

REPORT FROM THE BLUEFIN TUNA WORKING GROUP

Observations on the Size Composition of Bluefin Tuna Catches

from 1970

by

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I. Introduction

Reference is made to the previous reports of the Bluefin Tuna Working Group (Statistical News Letters, Nos. 20, 26 and 38, and to Cooperative Research Report, Ser.A, No.23). In the meantime, M. H. Aloncle from France has replaced Dr. C. Maurin as a member of the Group. The members continued their work by correspondance and with other tuna research workers in the region. In the following, the data obtained for the fishing season 1970 are presented.

II. Material

Reports on the catches and the catch composition of bluefin tuna were submitted by the following countries: Canada (Tables 1-4), France (Table 5), Italy (Tables 6-7), Norway (Tables 8-10), Portugal (Table 11), Spain (Tables 12-13) and USA (Tables 14-18)

Dr. O. Bagge reports that only one tuna weighing 300 kg was caught on 14 October by the Danish fishery at the Swedish west coast off Niddingen. There were no German tuna catches in 1970.

Dr. Tibbo and Dr. Beckett of the Fisheries Research Board of Canada reported that the Canadian bluefin landings (Table 1) quadrupled in 1970 due to the purse seine fishery for small bluefin off the mid-Atlantic coast of the United States. The catch of small bluefin in 1970 amounted to 1 160 metric tons. The remainder of the catch (160 metric tons) consisted of large bluefin taken by trap nets and harpoons in coastal waters, and bluefin of various sizes taken on surface long-lines by swordfish fishermen. The latter catches are incidental to swordfish and are made in offshore areas near to or beyond the edge of the continental shelf from Cape Hatteras to the Grand Bank of Newfoundland. Anglers landed approximately 60 metric tons of giant bluefin in 1970 but these are not included in Table 1. Up to 1968 there was no breakdown of tuna landings by species and hence the figures for 1962 to 1967 inclusive are total landings of all tunas on the Atlantic coast. They were chiefly bluefin but occasional landings of other species were made. Some skipjack, for example, were included in the 1963 to 1965 landings, and some yellowfin and bigeye in all landings since 1962. However, for 1968, 1969 and 1970 the figures are Canada's best estimates of bluefin landings.

Information on size and date of capture for all bluefin caught and landed by sport fishermen in Newfoundland waters is recorded by the Newfoundland and Labrador Tourist Development Office. Table 2 summarizes the dates and numbers of fish caught from 1956 to 1970 inclusive. The data are grouped in three-days' periods since variation in catch is probably due more to weather conditions than to changes in the availability of fish. The earliest captures in recent years were taken on 10-15 July in the Conception Bay on the south-east coast. However, most of the fish caught were from Notre Dame Bay about 100 miles (160 km) farther north where they appear somewhat later (20-26 July) but stay longer.

Table 3 gives the weight composition of the bluefin landed in Newfoundland during the last three years (1968-1970). These data have been grouped in 5 kg weight classes and the per mille frequency distribution calculated. The remainder of the fish that were caught were released - often after being tagged.

The sport fishery in the Gulf of St. Lawrence was active during 1970, particularly off the south-east coast of Prince Edward Island, where more than 100 fish were taken. Data on these captures are scanty but it would appear that, on an average, they were larger than the fish caught in Newfoundland waters. Several fish weighing more than 410 kg were recorded. One weighed 484 kg, and this is presumably a world record for rod and reel. Bluefin tuna also occurred in the north-western part of the Gulf of St. Lawrence in 1970 although very few landings were reported. Herring purse seine fishermen frequently made incidental catches of large bluefin but discarded them.

In general, bluefin tuna appear to have been abundant farther north than usual during the past three years, and this may be correlated with an increase in the surface temperature. Mean monthly temperatures in these years were 0.5 to 1.5°C above average at several stations, particularly during the period of summer warming.

Samples were obtained from each of three landings made from the purse seine fishery for small bluefin off the east coast of the United States and the per mille length distributions are given in Table 4. The length composition of the first two samples is similar, as might be expected since they were from catches made in the same general area and at approximately the same time. The third sample was from catches made later in the year and it differs from the others. Most of the fish in the first two samples were of age groups 1 and 2 (year classes 1969 and 1968), whereas age group 3 (year class 1967) predominated in the third sample. There were very few representatives of age group 4 (year class 1966), despite some older fish. The 1966 year class has had a varied history - it was absent from the fishery as age group 1 but formed a major component as age group 2 (see ICES, C.M.1969/J:2).

During the year 20 large bluefin were tagged and released; 3 from commercial trap net fisheries in St. Margaret's Bay, Nova Scotia, and 17 by anglers in Notre Dame Bay, Newfoundland. There were no tags returned in 1970.

In a joint research effort with the Woods Hole Oceanographic Institution, sonic transmitters were attached to a total of 8 bluefin in St. Margaret's Bay, and the fish were then released. 7 of them were tracked for as long as 56 hours and as far as 130 miles (210 km). Only 1 stayed inside the Bay - the others left immediately and proceeded offshore. The transmitters telemetered data on fish and water temperatures for studies of thermal regulation. Some of the results of these studies are in press.

M. H. Aloncle reports that the bluefin tuna catches off the French Mediterranean coast amounted to 1 200 tons ( $\pm 20\%$ ).

Dr. Sara who has provided the Italian information states that only few data could be collected. For the 1970 catch it is characteristic that relatively few but rather large fish were caught. Three fish were even close to 600 kg and a dozen fish were close to .....

to 550 kg. In total, only 4 000 bluefin tuna with an average weight of 230 kg were caught, while the average annual catch of the madragues stationed at Bonagia, Formica, Favignana and Scopello amounts to some 6 500 tuna.

According to Mr. J. Hamre, 1970 was one of the poorest years since the bluefin tuna fishery was started in Norway. Only 812 were caught. Since he did not get an opportunity to collect corresponding length/weight measurements, he used the data collected in 1968 to convert the weight frequency distribution in a length frequency distribution (Table 9), using a condition factor (K) of 2.16.

Mr. Hamre has also provided Table 10 on returns of the Norwegian tuna tagging experiments. One special conclusion can be drawn from the Table, namely that the tuna age groups fished on the Norwegian coast in 1962 are still visiting Norwegian waters as indicated by the returns obtained in 1970. This supports the suggestion that the 1952 year class may still be found in the Norwegian catches as suggested further below.

Dr. H. Vilela reports that in November 3 140 small tuna with a total weight of 15 509 kg were caught by hook and line on the Portuguese west coast.

Dr. J. Rodriguez-Roda states that the bluefin tuna catches of the madragues at Barbate, Sancti-Petri, Tarifa and La Linea amounted to 1 513 tons in 1970 and were thus a little lower than the catches in 1969 (1 634 tons).

Mr. Frank Mather III points out that the data given in Table 14 include 676 fish caught in Week 26 off southern New Jersey during a sport fishing tournament. The individual weight of these fish was obtained and converted into length by their length/weight formula. The rest of the sample was from catches of three locally-based purse seiners and was measured with calipers by their personnel and by the personnel of the National Mar. Fisheries Service Laboratory at Oxford, Maryland.

In Table 15 Mr. Mather III estimated the age composition and the average age of the catch (based on the data given in Table 14), catch and effort as well as tag return rates.

According to him it is evident that the stock of young bluefin has to some extent recuperated in the 1969 and 1970 seasons. The recoveries of two French tags which are from very small numbers of releases suggest that this recuperation may have been due, at least partly, to the immigration of fish from the eastern Atlantic. Now that the interaction between the stocks of young bluefin of the western and eastern sides of the North Atlantic has been conclusively demonstrated, it is hoped that more attention will be devoted to obtaining adequate size composition and catch and effort data for the fisheries in the eastern Atlantic, and that tagging of young bluefin in the eastern Atlantic will be done on more than a token basis.

In Tables 16 and 17 Mr. Mather gives the US tagging results for bluefin tuna. He states that the first two recaptures in the north-western Atlantic of giant bluefin tagged off the Bahamas have been recorded. In the meantime, the 40th west-east transatlantic migration by a small bluefin has been recorded.

He feels that the fishing pressure on the north-western Atlantic stock was high. The return rate from the 1970 season's releases was not excessive, while that from the previous (1969) season's, 24.6%, was by far the highest ever attained in this category. The second season returns are probably a better index of fishing ratio than that of the same season, as the former fish had then had more opportunity to mix thoroughly with the stock.

He finally says that there are some strong indications that the fisheries in the Bay of Biscay and in the north-western Atlantic fluctuate in response to transatlantic migration. However, in order to prove this more effort data are needed.

In Table 18, the length composition of bluefin tuna samples measured at Puerto Rico by the Inter-American Tropical Tuna Commission is given. It is for the first time that such data were obtained by the Working Group.

### III. Comparison of the catch composition data collected in the different countries

#### 1. Spanish with Norwegian catches

There was a slight shift in the mode of the Norwegian length-frequency distribution curve to higher lengths, indicating that the fish caught in 1970 belonged to more or less the same year class as those caught in 1969. The majority of these fish were probably members of the rich 1952 year class.

Fish of the 1958 and 1961 year classes again dominated in the Spanish catches as in 1969 with the only difference that the 1961 year class predominated over the 1958 year class, while the opposite was the case in the preceding year. A third group of fish with a mean length of about 170 cm probably belonged to the 1968 or the 1967 year class, which was observed already in 1968.

Due to too few data, a comparison between the Italian bluefin tuna catches and those of Spain and Norway is not possible. The few data available indicate, however, that the age composition of the Italian catches was similar to that of the previous years.

#### 2. US, Canadian and Puertorican catches

The US, Canadian and Puertorican bluefin tuna catches made by purse seines tally widely in the lower range of the length distribution curves. In the 1970 catches, fish of year classes 1969, 1968 and 1967 were strongly represented in the Canadian and US catches. Apart from these year classes the US catches contained also fish of the year classes 1966 and 1965. The similarity of the Canadian and US bluefin tuna catches had to be expected, since the fisheries of both countries take place on the same fishing grounds. It is noteworthy that in 1970 fish of age group I was again present in the catches after having been absent in the three preceding years.

#### 3. Canadian with Italian and Norwegian catches of giant bluefin tuna

For the first time, data on the size composition of giant tuna landed by sport fishermen in Newfoundland were obtained and are being compared with Norwegian purse seine catches and Italian madrague catches, all based on the weight composition. Figure 2 shows that for the years 1968 to 1970 the Canadian catches of giant bluefin tuna are distinctly smaller than the Norwegian catches. The fish of the Canadian catches was probably 11 to 13 years old. The fish of the Italian bluefin tuna catches in 1970 was ranging between the Canadian and Norwegian catches in weight composition. It is not possible to conclude from the weight composition data to which year classes the giant tuna caught off the Canadian coast belonged.

### IV. Summary

The size compositions of bluefin tuna catches collected in 1970 show that the East Atlantic fisheries of the various countries under observation have taken place on different year classes of fish, while the West Atlantic purse seine fisheries have fished on more or less the same age groups.

V. References

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Table 1. Canadian landings of bluefin tuna from the Atlantic Ocean 1962-1970\*.  
(Nominal catch (live weight), thousand metric tons)

Year	Landings
1962	0.2
1963	0.7
1964	1.5
1965	0.7
1966	0.2
1967	0.3
1968	0.1
1969	0.3
1970	1.3

\*) Does not include catches by sport fishermen, but may include small quantities of other species (yellowfin and bigeye) caught and landed by long-line fishermen.

Table 2. Numbers of large bluefin tuna caught by sport fishermen off the east coast of Newfoundland (Conception to Notre Dame Bays) during 1956-1970, arranged chronologically by three day periods.

Month/Date	Y E A R											1970			
	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966		1967	1968	1969
July 11										5	1	2	2	2	3
14										13				1	2
17										53				2	19
20										50				3	5
23										53				12	6
26										68				20	25
29										42				10	29
Aug. 1			1							19				27	33
4			1				10			4				30	20
7			1			2	7			17				30	31
10			1			16	2			27				30	10
13			1			17	3			11				41	27
16			2			37	3			11				43	24
19			2	1		20	3			11				42	24
22			1	1		12	4			13				27	13
25			1	2	1	2	8			6				35	37
28			1	2	3	2	3			6				53	34
31			1	2	4	2	8			6				51	14
Sept. 3				2	2		1			5				28	11
6				2	2		1			5				46	5
9				2	2		1							16	30
12				2	2		1							34	20
15				2	2		1							7	5
18				2	2		1							10	2
21				2	2		1							11	
24				2	2		1								1
27				2	2		1								
30				2	2		1							3	
Oct. 3				2	2		1								
6				2	2		1								
9				2	2		1								
12				2	2		1								
<b>TOTAL</b>															<b>406</b>

2 179 635 584

Table 3. Size composition of Canadian bluefin tuna catches by sport fishermen off the east coast of Newfoundland by smoothed weight frequency (per mille)

Weight Class (kg)	1968	1969	1970
185	1	-	-
190	2	-	-
195	8	3	-
200	17	9	-
205	23	15	6
210	22	17	14
215	25	18	15
220	40	24	10
225	55	27	13
230	60	29	26
235	51	30	42
240	49	39	55
245	68	49	65
250	83	46	65
255	72	49	53
260	51	50	46
265	58	52	55
270	72	64	71
275	58	56	73
280	39	39	71
285	31	46	61
290	29	63	48
295	21	64	42
300	14	50	30
305	13	41	26
310	9	30	23
315	5	21	17
320	4	23	17
325	3	18	15
330	5	9	10
335	8	5	8
340	4	5	6
345	-	4	6
350	-	1	7
355	-	-	4
360	-	1	-
365	-	2	-
370	-	1	-
	1 000	1 000	1 000
n =	273	165	131

NB. Weight class 190 includes fish from 190 to 194 kg (live weight).

Table 4. Length composition of small bluefin tuna taken off the US east coast in 1970. Fork lengths (caliper) by 5 cm classes (smoothed).

Length	Capture Period			Total
	Jul.8 - Aug.14	Jul.12 - Aug.24	Sept.3 - 13	
40 x)	7	8	-	5
45	73	128	1	67
50	150	276	3	143
55	111	201	5	106
60	36	49	3	29
65	68	42	1	37
70	168	100	8	92
75	172	90	60	108
80	75	33	110	73
85	31	6	78	39
90	36	15	126	58
95	20	25	274	106
100	4	16	248	89
105	-	5	80	29
110	1	1	3	1
115	4	1	-	2
120	12	3	-	5
125	17	1	-	6
130	11	-	-	4
135	3	-	-	1
140	1	-	-	-
	1 000	1 000	1 000	1 000
n =	900	200	398	1 498

x) Length class 40 includes fish from 400 to 449 mm.

Table 5. Bluefin tuna catches at St. Jean-de-Luz (France) in 1970 in kg (data given by Cooperative Maritime Itsasokoa).

Date	Total Weight	
	Fish below 30 kg	Fish above 30 kg
5 May - 11 May	3 573	-
12 Jun. - 18 Jun.	40 865.5	-
19 Jun. - 25 Jun.	40 227	-
26 Jun. - 2 Jul.	22 966.5	-
3 Jul. - 9 Jul.	48 840.5	-
10 Jul. - 16 Jul.	33 692	-
17 Jul. - 23 Jul.	15 416.5	-
24 Jul. - 30 Jul.	85 063.5	21 311
31 Jul. - 6 Aug.	41 877	12 994
7 Aug. - 12 Aug.	72 146	22 293
13 Aug. - 20 Aug.	87 819	78 867
21 Aug. - 27 Aug.	24 162	7 342
28 Aug. - 3 Sep.	23 956.5	5 628
4 Sep. - 10 Sep.	23 897	10 191
18 Sep. - 24 Sep.	246	-
25 Sep. - 1 Oct.	3 938	-
2 Oct. - 8 Oct.	2 193	-
9 Oct. - 15 Oct.	640	-
Total	573 519	158 626



Table 6. Weight distribution in % (smoothed) of 71 bluefin tuna caught in a Sicilian madrague at Bonagia on May 27, 1970. The weight groups refer to ungutted fish (kg).

Weight Group (kg)	%
200	3
205	10
210	14
215	14
220	10
225	14
230	21
235	18
240	21
245	21
250	10
255	14
260	25
265	35
270	42
275	35
280	32
285	46
290	46
295	35
300	67
305	89
310	64
315	52
320	39
325	33
330	44
335	22
340	3
345	10
350	10
355	11
360	14
365	7
370	-
375	3
380	7
385	3
390	-
395	-
400	3
405	11
410	14
415	11
420	4
425	3
430	7
435	3
	1 000
n =	71

Table 7. Length distribution (fork length) in % (smoothed) of 54 bluefin tuna caught in a Sicilian madrague at Formica in June 1970 (by caliper).

Length Group (cm)	%
130	5
135	10
140	5
145	5
150	28
155	50
160	60
165	65
170	51
175	37
180	51
185	69
190	65
195	51
200	46
205	37
210	19
215	14
220	28
225	33
230	28
235	42
240	53
245	22
250	14
255	28
260	37
265	23
270	5
275	-
280	-
285	6
290	8
295	5
	1 000
n =	54

Table 8. Size composition of Norwegian tuna catches south of 62°N by smoothed weight frequency (per mille) in 1970 (kg).

Group Mean		Week Numbers						Total
W <sup>1)</sup>	W <sup>2)</sup>	31	32	33	34	35	37	
162	208	-	4	-	-	1	-	1
167	215	-	7	-	-	2	-	1
172	221	-	4	-	-	1	-	1
177	228	-	7	-	-	-	-	1
182	234	25	17	2	-	-	-	2
187	241	100	14	4	-	-	-	3
192	247	125	10	6	1	1	5	4
197	253	75	17	15	5	5	10	9
202	260	50	31	25	14	13	5	17
207	266	50	62	30	23	23	-	26
212	273	50	86	36	25	27	-	31
217	279	50	89	34	32	24	10	33
222	286	75	86	47	42	27	20	40
227	292	100	65	79	44	43	10	50
232	298	100	41	94	44	57	10	55
237	305	75	44	92	50	47	25	54
242	311	25	61	83	67	47	20	59
247	318	-	58	74	87	71	10	71
252	324	25	58	64	84	78	30	72
257	331	50	65	51	77	75	60	69
262	337	25	48	49	80	82	65	71
267	343	-	38	51	74	85	75	70
272	350	-	31	49	60	70	95	61
277	356	-	21	44	48	49	85	47
282	363	-	21	29	36	41	70	37
287	369	-	14	15	28	33	70	29
292	376	-	4	8	24	20	75	21
297	382	-	-	2	19	19	70	17
302	388	-	-	2	12	22	40	15
307	395	-	-	6	9	18	30	12
312	401	-	-	6	7	13	40	10
317	408	-	-	2	4	9	25	6
322	414	-	-	-	1	3	15	2
327	420	-	-	2	1	-	20	2
332	427	-	-	4	2	-	10	2
337	433	-	-	2	1	-	-	1
342	440	-	-	-	-	-	-	-
347	446	-	-	-	-	-	-	-
352	453	-	-	-	-	-	-	-
357	459	-	-	-	-	-	-	-
362	465	-	-	-	-	-	-	-
367	472	-	-	-	-	-	-	-
372	478	-	-	-	-	-	-	-
377	485	-	-	-	-	1	-	-
382	491	-	-	-	-	2	-	1
387	498	-	-	-	-	1	-	-
n =		10	73	133	261	285	50	812

Table 9. Calculated length data. ( $K = 2.16$ ) length frequency distribution in per mille for Norwegian tuna catches in 1970.

Length Groups (cm)	Southern Area
210 - 214	1
215 - 219	3
220 - 224	6
225 - 229	26
230 - 234	80
235 - 239	125
240 - 244	174
245 - 249	212
250 - 254	202
255 - 259	106
260 - 264	50
265 - 269	15
270 - 274	2
275 - 279	-
280 - 284	1

Table 10. Releases of bluefin tuna in coastal waters of western Norway, and returns by years and area.

Releases Year	No.	Coast of Norway/North Sea Years at large										Coast of Spain Years at large								Grand Total						
		Coast of Norway/North Sea Years at large										Coast of Spain Years at large														
		0	1	2	3	4	5	6	7	8	Total	0	1	2	3	4	5	6	7		8	Total				
1957	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1958	20	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5
1959	41	5	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	10
1960	64	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6
1961	81	3	2	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	9
1962	13	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	242	9	9	3	1	0	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	4	1	0	0	32

Table 11. Bluefin tuna catches from the south coast of Portugal by madragues in 1970, specified by weight groups (kg).

Months 1970	Number of individuals						Total	
	Atún 90 kg and more	Atuarrros 50-89 kg	Albacoras 30-49 kg	Cachorretas and Cachorretitas below 30 kg	Number of individuals	Weight in kg		
May	1	-	-	1	2	383		
June	13	1	-	-	14	1 988		
July	83	5	-	34	122	12 605		
August	24	-	-	330	354	4 871		
Total	121	6	-	364	492	19 847		

Table 12. Spanish bluefin tuna catches (by number of fish); (the second figure (+) refers to fish smaller than 50 kg) at Barbate, Sancti-Petri, Tarifa and La Linea by weeks in 1970. (Rodriguez-Roda, 1970).  
(D = pre-spawning fish; R = Post-spawning fish).

Week Number	Time	Number of fish and spawning condition				Total
		Barbate	Sancti Petri	Tarifa	La Linea	
17	19 Apr.- 25 Apr.	-	-	30 D	-	30 D
18	26 Apr.- 2 May	-	-	-	-	-
19	3 May - 9 May	142+2 D	-	21 D	-	163+2 D
20	10 May - 16 May	972 D	341 D	147 D	-	1 460 D
21	17 May - 23 May	280+2 D	83 D	2 D	-	365+2 D
22	24 May - 30 May	94 D	404+2 D	-	-	498+2 D
23	31 May - 6 Jun.	152 D	530+1 D	273 D	-	955+1 D
24	7 Jun.- 13 Jun.	277 D	197 D	146 D	-	620 D
25	14 Jun.- 20 Jun.	63 D	1+1 D	6 D	-	70+1 D
26	21 Jun.- 27 Jun.	-	-	-	-	-
27	28 Jun.- 4 Jul.	50+3 D	-	-	-	50+3 D
28	5 Jul.- 11 Jul.	191 D+R	-	-	35 R	226 D+R
29	12 Jul.- 18 Jul.	447 R	-	-	138 R	585 R
30	19 Jul.- 25 Jul.	483+1 R	-	-	37 R	520+1 R
31	26 Jul.- 1 Aug.	1 835+1 R	-	-	88 R	1 923+1 R
32	2 Aug.- 8 Aug.	312 R	-	-	-	312 R
33	9 Aug.- 15 Aug.	73 R	-	-	162 R	235+1 R
34	16 Aug.- 22 Aug.	158 R	-	-	48 R	206 R
35	23 Aug.- 29 Aug.	21 R	-	-	-	21 R
36	30 Aug.- 5 Sep.	-	-	-	15 R	15 R
7	6 Sep.- 12 Sep.	-	-	-	-	-
38	13 Sep.- 19 Sep.	-	-	-	-	-
39	20 Sep.- 26 Sep.	-	-	-	4 R	4 R
Total Number		5 550+9 = 5 559	1 556+4 = 1 560	625	527+1 =528	8 258+14 = 8 272
Total kgs		1 007 730	308 812	122 010	74 470	1 513 022

Table 13. Weekly size composition in % (smoothed) of Spanish madrague catches at Barbate in 1970. (Rodriguez-Roda, 1971).

(D = pre-spawning; R = post-spawning fish)

Length Group	Week Number											Total
	19 D	20 D	21 D	22 D	23 D	24 D	27 R	28 R	29 R	31 R	32 R	
125-129.9	-	2	-	-	-	-	-	-	-	-	-	0
130-134.9	-	4	-	3	-	-	-	-	-	-	-	0
135-139.9	-	2	-	10	-	-	-	-	-	-	-	1
140-144.9	-	-	-	10	-	-	-	-	-	-	-	0
145-149.9	-	-	2	3	9	-	-	-	-	-	-	1
150-154.9	-	-	3	19	24	-	-	-	-	-	2	2
155-159.9	-	-	3	45	28	-	-	-	-	2	5	5
160-164.9	-	-	7	48	47	2	-	-	-	7	7	7
165-169.9	-	-	11	54	66	9	-	3	-	8	16	11
170-174.9	-	-	9	55	61	16	-	10	4	8	28	14
175-179.9	-	-	9	29	61	25	-	18	11	14	25	16
180-184.9	4	2	21	22	66	52	6	37	24	20	32	25
185-189.9	9	7	55	45	66	86	12	61	44	32	69	45
190-194.9	9	11	99	64	66	101	19	84	77	67	92	69
195-199.9	13	9	122	83	75	115	75	129	123	104	101	95
200-204.9	40	19	116	99	85	126	162	174	143	112	108	110
205-209.9	66	50	107	96	85	117	169	168	118	105	94	115
210-214.9	66	70	90	80	80	95	113	105	89	91	76	87
215-219.9	79	59	63	58	57	61	100	58	70	84	55	68
220-224.9	97	46	53	39	24	31	106	42	59	79	32	55
225-229.9	83	59	58	32	19	34	94	21	58	67	28	51
230-234.9	70	91	63	32	28	50	81	24	57	63	39	56
235-239.9	88	106	44	26	19	38	50	32	52	57	43	52
240-244.9	110	109	19	13	10	18	13	13	36	34	32	38
245-249.9	96	120	14	10	9	13	-	3	12	12	23	26
250-254.9	61	106	12	10	10	9	-	5	5	8	25	21
255-259.9	44	65	9	6	5	2	-	5	7	11	30	17
260-264.9	35	35	5	6	-	-	-	5	5	8	23	11
265-269.9	13	19	4	3	-	-	-	3	4	5	9	6
270-274.9	4	7	2	-	-	-	-	-	2	2	4	2
275-279.9	9	2	-	-	-	-	-	-	-	-	2	1
30-284.9	4	-	-	-	-	-	-	-	-	-	-	0
n =	57	135	142	78	53	111	40	95	243	260	141	1 355

Table 14. Weekly size composition of US bluefin tuna purse seine catches in % (smoothed) (fork length by caliper) for 1970. (Week 26 sample which has been taken during a sport fishing tournament has been converted from lbs into cm).

Length cm	Week of Year									Total
	26	28	30	32	33	34	35	36	38	
45	44	-	1	1	-	-	-	-	-	3
50	164	1	11	21	1	-	-	-	-	18
55	202	1	29	45	2	-	1	-	-	29
60	84	2	28	29	2	-	1	1	-	17
65	35	24	23	9	1	1	1	2	-	12
70	131	118	94	33	4	3	4	2	-	55
75	175	179	208	67	17	18	15	6	5	103
80	79	104	198	65	32	50	34	18	55	89
85	19	57	96	59	35	63	52	33	118	59
90	31	109	70	122	107	69	71	68	111	85
95	24	110	107	185	300	193	194	166	127	155
100	6	46	93	132	343	285	331	234	238	172
105	1	8	36	43	143	157	234	153	246	91
110	-	8	5	20	9	21	57	41	96	21
115	1	27	1	33	-	1	2	8	4	9
120	2	57	-	42	-	4	-	25	-	16
125	1	68	-	40	-	15	-	58	-	20
130	1	43	-	26	-	27	-	68	-	17
135	-	16	-	13	-	26	-	53	-	10
140	-	8	-	6	-	16	-	36	-	6
145	-	7	-	6	1	10	1	19	-	4
150	-	4	-	2	2	9	1	6	-	3
155	-	1	-	1	1	9	1	2	-	2
160	-	-	-	1	-	8	-	1	-	1
165	-	-	-	-	-	6	-	-	-	1
170	-	-	-	-	-	5	-	-	-	1
175	-	-	-	-	-	2	-	-	-	1
180	-	-	-	-	-	1	-	-	-	1
185	-	1	-	-	-	1	-	-	-	-
190	-	-	-	-	-	-	-	-	-	-
195	-	1	-	-	-	-	-	-	-	-
	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000
n =	657	1 260	1 718	1 353	798	962	1 188	397	193	8 526

Table 15. Age composition, catch and effort, and tag return data for young bluefin tuna in coastal waters between Cape Hatteras, North Carolina, and Cape Ann, Massachusetts, by years.

Years	1962	1963	1964	1965	1966	1967	1968	1969	1970
Ages	AGE COMPOSITION, IN PERCENT OF SAMPLES MEASURED								
I	1	10	17	17	70	9	2	1	7
II	6	10	19	55	25	60	63	40	29
III	7	27	27	16	5	15	34	47	55
IV	61	21	13	1	0	11	1	8	3
V	20	20	15	8	0	5	0	4	5
VI	1	9	9	1	0	0	0	0	1
VII	1	1	1	2	0	0	0	-	-
VIII	1	1	0	1	0	0	0	0	-
IX	-	-	0	0	0	0	0	0	-
X	-	-	0	0	0	0	0	0	0
>X	-	-	0	0	0	0	0	0	0
n =	3 044	5 586	2 318	1 079	3 734	1 466	946	816	8 967
Av. age	4.1	3.7	3.2	2.4	1.4	2.4	2.3	2.7	2.7
FISHERY STATISTICS									
Tons caught	3 379	5 933	6 165	2 975	875	2 556	670	1 728	5 000
Tons/boat day	10.0	9.5	6.8	7.3	4.7	13.7	7.9	18.2	17.8
No. of boats	7	18	21	13	6	11	5	4	8
Months at large	TAG RETURNS OBTAINED IN PERCENT OF RELEASES, BY TIMES AT LARGE								
0-5.9	0	24.1	20.4	9.0	9.6	14.2	32.4	2.5	10.5
6.0-17.9	1.3	5.2	6.9	6.7	2.0	14.0	8.1	6.2	24.8
18.0-29.9	6.7	2.0	0	0	0	1.9	1.1	2.1	2.3
30.0-41.9	0	0	1.3	0	0	0	0	0.1	1.6
Months at large	PERCENT TAG RETURN/ 1 000 TONS, BY TIMES AT LARGE								
0-5.9	0	4.0	3.3	3.0	11.0	5.5	48.4	1.5	2.1
6.0-17.9	0.4	0.9	1.1	2.2	2.3	5.4	12.1	3.6	4.9
18.0-29.9	2.2	0.3	0	0	0	0.7	1.7	1.3	0.5
30.0-41.9	0	0	0.2	0	0	0	0	0.1	0.3

Table 16. Releases and returns for giant bluefin tuna (over 120 kg) tagged off the Bahamas by years of release, months at large, and area<sup>±</sup>) of recapture.

Year	Releases	R e t u r n s					T O T A L
		Months at large					
		0-5.9	6.0-17.9	18.0-29.9	30.0-41.9	42.0-53.9	
1954	21	0	0	0	0	0	0
1955	14	0	0	0	0	0	0
1956	41	0	0	0	0	0	0
1957	0	0	0	0	0	0	0
1958	0	0	0	0	0	0	0
1959	25	0	0	0	0	0	0
1960	13	0	0	2 N	0	0	2 N
1961	34	2 N	0	0	0	0	2 N
1962	45	1 N	0	0	0	0	1 N
1963	147	0	0	1 B	0	0	1 B
1964	41	0	0	0	0	0	0
1965	55	0	0	0	0	0	0
1966	105	0	0	0	0	1 A	1 A
1967	82	1 N	0	0	0	-	1 N
1968	57	0	0	0	-	-	0
1969	47	0	0	-	-	-	0
1970	182	1 A	-	-	-	-	1 A

±) Areas: A - north-eastern North America  
 B - Brazil  
 N - Norway.



Table 17. Releases of young bluefin tuna in coastal waters between Cape Hatteras, North Carolina, and Cape Ann, Massachusetts, and returns in percent of releases, by years, region of recapture, and method of initial capture (S = sport; C = purse seine).

Releases		Returns from Release Area						Returns from Bay of Biscay					Grand total	
Year	No.	Years at large						Years at large						
		0	1	2	3	4	Total	1	2	3	4	5		Total
1954 S	169	0.6	0	0	0	0	0.6	0	0	0	0	1.2	1.2	1.8
1955 S	215	0	0	0	0	0	0	0	0	0	0	0	0	0
1956 S	58	0	0	0	0	0	0	0	0	0	0	0	0	0
1957 S	34	0	0	2.9	0	0	2.9	0	0	0	0	0	0	2.9
1958 S	38	0	0	0	0	0	0	0	0	0	0	0	0	0
1959 S	25	0	0	0	0	0	0	0	0	0	0	0	0	0
1960 S	15	0	0	6.7	0	0	6.7	0	0	0	0	0	0	6.7
1961 C	21	0	0	0	0	0	0	0	0	0	0	0	0	0
S	129	0	1.6	2.3	1.6	0	5.4	0	0	0	0	0	0	5.4
1962 C	25	0	0	0	0	0	0	0	0	0	0	0	0	0
S	52	0	7.7	0	0	0	7.7	0	0	0	0	0	0	7.7
1963 S	29	24.1	6.9	0	0	0	31.0	0	0	0	0	0	0	31.0
1964 C	455	21.4	6.8	0	0	0	28.2	0	0	0	0	0	0	28.2
S	10	20.0	10.0	0	0	0	30.0	0	0	0	0	0	0	30.0
1965 C	1629	10.0	2.5	1.7	0	0	14.2	0.7	0.1	0.1	0	0	0.8	15.0
S	43	2.3	16.3	7.0	0	0	25.6	4.7	9.3	0	0	0	14.0	39.5
1966 C	3772	13.1	14.0	1.2	0.2	0.1	28.5	0.3	0.1	0	<0.1	-	0.4	29.0
S	187	19.8	21.4	2.1	1.1	0	44.5	0.5	0	0	0	-	0.5	45.0
1967 C	614	15.6	9.4	2.6	1.3	-	28.8	0.2	0.2	0	-	-	0.3	29.2
S	14	0	7.1	0	14.3	-	21.4	0	0	0	-	-	0	21.4
1968 C	219	37.9	6.4	2.7	-	-	47.0	0	0	-	-	-	0	47.0
S	41	12.2	12.2	0	-	-	24.4	0	0	-	-	-	0	24.4
1969 C	92	7.6	7.6	-	-	-	15.2	0	-	-	-	-	0	15.2
S	237	2.1	29.2	-	-	-	31.2	0	-	-	-	-	0	31.2
1970 <sup>x</sup> )C	32	0	-	-	-	-	0	-	-	-	-	-	0	0
S	422	10.4	-	-	-	-	10.4	-	-	-	-	-	-	10.4

x) 1970 releases and returns received through October 9.

Table 18. Bluefin tuna length frequency data (smoothed), measured by the Inter-American Tropical Tuna Commission at Puerto Rico.

Length (cm)	%
50	60
55	180
60	180
65	60
70	-
75	8
80	17
85	18
90	30
95	122
100	197
105	133
110	15
1 000	

USA	=	.....	ITALY	=	-----
TURKEY	=	.....	FRANCE	=	-----
NORWAY	=	-----	CANADA	=	~~~~~
SPAIN	=	-----	PUERTO RICO	=	-----

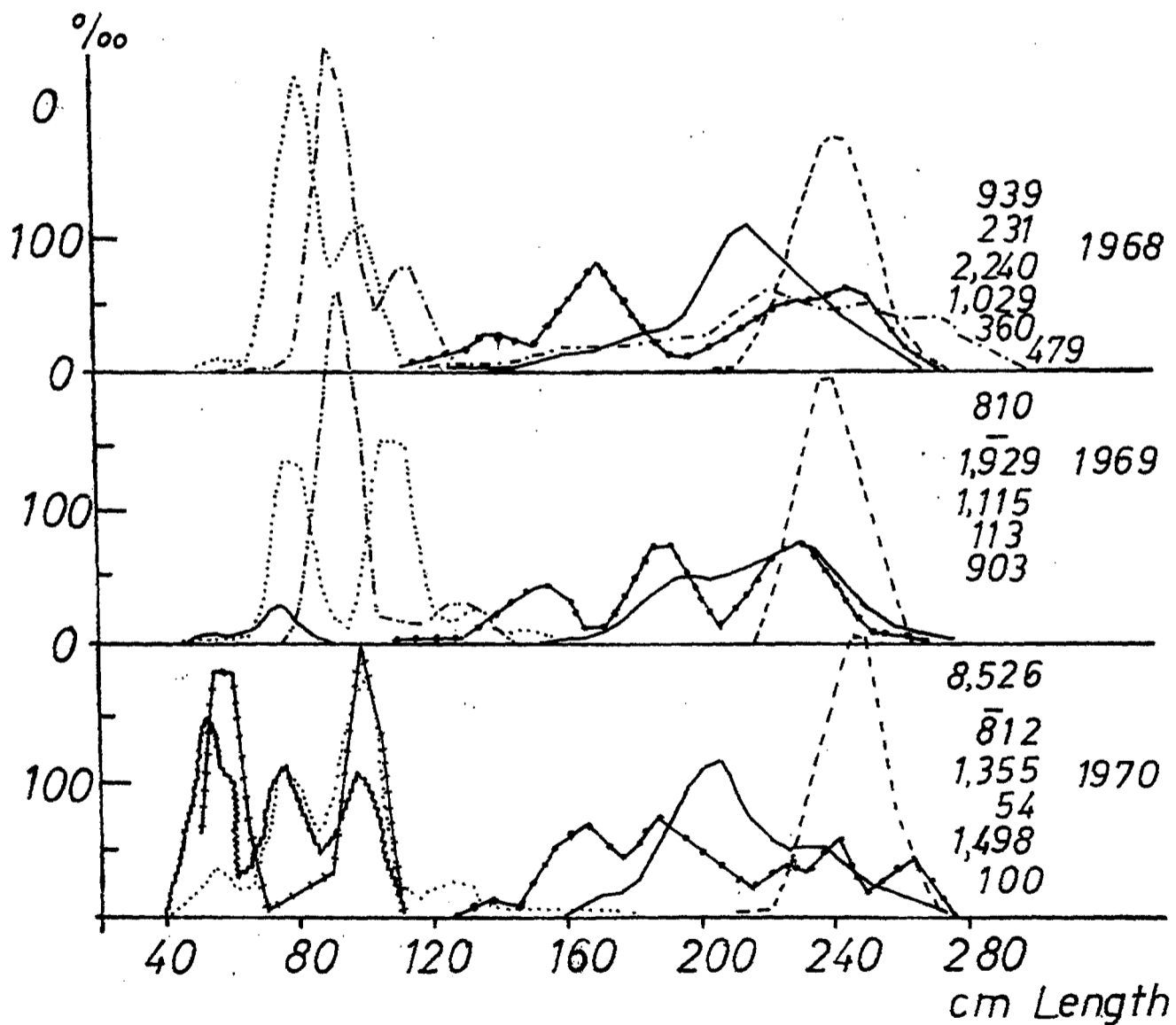


Figure 1. Size composition of Bluefin Tuna catches made in USA, Turkey, Norway, Spain, Italy, France, Canada and Puerto Rico.

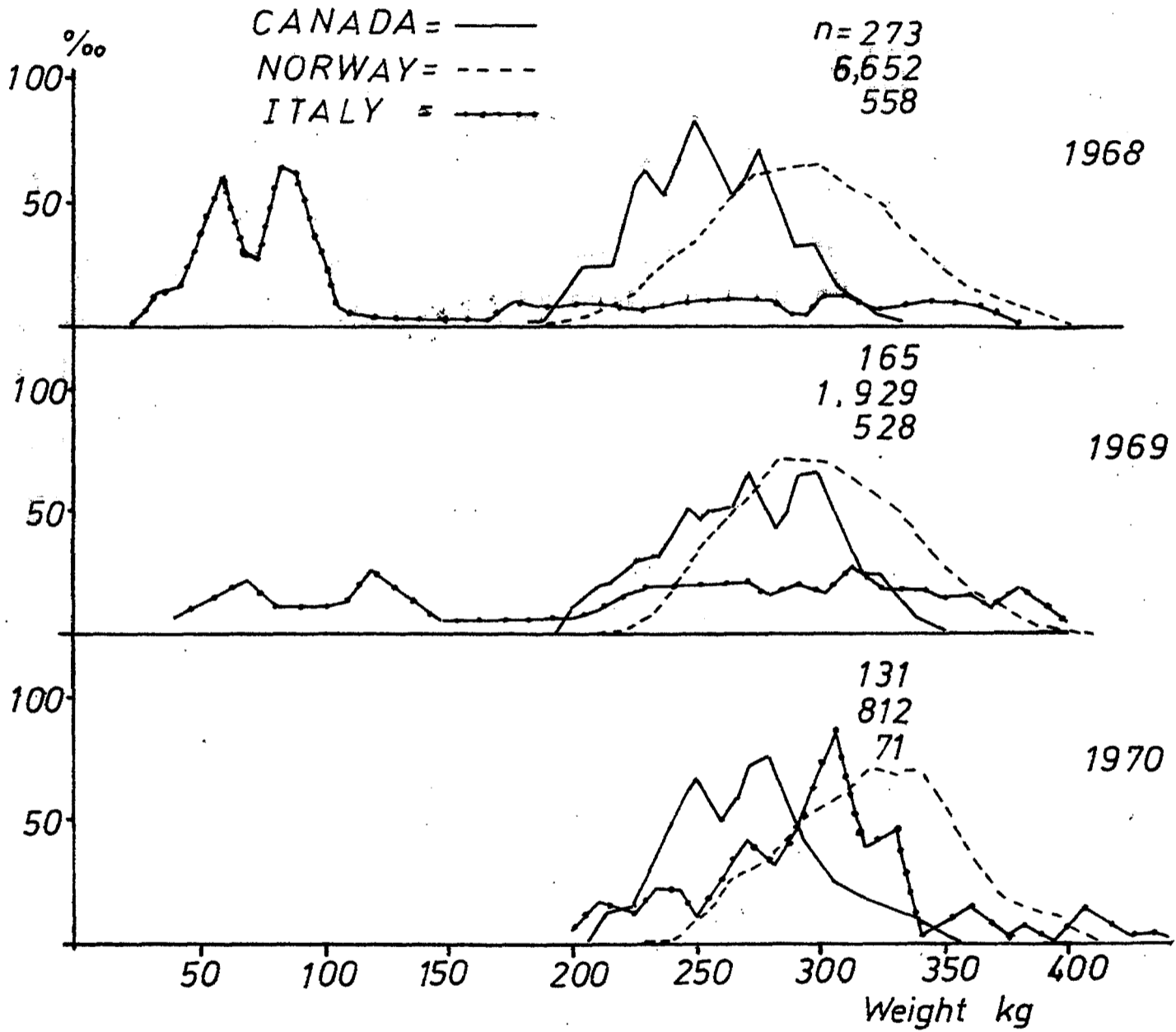


Figure 2. Weight composition of Bluefin Tuna catches made in Canada, Norway and Italy.