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An Update of Stock Status of 3KLP Lumpfish

by

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ABSTRACT

Lumpfish roe fishery in divisions 3KLP has been approximately 500 tonnes from 1977 to 1984. Landings reached a high of 3,000 tonnes in 1987 and dropped to an average of 2,000 tonnes from 1988 to 1994. Summaries of landing statistics are provided.
Research vessel indices of biomass and length composition are presented by year and division.

Résumé

La pêche de la lompe oeuvée dans les divisions 3KLP se chiffrait à environ 500 tonnes, de 1977 à 1984. Puis les débarquements ont atteint un sommet de 3 000 tonnes en 1987, pour chuter par la suite à 2 000 tonnes, en moyenne, de 1988 à 1994. Des sommaires des statistiques sur les débarquements sont inclus.

Les indices de la biomasse et de la composition des prises par longueur, obtenus par navire de recherche, sont présentés par année et par division.

Introduction

Lumpfish (Cyclopterus lumpus) are primarily a bottom dwelling species but have been reported to be semipelagic during early life (Davenport 1985).
Spawning takes place during the spring in Newfoundland waters and continues into the summer. The preferred spawning grounds are shallow water rocky shores with abundant seaweed growth. The fishery on this species is primarily based on roe and is prosecuted by vessels less than 65' in Newfoundland bays . This paper describes the commercial fishery from 1986 to 1994 and presents biomass and abundance estimates from research vessels surveys as well as size composition.

Materials and methods

Commercial landings were obtained from Department of Fisheries and Oceans Statistics Branch Newfoundland region. Landings were complied from sale slip records.
Random stratified surveys have been conducted in Division 3K ,3L and subdivision 3Ps since 1977, 1981 and 1972 respectively. These surveys have predominantly been in the autumn for Divisions 3K and 3L. In subdivision 3Ps the timing of the survey has varied from January to June.
Length frequency samples from commercial catches have been collected from Lumsden (3K) Lamaline (3Ps) and Point Crewe (3Ps) for 1988-1990 and 1994.

Results

The Fishery

The commercial fishery began for lumpfish roe in Newfoundland in 1970. Annual landings were < 200t in the early 1970's and averaged 600 metric tons from 1976 to 1984 (table 1 fig 1). Landings increased to a peak of 3 000 metric tons in 1987, due mainly to exceptionally high prices for roe (Stevenson and Baird 1992), but landings declined to an average of 2 000 metric tons from 1988-93. In 1994 landings further declined to 1 500t of roe. This decline was mainly in division 3K and 3L.

The bulk of this fishery has been in May and June except in 1991 when 80% (3K) and 40% (3L) of the landings were in July (table 2). Landings from subdivision 3Ps did not display this temporal shift.

Annual variation in landings between statistical areas(Fig. 2) within a Division has been constant over time (table 3 fig. 3).

Research Surveys

The fall research surveys in the offshore areas of divisions 3K resulted in biomass estimates less than 1 000 t in the early 1980's, increased to 8 000t in 1988 and then decreased to 1 600t for the 1990's (table 4). Division 3L biomass estimates were low in the early 1980's with a slight increase in the mid 80's and then declined to the lowest level in the time series in 1988 and 1989 . Estimates for the 1990's appear to be stable but associated with larger variances (fig 4). Subdivision 3Ps biomass estimates were an order of magnitude higher than Divisions 3K and 3L. When the 3Ps time series is partitioned by season (winter = January to March spring = April to June) the spring portion is comparable to 3K and 3L (fig. 5). Most of the biomass for subdivision 3Ps was in depths of 51 to 100 fathoms (table 5).

Length frequencies from RV surveys in divisions 3K and 3L are not considered representative of the population due to low sample size (fig.6a&b). Modal size of females in subdivision 3Ps ranged from 37 to 42 cm while the males ranged from 28 to 33 cm (fig. 6c).

Length frequencies collected from fishers using 11" gillnets had a modal value of 39 - 45 cm for females (fig 7).

Discussion

The stock structure of this species in Newfoundland waters is not known. Biomass estimates from the RV surveys have been lower for all years in divisions 3K and 3L than 3Ps. This maybe due to the timing of the surveys. The seasonal pattern in survey estimates in subdivision 3Ps are consistent with work by Collins 1976 where he described migration of lumpfish moving inshore in the spring and early summer to spawn in shallower coastal waters and returning to deeper waters offshore in late summer and early fall. As with work done by Blackwood in 1983 with experimental nets, small female lumpfish (<25cm) have not been caught by the survey trawl. Davenport 1985 pointed out that adults remain pelagic until the winter before spring spawning and thus are not available to ground gear.
Biomass estimates from the most recent winter surveys in 3Ps (1993) are half of what they were in 1985 . Landings in 3K have steadily declined since 1992 .Although it is difficult to confirm from the landings database, it is believed that effort has increased in these later years .

Conclusion

With survey biomass estimates from 3Ps declining and landings with similar or higher effort in 3K also declining, it is very likely that this species is being over exploited in Newfoundland waters.

References

Blackwood , G. 1983. Lumpfish roe fishery development in Newfoundland ,1982-83. Nfld. Dept. of fisheries, Industry Support Services, Development Report No. 31,29 p.

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Davenport, J. 1985. Synopsis of biological data on the lumpsucker, *Cyclopterus lumpus* (Linnaeus, 1758),FAO Fish. Synop.,(147). 31p.

Stevenson,S. C., Baird J. W. 1988. The fishery for lumpfish *(Cyclopterus lumpus)* in Newfoundland waters. Can. Tech. Rep. Fish. Aquat. Sci. 1595: iv + 26p.

Table 1. Lumpfish roe landings (tonnes)
NAFO divisions 3K,3L and 3P from 1977 to 1994

	3K	3L	3P	Total
1977	146	252,3		398,3
1978	334,4	376,2	99,9	810,5
1979	236,7	347,8	243,1	827,6
1980	56,8	50	411,7	518,5
1981	111,9	51,6	433	596,5
1982	77,1	22,5	455,8	555,4
1983	105,4	45,9	469,4	620,7
1984	114,3	117	330	561,3
1985	206,5	342,6	426,3	975,4
1986	434,2	460,5	651,2	1545,9
1987	1257	923,4	825,3	3006
1988	800,4	842,6	643,8	2286,8
1989	764,6	896,6	667,2	2328,4
1990	423,5	437	310,8	1171,3
1991	290,3	809,4	989	2088,7
1992	562,5	897,6	487,3	1947,4
1993	294,6	632,8	1514	2441,6
1994	132,9	385,3	994,1	1512,3

Table 2. Summary of Newfoundland lumpfish roe landings for NAFO Divisions 3K, 3L, and 3P by month (landings are in metric tons).

NAFO div. 3K

YEAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
1986	0.3	239.8	173.0	21.0	0.2	.	.	434.2
1987	0.1	511.4	621.0	115.5	9.3	0.1	0.0	1257.3
1988	0.0	489.6	242.5	65.2	3.0	0.0	.	800.4
1989	.	577.0	182.4	5.2	0.0	.	.	764.6
1990	.	85.8	303.8	33.9	.	.	.	423.5
1991	.	0.5	36.5	243.6	9.7	.	.	290.3
1992	.	132.3	382.6	47.5	.	.	.	562.5
1993	.	79.1	166.0	49.5	.	.	.	294.6
1994	0.0	52.8	65.7	14.4	.	.	.	132.9
.....								
total	0.4	2168.5	2173.4	595.7	22.1	0.2	0.0	4960.3

NAFO div. 3L

YEAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
1986	4.9	198.8	177.2	75.1	4.6	.	.	460.5
1987	0.6	421.6	341.7	134.4	19.2	4.4	1.4	923.4
1988	3.8	393.1	300.0	121.7	20.9	2.6	0.5	842.6
1989	2.6	703.9	183.6	5.8	0.4	0.4	.	896.6
1990	.	160.1	235.6	41.4	.	.	.	437.0
1991	.	110.7	348.1	347.3	3.3	.	.	809.4
1992	.	414.6	436.5	46.4	.	.	.	897.6
1993	.	356.2	227.9	48.7	.	.	.	632.8
1994	0.1	166.2	180.7	38.2	0.1	.	.	385.3
.....								
total	12.1	2925.1	2431.2	859.0	48.5	7.3	2.0	6285.1

NAFO div. 3P

YEAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
1986	31.1	338.3	202.5	79.3	0.1	.	.	651.2
1987	5.8	366.0	340.5	107.4	5.2	0.4	0.1	825.3
1988	3.3	308.2	254.3	75.2	1.5	1.1	0.2	643.8
1989	1.6	436.6	209.7	18.4	0.9	.	.	667.2
1990	1.1	144.3	165.4	0.0	.	.	.	310.8
1991	25.8	437.5	430.2	95.4	.	.	.	988.8
1992	12.6	242.6	204.8	27.3	.	.	.	487.3
1993	41.6	607.8	743.5	121.3	.	.	.	1514.2
1994	40.0	414.4	457.2	82.4	0.0	.	.	994.1
.....								
total	162.9	3295.8	3008.0	606.7	7.6	1.5	0.2	7082.7

Table 3. Summary of Newfoundland lumpfish roe landings for NAFO Divisions 3K, 3L, and 3P by statistical area (landings are in metric tons).

NAFO div. 3K

	A	B	C	D	H	I	K	TOTAL
YEAR								
1986	91.4	342.9	.	.	.	.	.	434.2
1987	493.4	762.5	1.4	.	.	.	.	1257.3
1988	188.0	612.4	.	.	.	.	.	800.4
1989	229.2	535.4	.	.	.	.	.	764.6
1990	141.2	282.0	0.3	.	.	.	.	423.5
1991	57.3	233.0	.	.	.	.	.	290.3
1992	77.3	485.2	.	.	.	.	.	562.5
1993	34.5	259.8	.	.	.	.	0.3	294.6
1994	6.1	126.7	.	0.0	0.0	0.1	.	132.9
.....								
total	1318.4	3639.7	1.8	0.0	0.0	0.1	0.3	4960.3

NAFO div. 3L

	B	C	D	E	F	G	H	TOTAL
YEAR								
1986	.	262.3	163.7	26.7	7.4	0.3	.	460.5
1987	0.9	468.4	304.3	134.4	14.3	1.1	.	923.4
1988	5.1	397.4	278.0	124.9	7.9	29.3	.	842.6
1989	0.6	473.3	262.5	79.2	1.4	79.7	.	896.6
1990	2.0	221.4	134.4	53.3	0.6	25.0	0.2	437.0
1991	0.2	313.7	293.4	141.3	4.6	56.3	.	809.4
1992	.	471.7	278.3	110.6	17.5	19.2	0.3	897.6
1993	.	248.4	209.5	100.1	19.2	29.4	26.3	632.8
1994	.	117.8	130.3	86.0	25.6	22.7	2.8	385.3
.....								
total	8.8	2974.2	2054.4	856.5	98.5	263.0	29.7	6285.1

NAFO div. 3P

	B	G	H	I	J	K	TOTAL
YEAR							
1986	.	.	392.6	229.6	29.1	.	651.2
1987	.	.	544.9	208.3	72.1	.	825.3
1988	.	.	463.3	136.0	44.6	.	643.8
1989	.	4.4	522.0	94.3	46.5	.	667.2
1990	.	3.8	224.6	67.1	15.3	.	310.8
1991	.	17.6	682.2	231.1	58.2	.	989.0
1992	.	2.6	235.4	156.5	92.7	.	487.3
1993	.	0.1	747.6	408.3	356.4	1.7	1514.2
1994	0.0	4.4	590.6	221.8	171.4	5.8	994.1
.....							
total	0.0	33.0	4403.2	1752.9	886.3	7.5	7083.0

Table 4. Lumpfish abundance and biomass (kg) estimates from bottom trawl surveys 1972 - 95.

	NUMBERS			WEIGHTS		
YEAR	3Ps	3K	3L	3Ps	3K	3L
1972	2 102 798			8 036 914		
1973	15 798 588			53 063 458		
1974	430 710			1 484 728		
1975	12 895			58 479		
1976	29 406			213 490		
1977	68 768	50 837		296 067	126 585	
1978	5 543 572	96 590		18 540 765	195 486	
1979	18 170 849	1 185 605		66 869 392	3 553 954	
1980	17 529 039	211 005		86 962 610	713 485	
1981	3 344 997	350 911	67 420	15 791 004	1 025 992	443 905
1982	77 272	286 003	280 791	235 078	875 564	761 909
1983	4 840 668	313 022	223 094	18 496 261	773 258	508 639
1984	1 467 543	458 635	67 411	5 782 731	1 060 145	278 869
1985	47 554 409	675 921	847 372	117 415 159	1 556 080	2 422 755
1986	41 423 314	1 667 861	528 852	123 338 105	4 207 716	1 498 327
1987	63 305 191	755 884	1 211 567	155 290 504	1 887 168	3 412 089
1988	18 169 082	3 569 634	122 593	48 585 170	8 282 007	299 254
1989	27 738 774	1 513 148	220 855	83 112 384	3 878 863	447 133
1990	47 526 899	708 850	413 792	91 817 576	1 362 692	1 664 008
1991	42 578 856	1 039 207	1 115 533	93 427 963	2 030 758	3 124 426
1992	22 100 157	262 668	1 860 267	47 012 847	721 965	5 485 819
1993a	34 297 872	77 471	748 823	63 300 923	2 719 970	2 000 553
1993b	17 528 135			37 426 513		
1994	18 447 631	938 449	1 471 716	46 173 676	1 472 047	3 421 660
1995	6 200 010			11 160 290		

a Feburary 1993.
b April 1993.

Table 5. Lumpfish biomass estimates (t) from research vessel surveys in NAFO Division 3Ps.

DEPTH range (fath)	Stratum number	Stratum Area sq. mi.	ATC 197 1972 Mar 20-30	ATC 207 1973 Mar 10-23	ATC 221 1974 Apr 19-30	ATC 234 1975 Jan 2-13	ATC 247 1976 May 11-21	ATC 261 1977 Apr 14-26	ATC 273 1978 Feb 21-28	ATC 287 1979 16-14y 5-mar	ATC 302 1980 19-mar 2-apr	ATC 316 1981 Mar 7-26	ATC 330 1982 28-mal 9-jul	AN 9 1983 22-avr 8-mal	AN 26 1984 Apr 9-19	WT 26 1985 Mar 7-29	WT 45 1986 Mar 6-23	WT 55+56 1987 13-14y 22-mar	WT 68 1988 27-jan 14-fev	WT 81 1989 Feb 1-16	WT 91 1990 31-jan 20-14y	WT 103 1991 Feb 2-20	WT 118 1992 Feb 5-25	WT 133 1993 Feb5-25	WT 135 1993 Apr 1-21	WT 150-151 1994 Apr 5-30	WT 166-167 1995 Apr 1-29
0-30	314		265		365		0	74	243	232	732	4021	44	1744	1152	521	3972	475	840	778	5818	886	45	28	1130	264	0
	320			742	0		0			2564	1562	644	0	809	819	3944	12864	4025	989	697	1126	1204	254	189	453	392	127
31-50	308			101	175	0	0	47	338	225	324	267	0	85	0	55	715	67	30	113	45	158	68	67	400	28	0
	312		881	2927	21	58	0	81	4306	198	0	2328	0	850	265	1174	1567	4441	189	630	580	1730	217	282	346	14	0
	315		687	3889	262		0	74		10031	578	0	0	0	504	2718	6948	9040	11263	2789	7528	9134	16921	1643	5785	1010	1360
	321		1660	668	0		0		4926		7363	558	0	241	446	667	1566	2566	793	1258	16771	845	755	170	308	166	0
	325			364			0		675	1327	499	2657	0	0	510	307	655	3108	3502	30639	2761	8562	2024	2244	840	1924	465
	326								362	62	51	50	0	0	0		37	209	841	405	183	434	0	54	0	250	28
	783																									58	
51-100	307		466	522	281	0	0	0	539	2892	686	600	0	206	176	152	2115	660	318	640	1165	3450	469	648	2481	161	0
	311		200	1461	328	0	0	0	3953	5250	778	1558	0	8636	595	31875	29451	3966	630	6197	11680	25930	1114	30591	1560	258	0
	317		65	6629	6	0	0	0		12647	426	87	0	19	297	16307	2360	15409	1126	1769	27610	5139	998	5363	9345	205	64
	319		1609	13891	0	0	0	0		164	536	258	0	32	436	5244	20604	78161	5489	27584		28507	11988	16485	13404	37710	5644
	322			107			213		1494	27804	7098	2235	141	5369	124	15004	5724	6782	4298	1739	5134	824	1829	499	466	624	180
	323		1765	8636			0	0	1596		65701	107	0	0	131	35918	32000	15266	6417	1390	3605	374	963	836	545	2008	2644
	324						0			87	42		50	473	115	1660	366	9623	6963	2425	4729	1333	4245	278	183	63	400
	781																									234	0
	782																									0	0
101-150	309				2	0	0	0	60	56	43	0	0	102	49	86	107	452	112	104	366	2280	251	164	74		
	309		0	74	2	0	0	19	0	60	15	100	0	0	44	174	200	114	145	69	134	469	2251	457	0	15	0
	310		0	52	20	0	0	0	0	12	0	0	0	0	70	110	54	46	28	19	318	144	38	227	6	11	0
	313		15	3609	0	0	0	0	10	1643	394	62	0	0	0	223	709	0	26	62	238	2022	2036	6	30	0	0
	316		0	11263	0	0	0	0		792	0	0	0	0	0	177	92	109	74	132	1290	530	52		66	9	11
	318		0	71	0	0	0	0		42	0	0	0	0	0		0	18	0	536		643	0	19	25	6	0
	779																									50	10
	780																									76	0
151-200	705		0	50	0		0	0	0	18	0	0	0	0	0	20	31	0	0	0	0	0	0	0	0	0	0
	706		0	0	0		0	0		308	0	0	0	0	0	62	170	57	38	0	19	93	14	9	7		0
	707		0		0		0	0		0	0			0	0		0	0	44	46		355	33	0	24	0	0
	715		0	0	1	0	0	0	0	0	0	0	0	0	0	37	10	15	9	12	40	42	0	26	0	0	0
	716		0	0	0		0	0	0	86	64	0	0	35	48	181	470	115	52	109	442	294	0	315	38	30	0
201-300	708							0		0	0			0	0		0	0	0	0		83	0	58	20	0	0
	711											0	0	0	0	25	12	54	0	0	94	12	120	214	0	93	28
	712									0	0	0	0	0		195	142	76	0	0	55	5	19	30	0	219	0
	713					0					0	0	0	0		137	57	0	13	22	18	236	61	110	30	139	0
	714									0	30	57	0	63		18	99	157	20	100	65	482	242	134	54	100	0
																										234	0
																										0	0
0-30			265	742	365	0	0	74	243	2796	2314	4665	44	2553	1971	4465	16836	4500	1929	1673	6744	2190	299	227	1563	678	127
31-50			3406	7739	478	58	0	202	10625	11843	8835	5660	0	966	1725	5121	11466	19449	16636	36235	27868	17863	19994	4460	7480	3468	1653
51-100			4347	29248	615	0	213	0	7582	46980	75267	5045	191	14957	1676	106360	92660	1E+05	29459	43964	54123	65657	21604	56622	27864	41281	8132
101-150			15	15269	24	0	0	19	90	2627	452	162	0	102	163	770	1162	739	365	944	2348	6108	4626	895	223	167	21
151-200			0	50	1	0	0	0	0	422	64	0	0	35	48	300	681	187	143	169	501	784	47	350	69	30	0
201-300			0	0	0	0	0	0	0	0	30	57	0	63	0	375	310	269	33	122	232	818	442	546	104	551	28
Total			8035	53066	1483	58	213	295	18540	66868	86862	15789	235	18496	5783	117411	123337	2E+05	48587	83107	91616	93420	47012	63000	37423	48173	11161

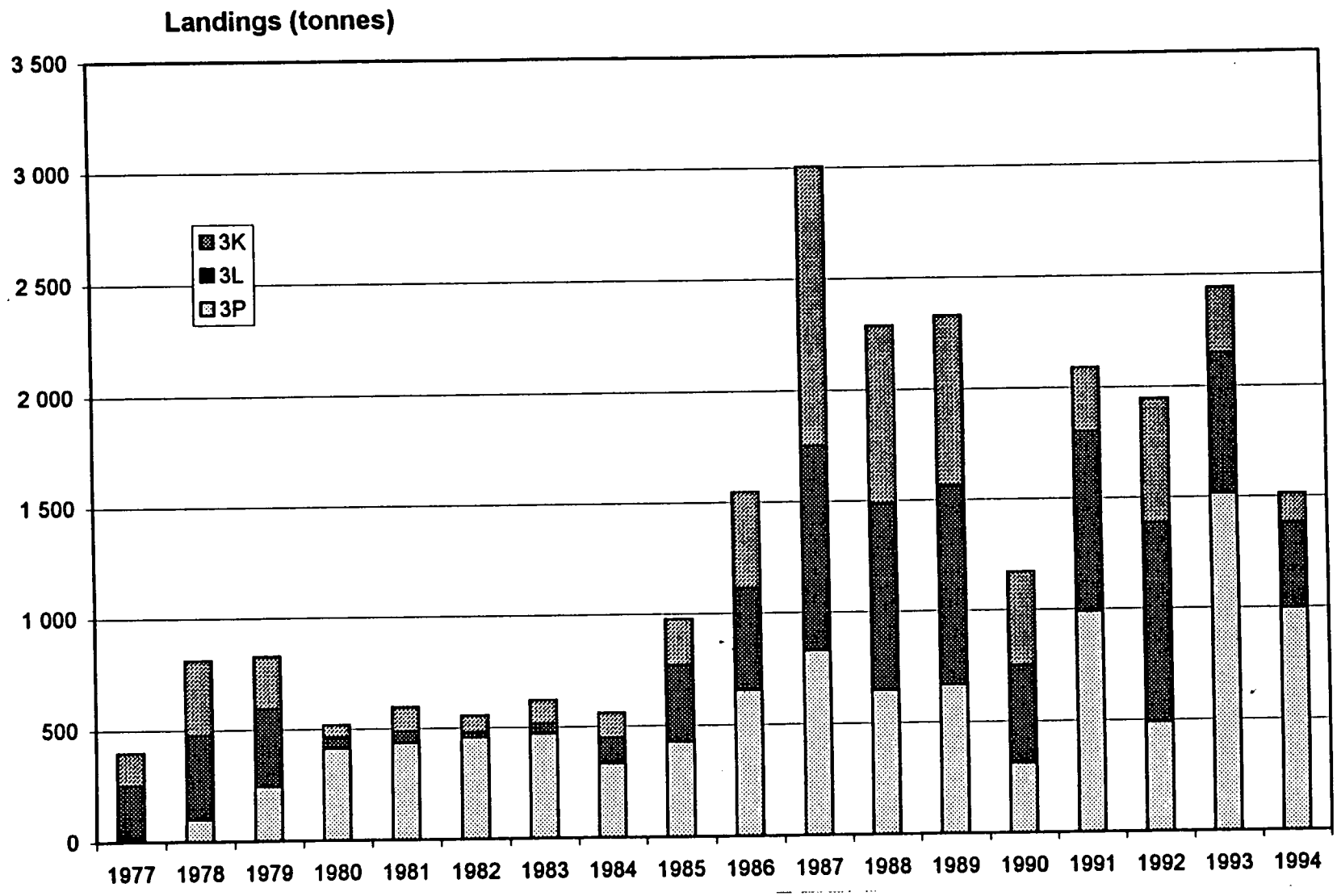

Fig. 1 Lumpfish roe landings for NAFO divisions 3K 3L and 3Ps

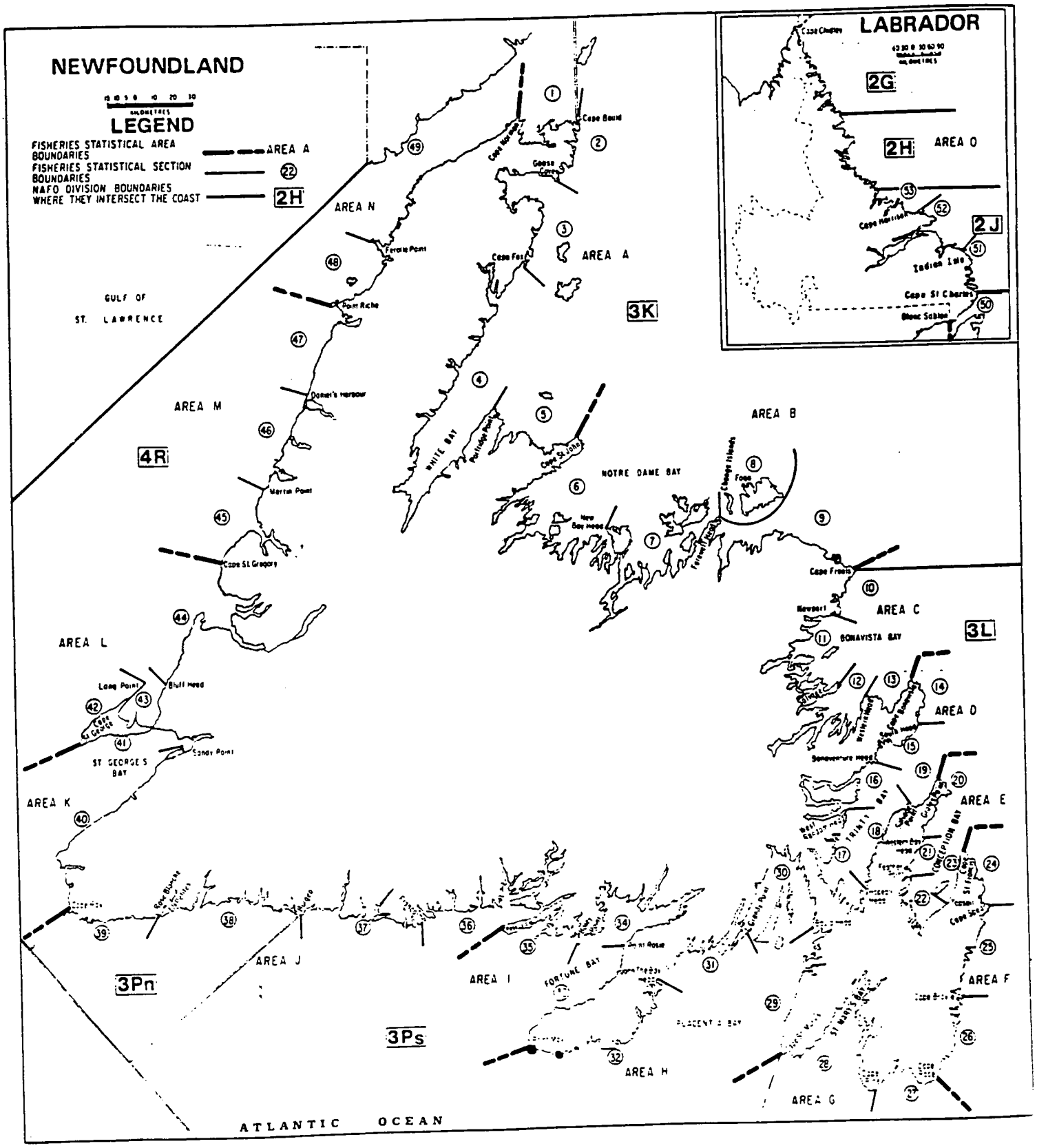

fig. 2 Fisheries Statistical Area of insular Newfoundland.

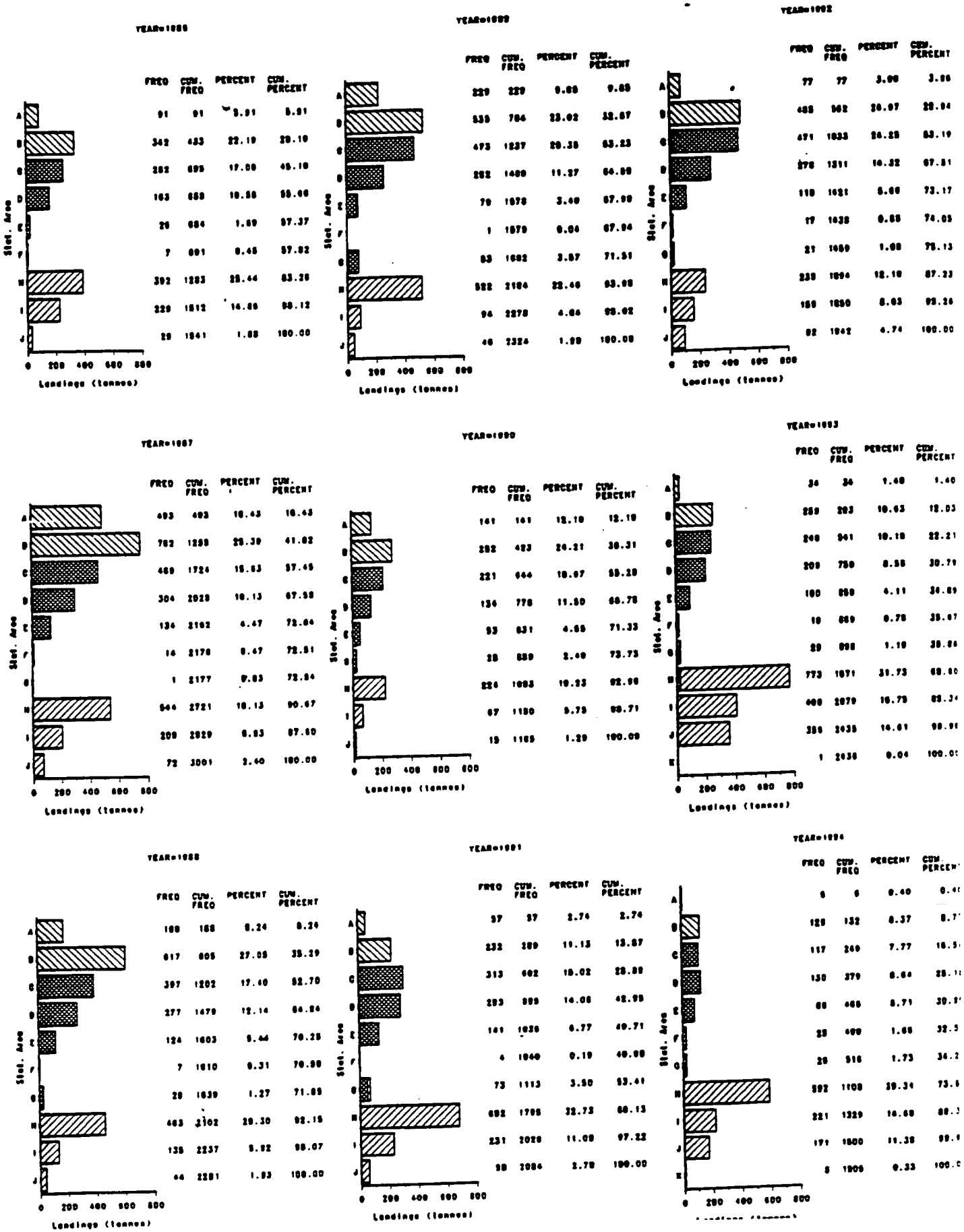

Fig . 3. Summary of Newfoundland lumpfish roe landings by Statistical Area in 3K,3L and 3P .(1986 - 1994)

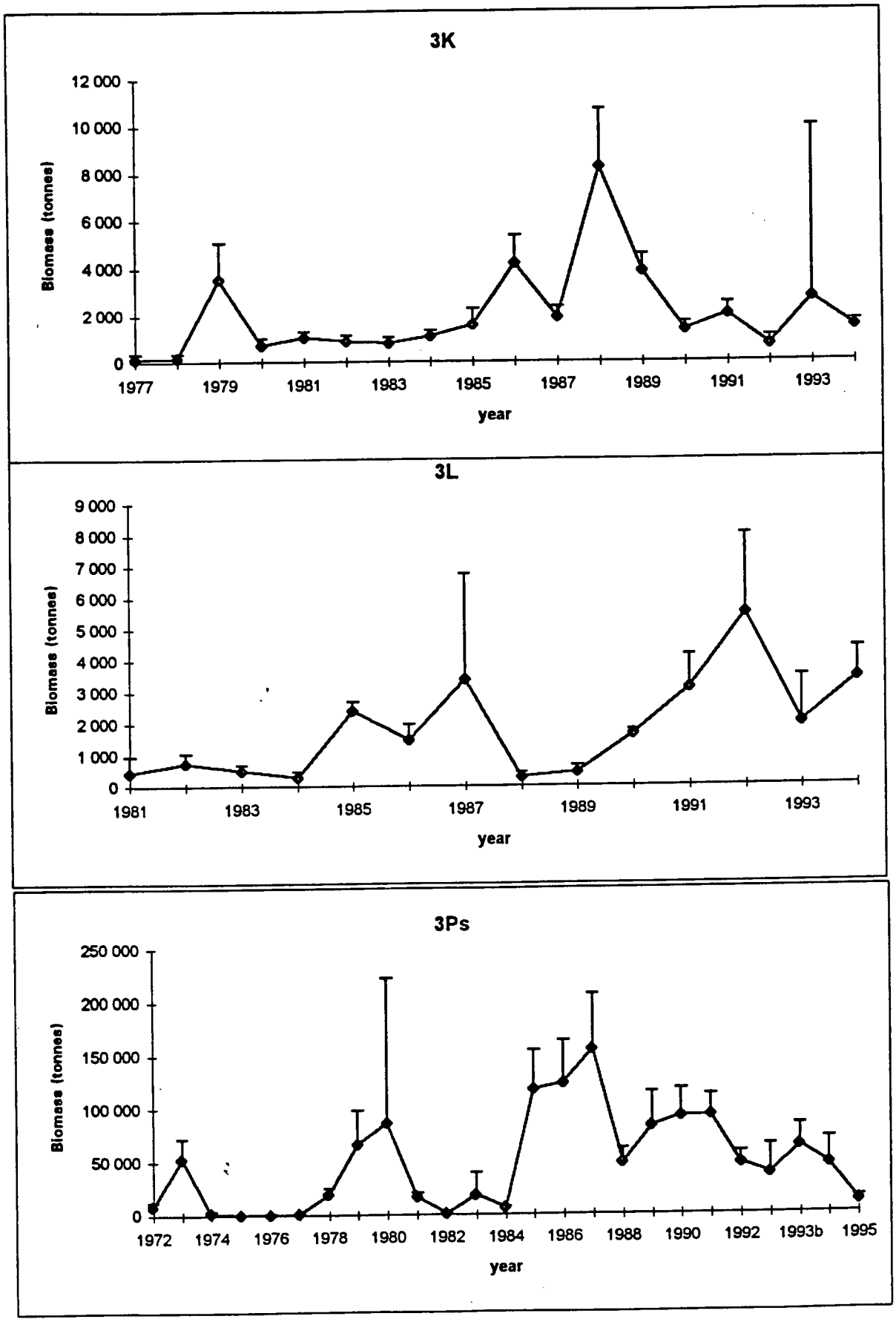

Fig 4. Survey biomass in divisions 3K,3L and subdivision 3Ps (Bars = 1 STD)

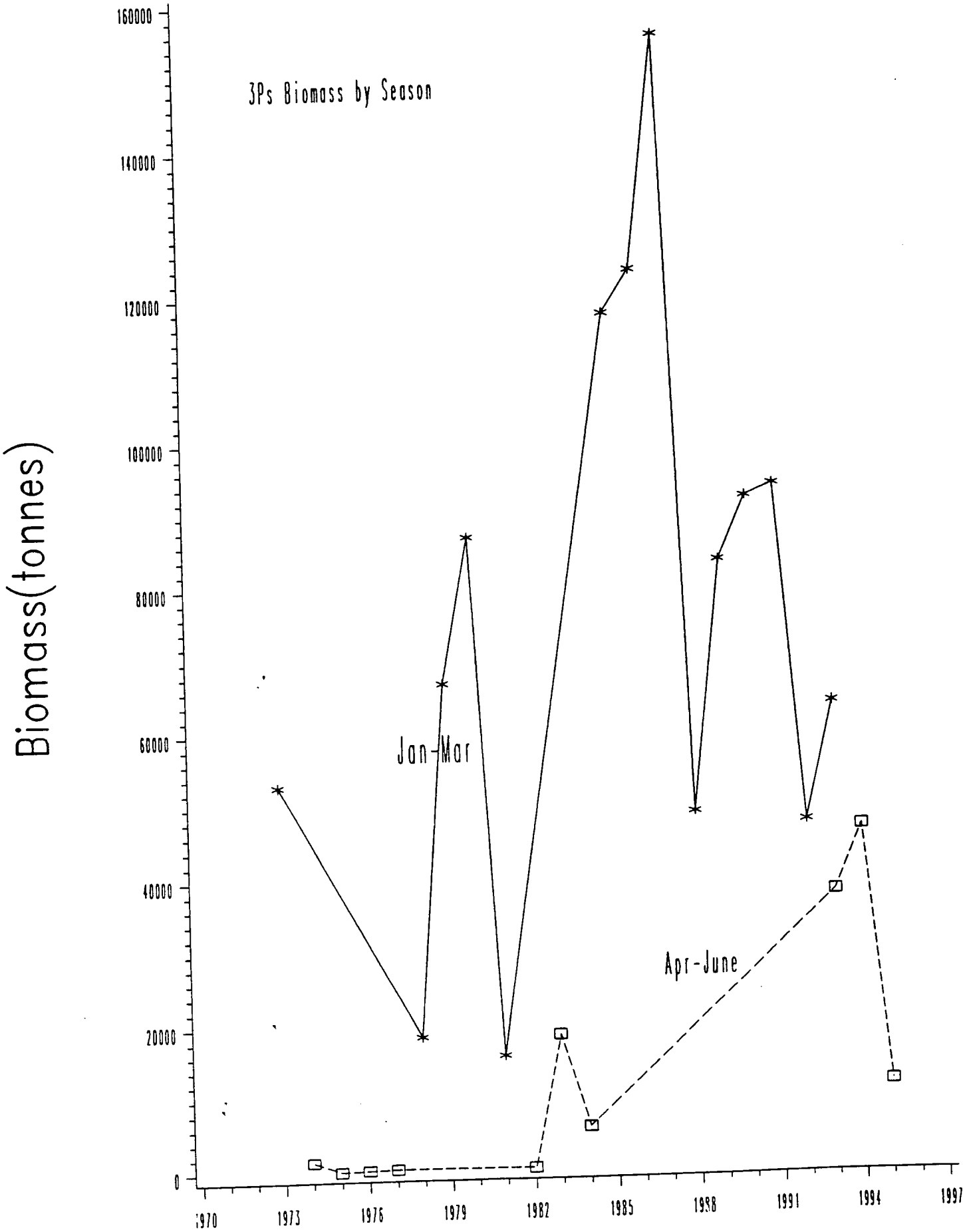

fig 5. Survey biomass in subdivision 3Ps by season.

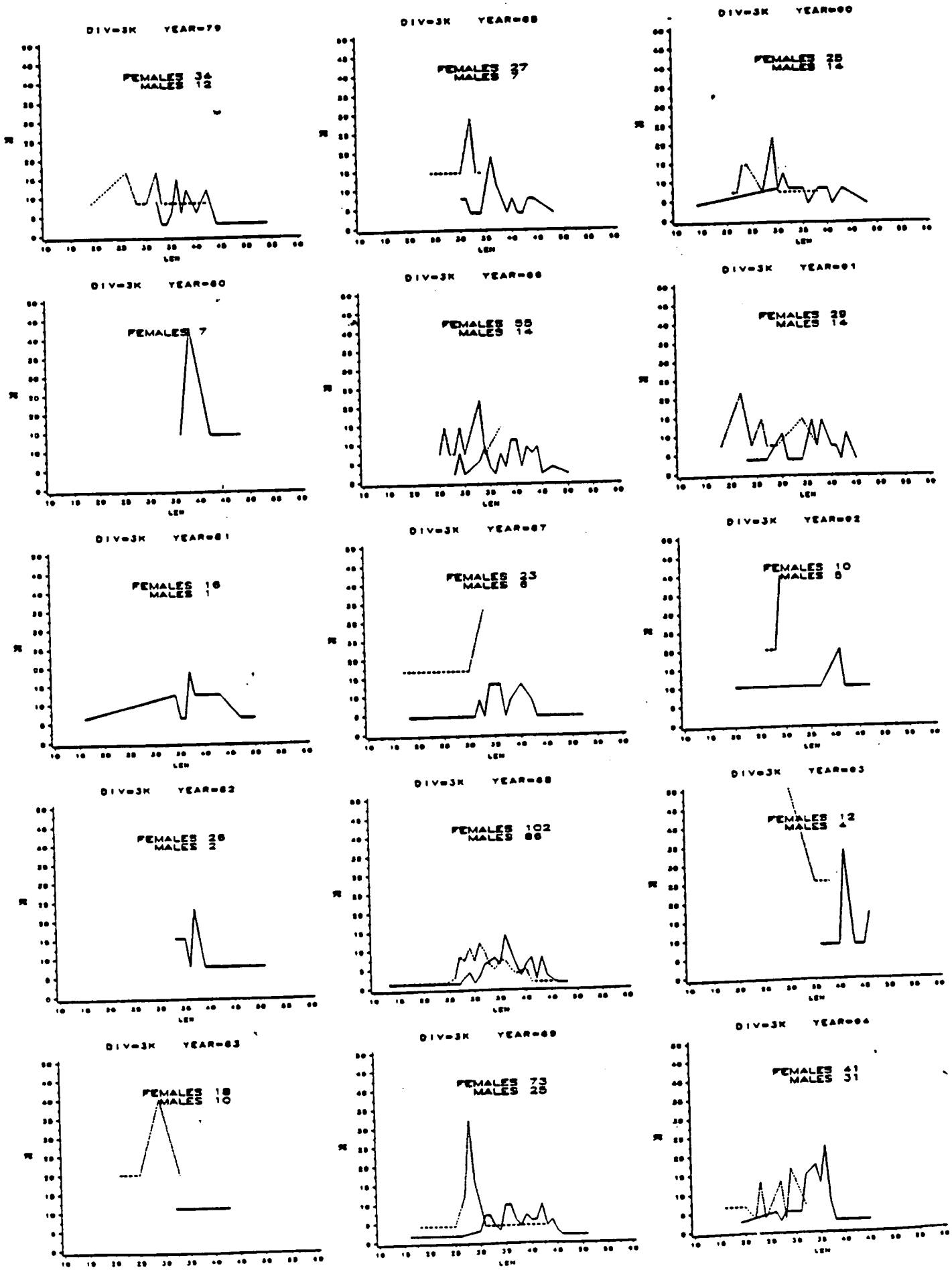

Fig. 6a. Length frequencies from bottom trawl surveys in 3K . 1979-83 .1985-1994.

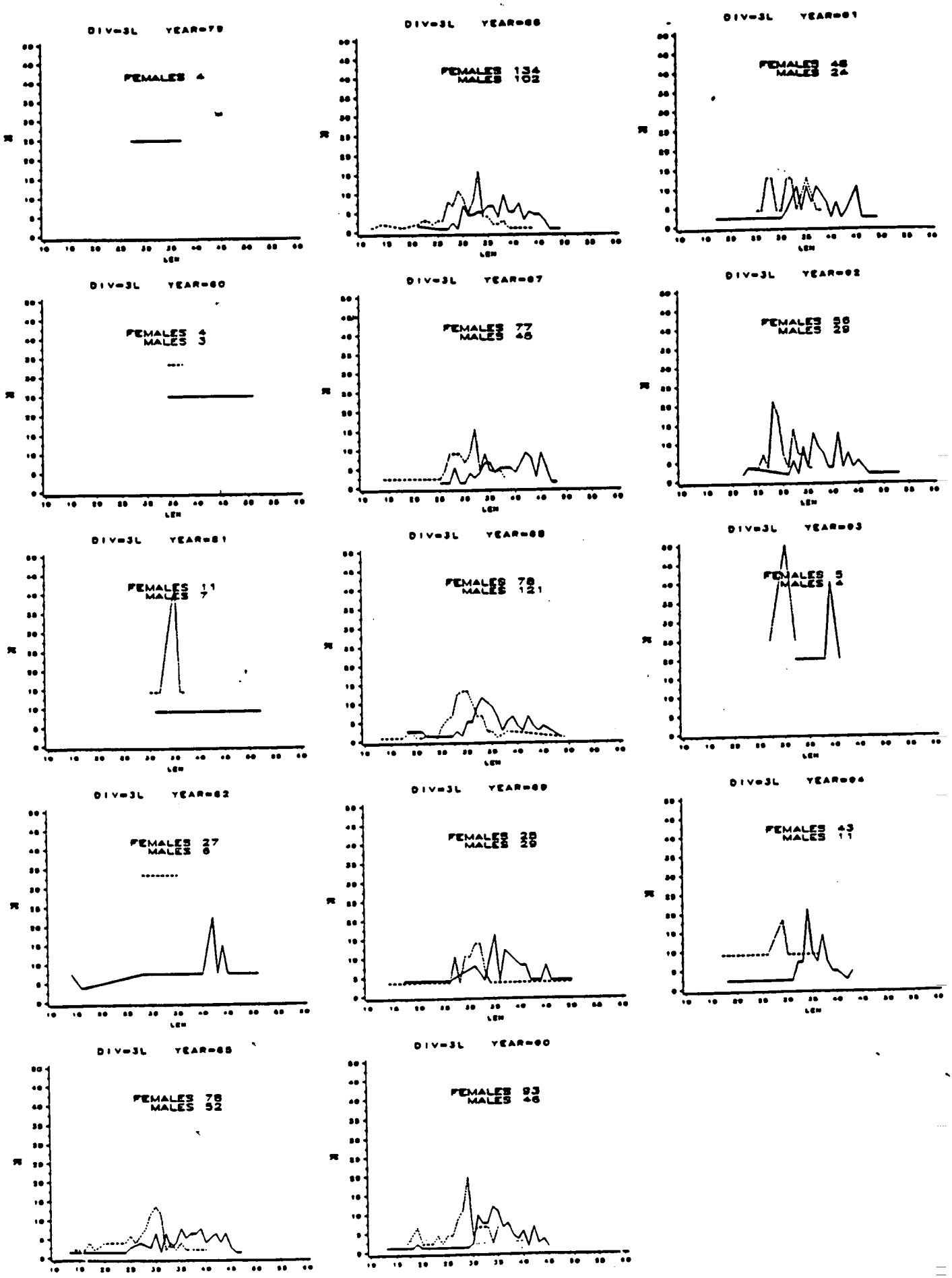

Fig. 6b. Length frequencies from bottom trawl surveys in 3L.. 1979-82 ,1985-1994.

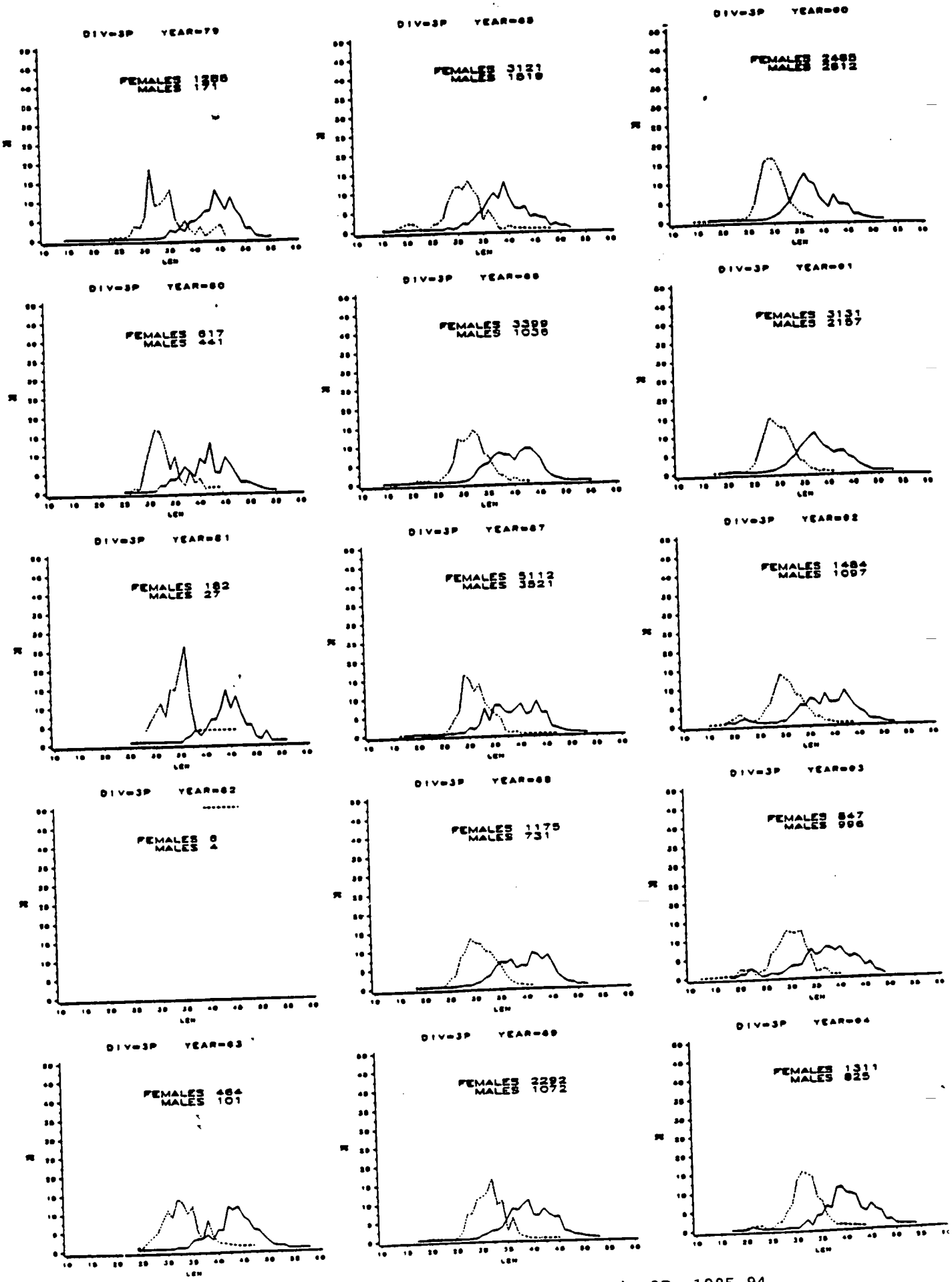

Figure 6c. Length frequencies from bottom trawl surveys in 3Ps 1985-94.

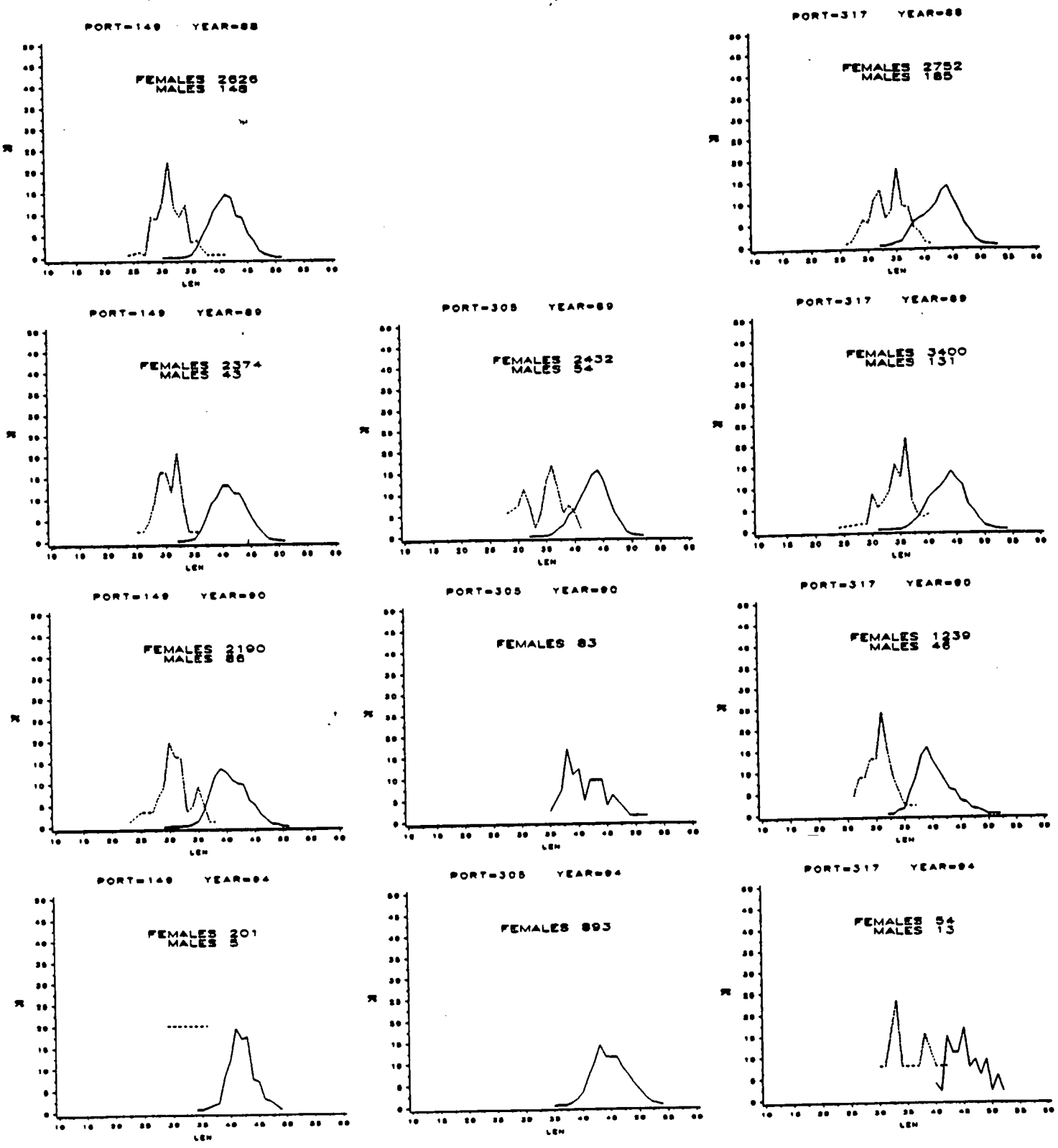

Fig 7. Length frequencies from commercial sample taken at Lumsden ,Port 149, Lamaline ,Port 305 and Point Crewe ,Port 317 for 1988-1990 and 1994.