

## SIZES AND SPECIES COMPOSITION OF ATLANTIC TUNA IMPORTS LANDED IN PUERTO RICO, 1984

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## SUMMARY

During 1984, 4,798 yellowfin, skipjack, bigeye, and albacore tunas were measured for length from landings of foreign-caught Atlantic tunas in Puerto Rico. These samples were summarized by capture gear, purse seine, baitboat and longline and capture area, eastern and western Atlantic. Results showed that the average size of yellowfin and bigeye tuna in baitboat and purse seine imports from the entire Atlantic was 51 cm. Average sizes of skipjack from all gears and areas remained relatively stable at 48 cm. Percentages of undersized yellowfin and bigeye tunas present in 1984 imports were higher for all gears and areas than comparable percentages in 1983. However, since the tonnage of yellowfin and bigeye tunas imported in 1984 decreased, the actual numbers of undersized yellowfin and bigeye tunas in the landings were approximately 6 percent less than in the 1983 landings.

## RESUME

En 1984, 4.798 albacores, listaos, thons obèses et germons ont été mesurés pour obtenir leur taille à partir des débarquements étrangers de thonidés de l'Atlantique effectués à Puerto Rico. Ces échantillons ont été classifiés par prises engin, senneurs, canneurs et palangriers et par zone de pêche, Atlantique est et ouest. Les résultats montrent que la taille moyenne d'albacore et de thon obèse des importations de canneurs et de senneurs de l'Atlantique entier était de 51 cm. Les tailles moyennes de listao pour tous engins et zones restent relativement stables à 48 cm. Les pourcentages d'albacore et de thon obèse hors taille montrent que les importations de 1984 sont plus importantes pour tous les engins et les zones par rapport aux pourcentages de 1983. Néanmoins, étant donné que le tonnage d'albacore et de thon obèse importé en 1984 a baissé, le nombre actuel d'albacore et de thon obèse des débarquements représente environ 6% de moins que les débarquements de 1983.

## RESUMEN

En Puerto Rico, durante 1984, se midieron a efectos de talla, 4.798 ejemplares de rabil, listado, patudo y atún blanco de desembarques de tónidos atlánticos procedentes de capturas extranjeras, para conocer su talla. Estas muestras se resumen por artes, cerco, cebo y palangre y zona de captura, Atlántico Este y Oeste. Los resultados demostraron que la talla media del rabil y patudo capturado con cebo y cerco, importado del total del Atlántico, era de 51 cm. El promedio de tallas del listado para todas las artes y zonas permaneció relativamente estable en 48 cm. Los porcentajes de rabil y patudo con talla inferior a la reglamentada, en las importaciones de 1984, fueron más altos para todos los artes y áreas que los porcentajes comparables en 1983. Sin embargo, dado que el tonelaje de rabil y patudo importado descendió en 1984, el número real de ejemplares de rabil y patudo con talla inferior a la reglamentada en los desembarques supuso aproximadamente el 6% menos que en los desembarques de 1983.

## INTRODUCTION

Landings of foreign-caught Atlantic tunas transshipped to Puerto Rico have been routinely sampled since 1974 by the Southwest Fisheries Center (SWFC) of the National Marine Fisheries Service. The purpose of the sampling has been to monitor the sizes of various tunas imported to the United States and to document changes that might be related to fishery activities, particularly with respect to minimum size regulations for yellowfin and bigeye tunas. The methods used to collect samples have been previously described (Herrick 1982, Sakagawa, Coan and Holzapfel 1976).

Mayaguez and Ponce were the major ports in Puerto Rico where Atlantic tunas were landed for canning purposes. During the period 1970 to 1984 an average of 86,227 mt per year, or 26 % of the total Atlantic catch was unloaded at these ports (Table 1). In 1984 a total of 87,143 mt of Atlantic tunas or 26 % of the 1984 total catch was unloaded. These landings were primarily yellowfin, skipjack and albacore but limited quantities of blackfin, little tunny, and frigate and bullet mackerels (*Auxis* sp.) were also landed. Bigeye and yellowfin tunas were usually landed as yellowfin since the same price was paid for both tuna species.

## 1984 SAMPLING RESULTS

A total of 4,798 fish from 1984 imports of Atlantic tunas were measured for size composition in Puerto Rico: 2,484 yellowfin, 1,304 skipjack, 810 bigeye and 200 albacore. This represented a sampling coverage of approximately 11 % of the total import landings. Samples were from catches in the eastern and western Atlantic with longline, baitboat and purse seine gears.

### Yellowfin Tuna

A total of 5,912 mt of Atlantic yellowfin and bigeye tunas were imported in 1984 and unloaded together as "yellowfin." Forty-nine species composition samples were taken to determine the mixture of species in these landings. Results indicated that 59.2% (by weight) of the landings were yellowfin tuna, 36.1% bigeye tuna and 4.7% other tuna species. Applying these percentages to the total yellowfin landings yielded 3,500 mt of yellowfin, 2,134 mt of bigeye and 278 mt other species.

Sizes of eastern Atlantic yellowfin tuna sampled from purse seine landings ranged from 31 to 87 cm in fork length. The

average length was 47 cm, the smallest average size observed since 1979. The percentage of fish less than 55 cm (undersized fish) in fork length was 89%, the highest since 1979 (Table 2, Figure 1A).

Sizes of eastern Atlantic yellowfin tuna in baitboat landings ranged from 32 to 117 cm in fork length. The average length was 55 cm, approximately 10 to 13 cm smaller than average sizes in 1982 and 1983. The percentage of undersize fish was 55%, approximately 30% higher than percentages recorded in 1982 and 1983 (Table 2, Figure 1B).

Sizes of yellowfin tuna in purse seine landings from the western Atlantic (mainly from the Caribbean Sea) ranged from 38 to 138 cm in fork length. The average length was 78 cm, 14 cm smaller than the average recorded in 1983. The percentage of undersized fish was 26%, 17% higher than the 1983 percentage (Table 2, Figure 2A).

Sizes of yellowfin tuna in baitboat landings from the western Atlantic (mainly from areas off Brazil) ranged from 51 to 88 cm fork length. The average size was 62 cm. In general, sizes of yellowfin tuna in this fishery were smaller than in 1980 to 1983. The percentage of undersized fish was only 1% (Table 2, Figure 2B).

### Skipjack Tuna

A total of 40,770 mt of Atlantic-caught skipjack tuna were landed in Puerto Rico in 1984. Approximately 14% of these landings were sampled for size composition.

Average sizes of skipjack tuna caught by purse seiners and baitboats in the eastern Atlantic were 46 and 45 cm fork length respectively (Table 3, Figure 3). These average sizes were very similar to those recorded for past years.

Average sizes of purse seine and baitboat caught skipjack tuna from the western Atlantic were 53 and 56 cm respectively (Table 3, Figure 4). Purse seine imports were mainly from the Caribbean Sea and baitboat imports from areas off Brazil.

### Bigeye Tuna

As noted above, bigeye tuna was not recorded separate from yellowfin tuna in landing records. Species composition samples indicated that 2,134 mt of bigeye tuna were landed in 1984. Composition samples were taken from 3% of these landings.

Sizes of bigeye tuna in purse seine landings from the eastern Atlantic ranged from 36 to 83 cm fork length, with an

average of 51 cm. In general, the sizes of fish in the 1984 imports were smaller than those in 1982 or 1983. The percentage of undersize bigeye tuna was 72%, 17% higher than the percentage recorded in 1983 (Table 4, Figure 5A).

Sizes of bigeye tuna in baitboat landings from the eastern Atlantic ranged from 36 to 70 cm. Average fork length of these fish was 52 cm, 11 cm less than average sizes of fish measured in 1983. The percentage of undersized bigeye tuna was 64%, 31% higher than the percentage recorded in 1983 (Table 4, Figure 5B).

#### Albacore Tuna

A total of 40,461 mt of Atlantic-caught albacore were imported in 1984. Size samples were taken from only 638 mt.

Three size-frequency samples of albacore from longline imports and one sample from baitboat imports from the southern Atlantic were taken in 1984. Average size of fish in the longline imports was 82 cm and in baitboat imports 93 cm (Table 5, Figure 6).

#### DISCUSSION

The amount of Atlantic yellowfin, bigeye and skipjack tunas imported by the U.S. in 1984 decreased 44%, 16% and 15% respectively from levels in 1983 (Foster and Holzapfel, 1984). Only albacore imports increased 30% over 1983 levels. Changes in U.S. consumption patterns and production strategy was believed to have affected tuna import levels in 1984 (Herrick and Koplin, 1985).

A high percentage of the yellowfin and bigeye tuna imports continued to be of undersized fish. Landings from both the eastern and western Atlantic showed increases in percentages of undersized fish. Baitboat landings of yellowfin tuna from the eastern Atlantic showed a particularly large gain in percentage of undersized fish of 34% (Figure 7). However, since the tonnage of yellowfin and bigeye tunas imported in 1984 decreased, the actual numbers of undersized yellowfin and bigeye tunas in the landings were approximately 6% less than in 1983 landings.

Sizes of bigeye and yellowfin tunas did not seem to be representative of all sizes of fish known to be generally available and caught by the fisheries. Therefore, it is suspected that sorting of fish at the ports of landing before transshipping to Puerto Rico and other markets might have caused the high percentage of undersized fish in the import landings.

#### LITERATURE CITED

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Table 1. Import landings (metric tons) of Atlantic-caught tunas in Puerto Rico for 1970 to 1984.1

	IMPORT LANDINGS				Total Atlantic Catch
	Albacore	Skipjack	Yellowfin and Bigeye <sup>2</sup>	Total Imports	
1970	34,322	7,980	5,414	47,706	228,781
1971	26,258	13,709	9,832	49,799	280,163
1972	48,249	41,758	23,736	113,770	296,277
1973	45,654	32,934	20,106	98,694	302,369
1974	25,627	49,315	17,349	92,291	357,332
1975	22,815	32,087	12,286	67,188	302,023
1976	17,159	33,153	10,816	61,128	318,148
1977	34,072	39,428	7,290	80,790	366,791
1978	43,157	53,204	9,363	105,724	358,234
1979	34,913	46,586	7,070	88,569	330,136
1980	27,146	45,566	8,377	81,089	354,708
1981	32,477	68,738	22,519	123,704	399,158
1982	37,015	60,360	11,037	108,414	446,788
1983	29,994	47,507	9,896	87,397	383,896
1984	40,461	40,770	5,912	87,143	338,317 <sup>3</sup>

<sup>1</sup> Tonnage is based on actual weights, not adjusted to round weight. Large fish and particularly albacore are frequently landed gilled and gutted.  
<sup>2</sup> Bigeye and yellowfin tuna are recorded together in landing weights.  
<sup>3</sup> Preliminary.

Table 2. Summary of imported Atlantic yellowfin tuna sampling results for 1978 to 1984.

	1978	1979	1980	1981	1982	1983	1984
Average Length (cm)							
Purse seine, E. Atl.	65	45	52	54	53	50	47
Purse seine, W. Atl.	-	-	48	58	-	92	78
Baitboat, E. Atl.	54	50	55	47	65	68	55
Baitboat, W. Atl.	-	-	96	98	66	88	62
Average (weighted by tonnage sampled)	57	48	52	53	54	592	51
Size Range (cm)							
Purse seine, E. Atl.	35-142	34-49	36-174	34-167	34-178	33-180	31-87
Purse seine, W. Atl.	-	-	27-89	37-138	-	44-163	38-138
Baitboat, E. Atl.	35-147	33-130	35-135	33-133	35-127	40-144	32-117
Baitboat, W. Atl.	-	-	51-126	62-132	36-98	65-142	51-88
Overall range	35-147	33-130	27-174	33-167	34-178	33-180	31-117
Number sampled							
Purse seine, E. Atl.	455	41	927	1865	3102	1857	549
Purse seine, W. Atl.	-	-	100	199	-	501	-378
Baitboat, E. Atl.	2932	4330	2671	1687	1563	1780	1563
Baitboat, W. Atl.	-	-	41	167	677	465	374
Total	3387	4371	3739	3918	5342	4603	2484
Tonnage sampled (mt)							
Purse seine, E. Atl.	1781	223	1597	3343	2485	690	162
Purse seine, W. Atl.	-	-	173	186	-	(NA) <sup>2</sup>	(NA) <sup>2</sup>
Baitboat, E. Atl.	1665	1182	308	492	85	319	137
Baitboat, W. Atl.	-	-	14	105	226	121	20
Total	3446	1405	2092	4126	2797	1130	319
Percentage less than 55 cm, by number							
Purse seine, E. Atl.	30	100	72	78	71	81	89
Purse seine, W. Atl.	-	-	88	37	-	9	26
Baitboat, E. Atl.	61	73	53	92	27	21	55
Baitboat, W. Atl.	-	-	2	0	7	0	1
Average (weighted by tonnage sampled)	51	77	72	79	68	552	69

<sup>1</sup> Data from catches made with unknown gear types were excluded. When the number of samples for a specific gear/area stratum was very low, these data were also excluded.  
<sup>2</sup> Tonnage sampled for western Atlantic purse seine catches in 1983 and 1984 was not available; therefore, data for the western Atlantic purse seine catches were excluded from the weighted average.

Table 3. Summary of imported Atlantic skipjack tuna sampling results for 1978 to 1984<sup>1</sup>.

	1978	1979	1980	1981	1982	1983	1984
Average Fork Length (cm)							
Purse seine, E. Atl.	46	47	47	47	47	47	46
Purse seine, W. Atl.	-	-	-	59	-	55	53
Baitboat, E. Atl.	44	46	45	45	43	44	45
Baitboat, W. Atl.	-	-	59	59	57	54	56
Average (weighted by tonnage sampled)	45	46	48	49	48	48.2	48
Size Range (cm)							
Purse seine, E. Atl.	34-70	34-68	32-69	36-70	33-63	32-62	36-65
Purse seine, W. Atl.	-	-	-	43-81	-	35-80	39-81
Baitboat, E. Atl.	30-64	35-66	33-73	35-76	35-61	35-57	36-58
Baitboat, W. Atl.	-	-	47-75	43-82	41-73	39-73	45-72
Overall range	30-70	34-68	32-75	35-82	33-73	32-80	36-72
Number Sampled							
Purse seine, E. Atl.	1220	861	85	953	854	607	202
Purse seine, W. Atl.	-	-	-	100	-	455	450
Baitboat, E. Atl.	1569	1469	1119	551	660	453	670
Baitboat, W. Atl.	-	-	250	296	606	509	432
Total	2789	2330	2226	1900	2120	2022	1304
Tonnage Sampled (mt)							
Purse seine, E. Atl.	8160	5517	5512	8748	4862	3956	2913
Purse seine, W. Atl.	-	-	-	672	-	(NA) <sup>2</sup>	(NA) <sup>2</sup>
Baitboat, E. Atl.	6220	3455	2181	2971	353	526	1353
Baitboat, W. Atl.	-	-	2167	2294	1597	1370	1351
Total	14380	8972	9860	14685	6812	5852	5617

<sup>1</sup> Data from catches made with unknown gear types were excluded. When the number of samples for a specific gear/area stratum was very low, these data were also excluded.

<sup>2</sup> Tonnage sampled for western Atlantic purse seine catches in 1983 and 1984 was not available; therefore, data for the western Atlantic purse seine catches were excluded from the weighted average.

Table 4. Summary of imported Atlantic bigeye tuna sampling results for 1978 to 1984<sup>1</sup>.

	1978	1979	1980	1981	1982	1983	1984
Average length (cm)							
Purse seine, E. Atl.	60	-	49	49	59	55	51
Baitboat, E. Atl.	52	52	57	66	56	63	52
Average (weighted by tonnage sampled)	54	52	51	59	59	55	51
Size range (cm)							
Purse seine, E. Atl.	42-120	-	39-88	32-68	39-184	38-189	36-83
Baitboat, E. Atl.	35-160	36-112	37-95	39-107	43-83	43-92	36-70
Overall range	35-160	36-112	37-95	32-107	39-184	38-189	36-83
Number sampled							
Purse seine, E. Atl.	173	-	241	259	753	731	369
Baitboat, E. Atl.	1943	2163	1029	321	234	69	441
Total	2122	2163	1270	580	987	800	810
Tonnage sampled (mt)							
Purse seine, E. Atl.	493	-	236	255	735	341	214
Baitboat, E. Atl.	747	489	167	98	10	1	89
Total	1240	489	403	353	745	342	303
Percentage less than 55 cm, by number							
Purse seine, E. Atl.	26	-	81	90	56	55	72
Baitboat, E. Atl.	72	76	59	30	48	33	64
Average (weighted by tonnage sampled)	58	76	75	83	56	55	70

<sup>1</sup> Data from catches made with unknown gear types were excluded. When the number of samples for a specific gear/area stratum was very low, these data were also excluded.

Table 5. Summary of imported Atlantic albacore tuna sampling results for 1978 to 1984<sup>1</sup>.

	1978	1979	1980	1981	1982	1983	1984
Average length (cm)							
Longline, S. Atl.	86	92	94	-	81	86	82
Baitboat, S. Atl.	-	-	-	-	-	-	93
Average (weighted by tonnage sampled)	86	92	94	-	81	86	82
Size range (cm)							
Longline, S. Atl.	62-114	60-114	57-113	-	60-100	54-111	55-110
Baitboat, S. Atl.	-	-	-	-	-	-	84-107
Overall range	62-114	60-114	57-113	-	60-100	54-111	55-110
Number sampled							
Longline, S. Atl.	350	220	509	-	100	250	150
Baitboat, S. Atl.	-	-	-	-	-	-	50
Total	350	220	509	-	100	250	200
Tonnage sampled (mt)							
Longline, S. Atl.	1682	1124	2660	-	536	1463	633
Baitboat, S. Atl.	-	-	-	-	-	-	5
Total	1682	1124	2660	-	536	1463	638

<sup>1</sup> Data from catches made with unknown gear types were excluded. When the number of samples for a specific gear/area stratum was very low, these data were also excluded.

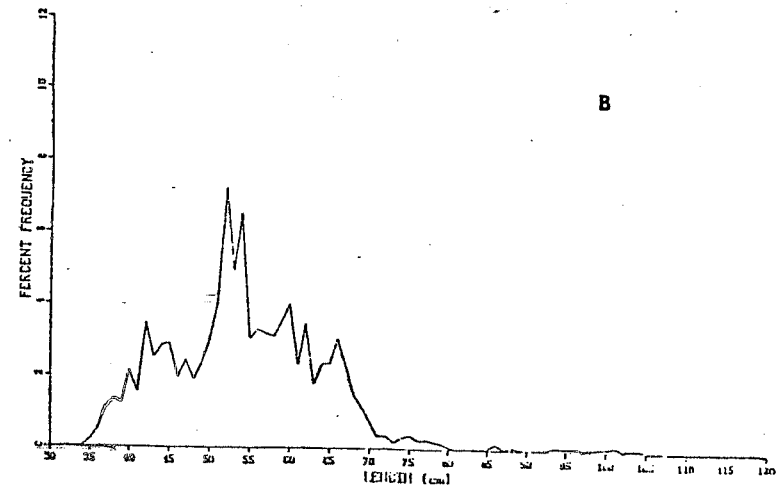
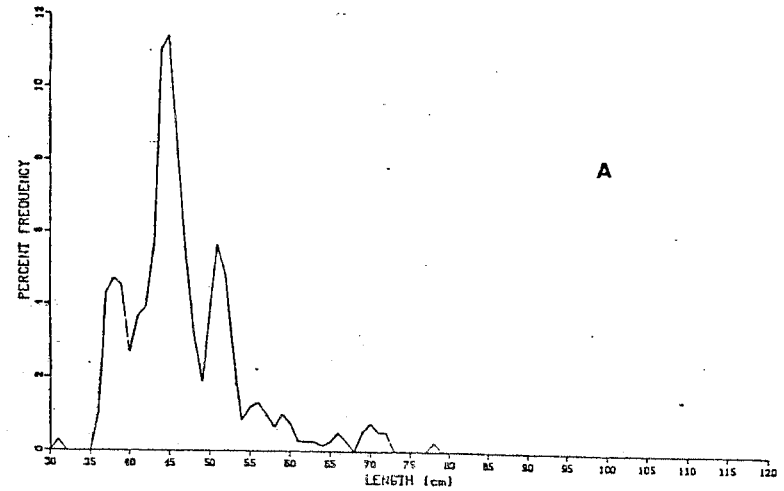


Figure 1. Estimated length composition of eastern Atlantic yellowfin tuna imports from (A) purse seine catches, and (B) baitboat catches.

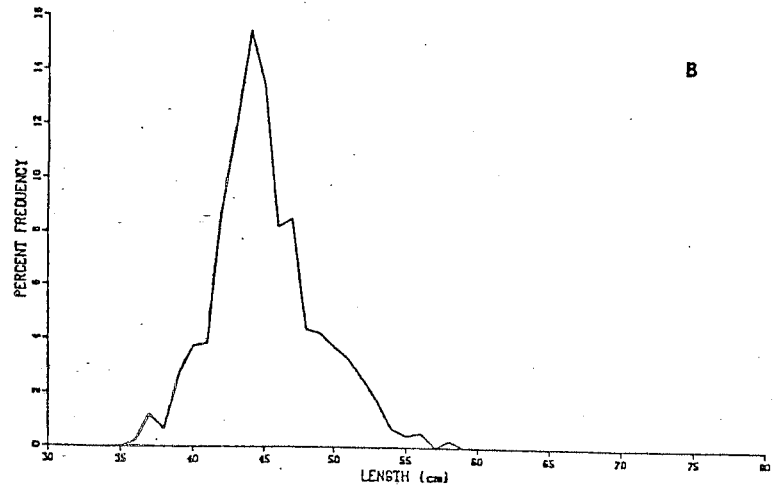
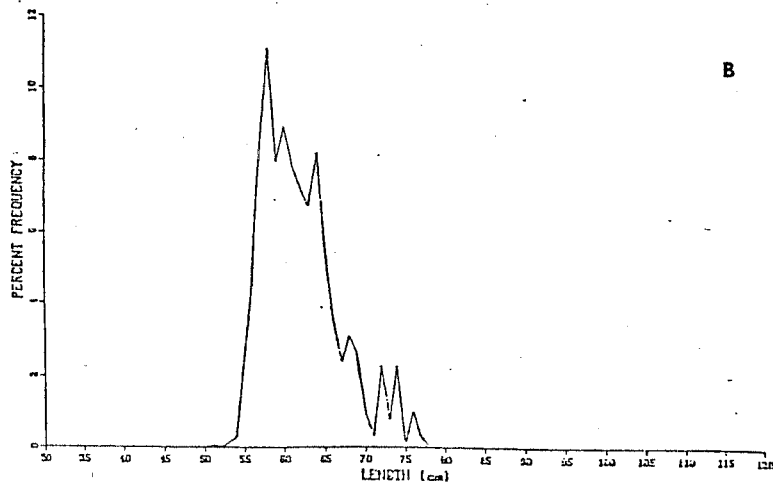
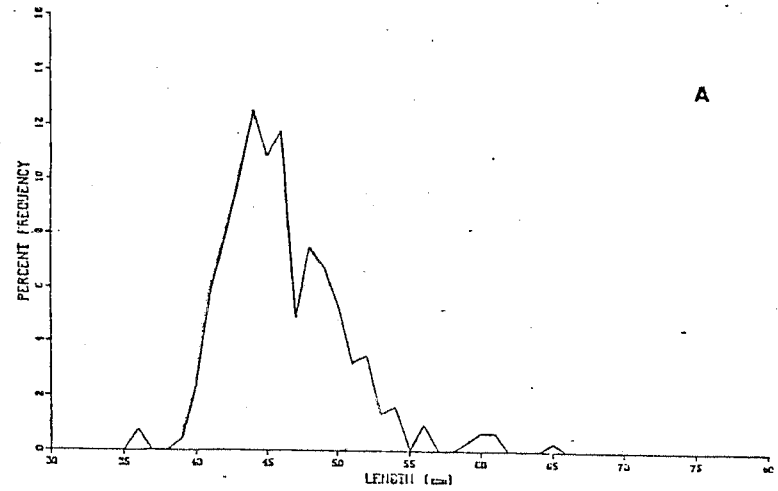
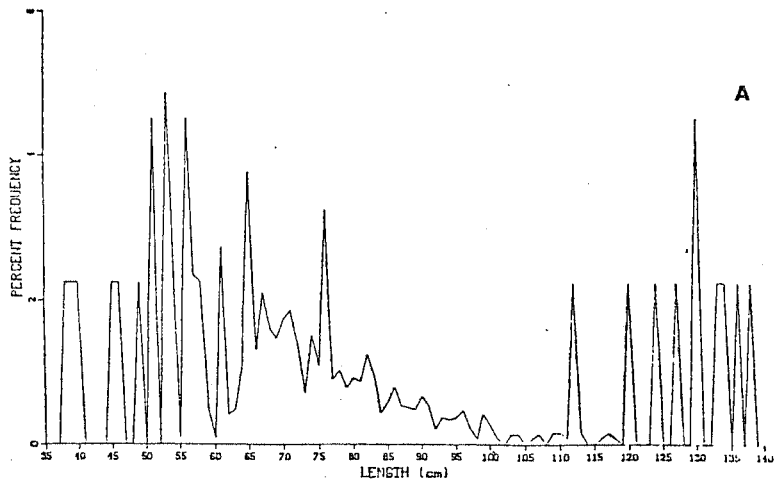


Figure 2. Estimated length composition of western Atlantic yellowfin tuna imports: from (A) purse seine catches, and (B) baitboat catches.

Figure 3. Estimated length composition of eastern Atlantic skipjack tuna imports: from (A) purse seine catches, and (B) baitboat catches.

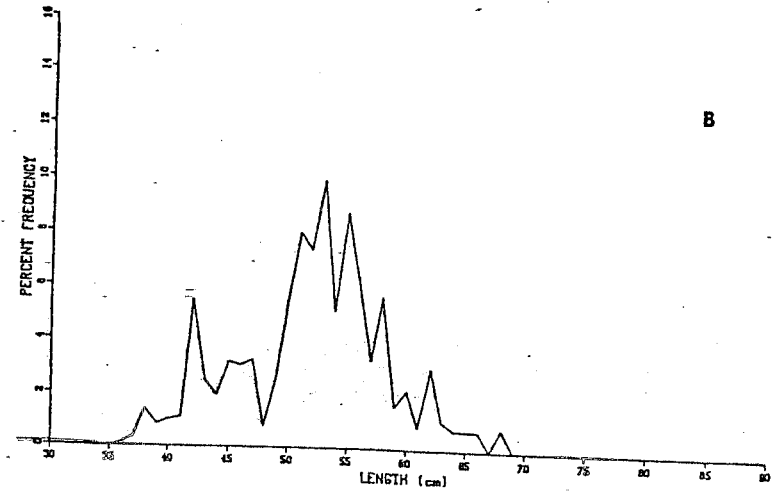
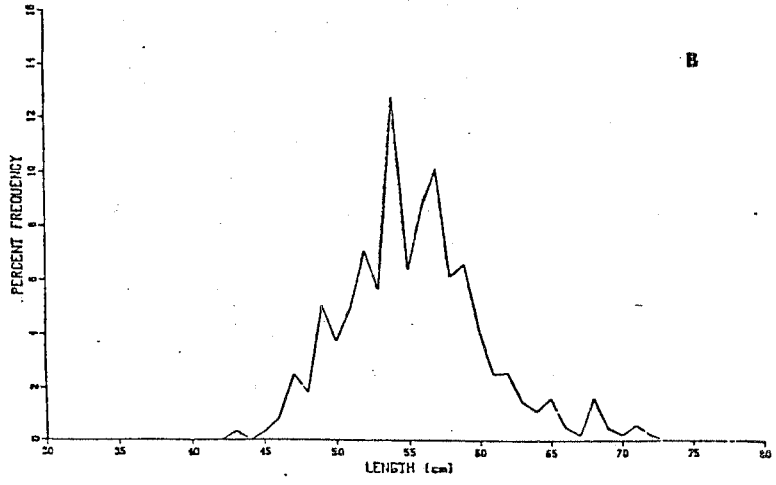
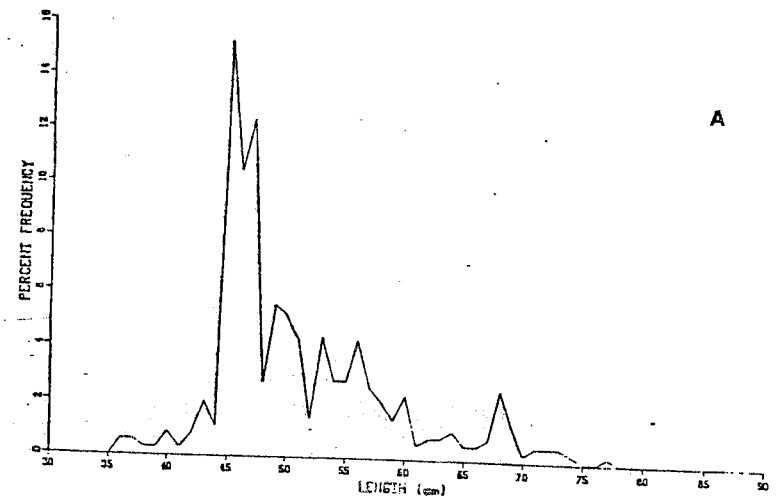
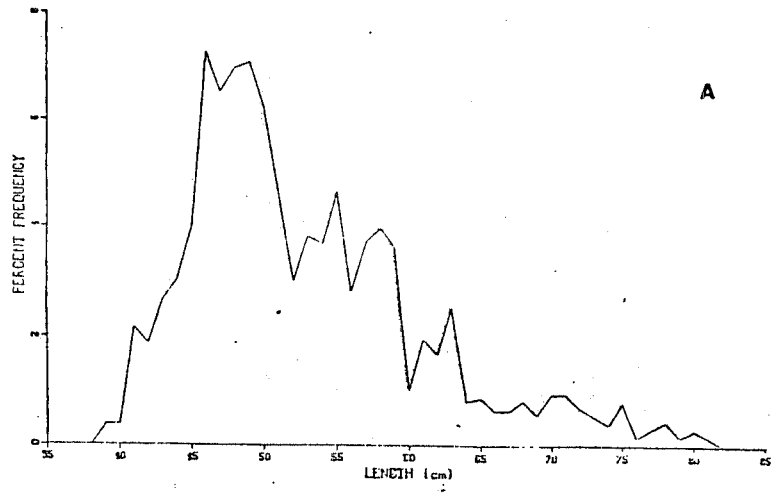


Figure 4. Estimated length composition of western Atlantic skipjack tuna imports from (A) purse seine catches, and (B) baitboat catches.

Figure 5. Estimated length composition of eastern Atlantic bigeye tuna imports from (A) purse seine catches, and (B) baitboat catches.

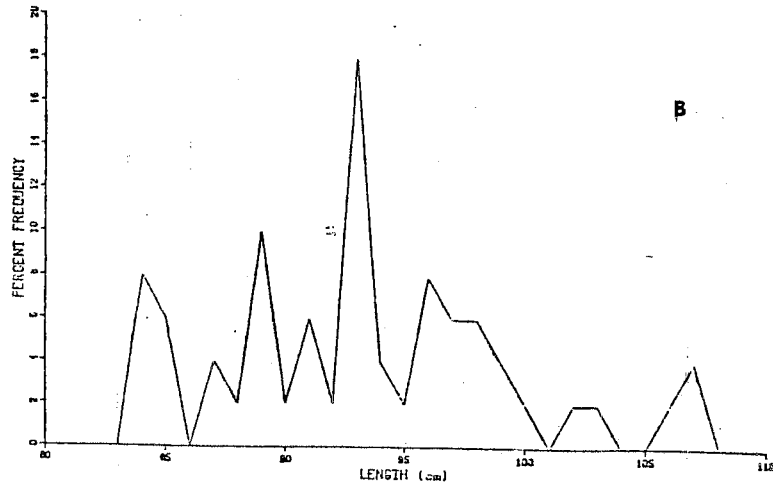
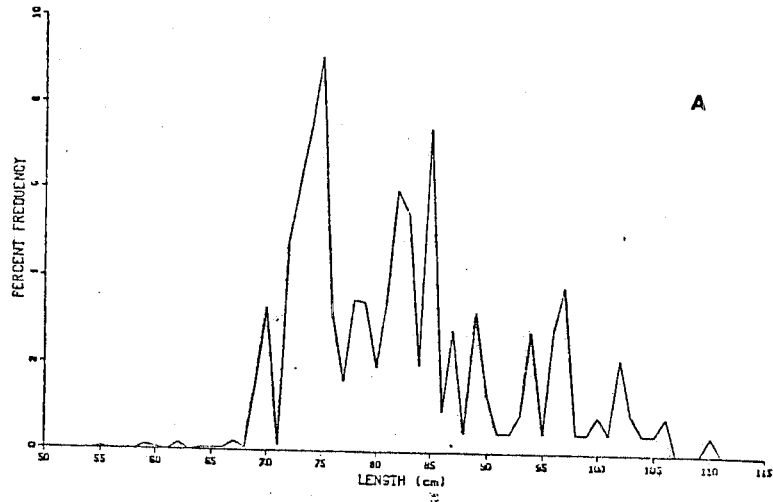


Figure 6. Estimated length composition of southern Atlantic albacore from (A) longline catches, and (B) baitboat catches.

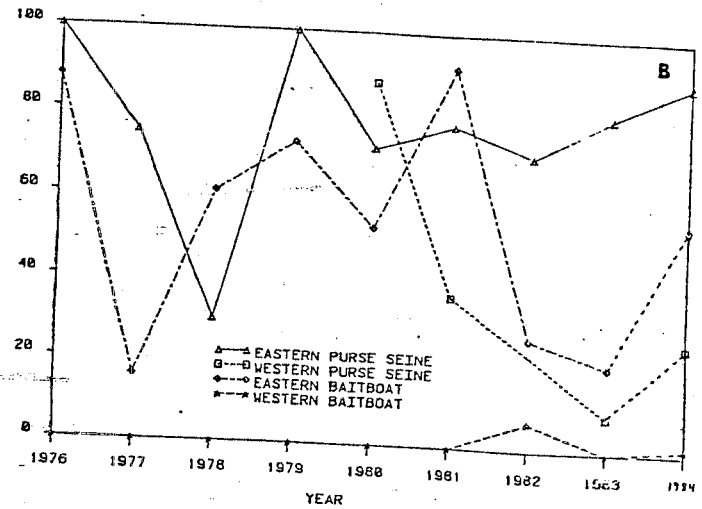
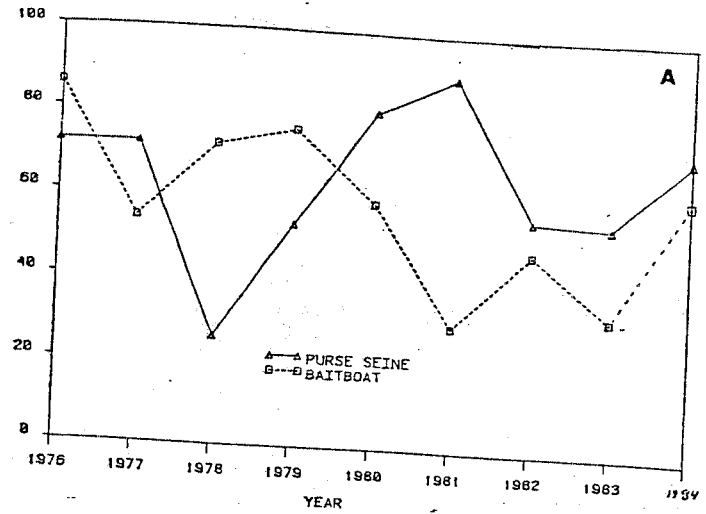


Figure 7. Percentage (by number) of fish less than 55 cm, by gear, for (A) eastern Atlantic bigeye tuna imports and (B) eastern and western Atlantic yellowfin tuna imports.