

Fol. 4/7
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International Council for the
Exploration of the Sea

C.M.1977/J:3
Pelagic Fish (S) Committee

Fiskeridirektoratet
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REPORT OF THE BLUEFIN TUNA WORKING GROUP

Observations on the Size Composition of Bluefin Tuna Catches from 1976

by

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	<u>Page</u>
Introduction	1
Material	1
Results	5
References	6
Tables 1 - 18	8 - 20
Figures 1 - 2	21 - 22

- o - o - o -

Introduction

Reference is made to previous reports of the Bluefin Tuna Working Group (Statistical News Letters, Nos. 20, 36 and 38, to Cooperative Research Reports, Ser. A., No.23 and to No. 40 as well as to documents C.M.1974/J:7, C.M.1975/J:5 and C.M.1976/J:5).

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 1975 are presented.

Material

Data on the size and age composition of Bluefin tuna catches were received from the following countries: Canada (Tables 1-4), Denmark (Table 5), France (Table 6), Norway (Table 7), Spain (Tables 8-11), Turkey (Table 12) and USA (Tables 13-18).

Mrs C.D. Burnett, Dr M.J.A. Butler and Dr T.D. Iles reported that Canadian landings of Bluefin tuna in the western Atlantic in 1976 yielded 846 metric tons round weight by all methods (Table 1), an increase of 217 metric tons, or 34% over the previous year:

- a) The purse seine fishery for small fish off the New Jersey coast caught 332 metric tons, an increase of 12% over 1975 (295 metric tons).
- b) The trap fishery in St Margaret's Bay (Nova Scotia) yielded 168 metric tons of giant Bluefin, an increase of 14% over 1975 (144 metric tons); 4 metric tons were landed from a mackerel trap fishery east of Halifax, N.S.
- c) The rod and reel catch of giants increased from 193 metric tons in 1975 to 342 metric tons in 1976, a 78% increase, but this was 6% less than the peak 1974 landing (365 metric tons).

Regulations which were introduced in 1974 for the various Canadian Bluefin fisheries were continued, with minor additions and modifications, throughout the 1975 and 1976 seasons. These should be viewed within the context of ICCAT Regulations.

Weights were obtained for 1 298 of the 1 338 large Bluefin caught in Canadian waters (Table 2). Fork and flank length measurements were obtained from approximately 60% of the catch.

Monthly landings from the Prince Edward Island rod and reel fishery are presented in Table 3. The average weight of fish in the fishery increased as the season progressed from 370.1 kg in August to 435.7 kg in October; the seasonal average was 395.3 kg, as compared with 386.1 kg in 1975.

The Canadian purse seine fishery for small Bluefin operated during July and August off the New York/New Jersey coast of the United States. The size (fork length) composition of the 332 metric tons catch is presented in Table 4. The fork lengths range from 51.5 to 112.8 cm with an average length of 86.8 cm.

In 1976, 11 giant Bluefin were tagged and released from the trap fishery (mackerel) in St Margaret's Bay, Nova Scotia. A further 17 giants, caught by rod and reel, were tagged and released from the Bay of Chaleur area (Gulf of St Lawrence).

Recoveries in 1976 included:

- (1) Two Bluefin caught in the Gulf of St Lawrence, which had been tagged in St Margaret's Bay, N.S. in 1971 and 1976, respectively.

- (2) A Bluefin tagged in the Bay of Chaleur in 1975 was recaptured off North Cape, Prince Edward Island.
- (3) A Bluefin released in St Margaret's Bay in 1975 was recovered this year from the same general area.

The commercial programme to impound Bluefin in St Margaret's Bay was continued in 1976. A total of 9 impoundments were established and 292 giants were successfully fattened over a two- to three-month period for the Japanese "Sashimi" market. The impounded Bluefin were fed trash fish once or twice a day at an approximate rate of 5% body weight per day. In September, 110 fish were removed (average weight 372.2 kg), 178 in October (average weight 400.7 kg) and 4 in early November (average weight 416.6 kg). At that time, the water temperature decreased to between 6° and 7°C and the remaining 10 to 15 Bluefin died.

The otolith sampling programme for age determinations was continued this year and involved approximately 500 giant Bluefin and 191 juveniles. On the recommendation of the Standing Committee for Research and Statistics of ICCAT, an effort will be made to standardise Bluefin ageing techniques at a Workshop to be held in New York in March 1977.

Seasons and amended regulations for the 1976 East Coast Bluefin tuna fishery were announced in March by the Minister of State for Fisheries Remoe LeBlanc.

Changes to be introduced this year include a new 10-week season off Newfoundland and an additional season along the Atlantic coast of Nova Scotia.

New regulations set a minimum size limit of 300 pounds for the large tuna fishery. This limit has been imposed to provide some degree of protection for tuna of intermediate age.

At the request of the majority of fishermen, night fishing for tuna will be prohibited on the grounds of safety. In addition, tuna fishing by rod and reel will be restricted to operations from registered tuna vessels (i.e. fishing from a wharf will not be allowed). The catch limit remains the same as last year, namely two fish per boat per day.

The 1976 seasons are as follows:

- a) Prince Edward Island (Alberton to Tracadie) - 10 July to 17 September inclusive.
- b) Prince Edward Island (all other areas) - 10 August for 10 weeks.
- c) New Brunswick and Quebec - 10 August for 10 weeks.
- d) Outer Nova Scotia - 1 August for 10 weeks.
- e) Nova Scotia (Gulf portions) - 1 September for 10 weeks.
- f) Newfoundland (Atlantic coast) - 15 July for 10 weeks.
- g) Newfoundland (Gulf portion) - 1 August for 10 weeks.

Mr LeBlanc said that in future, licenses would only be transferred to bona fide fishermen. There were no plans at present to change the number of licenses issued for tuna fishing in the Gulf of St Lawrence (192).

The Minister stressed the importance of acquiring accurate data on the tuna fishery. To this end, each licensee must maintain a log descriptive of his fishing operations and catch and submit it weekly to the Fisheries and Marine Service's Statistics Branch.

Other regulations introduced as part of the 1975 tuna policy will continue in force for 1976.

These are:

- No fishing for Bluefin will be permitted in the Gulf of St Lawrence, except by rod and reel. Fishing lines may not exceed 130 lbs breaking strength, and the length of the double line is limited to 30 feet.
- All vessels engaged in taking or attempting to take Bluefin tuna must be registered with the Fisheries and Marine Service as tuna sport fishing vessels. Only persons issued operator's licenses in 1975 may register their vessels for the tuna sport fishery in 1976. Vessel registrations must be renewed each year. The fee for registration being \$20 and for an operator's license \$5 (unchanged from 1975). Licenses and registrations must be applied for between 20 March and 16 May, each year.
- Transfer of fish between tuna fishing boats will not be permitted.
- All plants handling tuna for export must be registered and meet standards established by the Fisheries Inspection Act.
- Infringement of these regulations could result in suspension of a license to participate in the Bluefin fishery.

Dr Bagge submitted the Danish data (Table 5).

Dr Aloncle explained that the French catches do not reflect the exact situation of the Bluefin tuna density in the Gulf of Gascogne.

The year has been a very hot one. The temperature of the surface waters has largely exceeded 20°C on the surface and the fishermen have complained of the excessive hydrological conditions which have disturbed the fishing conditions in the gulf.

This fishery remains very artisanal on the French Atlantic coast where catches are always made with living bait.

This activity has, however, taken a certain development on the French Mediterranean coast where the fishery is carried out with the purse seine under participation of a plane which informs the purse seine fishermen of the position of the shoals.

Mr Mycklevoll reports that the first catch of Bluefin tuna was landed on 8 July, opening the season 2-3 weeks earlier than expected - in week 28 as compared to weeks 30-31 for the last ten years.

1 619 fish, totalling 413 110 kg, were landed during the period 8 July - 28 August (weeks 28-35). A single fish was caught on 1 October. The catches were concentrated in the first three and the last three weeks, with only two fish landed during weeks 31-32.

No fishing stops or other restrictions were imposed, but periods of bad weather hampered the fishery. 80 catches were landed by 28 fishermen. The catches ranged between 1 and 110 fish. The bulk were caught on the coast of Hordaland and Sogn & Fjordane, while 2 fish were reported from Møre & Romsdal and 2 fish from Rogaland, the neighbouring districts to the north and south.

The complete Norwegian catch is included in Table 7; individual weights are lacking for 62 fish in week 29. Only giant Bluefin were caught. Individual weights (gutted and without head) varied between 130 and 400 kg, averaging 255.2 kg. This corresponds approximately to 165-520, mean 330 kg live weight. A mean weight increment of about 35 kg from week 28 to week 35 is observed.

No length measurements were recorded.

One American tuna tag was returned. The fish that was tagged at Cat Cay, Bahamas on 8 June 1969 was recaptured north of Bergen on 24 August 1976.

According to Dr Rodriguez-Roda, only two madragues were working in 1976 in southern Spain, one at Barbate and a new one at Zahara de los Atunes, 8 km from Barbate toward the Strait of Gibraltar.

This year, the catches were a little better than in 1975. The mean age of tuna for Barbate was 11.4 years at a mean length of 237.6 cm (Tables 8 and 9).

Mr Cort informed the Working Group that the Bluefin tuna fishing season 1976 in the Bay of Biscay began later than usual owing to high temperatures, which reached 24.9°C and occurred until the second half of July; the result was that the fish were not biting the bait. In August, the catches were very good, being 67.3% of the total. The season ended during the first week of October.

Another noteworthy point was the presence of fish in a state of advanced sexual maturity (Cort *et al.*, 1976); These observations took place at the end of June and the beginning of July, precisely when the temperatures were higher in the Bay. The result of the microscopic study of the ovules and oocytes of the fish appeared to confirm that these were in stage IV (prespawning).

Studies made during coming seasons may prove the possible existence of spawning grounds for certain groups of fish in the Bay of Biscay.

In Table 10 (Bard and Cort, 1976), information is given on the demographic structure of the Bluefin surface fishery in the Bay of Biscay from 1972 to 1976 for the fishing fleets of Fuenterrabia (Spain) and St Jean de Luz (France), whose catches are up to more than 95% of the total catch made in the entire Bay throughout the season.

The trends in recent years show a decrease for the c.p.u.e. in kg, but an increase for the c.p.u.e. in number of fish; this is due to the fact that boats have been seeking the small fish in recent years (Table 11).

The Turkish data in Table 12 were presented by Dr Gazi Sun.

Dr Parks of the Southeast Fisheries Center recorded that in 1976 US commercial fisheries landed 1 736 metric tons of Bluefin tuna. In addition, there was a small sport catch probably in the neighbourhood of 50 metric tons and probably consisting of ages 0, 1, 2 and 3 Bluefin.

Table 13 lists the total US commercial Bluefin catch by age (estimated by length frequency) and gear in numbers and in weight. The table indicates that the 1973 (age 0) year class, at age 3 in 1976, contributed 80% of the catch in numbers or 51% of the catch by weight. The table further indicates that the catch in numbers was distributed by 3% handgear, 97% purse seine and by weight 34% handgear, 66% purse seine.

Table 14 lists US Bluefin catches for the period 1970-76. The Table shows a general decline in catch from 1970 to 1976 with the 1976 catch 52% of the 1970 catch. Between 1970 and 1973, total catch (by weight) was distributed approximately as 9% handgear, 91% purse seine. Since 1974, the distribution has been approximately 34% handgear, 66% purse seine.

From 1970 to 1973, the annual handgear catch remained below 350 metric tons then increased to between 580-690 metric tons from 1974 to 1976. The 1976 catch was 2.9 times as large as the 1970 catch.

The annual purse seine catch gradually declined between 1970 and 1976, the reversal of this trend in 1975 and 1976 most likely caused by the presence of the strong 1973 year class.

The 1976 catch was 37% of the 1970 catch.

Table 15 lists estimated 1976 handgear catch by age and week. The table indicates that significant handgear catches occurred between weeks 28 and 38 (4 July - 18 September) with the maximum weekly catch (25% of the total handgear catch by weight) occurring in week 34. The modal age in the catch in most weeks was 13 years; there did not appear to be a shift in the age distribution of the catch as the season progressed.

Table 16 lists estimated 1976 purse seine catch by age and week. The table indicates that the purse seine season was divided into two periods. In the first period (weeks 26-30; 27 June - 24 July) age 2-3 Bluefin were caught; in the second (weeks 37, 38; 5-18 September) age 9+ fish were taken. The largest weekly catch by weight occurred in the first week.

In the first period, age 3 Bluefin dominated the catches in all weeks (90% of the total period-1 catch by weight). In the second period, age 14 fish predominated (26%). Overall, age 3 Bluefin, 1973 year class fish, comprised 77% of the purse seine catch by weight.

Tables 17 and 18 list sample length-frequency by week for the 1976 US Bluefin catch.

Results

1. The recovery of the Spanish madrague fishery which had practically ceased fishing in 1974 continued in 1976. Although only two madragues were operated, landings amounted again to 490 tons and were thus larger than in any one year since 1973.
2. The catches of the Norwegian fishery which in 1975 were the largest since 1968, declined in 1976 and amounted to only 1 619 fish with a total weight of 413 tons.
3. The overall Canadian catches were 846 tons larger than in previous years, while the US Bluefin tuna fishery yielded 1 786 metric tons less than in 1975.
4. The Spanish and French fishery in the Bay of Biscay declined sharply from 1975-1976 and yielded 856 metric tons, being half the catch of 1975 (1 696 tons). This decrease of catches is related to the abnormally high water temperature until the second half of July.
5. The Norwegian Bluefin tuna catches were of a similar size composition as in previous years (Figure 1). The slightly lower average weight of the fish is most likely related to the earlier start of the fishery during week 28 as compared to weeks 30-31 for the last 10 years. The size composition did not tally with that of the Canadian catches of giant tuna which were considerably larger. The Spanish madrague catches consisted of much smaller fish than the hand gear catches of the US in the west Atlantic (Figure 2).
6. The US and Canadian purse seine catches of juvenile fish were dominated by 3 year olds. This year class dominated the catches also in 1974 and 1975.
7. In the live bait fishery in the Bay of Biscay, the strongest year class was that of 2 year olds which was also the case in 1975. This shows that the fluctuation pattern in the strength of the recruit year classes does not tally in the eastern and western Atlantic.

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Table 1. Canadian catches of Bluefin tuna from the Atlantic Ocean, 1962-76.

Year	Landings (nominal catch in metric tons, round weight)			
	Traps ^{***}	Purse Seines	Rod & Reel [*]	Total
1962	137	-	40	177
1963	229	323	90	642
1964	318	579	99	996
1965	175	461	90	726
1966	211	-	102	313
1967	298	-	58	356
1968	253	-	180	433
1969	407	-	170	577
1970	275	1 161	151	1 587
1971	68	935	128	1 131
1972	36	202	261	499
1973	160	639	215	1 014
1974	300	103	365	768
1975	141	295	193	629
1976	172	332	342	846

* Prior to 1974 tagged and/or released fish are included in the rod and reel totals.

*** From 1962-74 the catch includes a small proportion of incidental longline catches.

Table 2. Size composition (round weight per mille by 10 kg unit) of large Bluefin tuna captured in five localities along the Canadian Atlantic coast in 1976 (% smoothed).

Size class kg	P.E.I.		Nfld.		N.B.		Quebec		N.S.		Total	
	Rod & Reel n	%	Rod & Reel n	%	Rod & Reel n	%	Rod & Reel n	%	Trap n	%	n	%
80	1	2							2	4	2	0
...	0	0										
190	0	0							0	0	1	0
200	0	0							1	2	1	0
210	0	0							0	0	0	0
220	0	0							0	0	0	0
230	0	0							2	4	2	1
240	0	0							3	7	3	2
250	0	0	0	0					5	11	5	5
260	2	3	1	167					9	20	12	8
270	2	3	2	332	0	0			8	18	12	12
280	6	9	0	0	1	6	0	0	21	46	28	16
290	7	11	0	0	1	6	1	46	5	11	14	15
300	8	12	1	167	0	0	0	0	9	20	18	16
310	16	25	0	0	0	0	0	0	16	35	32	25
320	17	26	0	0	3	18	0	0	25	55	45	34
330	22	34	0	0	7	42	1	46	22	48	52	46
340	44	68	1	167	7	42	1	46	34	75	87	57
350	38	58	0	0	11	67	1	46	18	40	68	62
360	44	68	0	0	13	79	0	0	43	95	100	65
370	32	49	1	167	10	61	2	91	27	59	72	67
380	55	85	0	0	10	67	1	46	34	75	101	73
390	47	72			15	91	1	45	39	86	102	81
400	75	115			16	97	1	45	24	53	116	81
410	40	61			16	97	5	227	22	48	83	67
420	36	55			11	67	1	45	19	42	67	57
430	34	52			16	97	3	136	23	51	76	52
440	26	40			12	73	0	0	11	24	49	41
450	30	46			2	12	0	0	6	13	38	31
460	20	31			3	18	3	136	7	15	33	25
470	13	20			3	18	1	45	7	15	24	19
480	10	15			1	6	0	0	6	13	16	14
490	7	11			1	6			6	13	14	10
500	7	11			2	12			0	0	9	7
510	5	8			1	6			1	2	7	7
520	5	8			0	0			1	2	6	3
530	1	2			0	0			0	0	1	1
540	0	0			2	12					2	0
Total	650	1 000	6	1 000	165	1 000	22	1 000	455	1 000	1 298	1 000
Mean weight (kg)	395.3		304.7		401.8		407.4		331.7			

Size class 80 kg = 80.0 - 89.9.
 Nfld. = Newfoundland.
 N.S. = Nova Scotia.

P.E.I. = Prince Edward Island.
 N.B. = New Brunswick.

Table 3. Size composition of large Bluefin caught by rod and reel off Prince Edward Island during three consecutive months of the 1976 season (number of fish and round weight per mille by 10 kg unit).

Size class (kg)	August		September		October	
	No. of fish	%	No. of fish	%	No. of fish	%
190			1	5		
200			-	-		
210			-	-		
220			-	-		
230			-	-		
240			-	-		
250			-	-		
260	1	4	1	5		
270	1	4	1	5		
280	3	11	3	14		
290	6	23	1	5		
300	7	27	1	5		
310	14	53	1	5	1	6
320	10	38	7	32	-	-
330	14	53	6	27	2	12
340	23	88	16	73	5	29
350	24	92	10	46	4	24
360	22	84	17	78	5	29
370	22	84	6	27	4	24
380	30	115	20	92	5	29
390	24	92	18	82	5	29
400	21	80	39	179	15	88
410	14	53	17	78	9	53
420	12	46	7	32	17	100
430	6	23	11	50	17	100
440	4	15	9	41	13	77
450	3	11	8	37	19	112
460	1	4	7	32	12	71
470			5	23	8	47
480			2	9	8	47
490			-	-	7	41
500			2	9	5	29
510			2	9	3	18
520					5	29
530					1	6
Total	262	1 000	218	1 000	170	1 000
Mean weight (kg)	370.1		394.2		435.7	

Size class 190 kg = 190.0 - 199.9

Table 4. Size (fish length) composition of small Bluefin taken off the US coast by Canadian purse-seine vessels in 1976.

Size class (cm)	No. of fish	%
50	23	16
55	102	72
60	4	3
65	-	-
70	28	20
75	338	240
80	116	82
85	25	18
90	196	139
95	466	331
100	104	74
105	6	4
110	1	1
Total	1 409	1 000

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

Table 5. Weight distribution of Bluefin tuna landed in Denmark in 1976. The weight group refers to gutted fish with gills (kg).

Weight group kg	n
320 - 324	1
...	
330 - 334	2
335 - 339	1
...	
345 - 349	1
...	
355 - 359	1
360 - 364	1
365 - 369	1
370 - 374	1
375 - 379	1
380 - 384	1
...	
395 - 400	2
...	
410 - 414	1
...	
430 - 434	1
...	
450 - 454	1
Total	16

All the tuna are caught by Swedish and Danish midwater trawlers in the Kattegat.

Table 6. French Bluefin tuna catches in 1976 from the Golfe de Gascogne (France) in kg.

Date	Total weight	
	Fish below 30 kg	Fish above 30 kg
3 Jun - 9 Jun	8 750	-
10 Jun - 16 Jun	34 281.5	-
17 Jun - 23 Jun	3 050	-
24 Jun - 30 Jun	2 684	-
1 Jul - 7 Jul	672.5	-
14 Jul - 21 Jul	6 485	-
22 Jul - 28 Jul	1 190	-
29 Jul - 4 Aug	1 223	-
5 Aug - 11 Aug	34 840	-
12 Aug - 18 Aug	69 725	-
19 Aug - 25 Aug	47 152	-
26 Aug - 1 Sep	30 757	-
2 Sep - 8 Sep	8 887	-
9 Sep - 15 Sep	6 056	-
16 Sep - 22 Sep	5 976	-
23 Sep - 29 Sep	2 045	-
1 Oct - 6 Oct	4 263	-
Total	268 037.0	

Table 8. Size composition in ‰ (smoothed) of Spanish madrague catches of Bluefin tuna (Thunnus thynnus L.) at Barbate in 1976.

Length group cm	‰ smoothed
170 - 174.9	1.7
175 - 179.9	3.3
180 - 184.9	1.7
185 - 189.9	1.7
190 - 194.9	3.3
195 - 199.9	3.3
200 - 204.9	18.1
205 - 209.9	39.5
210 - 214.9	47.7
215 - 219.9	60.9
220 - 224.9	85.5
225 - 229.9	93.7
230 - 234.9	88.8
235 - 239.9	95.4
240 - 244.9	95.4
245 - 249.9	90.5
250 - 254.9	82.2
255 - 259.9	60.9
260 - 264.9	49.4
265 - 269.9	41.1
270 - 274.9	21.4
275 - 279.9	6.6
280 - 284.9	3.3
285 - 289.9	3.3
290 - 294.9	1.7
N = 152	1 000

Table 9. Catch from two madragues in southern Spain (Barbate and Zahara near Barbate).

Barbate	1 680 tuna = 417 495 kg; mean weight = 248.5 kg
Zahara de los Atunes	439 tuna = 72 740 kg; mean weight = 231.4 kg
Total	2 119 tuna = 490 235 kg; mean weight = 231.4 kg

Table 10. Demographic structure of the life bait fishery on Bluefin tuna in the Golfe de Gascogne.

Year	Age group										Effort		Man days on the sea
	I	II	III	IV	V	VI	VII	VIII-X	Days on the sea				
1972	0	30 200	15 000	3 200	6 260	6 240	6 240	1 750	3 009	28 735			
1973	0	91 900	11 000	2 200	2 400	5 000	3 000	2 000	3 389	32 556			
1974	0	35 000	48 800	6 100	1 000	900	150	0	2 258	23 535			
1975	13 000	85 700	9 407	5 900	950	480	0	0	3 034	30 931			
1976	845	45 987	9 654	1 643	1 188	685	51	0	1 489	15 524			

Table 11. The catch, effort and catch per unit of effort for the Spanish and French fishery in the period 1972-1976 (Bay of Biscay).

	1972	1973	1974	1975	1976
Catch (Tm)	2 094	2 001	1 558	1 669	856
Catch (n. fish)	68 890	117 500	91 950	115 437	60 053
E (.)	28 735	32 556	23 535	30 931	15 524
C.p.u.e. (kg)	72.9	61.5	66.2	54	55.1
C.p.u.fish	2.4	3.6	3.9	3.7	3.7

⌘ (.) E = days at sea x number of men

Table 12. Catch of Thunnus thynnus (Bluefin tuna) in Istanbul area in 1976.

Weight group (kg)	n
150-154	1
...	
160-164	1
...	
170-174	1
175-179	1
180-184	1
185-189	4
190-194	2
...	
200-204	1
205-209	1
210-214	3
215-219	2
220-224	2
225-229	5
230-234	1
235-239	1
240-244	2
...	
250-254	3
255-259	1
260-264	3
265-269	2
270-274	3
275-279	2
280-284	2
285-289	1
290-294	2
295-299	3
300-305	2
...	
315-319	1
...	
330-334	1
...	
340-344	1
...	
350-354	2
...	
375-379	1
...	
385-389	1
Total	60

Table 13. Estimated 1976 US Bluefin tuna catch by age and gear.

Age	Handgear catch		Purse seine catch		Total catch			
	No.	Weight (metric tons)	No.	Weight (metric tons)	No.	%	Weight (metric tons)	%
1			*					
2			10	323	10	323	97.9	5.6
3			50	327	50	327	883.0	50.9
4							0.0	0.0
5	3	0.2			3	0.005	0.2	0.01
6	33	5.0			33	0.05	5.0	0.3
7	44	6.6			44	0.07	6.6	0.4
8	138	25.2			138	0.2	25.2	1.4
9	66	16.3	11	1.8	77	0.1	18.1	1.0
10	198	50.9	42	7.9	240	0.4	58.8	3.4
11	118	33.4	40	9.0	158	0.2	42.4	2.4
12	495	160.1	31	8.1	526	0.8	168.2	9.7
13	600	235.4	116	33.9	716	1.1	269.3	15.5
14	129	55.9	125	42.8	254	0.4	98.7	5.7
15			73	27.6	73	0.1	27.6	1.6
16+			81	34.8	81	0.1	34.8	2.0
Total	1 824		61 169		62 993			
%	2.9		97.1					
Weight		589.0		1 146.8			1 735.8	
%		33.9		66.1				

*There was a small catch (probably around 1% of the total catch by weight) of 1-year-old fish.

Table 14. US catch of Bluefin tuna by gear and % of total catch by gear, 1970-1976.

Year	Hand gear		Purse seine		Total
	Metric tons	%	Metric tons	%	Metric tons
1970	201	6.0	3 126	94.0	3 327
1971	336	10.6	2 834	89.6	3 170
1972	216	9.9	1 969	90.1	2 185
1973	190	9.9	1 735	90.1	1 925
1974	683	44.5	852	55.5	1 535
1975	694	24.4	2 029	75.6	2 845
1976	589	33.9	1 147	66.1	1 736

Table 15. Estimated catch of Bluefin tuna by age and week and by weight and number of fish, 1976 US handgear fishery.

Age Week	28 [#]	29	30	31	32	33	34	35	36	37	38	Total
1												
2												
3												
4	0.2											0.2
5	0.9	1.1	0.3							1.7	1.0	5.0
6		1.1	0.3	1.5	0.7	0.6				1.5	0.9	6.6
7		2.4	1.2	0.6	1.6	2.2	8.1		0.3	3.7	2.2	25.2
8					1.7	3.7		2.9		6.4	3.9	16.3
9	0.6	2.1	1.1	1.6	8.6		21.3	7.7	0.7	2.0	1.2	50.9
10	4.6	4.1	1.3	4.6	2.5	8.8				4.5	2.7	33.4
11	4.9	6.2	16.1	17.1	25.5	19.9	44.3	16.0	1.5	5.0	3.0	160.1
12	5.5	20.7	15.3	23.5	22.9	30.7	54.5	19.6	1.8	24.5	14.6	235.4
13	7.3	3.7	4.3	5.6	5.5	4.0	19.9	7.2	0.7	1.6	1.0	55.9
14	2.4											
15												
16+												
Total	26.4	41.4	39.9	54.5	69.0	69.9	148.1	53.4	5.0	50.9	30.5	589.0

Weight
(metric
tons)

Age Week	28	29	30	31	32	33	34	35	36	37	38	Total
1												
2												
3												
4												
5	3	11	2	11	4	4				3	9	33
6	8	8	2	4	9	13	45	17	1	9	6	44
7		13	8		9	17				17	11	138
8	3									23	14	66
9	20	8	5	7	35	31	82	30	2	6	3	198
10	11	26	5	18	9	62	137	50	5	11	7	118
11	32	5	52	56	78	84	146	54	6	11	7	495
12	11	52	44	66	61	84	45	17	1	49	27	600
13	6	8	11	14	13	9				3	2	129
14												
15												
16+												
Total	94	131	129	176	218	220	455	168	15	132	86	1 824

Number of
fish

Week 28 = 4-10 July.

Table 16. Estimated catch of Bluefin tuna by age and week and by weight and number of fish, 1976 US purse seine fishery.

<u>Weight</u> <u>(metric</u> <u>tons)</u>	Age	26	27	28	30	37	38	Total
	Week							
1		59.5	3.0	17.1	18.3			97.9
2		316.6	180.3	186.7	199.4			883.0
3								
4								
5								
6								
7								
8								
9						0.2	1.6	1.8
10						0.7	7.2	7.9
11						0.2	8.8	9.0
12						0.6	7.5	8.1
13						2.9	31.0	33.9
14						3.0	39.8	42.8
15						2.2	25.4	27.6
16+						1.2	32.8	34.8
Total		376.1	183.3	203.8	217.7	11.0	154.1	1 146.8

<u>Number</u> <u>of fish</u>	Age	26	27	28	30	37	38	Total
	Week							
1								
2		6 251	294	1 827	1 951			10 323
3		17 384	9 845	11 168	11 930			50 327
4								
5								
6								
7								
8								
9						2	9	11
10						3	39	42
11						1	39	40
12						2	29	31
13						9	107	116
14						9	116	125
15						5	68	73
16+						3	78	81
Total		23 635	10 139	12 995	13 881	34	485	61 169

Table 17. Sample length frequency, 1976 US purse seine Bluefin tuna catch (number of fish).

Length cm	Week					Total No. of fish	% smoothed
	26	27	28	37	38		
66	-	-	-				
68	1					1	1
70	2	-	4			6	3
72	6	-	2			8	10
74	29	2	9			40	26
76	49	4	11			64	36
78	28	5	7			40	28
80	11	4	4			19	15
82	5	-	4			9	7
84	2	1	1			4	3
86	-	-	1			1	4
88	2	-	17			19	19
90	12	12	49			73	57
92	45	64	59			168	118
94	86	129	65			280	184
96	123	188	30			341	193
98	73	101	11			185	132
100	23	34	5			62	56
102	5	11	-			16	17
104	2	3	-			5	4
106	-	1	-			1	2
108	-	2	-			2	1

180				1	-	1	1
185				-	1	1	1
190				-	1	1	1
195				-	1	1	1
200				1	4	5	3
205				4	3	7	5
210				3	4	7	6
215				8	6	14	7
220				3	3	6	7
225				2	10	12	8
230				4	12	16	9
235				-	3	3	6
240					11	11	6
245					9	9	7
250					10	10	6
255					5	5	4
260					6	6	3
265					1	1	2
270					2	2	1
n =	504	561	279	26	92	1 462	1 000

66 = 66-67 cm.

Table 18. Sample length frequency, 1976 US handgear Bluefin tuna catch.

Length cm	July		August		September		Total	
	n	% sm.*	n	% sm.	n	% sm.	n	% sm.
140	2	2	-	-	-	-	2	1
145	0	1	-	-	-	-	1	1
150	1	2	-	-	-	-	1	2
155	-	1	-	-	-	9	5	5
160	3	7	-	-	2	23	5	5
165	2	7	-	-	1	18	3	5
170	1	7	-	-	0	9	1	5
175	4	12	-	-	1	9	5	5
180	2	12	-	-	0	14	2	6
185	3	9	0	1	2	23	5	6
190	1	9	2	6	1	27	4	9
195	4	13	4	10	2	31	10	13
200	6	17	3	11	2	36	11	15
205	3	12	5	11	2	31	10	13
210	2	8	2	11	1	32	5	12
215	2	9	6	13	3	41	11	14
220	4	12	3	11	2	46	9	15
225	4	18	2	10	3	36	9	16
230	8	24	6	20	0	23	14	20
235	4	25	11	30	2	27	17	23
240	13	33	12	40	2	50	27	38
245	8	46	17	47	5	77	30	49
250	23	69	15	62	5	68	43	66
255	24	99	33	106	0	41	57	97
260	43	133	57	139	4	55	104	128
265	40	127	35	129	4	82	79	126
270	24	102	42	114	6	82	72	107
275	29	95	30	95	2	59	61	88
280	15	53	21	63	3	37	39	58
285	7	29	9	38	0	14	16	32
290	4	13	11	24	0	0	15	18
	286	1 000	326	1 000	55	1 000	667	1 000

*sm. = smoothed.

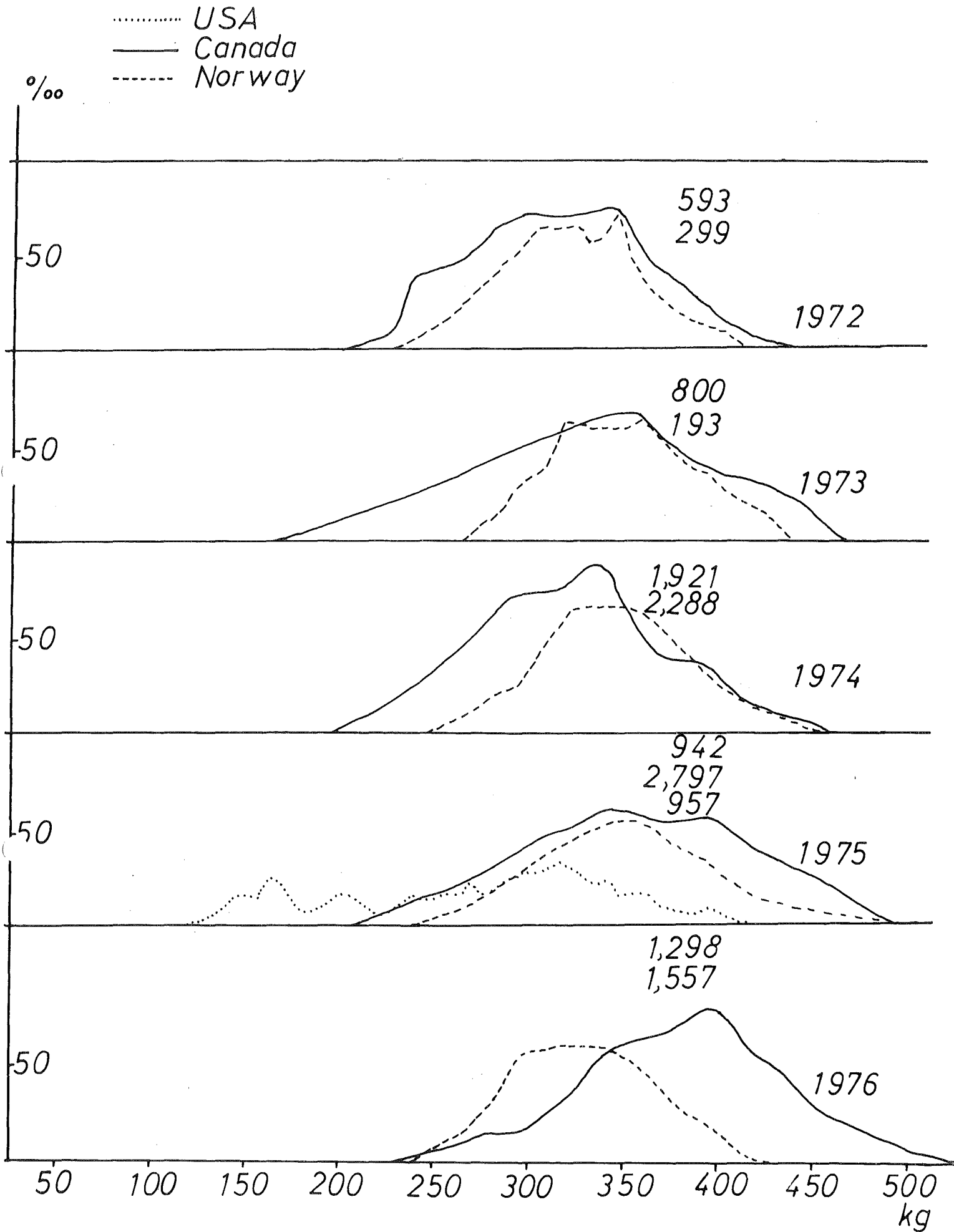


Figure 1. Weight composition of Bluefin tuna catches made in USA, Canada and Norway.

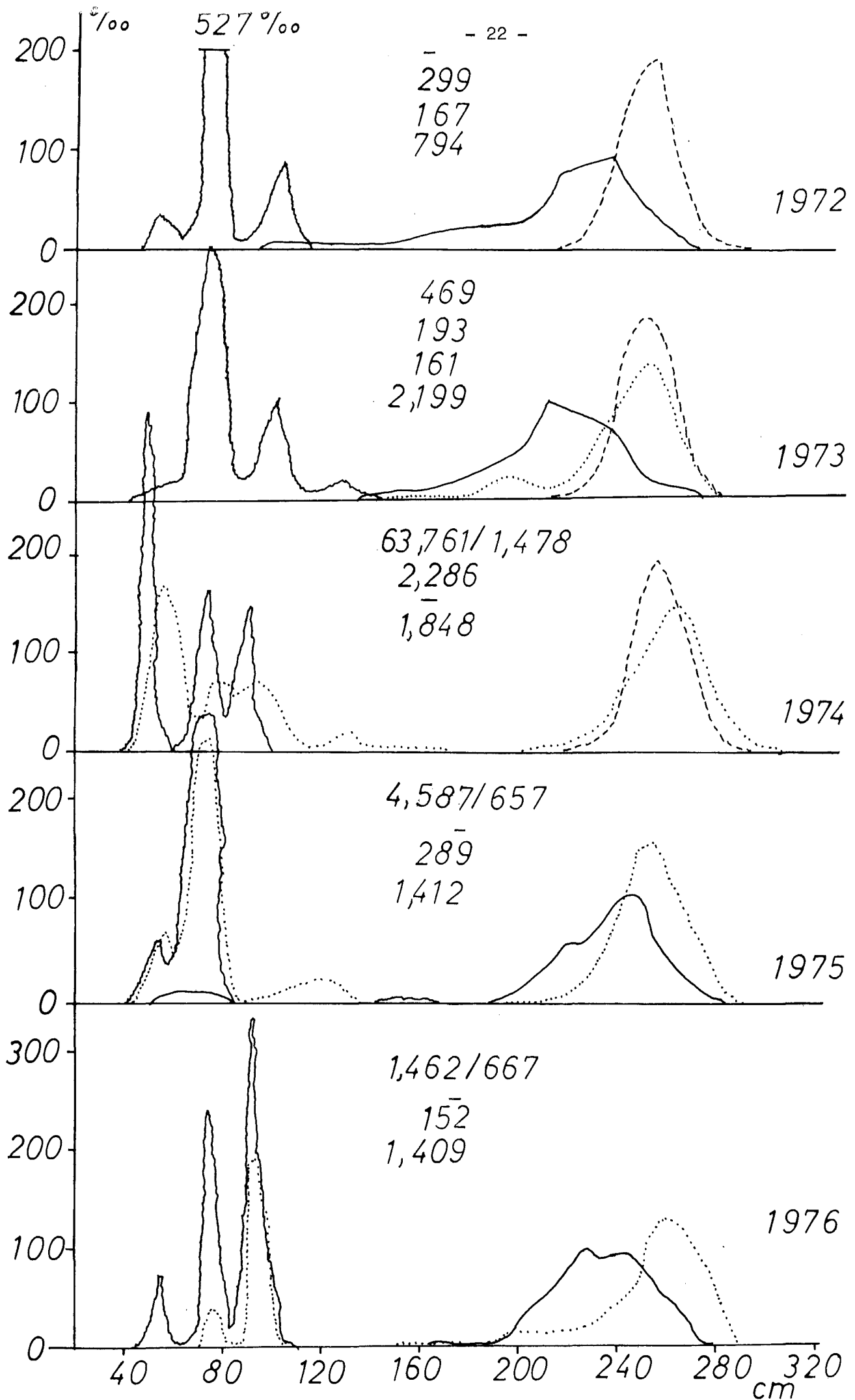


Figure 2. Size composition of Bluefin tuna catches made in USA, Norway, Spain and Canada.