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The 1996 Iceland Scallop Fishery in NAFO Div. 3LNO

by

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Les documents de recherche sont publiés dans la langue officielle utilisée dans le manuscrit envoyé au secrétariat.

ABSTRACT

There were no research surveys for scallops in this area in 1996. In the absence of new research information, it was possible to examine fishery performance data only.

Overall, with the exception of 3LN north, catch rates have remained stable over the past several years. However, there has been an increase in meat counts i.e. smaller scallops are being harvested. There is no basis on which to advise changes in TAC. The TACs currently are 1,000 t round for eastern 3L, 3,000 t for the Lilly/Carson Canyon area and 3,000 t for the 3LN area just north of these canyons. A new fishing area in southern 3N developed in 1996. Based on estimated suitable scallop habitat in this area (3Nf) relative to the Lilly/Carson Canyon area, a TAC of 800 t round would be appropriate.

RÉSUMÉ

Aucune recherche sur les pétoncles n'a eu lieu dans la région en 1996. Faute de nouvelles données de recherche, on a seulement examiné les données sur le rendement de la pêche.

Dans l'ensemble, les taux de capture sont demeurés stables au cours des dernières années, sauf dans la division 3LN nord. Toutefois, on a enregistré une augmentation du nombre de chairs (c.-à-d. qu'on capture des pétoncles de plus petite taille). Il n'existe aucune raison de recommander des modifications aux TAC (total admissible des captures). Actuellement, ces taux s'établissent à 1 000 tonnes (poids entier) pour la division 3L est, à 3 000 tonnes pour la zone des canyons Lilly et Carson et à 3 000 tonnes pour la partie de la division 3LN située juste au nord de ces canyons. Une nouvelle zone de pêche s'est ajoutée dans la division 3N sud en 1996. Un TAC de 800 tonnes (poids entier) serait approprié pour cette zone d'après des études estimatives de l'habitat propice au pétoncle à cet endroit (3Nf) par rapport à la zone des canyons Lilly et Carson.

Introduction

Until recently (1993) there was little interest in the Iceland scallop, Chlamys islandica, on the Grand Banks of Newfoundland. Most of the early explorations for scallops were directed primarily for the larger sea scallop, Placopecten magellanicus. For long Iceland scallop aggregations here were considered marginal for full-scale commercialization. However, declining opportunities in the groundfish sector, particularly for vessels in the 55-65 ft range rekindled interest in the mollusc. By 1994 the directed fishery for the Iceland scallop had mushroomed with 57 vessels participating and nominal catch at 4,000 t, round (Tables 1 and 2). It has since burgeoned to become Canada's largest fishery for the mollusc. Total removals to date are estimated at 21,000 t round (Table 1). Over 90% of this cumulative catch came from NAFO Div. 3N. The fishery is continuing to expand, with new entrants participating and new aggregations being prosecuted (Table 2).

Two zones on the eastern Grand Banks have been under a TAC regime since 1995: 1,000 t shellstock for NAFO Div. 3L (eastern portion of 3L) and 3,000 t shellstock for NAFO Div. 3N (Lilly Canyon and Carson Canyon areas) (Fig. 1). In 1996, recognizing a discontinuity in resource distribution a new zone contiguous to the one encompassing the Lilly and Carson Canyon (Fig. 1) was proposed with an additional catch level set at 3,000 t. However, the new boundaries have yet to be incorporated into the management plan. An additional 1,000 t had been proposed for areas outside of these three zones. At the request of stockholders this was revised upwards to 5,000 t.

Research Surveys

None of the three "boxes" were re-surveyed (for abundance changes) in 1996. The Lilly Canyon and Carson Canyon area had last been visited in 1994. Fishable biomass had then been estimated at between 20,000 and 38,000 t (\bar{x} = 29,000 t) round (C.I. \pm 30%). Applying a 10% exploitation rate, a TAC of 3,000 t round had been proposed. TAC levels remained unchanged in 1996 (Naidu et al. 1995) (Table 3). The 3L TAC is based on an estimate developed in 1994 (Naidu et al. 1995) and has remained unchanged at 1,000 t round (Table 3A).

ROXANN sweeps were conducted in 1996 over the Lilly Canyon and Carson Canyon "box" (LCC). Seventeen transects, between 44°40'N and 45°56'N, transecting 699.5 n mi (covering 3,330 n mi²) were completed. Approximately 1,611 mi² (or 48.4%) of the area covered have been identified as suitable for the presence of Iceland scallops (Table 4). This delineation of grounds will improve considerably the survey design to re-estimate abundance, perhaps as early as in 1997. During the course of calibration work for acoustic sweeps data were also assembled on research vessel catch rates and proportions of cluckers to live scallops in the LCC "box".

The 1996 Fishery

Fleet composition in 1996 has shifted in favour of larger vessels. Two new entrants in the ≥ 65 ft size class and three in the 55-65 ft size category entered the fishery (Table 2). As in previous years, most of the effort (93%) was directed into NAFO Div. 3N which accounted for at least 97% of total removals (8,240 t out of 8,474 t round) (Table 5). A more detailed inspection of the distribution of fishing effort (Table 3) show that most (30%) of the effort continued to be directed into the Lilly/Carson Canyon, followed by an area in NAFO Div. 3N never-before-fished (Fig. 2). About 20% of the effort was again directed into aggregations immediately north of the Lilly/Carson Canyon area which had produced as much as the canyons (2,913 t versus 3,023 t or 47.6%) in 1995. Most of the catch in 1996 (3,483 t out of 9,457 t or 37%) came from new aggregations to the SE of the Banks (3Nf). Elsewhere as in Div. 3L effort was sparse.

Fishery Performance in 1996

a. Lilly/Carson Canyon (LCC Box):

The 1996 season commenced March 8, well before the management plan was released (September 16). This area was subject to several variation orders. Four separate time windows were available: March 8-April 30; May 8-18; September 10-15; and October 9-28.

Catch rates early in the season were in the range of 80-90 kg/tow round and finished off in the low 80s kg/tow, a within-season drop of some 8% and down 12% from the previous year (Table 6). Individual meat weight distribution confirms the shift noted in 1995 towards smaller scallops (Fig. 3). Pockets of large animals appear to have been located and selectively harvested (Table 7).

b. 3N North (portion of 3LN box, in 3N only):

The mean catch per tow here showed an increase during the latter part of the season (Table 8). It is not known if this is a reflection of the diversion of effort from points south relative to periodic closures of the adjoining LCC Box or real changes in availability. The latter would most likely reflect the location and fishing of new aggregations. Overall, this zone saw a decline of some 30% from the previous year. Approximately 92% of removals for the proposed, yet-to-be implemented 3LN zone came from this area (Fig. 1). Again, a shift from the previous year towards smaller sizes (high counts) is evident (Fig. 4, Table 9). High-counts in 3LN in 1996, relative to the other zones (Fig. 5), would have encouraged the fleet to move elsewhere.

c. Southeast 3N (3Nf):

This never-before fished zone was discovered by the Newfoundland-based fishing fleet soon after the LCC box was closed in mid-May 1996. In addition to the directed effort into 3N north in June (106 days), we saw the beginning of effort proliferation (79 days) into 3Nf. By July many vessels moved into this area. Effort into 3N North declined correspondingly suggesting better catch rates in 3Nf and/or lower counts, the latter with a higher unit value than smaller meats. Inspection of logs (Table 10) confirm that the

catch rates in 1996 were highest in the new area (124 kg/tow versus 98 kg/tow in the LCC (Table 5) and 110 kg/tow in the swath or real estate within 3N just north of the LCC (Table 7)). In fact during July-August 1996 when the bulk of effort shifted to 3Nf mean daily catch rate in the new area was the 200-300 kg/tow range, well above any area in any month (Table 11). Moreover, the majority of meats was large; but unlike the mix from the Lilly/Carson Canyon in 1994 (Fig. 6). In the July-August period a total of 745 fishing days was directed into this new area with nearly 2,700 t removed (out of a total of 3,107 t for the year).

Natural Mortality

Indirect non-yield fishing mortality in the Iceland scallop has been estimated at least as high as 0.18 (17%) and possibly as high as 0.36 (31%) respectively for the Digby and New Bedford rakes (Naidu 1988). Natural mortality computed from percent occurrence of cluckers has continued to increase over grounds fished on the Grand Banks, some of it no doubt reflecting gear-induced mortality (Table 12). To date this has not been incorporated into our assessments.

Exploratory Survey on the Flemish Cap

Eager to participate in this expanding fishery, several enterprises began to express interest in carrying out exploratory surveys over the eastern Grand Banks of Newfoundland, particularly outside of the 200-mile Canadian Economic Zone. One of these, Fishery Products International (FPI) in November 1996 sent two offshore scallop vessels, the M.V. TRIANO and M.V. ZEBROID, both from Riverport, N.S. into the Flemish Cap area. In total, the vessels conducted 102 tows in the area. Not a single scallop was taken; neither was there any evidence of shell debris. This led to the inevitable conclusion that it is unlikely that there are commercial scallop beds in the Flemish Cap area (memo dated December 5, 1996, to B. Rowatt, Deputy Minister, DFO from V. Young, Chairman and CEO of FPI). The basic conclusion was that the bottom over the Flemish Cap was generally unsuitable (rocky and hard) for the presence of scallops beds: This exploratory survey has confirmed our suspicion that further expansion of this fishery eastwards on the Grand Banks of Newfoundland to be highly likely.

References

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- Naidu, K. S. 1988. Estimating mortality rates in the Iceland scallop, Chlamys islandica (O. F. Muller). J. Shellfish Res. 7(1): 61-71.
- Naidu, K. S., F. M. Cahill, P. J. Veitch, and D. E. Stansbury. 1995. Status of the Iceland scallop, Chlamys islandica, on the Grand Banks of Newfoundland (NAFO Div. 3LNO), 1994. DFO Atl. Fish. Res. Doc. 95/136, 24 p.

Table 1. Nominal catch (t, round) and effort in the fishery directed at Iceland scallops in NAFO Div. 3LNO, 1992-96. All figures are based on the species-specific conversion factor of 9.2.

Year	No. of vessels	NAFO Div. 3L	NAFO Div. 3N	NAFO Div. 3O	NAFO Div. 3LNO
1992	1	20	2	0	22
1993	10	489	325	3	817
1994	57	86	3,844	11	3,941
1995	48	101	6,400	0	6,501
1996	52	406	9,048	0	9,454
TOTALS	-	1,102	19,619	14	20,735

Table 2. Size composition of vessels fishing Iceland scallops offshore (east of 51°00'W longitude) in 1995-96.

Vessel size (LOA)	No. of Vessels (%)	
	1995	1996
≥65 ft	0	2 (4.1)
55-65 ft	33 (75.0)	36 (73.5)
45-54 ft	8 (18.2)	8 (16.3)
35-44 ft	3 (6.9)	3 (6.1)
<35 ft	0	0
Total	44	49

Table 3. Summary of TACs, effort, distribution of effort and removals from NAFO Div. 3LNO, 1996.

		Landings (kg, round)		
Area	TAC (t)	No. of fishing days	Log estimates	Dockside monitoring
Eastern 3L	1,000	18	37,826	145,650
3LN	3,000	593	1,411,555	967,035
Lilly/Carson Canyons	3,000	904	2,695,721	2,970,170
Southeast 3N	-	833	3,106,563	3,483,321
Remainder of 3LNO	-	606	1,222,056	1,890,413
Total	-	2,954	8,473,721	9,456,589

Table 3A. Summary of abundance estimates, TACs and removals of Iceland scallops from areas under TAC on the Grand Banks of Newfoundland.

Year	3L	3LN	LCC
A. 1994 Abundance estimate	4,000-15,000 (\bar{x} = 9,500 t)	n/a	20,000-38,000 (\bar{x} = 29,000 t)
TAC	1,000 t	nil	3,000 t
Nominal catch	91 t	280 t	4,200 t
B. 1995 Abundance estimate	n/a	15,000-45,000 (\bar{x} = 30,000 t)	n/a
TAC	1,000 t	nil	3,000 t
Nominal catch	174 t	2,913 t	3,023 t
C. 1996 Abundance estimate	n/a	n/a	n/a
TAC	1,000 t	3,000 t	3,000 t
Nominal catch	146 t	967 t	2,970 t

Table 4. Roxann transects - TELEOST 27, 1996 (Lilly/Carson Canyon area).

Survey line number	Start Lat.	Start Long.	End Lat.	End Long.	Distance covered (n mi)
1	4440.00	4903.25	4439.99	4959.10	39.85
2	4444.99	4958.97	4445.00	4903.19	39.75
3	4450.01	4901.23	4449.99	4959.08	41.17
4	4455.01	4959.63	4454.99	4908.66	36.22
5	4459.98	4859.64	4500.01	4959.11	42.19
6	4504.99	4959.12	4504.99	4853.91	46.20
7	4510.00	4959.09	4509.99	4849.98	48.89
8	4515.00	4848.02	4514.79	5030.89	72.67
9	4514.79	5030.89	4520.07	5030.71	5.28
10	4520.07	5030.71	4520.28	4850.71	70.53
11	4524.90	4910.63	4525.00	4959.06	34.11
12	4530.00	4958.91	4529.99	4926.95	22.47
13	4534.99	4927.00	4535.02	4852.49	24.23
14	4540.00	4851.95	4540.00	4959.04	47.04
15	4545.00	4959.08	4545.00	4850.84	47.78
16	4550.00	4848.32	4550.00	4959.03	49.43
17	4556.01	4959.28	4556.00	4913.84	31.70
					699.51
Approximate area covered by survey (n mi ²)					3330.40
48.4% (1611.58 n mi ² of survey area consists of bottom type suitable for Iceland scallops.					

Table 5. Summary of Iceland scallop landings and distribution of effort in eastern Grand Bank, 1996.

NAFO Division	No. of boats	No. of fishing days	Landings ¹ kg, round) (% of total)
3L	19	196	233,200 (2.8)
3N	49	2,750	8,240,521 (97.2)
3O	7	8	0
Offshore only (east of 51° long.)	49	2,812	8,346,807 (98.5)
All of 3LNO	52	2,954	8,473,721

¹ sum of daily log estimates x 9.2

Table 6. Monthly CPUE estimates (kg/tow, round) for the Lilly/Carson Canyon area of NAFO Div. 3N, 1996. For comparison with the previous year, corresponding estimates from 1995 are paranthesized.

Month	Removals ¹ (t, round)	Fishing days	CPUE (kg/tow)
March	301	102	88
April	1,078	364	90
May	730	231	83
June	32	9	102
July	7	1	-
August	9	5	47
September	262	86	80
October	277	106	82
November	-	-	-
Overall 1996	2,696	904	86
1995 estimates	(3,023)	(977)	(98)

¹ sum of daily log estimates x 9.2

Table 7. Percent composition of meat counts in Iceland scallop catches from the Lilly/Carson Canyon area, 1994-96.

Meat count (no./lb)	1994	1995	1996
1-9	0	0	0
10-19	1.9	0	0.4
20-29	31.7	0.4	12.8
30-39	38.9	4.8	29.4
40-49	19.6	19.5	31.9
50-59	5.8	25.3	16.4
60-69	1.6	23.3	6.7
70-79	0.4	13.7	1.7
80+	0.1	13.0	0.8
N	3,280	1,629	6,408

Table 8. Monthly CPUE estimates (kg/tow, round) for that portion of Div. 3N north of the Lilly/Carson Canyon area, 1996. For comparisons with the previous year, corresponding estimates from 1995 are paranthesized.

Month	Removals ¹ (t, round)	Fishing days	CPUE (kg/tow)
March	13	9	59
April	24	13	80
May	121	76	48
June	290	106	77
July	36	7	146
August	136	52	88
September	370	146	87
October	230	96	86
November	72	29	77
Overall 1996	1,292 ²	534	79
1995 estimates	(2,913)	(998)	(110)

¹ sum of daily log estimates x 9.2

² this total represents 92% of all removals from 3LN zone

Table 9. Percent composition of meat counts in Iceland scallops from the 3LN area (north of Lilly/Carson Canyon), 1995-96.

Meat count (no./lb)	1995	1996
1-9	0	0
10-19	0.1	0.1
20-29	2.9	0.4
30-39	20.9	5.5
40-49	33.1	22.6
50-59	24.3	28.0
60-69	11.7	21.3
70-79	4.4	11.5
80+	2.6	10.7
N	4,179	1,831

Table 10. Monthly CPUE estimates for the Southeast 3N zone (3Nf), 1996.

Month	Removals ¹ (t, round)	Fishing days	CPUE kg/tow
March	-	-	-
April	-	-	-
May	0.4	1	22
June	410	79	235
July	1,735	392	166
August	944	353	75
September	17	8	68
October	-	-	-
November	-	-	-
Overall	3,107	833	124

¹ sum of daily log estimates x 9.2

Table 11. Mean daily catch (kg, round) per tow by month over selected grounds on the Grand Bank of Newfoundland, 1996.

Month	Lilly/ Carson Canyon ($\bar{x} \pm S.D.$)	3N (north of LCC) ($\bar{x} \pm S.D.$)	3LN ($\bar{x} \pm S.D.$)	SE 3N ($\bar{x} \pm S.D.$)
March	94.4 (± 47.4)	72.4 (± 53.7)	72.4 (± 53.7)	-
April	103.1 (± 75.2)	97.7 (± 65.8)	97.7 (± 65.8)	-
May	85.4 (± 44.8)	51.1 (± 34.5)	49.5 (± 34.9)	21.7
June	105.9 (± 32.6)	82.2 (± 41.2)	93.2 (± 77.1)	277.8 (± 153.6)
July	-	146.0 (± 54.4)	146.0 (± 54.4)	200.4 (± 258.9)
August	40.2 (± 23.5)	98.6 (± 82.1)	95.7 (± 81.0)	80.1 (± 49.2)
September	90.0 (± 101.5)	102.3 (± 74.6)	99.8 (± 75.0)	66.4 (± 21.0)
October	90.2 (± 48.9)	108.7 (± 86.4)	110.3 (± 83.7)	-
November	-	107.5 (± 155.4)	114.0 (± 129.8)	-
Overall	94.3 (± 66.0)	92.9 (± 77.3)	95.3 (± 81.9)	154.7 (± 198.6)

Table 12. Estimated natural mortality for Iceland scallops on the Grand Bank (Div. 3N only). (M_1 based on cluckers only; M_2 based on cluckers and crushed scallops.) Observed cluckers are adjusted upwards by a factor of 1.221 to allow for tow-induced disarticulation.

Year	No. live		No. cluckers		M_1	M_2
	Whole	Crushed	Observed	Adjusted		
1982	9,302	1,074	293	358	0.058	0.234
1989	7,032	1,273	320	391	0.078	0.336
1994	12,995	1,055	918	1,121	0.129	0.252
1995	3,089	118	319	389	0.189	0.247
1996	3,390*		494	603	0.265	?

* separation between live and crushed scallops not available.

Table 13. Estimated natural mortality for Iceland scallops in the Lilly/Carson Canyon Zone of 3N. (M_1 based on cluckers only; M_2 based on cluckers and crushed scallops.) Observed cluckers are adjusted upwards by a factor of 1.22 to allow for tow-induced disarticulation.

Year	No. live		No. cluckers		M_1	M_2
	Whole	Crushed	Observed	Adjusted		
1982	201	19	3	4	0.031	0.180
1989	4,906	934	137	167	0.048	0.322
1994	12,995	1,055	918	1,121	0.129	0.252
1995	1,089	49	47	57	0.083	0.155
1996	1,628*		235	287	0.263	?

* separation between live and crushed scallops not available.

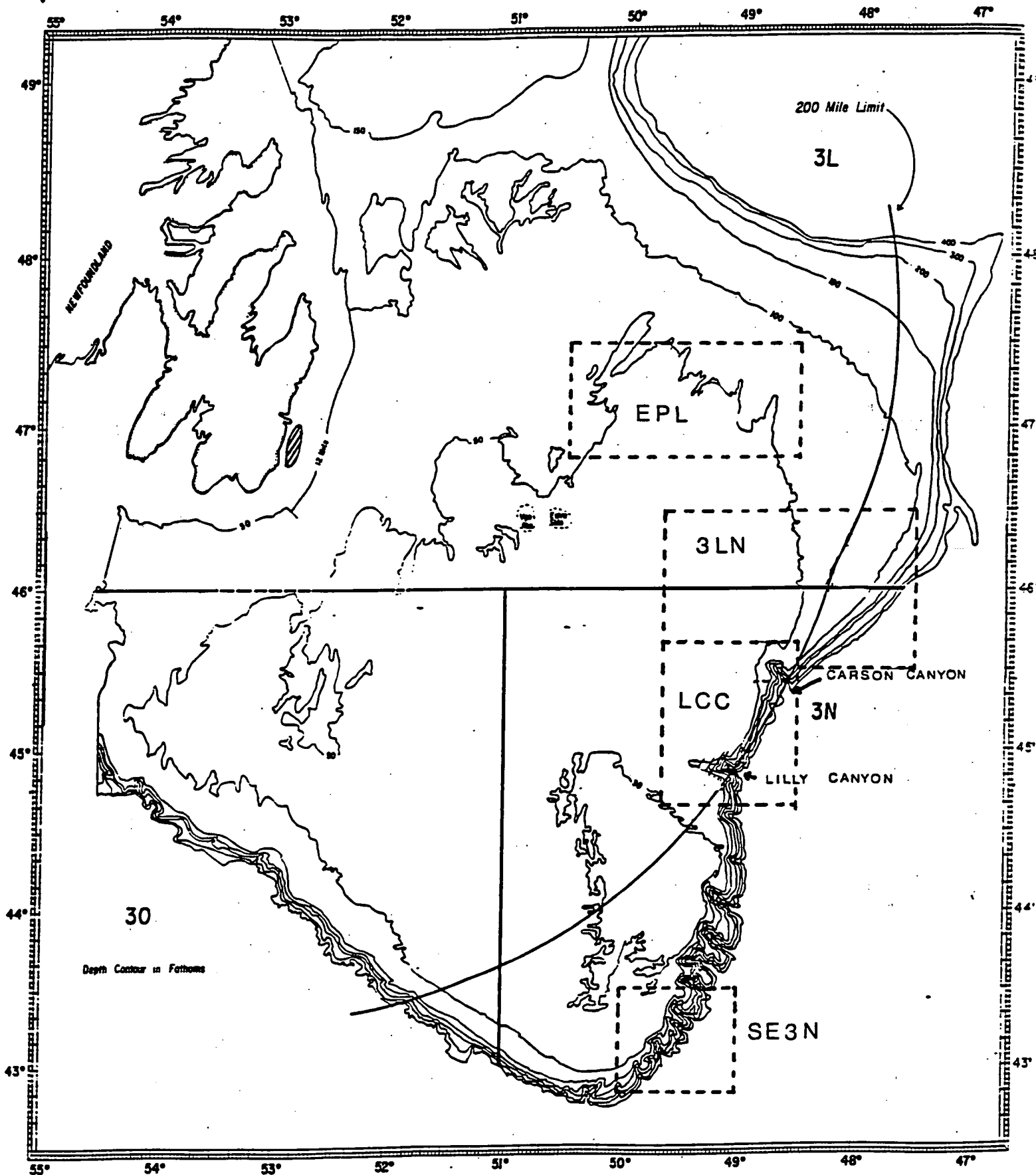


Fig. 1. TAC zones in 1996 for the Iceland scallop fishery over the Grand Banks of Newfoundland. (The box (SE 3N) was introduced mid-season by resource managers but had no associated TAC.)

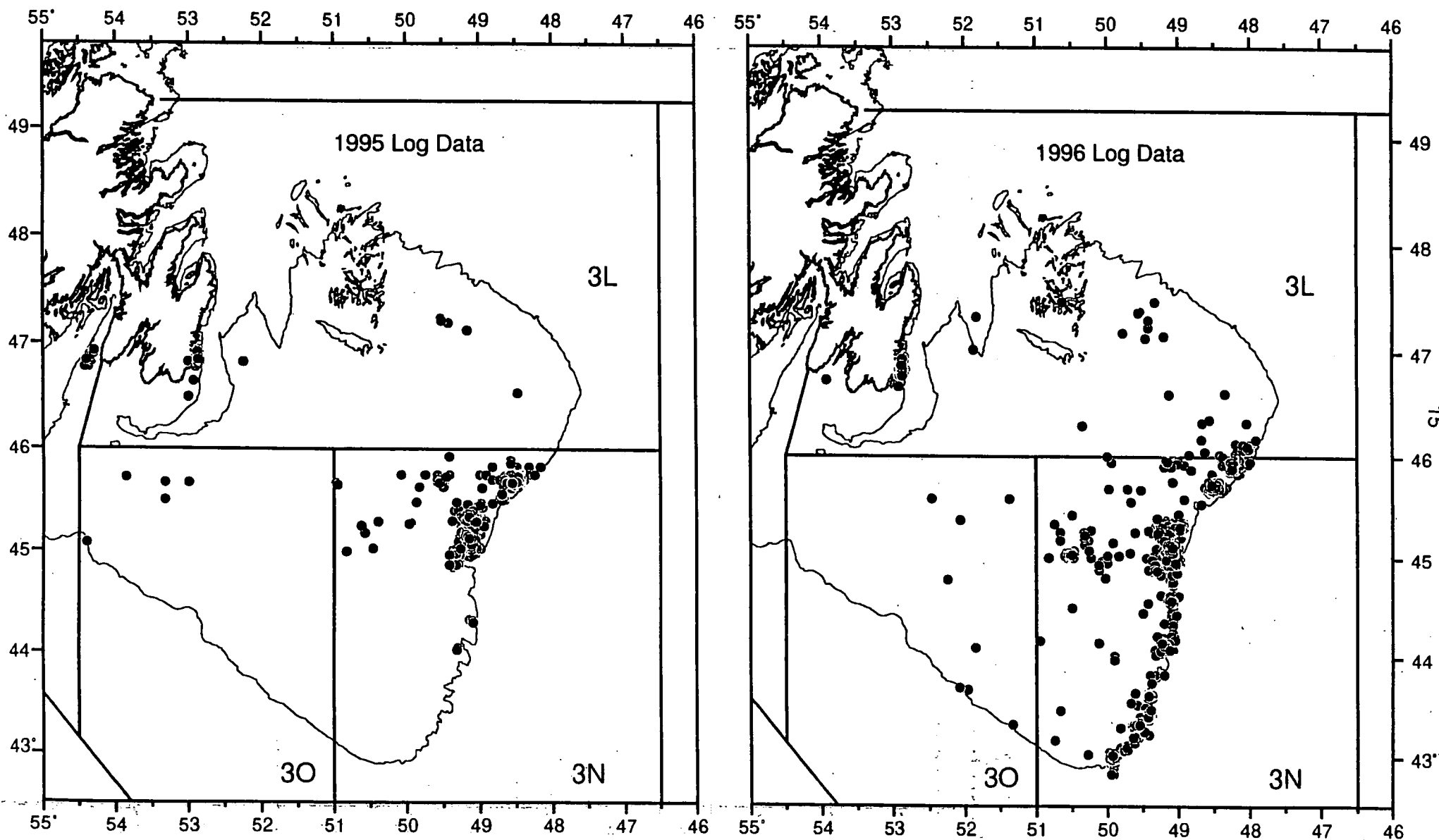


Fig. 2. Distribution of fishing effort in NAFO Div. 3LN in 1995-96.

Fig. 3. Unadjusted (as landed) frequency distribution of individual meat weights from the Iceland scallop fishery in the Lilly Canyon/Carson Canyon area, 1994 - 96.

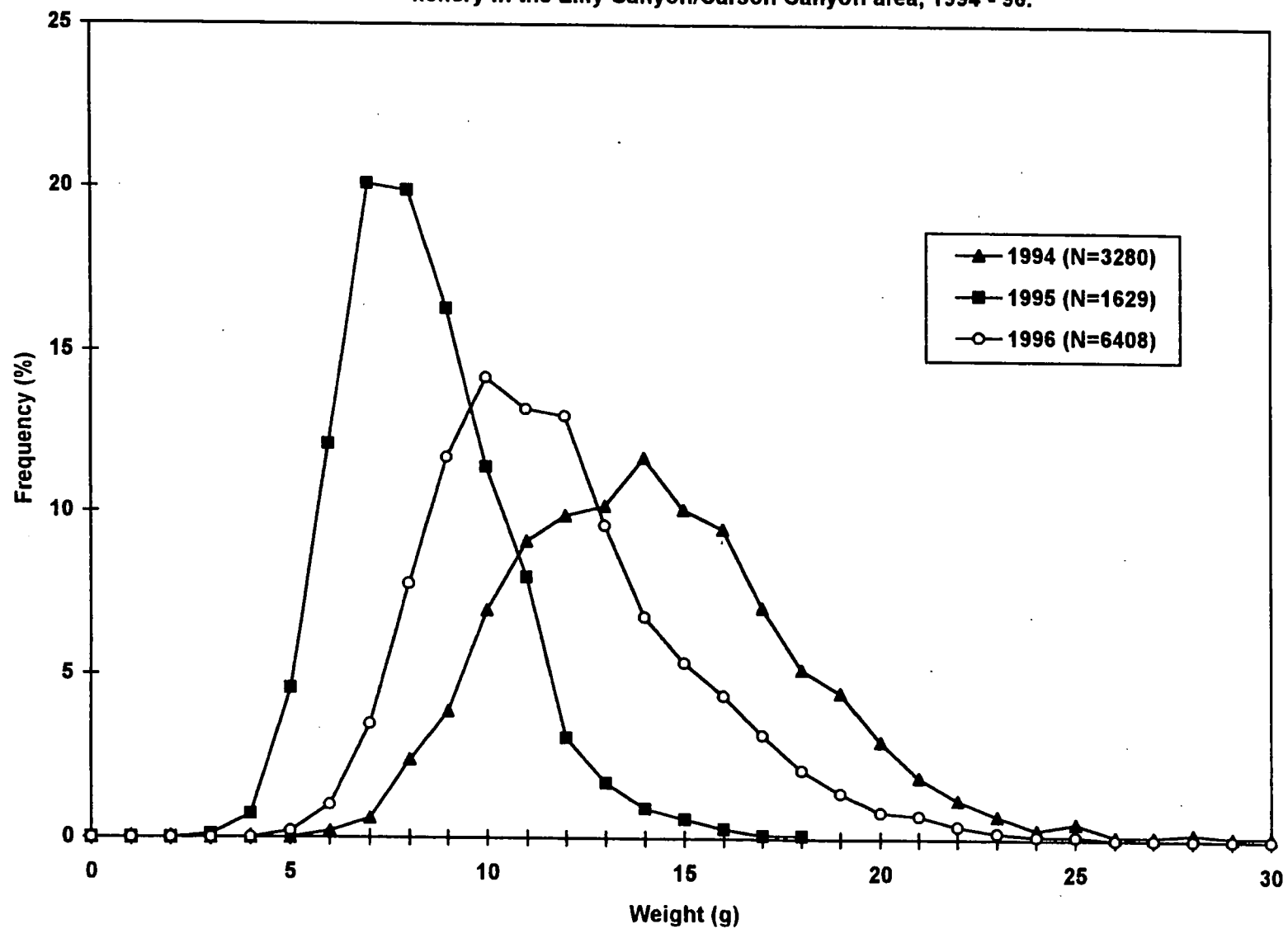


Fig. 4. Unadjusted (as landed) frequency distribution of individual meat weights from the Iceland scallop fishery in 3LN, 1995 - 96.

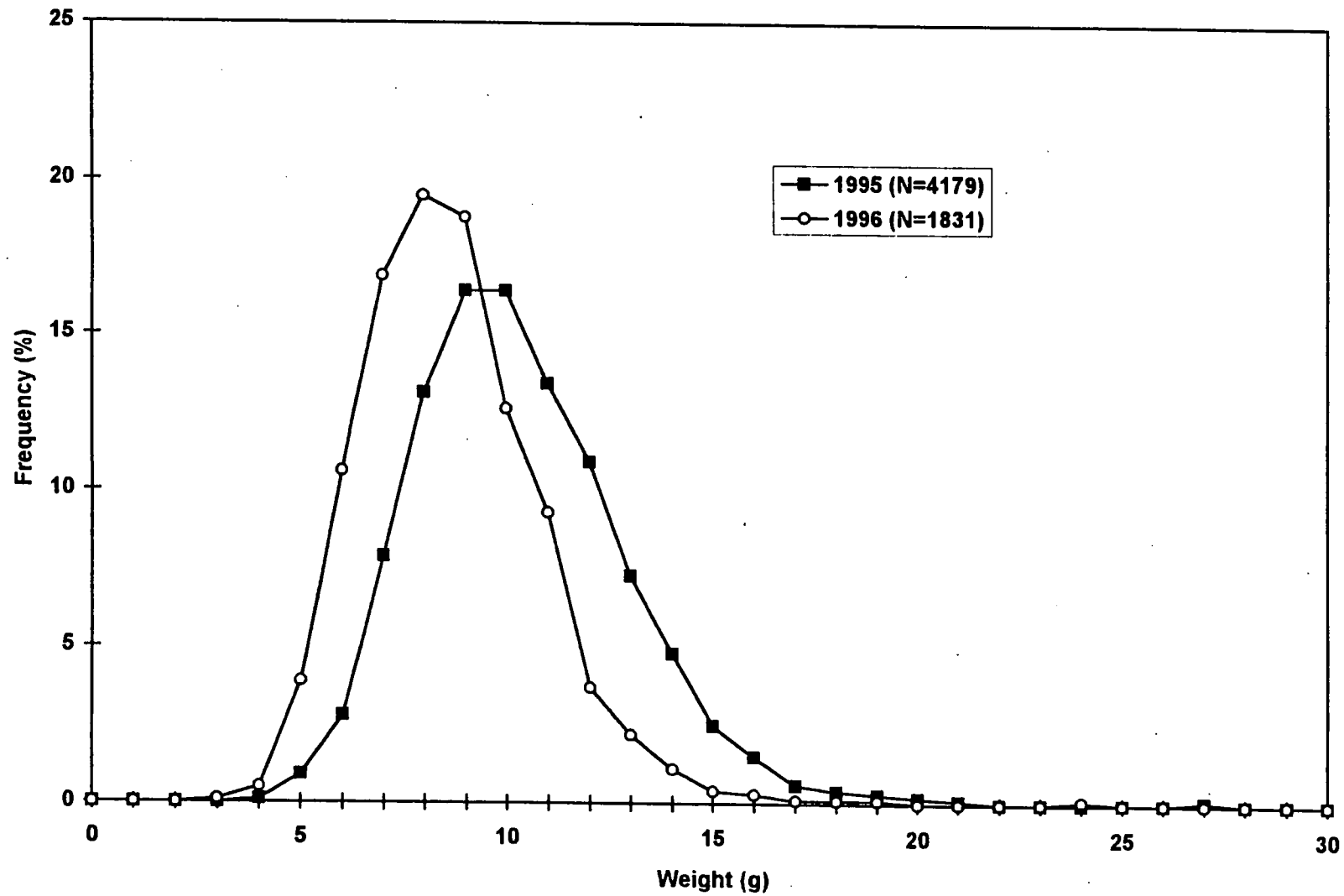


Fig. 5. Unadjusted (as landed) frequency distribution of individual meat weights from the Iceland scallop fishery on the Grand Bank, 1996.

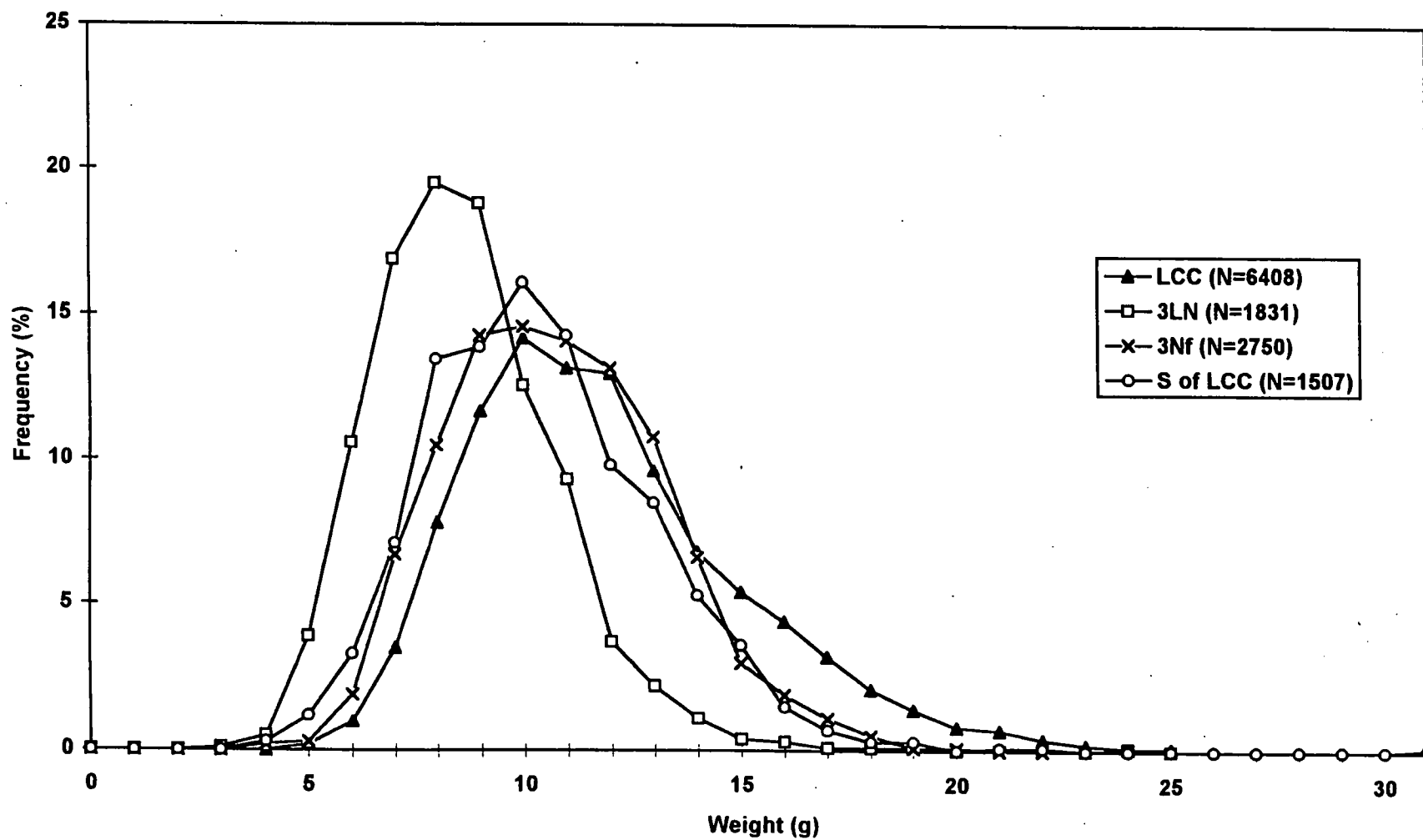
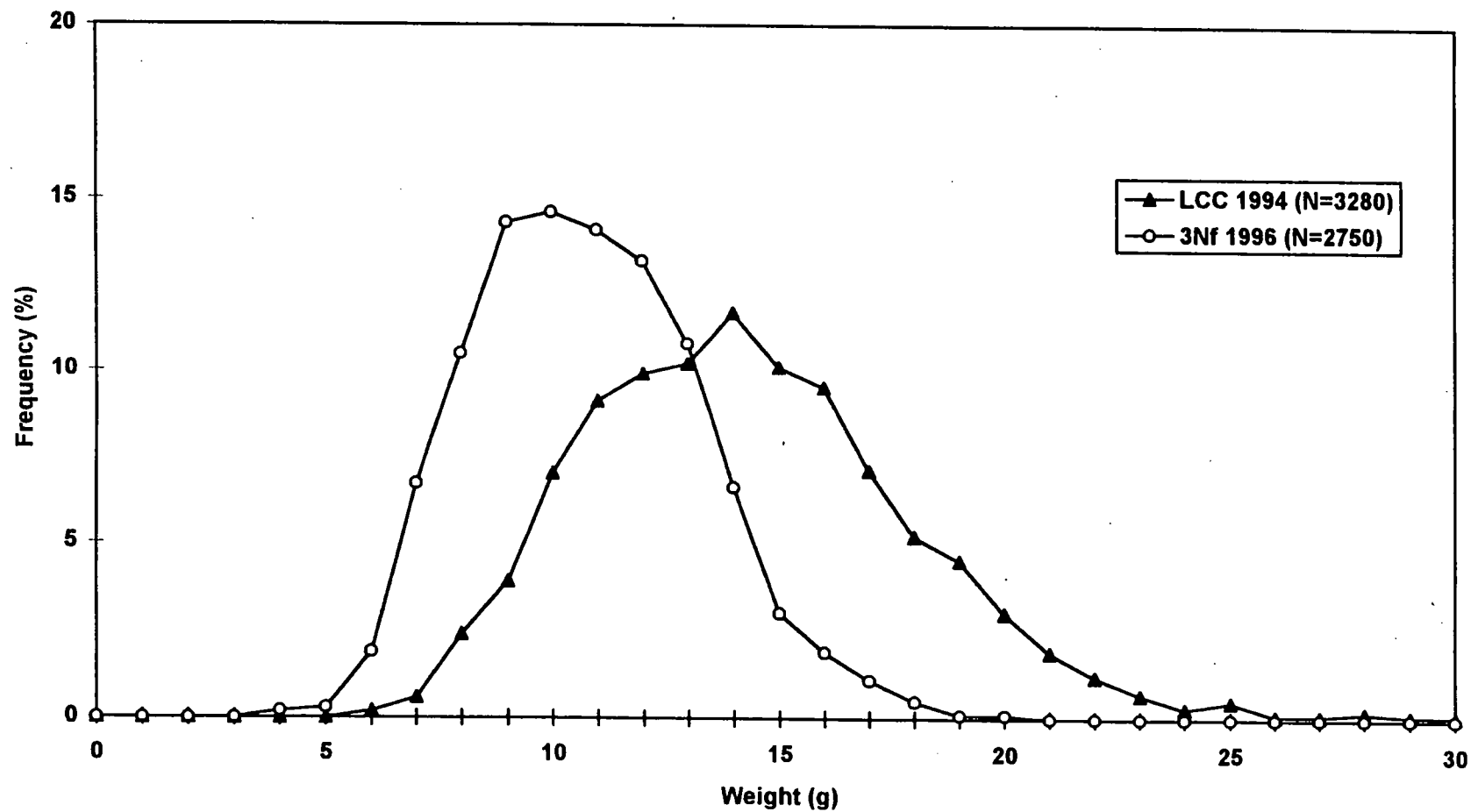


Fig. 6. Unadjusted (as landed) frequency distribution of individual meat weights from the Iceland scallop fishery in LCC, 1994 and 3Nf 1996.



1994-1996

Solid line = 1994, dashed (--) line = 1995, broken line = 1996

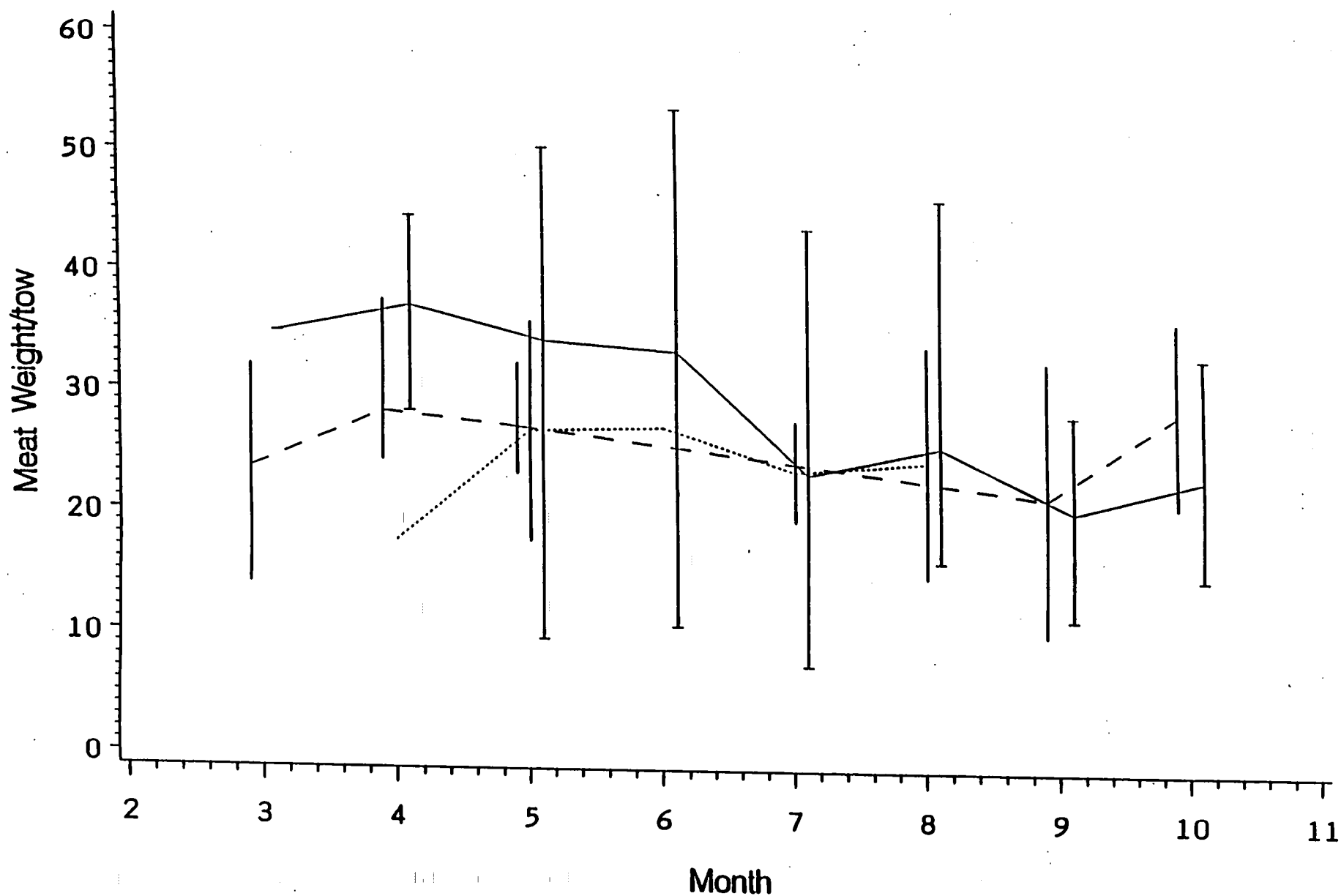


Fig. 7. Average monthly catch per tow (lb. meats) from the Lilly Canyon and Carson Canyon area for vessels reporting catches $\geq 30,000$ lb/yr, 1994 - 96.

Fig. 8. Iceland scallop research shell height frequencies for area 3N, 1982 - 1995.

