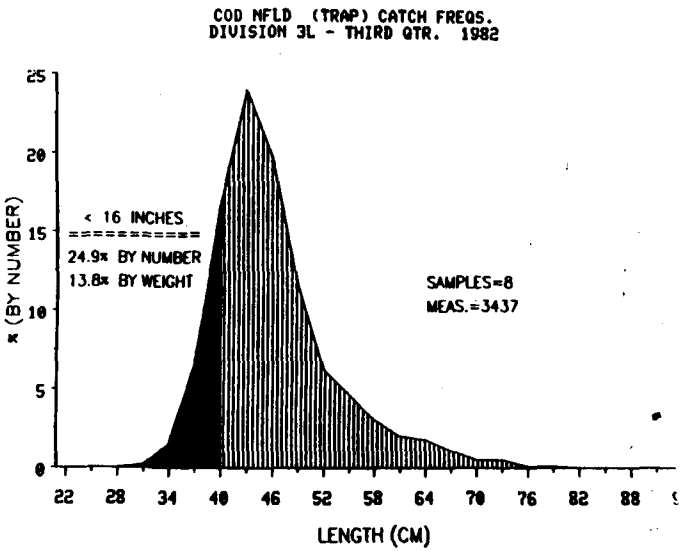
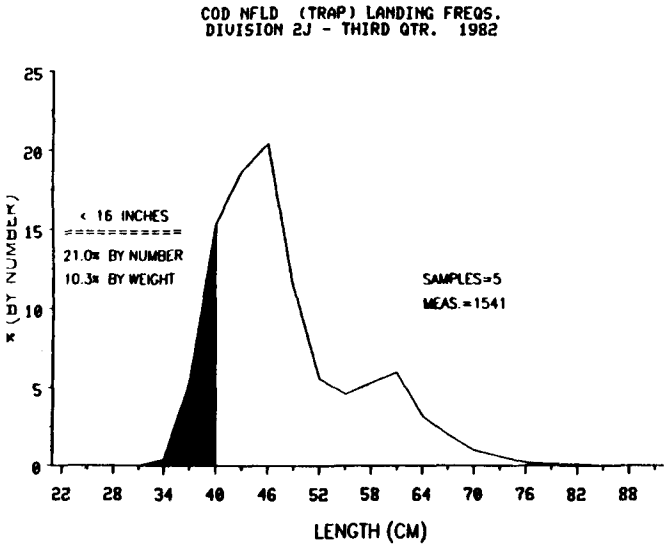
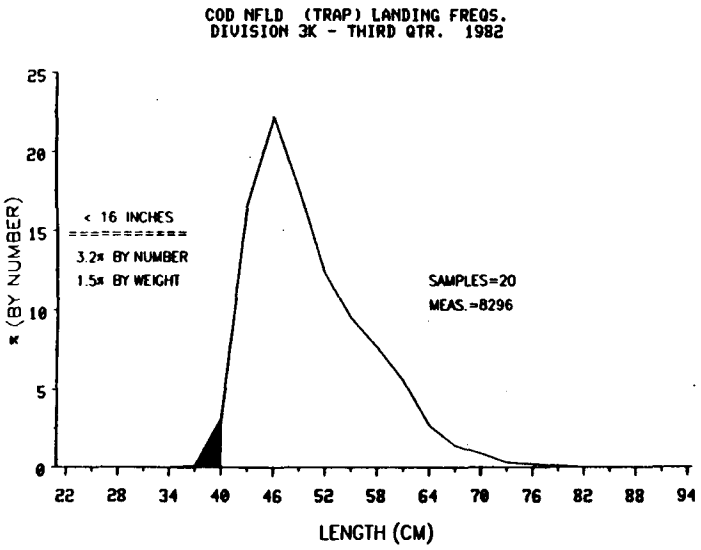

COD NFLD (TRAP) LANDING FREQS.
DIVISION 3L - THIRD QTR. 1983
< 16 INCHES
6.0% BY NUMBER
2.7% BY WEIGHT
SAMPLES=110
MEAS.=33831
% (BY NUMBER)
LENGTH (CM)

Fig. 1. (Cont'd.)


COD NFLD (TRAP) CATCH FREQS.
DIVISION 3K - THIRD QTR. 1982
< 16 INCHES
27.3% BY NUMBER
15.3% BY WEIGHT
SAMPLES=4
MEAS.=2472
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) CATCH FREQS.
DIVISION 3L - THIRD QTR. 1982
< 16 INCHES
24.9% BY NUMBER
13.8% BY WEIGHT
SAMPLES=8
MEAS.=3437
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) LANDING FREQS.
DIVISION 2J - THIRD QTR. 1982
< 16 INCHES
21.0% BY NUMBER
10.3% BY WEIGHT
SAMPLES=5
MEAS.=1541
% (BY NUMBER)
LENGTH (CM)


COD NFLD (TRAP) LANDING FREQS.
DIVISION 3K - THIRD QTR. 1982
< 16 INCHES
3.2% BY NUMBER
1.5% BY WEIGHT
SAMPLES=20
MEAS.=8296
% (BY NUMBER)
LENGTH (CM)

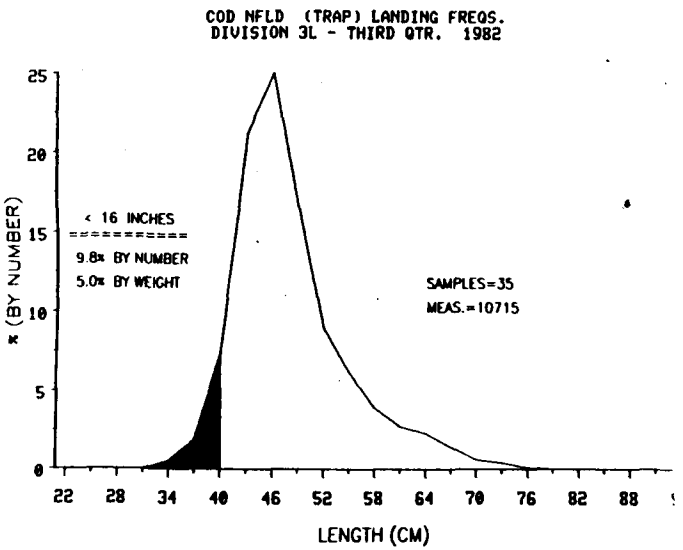

COD NFLD (TRAP) LANDING FREQS.
DIVISION 3L - THIRD QTR. 1982
< 16 INCHES
9.8% BY NUMBER
5.0% BY WEIGHT
SAMPLES=35
MEAS.=10715
% (BY NUMBER)
LENGTH (CM)

Fig. 1. (Cont'd.)

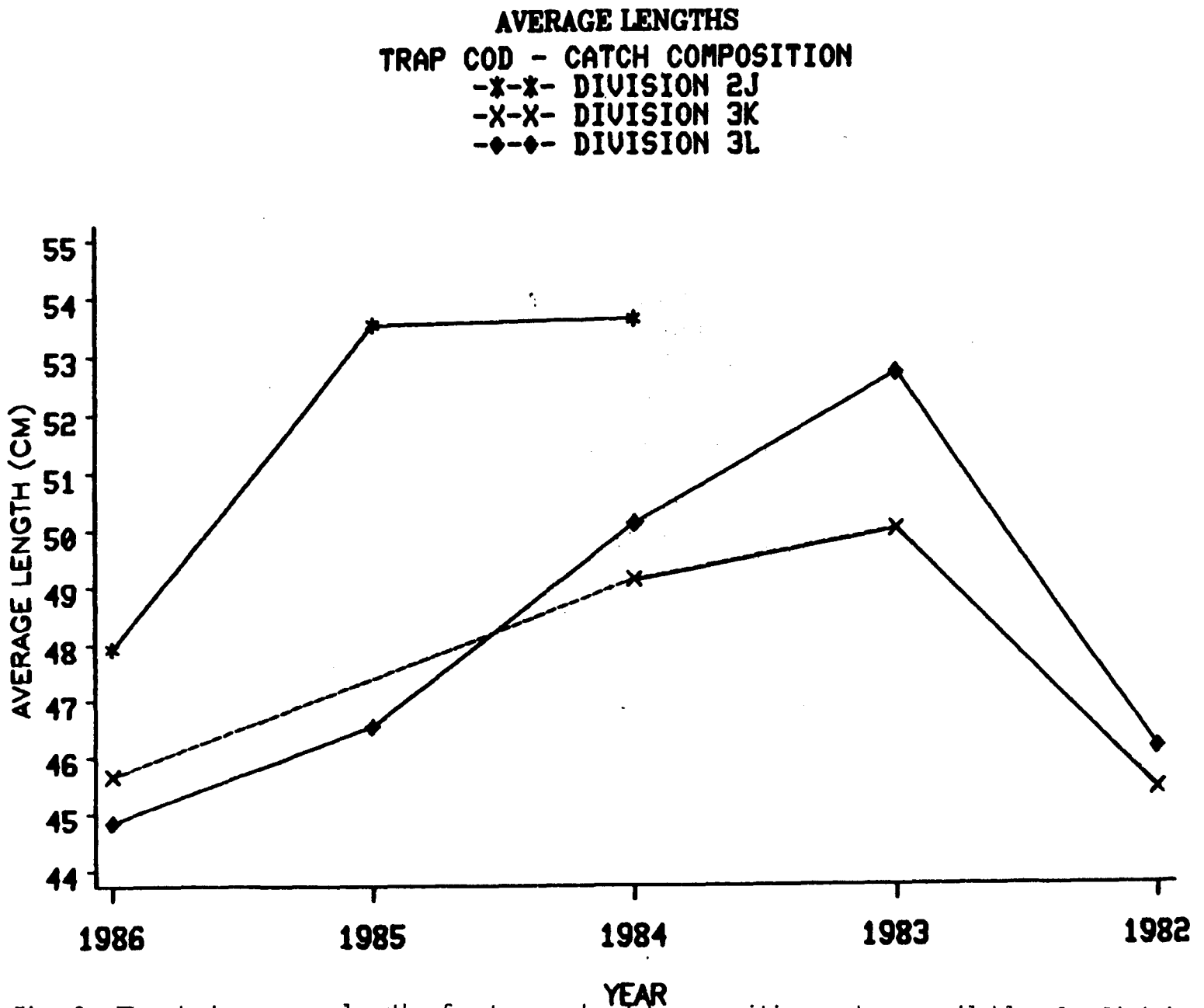


Fig. 2. Trends in average lengths for trap cod catch compositions, where available, for Division 2J, 3K, and 3L during 1982-86.