

9)

This paper not to be cited without prior reference to the authors

International Council for the
Exploration of the Sea

C.M. 1974/J:7
Pelagic Fish (Southern)
Committee



Digitalization sponsored
by Thünen-Institut

REPORT OF THE BLUEFIN TUNA WORKING GROUP

Observations on the Size Composition of the Bluefin
Tuna Catches from 1973

=====

by

H. Aloncle, J. Hamre, J. Rodriguez-Roda and K. Tiews

I. Introduction

Reference is made to previous reports of the Bluefin Tuna Working Group (Statistical News Letters, Nos. 20, 26 and 38, and to Cooperative Research Report, Ser. A, Nos. 23 and 40). The members continued their work by correspondence and with other tuna research workers in the region. In the following, the data obtained for the fishing season 1973 are presented.

II. Material

Data on size and age composition of bluefin tuna catches were received from the following countries: Canada (tables 1-5), Denmark (table 6), France (table 7), Norway (tables 8-10), Spain (table 11) and USA (tables 12-14).

Dr. S. N. Tibbo and Dr. J. S. Beckett reported that Canadian commercial landings of bluefin tuna in 1973 were approximately 800 metric tons, live weight (Table 1). This is more than four times the amount taken in 1972, but less than 60% of the peak catch (1 436 metric tons) in 1970. The catch included 160 metric tons of large tuna, chiefly from the trap fishery in St. Margarets Bay on the Atlantic coast of Nova Scotia, and 639 metric tons of small (under 60 kgs) fish from the purse-seine fishery off the New Jersey coast of the United States.

The sport fishery accounted for an additional 215 metric tons, about 18% less than the peak catch (261 metric tons) in 1972. Records supplied by Provincial Tourist Development Offices and the Fisheries Information Service show that sports fishermen caught 742 tuna during 1973. Total of 672 being taken in the southern Gulf of St. Lawrence (Prince Edward Island, northern New Brunswick and Quebec areas); 51 off the east coast of Newfoundland, and 19 off southwest Nova Scotia. All the fish were landed except for the 16 taken off Quebec and 18 of the Newfoundland captures.

Size data for the three areas of the sports fishery, and for 113 tuna taken by traps are presented in Table 2. Fish taken off Prince Edward Island were substantially larger (mean 344 kg) than those from Newfoundland (245 kg) with the few sports catches off Nova Scotia (326 kg) closer to the former, as in previous years. The average size of the commercial catches off Nova Scotia (243 kg) was, however, considerably smaller than that of the sport catches. The monthly variation in the size composition of catches in the Prince Edward Island area is given in Table 3. The average size (weight) increased as the season advanced, increasing from 325.6 kg in July to 390.8 kg in September-October.

Landings of small bluefin from the purse-seine fishery off the mid-Atlantic coast of United States were examined for size (length) composition. Catches were all made during the month of August and samples were combined (Table 4). The data show four modes in the size distribution representing the different year-classes.

Dr. O. Bagge reported that 6 bluefin tuna were landed in Denmark between the 30. August and the 18. October. The tuna were caught by Swedish and Danish midwater trawlers fishing in the Southern Skagerrak resp. in the Northern Kattegat (Table 6). The French data were submitted by Dr. H. Aloncle (Table 7).

According to Dr. R. Sara the total Italian madrague catches were about 1 000 bluefin tuna in 1973. They were mostly large tuna. In one catch 111 tuna had an average weight of 470 kg. At the end of the fishing season some 100 small fish with an average weight of 40 kg were caught. Dr. F. Li Greci informed the Working Group that during the last two years some of the largest Sicilian fishing boats have fished bluefin and other tuna-like fishes by purse seine.

Mr. S. Myklevoll reported that the total Norwegian bluefin tuna catch in 1973 was 193 fish. Except for 1 fish that was caught on 31 July, the catches were made during two short periods: 12-16 August and 28-29 August, and landed on a short stretch (30 n.m) off the coast west of Bergen.

All the captured fish were of the big old stock, gutted weight ranging from 180 to 360 kilos (calculated total weight: 230 - 460 kilos) (Table 8). Complete weight data were received. No length measurements were recorded in 1973.

An average condition factor (K) of 2.12 has been calculated on the basis of length/weight measurement made in week 33 of 1971. This calculation is shown in Table 9. The calculated K-value has been used to convert the weight distribution in Table 8 to length (Table 10).

One American tuna tag was received this season. The release and recovery data are as follows:

Tagging	: Locality: Cat Cay, Bahamas 25°3P'N 79°18'W
	Date : 9 May 1972
Recapture	: Locality: Slotterøy Fyr 59°58'N 5°02'E
	Date : 27 August 1973

Dr. R. Monteiro informed the Working Group that during 1973 Portugal has not fished this species in the continental and Madeira waters. On the other hand from the Açores Islands a catch of 37 bluefin with a weight of 2 510 kg was made.

Dr. J. Rodriguez-Roda reported that during 1973 only two madragues were in operation in the South of Spain; i.e. Barbate and La Línea. The captures from the Barbate madrague were 1 952 bluefin tuna with a total of 399 453 kg. The madrague of La Línea captured 431 bluefin tuna with a total of 68 535 kg.

The total madrague fishery on the South coast of Spain yielded 2 383 bluefin tuna with 467 988 kg in 1973. The total catch in 1973 amounted thus more than four times in number and more than five times in weight than 1972 but it is lower still than the total captures in 1971 (Table 11).

Information on the catch of bluefin tuna by the Canadian-USA-purse-seine fleet were compiled by the Southwest Fisheries Center of the National Marine Fisheries Service (Table 12). Mr. G. Sakagawa stated that an estimated total of 90 747 bluefin tuna (= 1 490 metric tons) were caught by the Canadian-USA-purse-seine fleet in 1973. More than 90 % of the catch was made in July and August, and 2-year old fish dominated the catch (Table 13). In 1972, 2 136 metric tons of bluefin tuna were landed, 52 % were 2-year-old fish.

Some data on sizes of fish caught by USA handline, harpoon, rod and reel and trapfisheries were collected by Messrs. Frank Mather, III and John Mason of the Woods Hole Oceanographic Institution, and are shown in Table 14. It is noted that the length-frequency sample from the rod and reel fishery is a biased forward large fish (> 155 cm). Smaller bluefin tuna, primarily in the size range caught by the purse-seine fishery, were also landed but were not sampled. The length-frequency samples in Table 14, indicate that large bluefin tuna (> 185 cm) continue to dominate the catch of the handline, harpoon and trap fisheries as they did in previous years.

III. Results

1. In 1973 the Spanish bluefin tuna catches were thrice as high in number of fish caught and five times as large in total weight as in the previous year but lower than in 1971. The Norwegian bluefin tuna catches decreased further in 1973 and were lowest since the beginning of the fishery.
2. As in 1972 the length composition of Norwegian and Spanish bluefin tuna catches differed essentially in 1973. Both fisheries were fishing on different age groups of fish. The size compositions of both catches were more or less unchanged during both the last two years under observation.
3. As in the previous years the U.S. and Canadian purse seine catches consisted mainly of 2 year old fish. Fish of the relatively strong year class 1967 can be detected in the age composition (Table 13).
4. Although the U.S. length frequency distribution given for handline, harpoon, rod and reel as well as trap catches cannot be considered a random sample it is obvious that the predominant size groups in these catches were the same as in the Norwegian purse seine fishery (Fig. 1).
The weight frequency distribution of Canadian sport and commercial catches of large bluefin tuna tallied to a large degree with that of the Norwegian purse seine catches in 1972 and 1973 (Fig. 2).

IV. References

- Aloncle, H., Hamre, J., Rodriguez-Roda, J. and Tiews, K. 1974:
Fifth Report of the Bluefin Tuna Working Group. Observations on the size composition of Bluefin Tuna catches from 1970 to 1972. Cons. Int. Explor. Mer., Coop. Res. Rep. No.40.
- Hamre, J., Lozano, F., Rodriguez-Roda, J. and Tiews, K., 1966:
Second Report from the Bluefin Tuna Working Group. On the Development of the Bluefin Tuna Fisheries from 1950 to 1964 and further Observations on Size Composition of Bluefin Tuna Catches. Stat. News Letters, No. 26, 1-34, Cons. Int. Explor. Mer.
- Hamre, J., Lozano, F., Rodriguez-Roda, J., and Tiews, K., 1968:
Third Report from the Bluefin Tuna Working Group. Observations on the Size Composition of Bluefin Tuna Catches from 1965-1966. Stat. News Letters, No. 38: 1-27, Cons. Int. Explor. Mer.
- Hamre, J., Maurin, C., Rodriguez-Roda, J., and Tiews, K., 1971:
Report of the Bluefin Tuna Working Group. Observations on the Size Composition of Bluefin Tuna Catches from 1967-1969. Cons. Int. Explor. Mer., Coop. Res. Rep., Ser. A., No. 23: 1-49
- Hamre, J. and Tiews, K., 1964:
Report from the Bluefin Tuna Working Group- On the Size Composition of Tuna Catches from 1956-1962. Stat. News Letters, No. 20:1-43, Cons. Perm. Int. Explor. Mer.
- Lenarz, W.H., Mather III, F.J., Beckett, J.S., Jones, A.C. and Mason, J.M., 1973:
Estimation of Rates of Tag Shedding by Northwest Atlantic Bluefin Tuna. Fishery Bulletin 71: 1103-1105.

Table 1: Canadian catches of bluefin tuna from the Atlantic Ocean, 1962 - 1973
(Nominal catch in metric tons, live weight)

Year	Landings			Total Commercial	Sport*
	Traps and Longlines	Purse Seines			
1962	137	-		137	40
1963	229	323		552	90
1964	318	579		897	99
1965	175	461		636	90
1966	211	-		211	102
1967	298	-		298	58
1968	253	-		253	180
1969	407	-		407	170
1970	275	1 161		1 436	151
1971	68	935		1 003	128
1972	36	202		238	261
1973	160	639		799	215

* Weights are partly estimated. Some fish were not landed - many of these were tagged before being released.

Table 2 : Size composition (10 kg live weight per mille) of large bluefin tuna captured in three localities along the Canadian Atlantic Coast in 1973

Size class (kg)	A r e a				Total smoothed
	Prince Edward Island Sport	Newfoundland Sport	Nova Scotia Commer- cial	Sport	
140	2	-	-	-	1
150	-	-	-	-	1
160	-	-	9	-	1
170	-	-	26	-	3
180	2	-	9	-	4
190	-	48	26	-	8
200	4	48	89	-	14
210	3	-	97	-	18
220	4	48	133	-	22
230	6	238	79	-	25
240	14	285	71	-	29
250	18	95	124	-	33
260	26	95	71	-	38
270	40	95	89	125	43
280	35	-	53	125	45
290	46	-	89	63	48
300	54	48	26	125	51
310	60	-	9	125	57
320	88	-	-	-	62
330	60	-	-	188	62
340	86	-	-	-	63
350	71	-	-	125	62
360	71	-	-	-	55
370	52	-	-	62	47
380	51	-	-	-	40
390	43	-	-	62	36
400	38	-	-	-	33
410	43	-	-	-	31
420	29	-	-	-	26
430	23	-	-	-	18
440	14	-	-	-	11
450	6	-	-	-	6
460	2	-	-	-	2
470	2	-	-	-	1
480	2	-	-	-	1
490	2	-	-	-	1
500	3	-	-	-	1
510	-	-	-	-	1
	1 000	1 000	1 000	1 000	1 000
n =	650	21	113	16	800

Size class 140 kg = 140.0 - 149.9 kg

Table 3: Size composition of large bluefin caught by rod and reel off Prince Edward Island during four consecutive months of the 1973 season in 10 kg groups % live weight

Size Class	Sampling Period							
	July		Aug.		Sept.		Oct.	
	Numb.	%	Numb.	%	Numb.	%	Numb.	%
140					1	6		
150					-	-		
160					-	-		
170					-	-		
180	1	6			-	-		
190	-	-			-	-		
200	1	6	2	11	-	-		
210	1	6	1	5	-	-		
220	2	11	-	-	1	6		
230	3	17	1	5	-	-		
240	2	11	6	33	1	6		
250	4	22	8	44	-	-		
260	10	56	6	33	1	6		
270	14	78	10	54	2	12		
280	6	33	14	76	2	12	1	9
290	14	78	13	71	3	17	-	-
300	11	61	17	93	7	40	-	-
310	16	89	10	54	11	63	2	18
320	10	56	27	147	13	75	7	61
330	11	61	12	65	13	75	3	26
340	20	112	18	98	13	75	5	44
350	7	39	9	49	17	98	13	114
360	12	67	9	49	18	104	7	61
370	8	45	3	16	18	104	5	44
380	4	22	7	38	13	75	9	79
390	5	28	3	16	12	69	8	70
400	5	28	2	11	7	40	11	96
410	5	28	2	11	5	29	16	140
420	1	6	3	16	5	29	10	88
430	3	17	1	5	5	29	6	52
440	2	11			2	12	5	44
450	1	6			1	6	2	18
460					1	6	-	-
470					-	-	1	9
480					-	-	1	9
490					-	-	1	9
500					1	6	1	9
	1 000		1 000		1 000		1 000	
	n = 179		184		173		114	

Size class 140 kg = 140.0 - 149.9 kg

Table 4: Size composition of small bluefin taken off the U.S. east coast by Canadian vessels in 1973

Size Class (cm)	No. of Fish	°/oo smoothed
45	-	1
50	12	8
55	50	12
60	13	12
65	26	40
70	283	169
75	895	259
80	200	150
85	11	27
90	13	20
95	137	71
100	341	104
105	100	62
110	6	13
115	3	3
120	17	12
125	66	20
130	23	13
135	2	3
140	-	1
••• 170	••• 1	••• 1
n	2 199	1 000

Size category 50 = 50.0 - 54.9 (fork length caliper)

Table 5: Recoveries of small bluefin tuna double tagged with two types of spaghetti tag in 1971, with data on loss of one tag

Year	Number Released	Number Recaptured	% "Survivors"* Recaptured	% Recaptures One Tag Only
<u>FTIA Tag (Nylon Barb)</u>				
1971	140	17	12.1	6
1972		16	13.0	50
1973		2	1.9	0

Total		35	25.0	25.7
<u>"H" Tag (Stainless Steel Anchor)</u>				
1971	128	10	7.8	10
1972		20	16.9	55
1973		5	5.1	80

Total		35	27.3	45.7

* Recovery rates for individual years have been calculated after allowing for known removals, i.e. the recaptures in previous years.

Table 6: Weight distribution in ‰ (smoothed) of bluefin tuna landed in Denmark in 1973. The weight group refers to gutted fish, with gills (kg).

Weight group kg	‰ smoothed
240	43
245	85
250	43
...	
295	43
300	85
305	43
310	-
315	78
320	158
325	80
330	43
335	85
340	43
...	
390	43
395	85
400	43
n = 6	1 000

Table 7: French bluefin tuna catches in 1973 from Jean- de- Luz in kg

Date	Total weight	
	Fish below 30 kg.	Fish above 30 kg.
24 - 30.05.73	24 829	
31 - 06.06.73	11 198	
07 - 13.06.73	1 075	
14 - 20.06.73	16 608	
21 - 27.06.73	30 239	
28 - 04.07.73	59 858	
05 - 11.07.73	30 841	
12 - 18.07.73	51 296	
19 - 25.07.73	71 098	
26 - 01.08.73	45 415	12 125
02 - 08.08.73	31 619	7 375
09 - 14.08.73	40 988	15 424
15 - 22.08.73	25 964	16 878
23 - 29.08.73	9 863	
30 - 05.09.73	5 827	
06 - 12.09.73	21 172	
13 - 19.09.73	3 806	
20 - 26.09.73	70	
27 - 03.10.73	3 201	
04 - 10.10.73	590	
11 - 17.10.73	2 479	
18 - 24.10.73	626	
	488 662	51 802

Table 8: Size composition (kg) of Norwegian bluefin tuna catches south of 62°N by smoothed weight frequency (‰) in 1973

Group means		Week No.				Total
w' 1)	w 2)	31	32	33	35	
182	234	-	-	3	-	1
187	241	-	-	6	-	3
192	247	-	-	3	3	3
197	253	-	-	-	6	3
202	260	-	-	-	3	1
207	266	-	25	6	-	4
212	273	-	50	19	-	12
217	279	250	25	33	6	20
220	286	500	-	41	17	29
227	292	250	-	41	27	35
232	298	-	25	50	22	41
237	305	-	75	75	30	53
242	311	-	150	81	36	62
247	318	-	175	64	46	61
252	324	-	75	64	51	59
257	331	-	-	70	57	60
262	337	-	25	58	62	59
267	343	-	50	47	73	60
272	350	-	25	45	84	62
277	356	-	-	42	87	61
282	363	-	25	39	74	55
287	369	-	75	42	47	46
292	376	-	75	42	33	39
297	382	-	50	39	36	37
302	388	-	50	33	35	35
307	395	-	25	25	30	27
312	401	-	-	17	33	24
317	408	-	-	8	35	21
322	414	-	-	6	25	15
327	420	-	-	3	11	7
332	427	-	-	-	3	1
337	433	-	-	-	3	1
342	440	-	-	-	6	3
347	446	-	-	-	3	1
352	453	-	-	-	3	1
357	459	-	-	-	6	3
362	465	-	-	-	3	1
n		1	10	90	92	193

1) = w' = weight of gutted fish without head

2) = w = weight of ungutted fish (w = w' x 1.285)

Table 7: French bluefin tuna catches in 1973 from Jean- de- Luz in kg

Date	Total weight	
	Fish below 30 kg.	Fish above 30 kg.
24 - 30.05.73	24 829	
31 - 06.06.73	11 198	
07 - 13.06.73	1 075	
14 - 20.06.73	16 608	
21 - 27.06.73	30 239	
28 - 04.07.73	59 858	
05 - 11.07.73	30 841	
12 - 18.07.73	51 296	
19 - 25.07.73	71 098	
26 - 01.08.73	45 415	12 125
02 - 08.08.73	31 619	7 375
09 - 14.08.73	40 988	15 424
15 - 22.08.73	25 964	16 878
23 - 29.08.73	9 863	
30 - 05.09.73	5 827	
06 - 12.09.73	21 172	
13 - 19.09.73	3 806	
20 - 26.09.73	70	
27 - 03.10.73	3 201	
04 - 10.10.73	590	
11 - 17.10.73	2 479	
18 - 24.10.73	626	
	488 662	51 802

Table 8: Size composition (kg) of Norwegian bluefin tuna catches south of 62°N by smoothed weight frequency (‰) in 1973

Group means		Week No.				Total
w' 1)	w 2)	31	32	33	35	
182	234	-	-	3	-	1
187	241	-	-	6	-	3
192	247	-	-	3	3	3
197	253	-	-	-	6	3
202	260	-	-	-	3	1
207	266	-	25	6	-	4
212	273	-	50	19	-	12
217	279	250	25	33	6	20
220	286	500	-	41	17	29
227	292	250	-	41	27	35
232	298	-	25	50	22	41
237	305	-	75	75	30	53
242	311	-	150	81	36	62
247	318	-	175	64	46	61
252	324	-	75	64	51	59
257	331	-	-	70	57	60
262	337	-	25	58	62	59
267	343	-	50	47	73	60
272	350	-	25	45	84	62
277	356	-	-	42	87	61
282	363	-	25	39	74	55
287	369	-	75	42	47	46
292	376	-	75	42	33	39
297	382	-	50	39	36	37
302	388	-	50	33	35	35
307	395	-	25	25	30	27
312	401	-	-	17	33	24
317	408	-	-	8	35	21
322	414	-	-	6	25	15
327	420	-	-	3	11	7
332	427	-	-	-	3	1
337	433	-	-	-	3	1
342	440	-	-	-	6	3
347	446	-	-	-	3	1
352	453	-	-	-	3	1
357	459	-	-	-	6	3
362	465	-	-	-	3	1
n		1	10	90	92	193

1) = w' = weight of gutted fish without head

2) = w = weight of ungutted fish (w = w' x 1.285)

Table 9: Calculated length and condition factors for Norwegian bluefin tuna catches 1973, based on 1971 data.

Week no.	1973				1971			
	n	\bar{w}'	\bar{l}'	K	n	\bar{w}'	\bar{l}'	K
31	1	227.0	178.8	1.82	145	232.5	176.5	1.92
32	10	257.3	178.8	2.06	136	241.7	176.5	2.00
33	90	258.2	178.8	2.06	215	248.2	176.5	2.06
34	0	-	-	-	492	254.9	176.5	2.11
35	92	237.7	178.8	2.19	107	264.3	176.5	2.19
36	0	-	-	-	0	-	-	-
37	0	-	-	-	542	280.0	176.5	2.32
Total	193	265.4	178.8	2.12	1637	259.9	176.5	2.15

Table 10: Length frequency distribution (°/oo) for Norwegian bluefin tuna catches in 1973, calculated from weight distribution data (Table 8) by condition factor (K) = 2.12.

Length group (total)	°/oo (smoothed)
215 - 219	1
220 - 224	4
225 - 229	8
230 - 234	29
235 - 239	77
240 - 244	130
245 - 249	167
250 - 254	183
255 - 259	169
260 - 264	129
265 - 269	73
270 - 274	25
275 - 279	6
280 - 284	3
n =	193
	1 000

Table 11: Size composition in ‰ (smoothed) of Spanish madrague catches in 1973

Length group cm	‰ (smoothed)
140 - 144.9	2
145 - 149.9	5
150 - 154.9	5
155 - 159.9	2
160 - 164.9	2
165 - 169.9	5
170 - 174.9	8
175 - 179.9	15
180 - 184.9	26
185 - 189.9	31
190 - 194.9	36
195 - 199.9	43
200 - 204.9	57
205 - 209.9	84
210 - 214.9	99
215 - 219.9	96
220 - 224.9	90
225 - 229.9	84
230 - 234.9	79
235 - 239.9	70
240 - 244.9	50
245 - 249.9	31
250 - 254.9	23
255 - 259.9	22
260 - 264.9	17
265 - 269.9	6
270 - 274.9	2
275 - 279.9	5
280 - 284.9	5
285 - 289.9	2
n = 161	1 000

Table 12: Length-frequency distribution of Atlantic bluefin tuna caught by the Canadian -USA purse seine fleet in 1973 (smoothed per mille)

Length group cm	°/oo smoothed
46 - 50	3
51 - 55	15
56 - 60	22
61 - 65	17
66 - 70	65
71 - 75	193
76 - 80	224
81 - 85	102
86 - 90	15
91 - 95	19
96 -100	61
101 -105	94
106 -110	51
111 -115	8
116 -120	7
121 -125	21
126 -130	27
131 -135	13
136 -140	3
141 -145	4
146 -150	8
151 -155	12
156 -160	10
161 -165	3
166 -170	0
171 -175	0
176 -180	1
181 -185	1
186 -190	1

1 000

n = 90 746 specimens

Table 13: Estimated numbers and ages of bluefin tuna caught by the Canadian - U.S.A. purse seine fleet in the northwest Atlantic in 1973

Age (Years)	Approximate Length (cm)	Catch	
		Number	%
1	50 - 59	5 494	6.1
2	70 - 90	53 770	59.3
3	91 - 110	21 526	23.7
4	111 - 131	6 150	6.8
5	132 - 150	1 308	1.4
6	151 - 162	2 395	2.6
7	163 - 174	446	< 0.1
8	175 - 186	38	< 0.1
9	187 - 201	19	< 0.1
n =		90 746	100.0
Average length (cm) = 87.6			

Table 14: Length frequency distribution of Atlantic bluefin tuna caught by U.S.A. fishermen in 1973 (^o/_{oo} smoothed). The months when samples were collected are shown in parantheses

Fork Length (cm)	Catch by gear				Total
	(July-October) Handline ¹⁾	(June-October) Harpoon ¹⁾	(June-October) Rod & reel ¹⁾	(July-November) Trap ²⁾	
121-125				5	1
126-130				21	2
131-135				26	2
136-140				21	2
141-145				26	2
146-150				21	2
151-155			1	5	1
156-160			3	-	2
161-165			4	5	3
166-170			4	11	3
171-175		3	4	5	3
176-180		5	3	-	2
181-185		3	7	5	5
186-190		3	18	11	12
191-195		8	28	11	19
196-200		8	31	11	21
201-205		5	21	11	15
206-210	4	6	12	16	10
211-215	16	11	13	21	13
216-220	24	11	16	31	17
221-225	44	17	23	42	26
226-230	89	31	46	26	47
231-235	121	45	71	11	67
236-240	129	57	86	21	79
241-245	125	94	113	52	104
246-250	117	142	134	93	128
251-255	97	162	131	113	137
256-260	77	153	101	113	108
261-265	69	116	60	98	76
266-270	48	77	38	73	50
271-275	24	37	20	53	26
276-280	12	7	8	26	10
281-285	4		4	11	4
286-290				5	1
291-295					
296-300					
	1 000	1 000	1 000	1 000	1 000
n =	62	88	271	48	469

- 1) Sample of catch. Samples from rod and reel are from only the catch of large fish (> 155 cm). Both small (< 156 cm) and large fish are caught with rod and reel.
- 2) Virtually the entire U.S.A. trap catch of bluefin tuna was sampled.

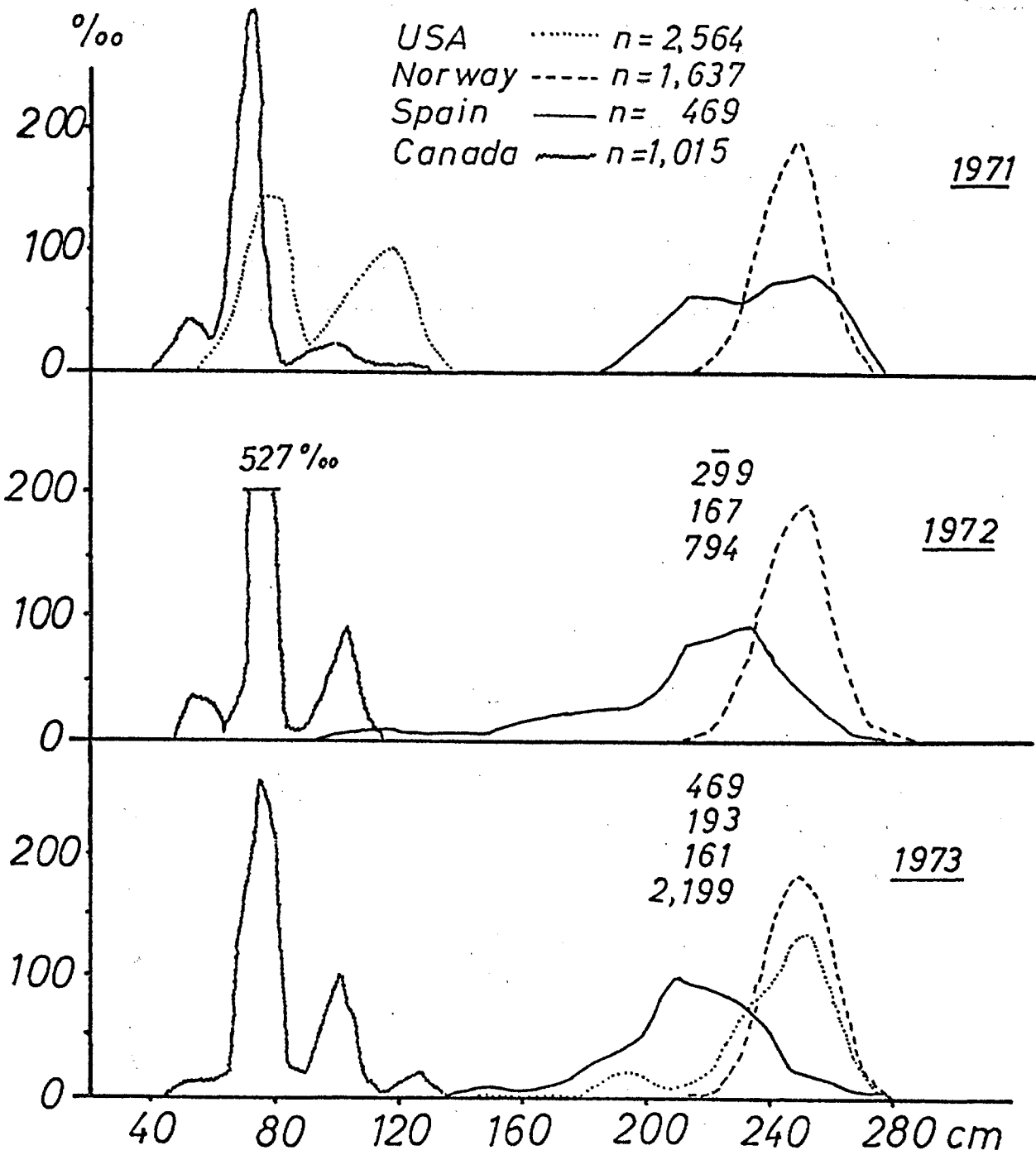


Fig. 1: Size composition of bluefin tuna catches made in USA, Norway, Spain and Canada.

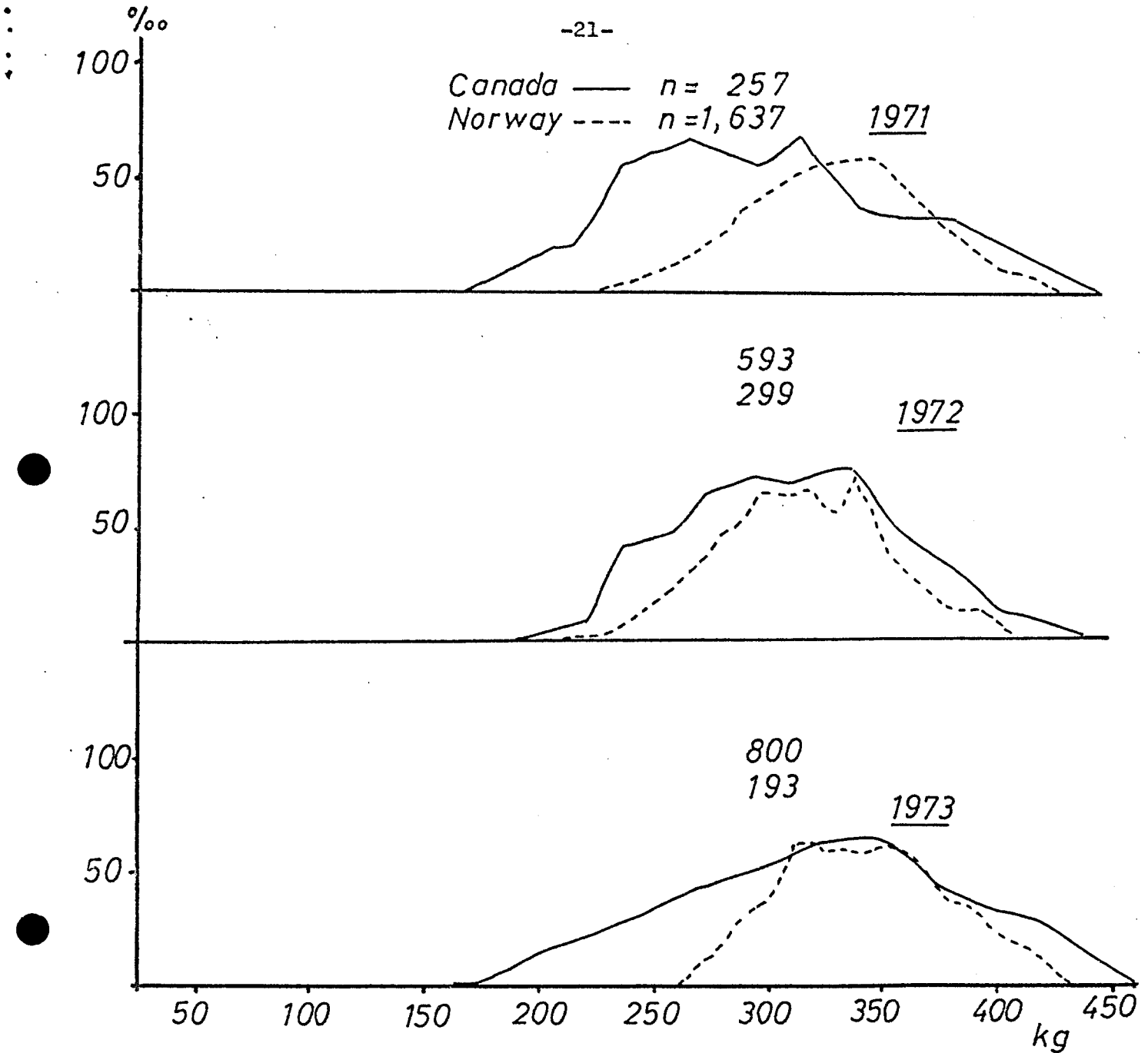


Fig. 2: Weight composition of bluefin tuna catches made in Canada and Norway.