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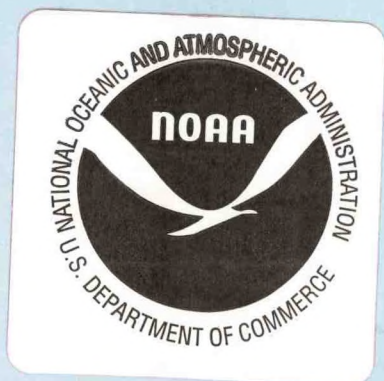
SIZE AND SPECIES COMPOSITIONS  
OF ATLANTIC TUNAS FROM IMPORTS  
LANDED IN PUERTO RICO DURING 1983

BY

TOD C. FOSTER AND  
EUGENE P. HOLZAPFEL

ADMINISTRATIVE REPORT LJ-84-25

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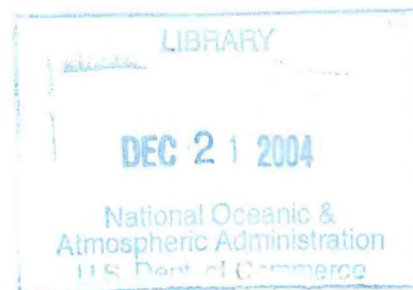


Size and Species Compositions of Atlantic Tunas  
from Imports Landed in Puerto Rico during 1983

Tod C. Foster and Eugene P. Holzapfel

Southwest Fisheries Center  
National Marine Fisheries Service, NOAA  
La Jolla, California 92038

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SUMMARY

United States imports of foreign-caught Atlantic tunas transshipped to Puerto Rico are sampled for size and species composition by personnel of the Southwest Fisheries Center, under a program that began in 1974. Fork length measurements were made on a total of 9,702 fish in 1983: 5,844 yellowfin tuna, 2,173 skipjack tuna, 999 bigeye tuna, 418 albacore tuna, 218 blackfin tuna, and 50 bullet tuna (*Auxis* sp.). Length-frequency information derived from these measurements is presented for the first four of these species. The International Commission for the Conservation of Atlantic Tunas' minimum size regulation for yellowfin and bigeye tuna is 55 cm fork length. Sampling of imports to Puerto Rico in 1983 indicates that a large percentage of fish of these species was less than 55 cm.

## INTRODUCTION

Most of the Atlantic-caught tuna imported by the United States is transshipped to Mayaguez and Ponce, Puerto Rico. From 1970 to 1983, these imports averaged 86,162 mt annually, or 26% of the total Atlantic tuna catch. Puerto Rican imports of Atlantic tunas reached a peak of 123,704 mt in 1981, but decreased to 108,414 mt in 1982 and to 87,397 in 1983. While albacore, bigeye, skipjack, and yellowfin tunas are the primary species, limited quantities of blackfin, little tunny, and bullet tuna (*Auxis* sp.) are also included. The bigeye and yellowfin tuna species are not separated during unloading and are normally recorded as yellowfin tuna (Table 1).

The Southwest Fisheries Center (SWFC) of the National Marine Fisheries Service established a monitoring program in Puerto Rico in 1974 for length and species composition of imported tunas. This paper presents results obtained from the program in 1983. Procedures used in this sampling program, and the methods for estimating length and species compositions for the total import landings from the samples, have previously been described (Herrick 1982, Sakagawa, Coan, and Holzapfel 1976).

Minimum size regulations (3.2 kg or 55 cm fork length, with a 15% undersize allowance per catcher vessel per landing), were adopted for yellowfin and bigeye tunas (in 1973 and 1979, respectively) by the International Commission for the Conservation of Atlantic Tunas (ICCAT). In this regard, the size and species composition sampling results obtained in Puerto Rico are representative of Atlantic-caught tunas that are exported to the United States<sup>1</sup>, and are not necessarily representative of the actual size and species compositions of catches at their original port of landing. Therefore, the Puerto Rican import sampling program is not specifically designed nor intended to monitor the effectiveness of these size regulations.

<sup>1</sup> Given limited sampling resources in Puerto Rico, priority size and species composition sampling coverage is given to surface-caught yellowfin/bigeye and skipjack tuna imports.



## RESULTS OF THE 1983 PUERTO RICO SAMPLING PROGRAM

During 1983, 174 length-frequency samples (82 yellowfin, 43 skipjack, 33 bigeye, 9 albacore, 6 blackfin, and 1 bullet tuna) were taken from transshipments of Atlantic tunas to Puerto Rico. Most of the samples were from the eastern Atlantic, with the remainder from the western Atlantic. 20,426 mt of shipments were sampled, or 23% of the total tonnage of U.S. Atlantic tuna imports. Fork length measurements were made on 9,702 fish: 5,844 yellowfin tuna, 2,173 skipjack tuna, 999 bigeye, 418 albacore, 218 blackfin, and 50 bullet tuna (Tables 2-5).

Because yellowfin and bigeye tuna are unloaded together as "yellowfin" (or, occasionally, as "bigeye" when that species predominates), it is necessary to sample these transshipments to determine their species composition. In 1983, 74 species composition samples of 100 fish each indicated that 73.6% by weight of these samples were yellowfin tuna, and 26.1% were bigeye tuna. Applying this result to the total of 9,896 mt of mixed yellowfin/bigeye tuna imports (Table 1) yields corrected totals of 7,283 mt and 2,583 mt for yellowfin and bigeye tunas, respectively. In addition, the species composition sampling indicates that 0.3% or 30 mt of skipjack tuna, bullet tuna (Auxis sp.), and blackfin tuna were included in these mixed shipments.

### Yellowfin tuna

Purse-seine-caught yellowfin tuna imported from the eastern Atlantic in 1983 ranged in size from 33 to 180 cm in fork length, although only 1% of the fish were greater than 80 cm. The large majority of the fish were between 40 and 60 cm long. The average fork length was 50 cm, which is very similar to the average fork length for catches made in 1981 and 1982 (Table 2, Figure 1A).

Baitboat-caught yellowfin tuna imported from the eastern Atlantic in 1983 ranged in size from 40 to 144 cm fork length and were more evenly distributed over their size range than purse-seine-caught yellowfin tuna. The average fork length was 68 cm, an increase of 3 cm over that recorded in 1982 (Table 2, Figure 1B).

Purse-seine-caught yellowfin from the western Atlantic (predominantly from the Caribbean Sea) ranged in size from 44 to 163 cm fork length, with an average of 92 cm. A number of year-classes of fish are available to this fishery, judging from the length composition shown in Figure 2A.

Yellowfin tuna caught by baitboats in the western Atlantic and imported into Puerto Rico in 1983 ranged from 65 to 142 cm long. The average fork length was 88 cm, an increase from the average fork length of 66 cm estimated from sampling in 1982

(Table 2, Figure 2B).

Sampling results indicated the percentage of yellowfin tuna less than 55 cm fork length was 81% for imported eastern Atlantic purse-seine-caught fish in 1983, an increase from 71% during 1982. The percentage less than 55 cm fork length for imported eastern Atlantic baitboat-caught fish decreased to 21% from 1982's 27%. None of the baitboat-caught yellowfin tuna and only 9% of the purse-seine-caught yellowfin tuna from the western Atlantic were less than 55 cm fork length (Table 2).

#### Skipjack Tuna

The average fork lengths of skipjack tuna as determined by sampling of imports to Puerto Rico have been remarkably constant since 1976. Purse-seine-caught skipjack tuna were slightly larger than baitboat-caught skipjack tuna in the eastern Atlantic, with average fork lengths of 47 and 44 cm, respectively (Table 3, Figure 3). Skipjack tuna caught by baitboats in the western Atlantic and by purse seiners in the Caribbean continue to be considerably larger than those from the eastern Atlantic, with average fork lengths of 54 and 55 cm, respectively (Table 3, Figure 4).

#### Bigeye Tuna

Samples of purse-seine-caught bigeye tuna transshipped to Puerto Rico from the eastern Atlantic in 1983 contained fish ranging from 38 to 189 cm fork length (less than 1% were greater than 83 cm), and averaging 55 cm. The percentage of fish less than 55 cm was 55%, very close to the 56% estimated from the 1982 samples (Table 4, Figure 5).

Baitboat-caught bigeye tuna transshipped to Puerto Rico from the eastern Atlantic in 1983 ranged from 43 to 92 cm fork length and were larger on the average (63 cm) than purse-seine-caught bigeye tuna; the percentage of fish less than 55 cm was estimated to be 33% in 1983, down from 48% estimated for the 1982 samples (Table 4, Figure 5).

#### Albacore Tuna

Five size frequency samples of imported southern Atlantic longline-caught albacore tuna were taken in 1983. Average fork length was 86 cm (up from 81 cm in 1982) and sizes ranged from 54 to 111 cm (Table 5, Figure 6).

## DISCUSSION

Large percentages of fish less than 55 cm fork length continue to occur in Puerto Rican imports of Atlantic yellowfin and bigeye tuna. Sampling results obtained in 1983 revealed that 62% by number of the yellowfin tuna and 55% by number of the bigeye tuna from the eastern Atlantic were less than 55 cm fork length<sup>2</sup>. The proportion of fish less than 55 cm fork length contained in the imports of yellowfin and bigeye tuna has been quite variable from 1977 to 1983 (Figure 7).

While skipjack tuna from the eastern Atlantic transshipped to Puerto Rico represent all sizes caught by the fishery, the same may not be true for the combined yellowfin/bigeye catch from either purse seiners or baitboats. Selected sizes of yellowfin and bigeye tunas may be transshipped to different countries or are canned in the country where the catcher vessel unloads its catch. The large percentage of undersize fish in the Puerto Rico sample is probably not indicative of the percentage that was actually caught by the vessels in the eastern Atlantic.

<sup>2</sup> The estimated percentages are an average of purse seine and baitboat-caught samples, weighted by the tonnage sampled.

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Herrick, Samuel F. 1982. Size and species compositions of Atlantic tunas from imports landed in Puerto Rico during 1980. Collective Vol. Sci. Pap. Inter. Comm. Conserv. Atl. Tunas, Madrid (SCRS-1981) 17(1):53-67.

Sakagawa, Gary T., A. L. Coan and E. P. Holzapfel. 1976. Length composition of yellowfin, skipjack, and bigeye tunas caught in the eastern tropical Atlantic by American purse seiners. N.O.A.A. Technical Report NMFS-702.

Table 1. Import landings (metric tons) of Atlantic-caught tunas in Puerto Rico for 1970 to 1983.<sup>1</sup>

	Albacore	Skipjack	Yellowfin/ Bigeye <sup>2</sup>	Total Imports	Total Atlantic Catch
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	412,970 <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 tuna are included with yellowfin tuna in landing weights.

<sup>3</sup> Preliminary.

Table 2. Summary of imported Atlantic yellowfin tuna sampling results for 1977 to 1983<sup>1</sup>.

	1977	1978	1979	1980	1981	1982	1983
Average Length (cm)							
Purse seine, E. Atl.	53	65	43	52	54	53	50
Purse seine, W. Atl.	-	-	-	48	58	-	92
Baitboat, E. Atl.	61	54	50	55	47	65	68
Baitboat, W. Atl.	-	-	-	96	98	66	88
Average (weighted by tonnage sampled)	60	57	48	52	53	54	59 <sup>2</sup>
Size Range (cm)							
Purse seine, E. Atl.	45-98	35-142	34-49	36-174	34-167	34-178	33-180
Purse seine, W. Atl.	-	-	-	27-89	37-138	-	44-163
Baitboat, E. Atl.	39-129	35-147	33-130	35-135	33-133	35-127	40-144
Baitboat, W. Atl.	-	-	-	51-126	62-132	36-98	65-142
Overall range	39-129	35-147	33-130	27-174	33-167	34-178	33-180
Number sampled							
Purse seine, E. Atl.	131	455	41	927	1865	3102	1857
Purse seine, W. Atl.	-	-	-	100	199	-	501
Baitboat, E. Atl.	2148	2932	4330	2671	1687	1563	1780
Baitboat, W. Atl.	-	-	-	41	167	677	465
Total	2279	3387	4371	3739	3918	5342	4603
Tonnage sampled (mt)							
Purse seine, E. Atl.	47	1781	223	1597	3343	2485	690
Purse seine, W. Atl.	-	-	-	173	186	-	(NA) <sup>2</sup>
Baitboat, E. Atl.	542	1665	1182	308	492	85	319
Baitboat, W. Atl.	-	-	-	14	105	226	121
Total	589	3446	1405	2092	4126	2797	1130
Percentage less than 55 cm, by number							
Purse seine, E. Atl.	75	30	100	72	78	71	81
Purse seine, W. Atl.	-	-	-	88	37	-	9
Baitboat, E. Atl.	16	61	73	53	92	27	21
Baitboat, W. Atl.	-	-	-	2	0	7	0
Average (weighted by tonnage sampled)	22	51	77	72	79	68	55 <sup>2</sup>

<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 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 1977 to 1983<sup>1</sup>.

	1977	1978	1979	1980	1981	1982	1983
Average Fork Length (cm)							
Purse seine, E. Atl.	48	46	47	47	47	47	47
Purse seine, W. Atl.	-	-	-	-	59	-	55
Baitboat, E. Atl.	45	44	46	45	45	43	44
Baitboat, W. Atl.	-	-	-	59	59	57	54
Average (weighted by tonnage sampled)	46	45	46	48	49	48	48 <sup>2</sup>
Size Range (cm)							
Purse seine, E. Atl.	34-69	34-70	34-68	32-69	36-70	33-63	32-62
Purse seine, W. Atl.	-	-	-	-	43-81	-	35-80
Baitboat, E. Atl.	25-68	30-64	35-66	33-73	35-76	35-61	35-57
Baitboat, W. Atl.	-	-	-	47-75	43-82	41-73	39-73
Overall range	25-69	30-70	34-68	32-75	35-82	33-73	32-80
Number Sampled							
Purse seine, E. Atl.	604	1220	861	857	953	854	607
Purse seine, W. Atl.	-	-	-	-	100	-	453
Baitboat, E. Atl.	1867	1569	1469	1119	551	660	453
Baitboat, W. Atl.	-	-	-	250	296	606	509
Total	2471	2789	2330	2226	1900	2120	2022
Tonnage Sampled (mt)							
Purse seine, E. Atl.	3004	8160	5517	5512	8748	4862	3956
Purse seine, W. Atl.	-	-	-	-	672	-	(NA) <sup>2</sup>
Baitboat, E. Atl.	4318	6220	3455	2181	2971	353	526
Baitboat, W. Atl.	-	-	-	2167	2294	1597	1370
Total	7322	14380	8972	9860	14685	6812	5852

<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 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 1977 to 1983<sup>1</sup>.

	1977	1978	1979	1980	1981	1982	1983
Average length (cm)							
Purse seine, E. Atl.	57	60	-	49	49	59	55
Baitboat, E. Atl.	57	52	52	57	66	56	63
Average (weighted by tonnage sampled)	57	54	52	51	59	59	55
Size range (cm)							
Purse seine, E. Atl.	35-112	42-120	-	39-88	32-68	39-184	38-189
Baitboat, E. Atl.	41-113	35-160	36-112	37-95	39-107	43-83	43-92
Overall range	35-113	35-160	36-112	37-95	32-107	39-184	38-189
Number sampled							
Purse seine, E. Atl.	110	173	-	241	259	753	731
Baitboat, E. Atl.	982	1943	2163	1029	321	234	69
Total	1092	2122	2163	1270	580	987	800
Tonnage sampled (mt)							
Purse seine, E. Atl.	30	493	-	236	255	735	341
Baitboat, E. Atl.	230	747	489	167	98	10	1
Total	260	1240	489	403	353	745	342
Percentage less than 55 cm, by number							
Purse seine, E. Atl.	72	26	-	81	90	56	55
Baitboat, E. Atl.	54	72	76	59	30	48	33
Average (weighted by tonnage sampled)	56	58	76	75	83	56	55

<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 1977 to 1983<sup>1</sup>.

	1977	1978	1979	1980	1981	1982	1983
Average length (cm)							
Longline, S. Atl.	85	86	92	94	-	81	86
Size range (cm)							
Longline, S. Atl.	54-111	62-114	60-114	57-113	-	60-100	54-111
Number sampled							
Longline, S. Atl.	150	350	220	509	-	100	250
Tonnage sampled (mt)							
Longline, S. Atl.	398	1682	1124	2660	-	536	1463

<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.

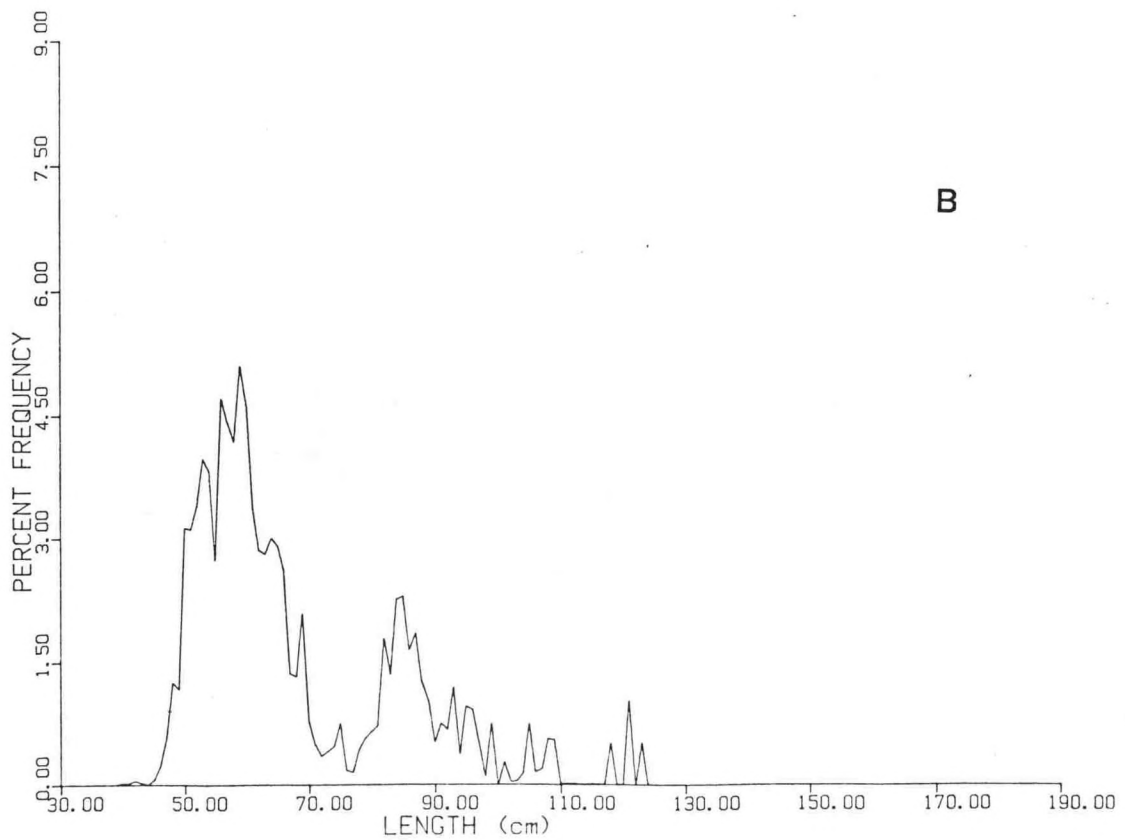
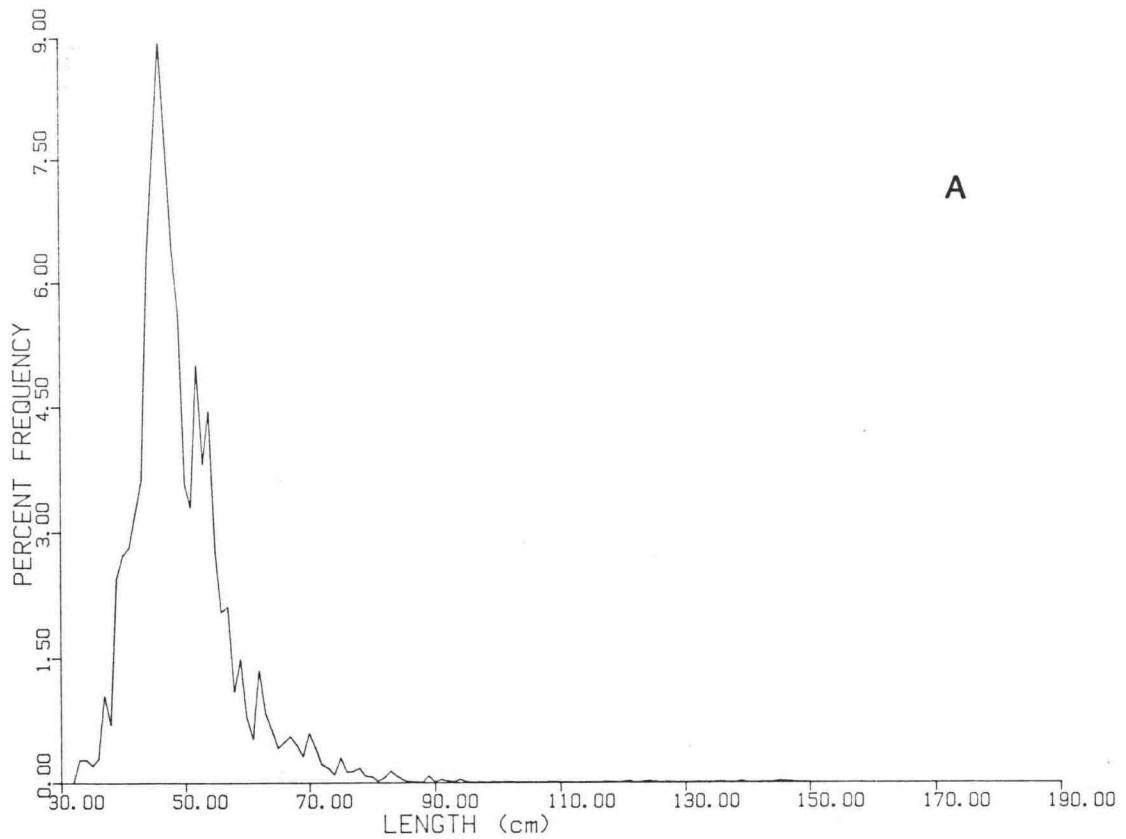


Figure 1. Estimated length composition of yellowfin tuna transshipped from (A) eastern Atlantic purse seine catches, and (B) eastern Atlantic baitboat catches.

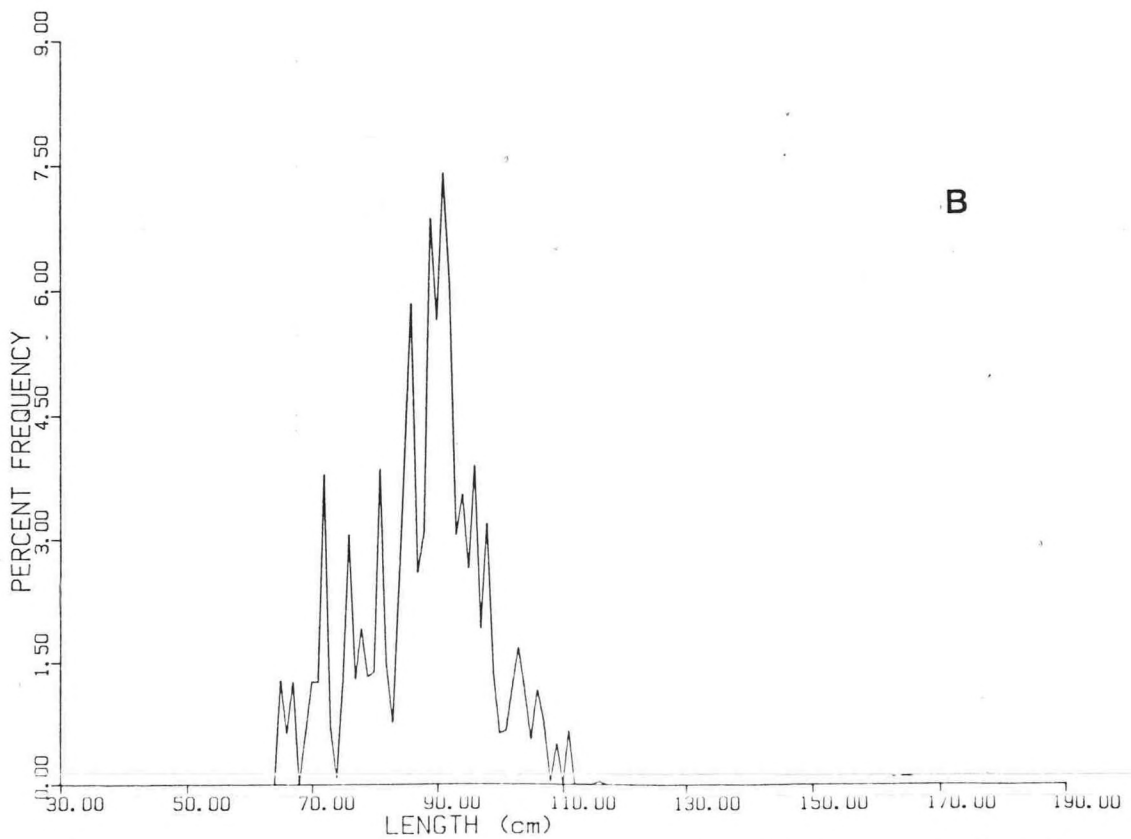
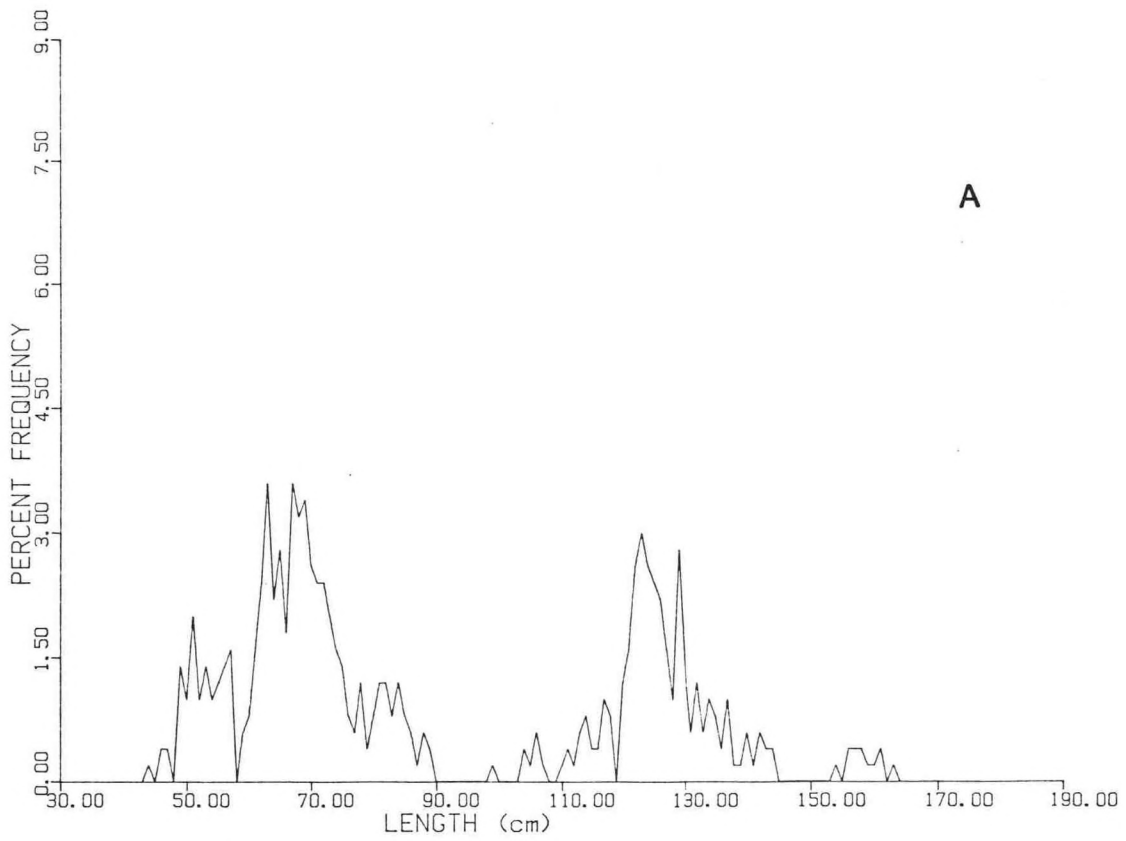


Figure 2. Estimated length composition of yellowfin tuna transshipped from (A) western Atlantic purse seine catches, and (B) western Atlantic baitboat catches.

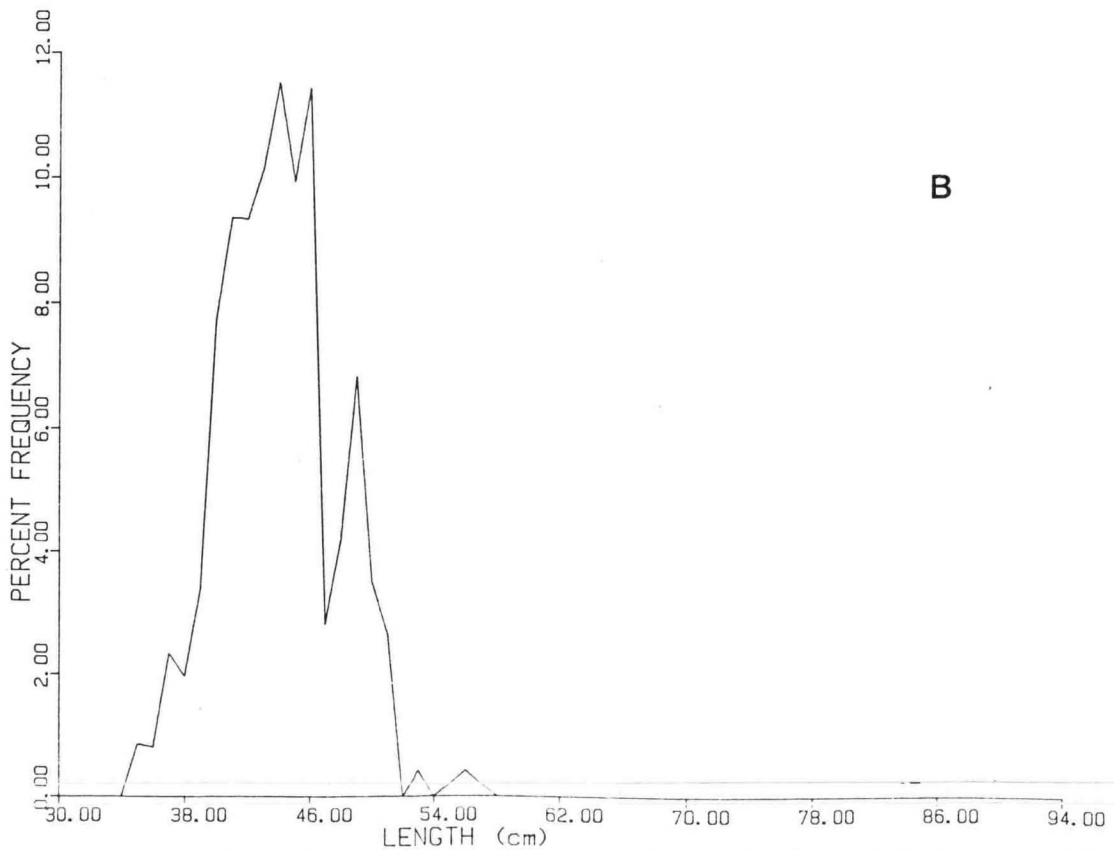
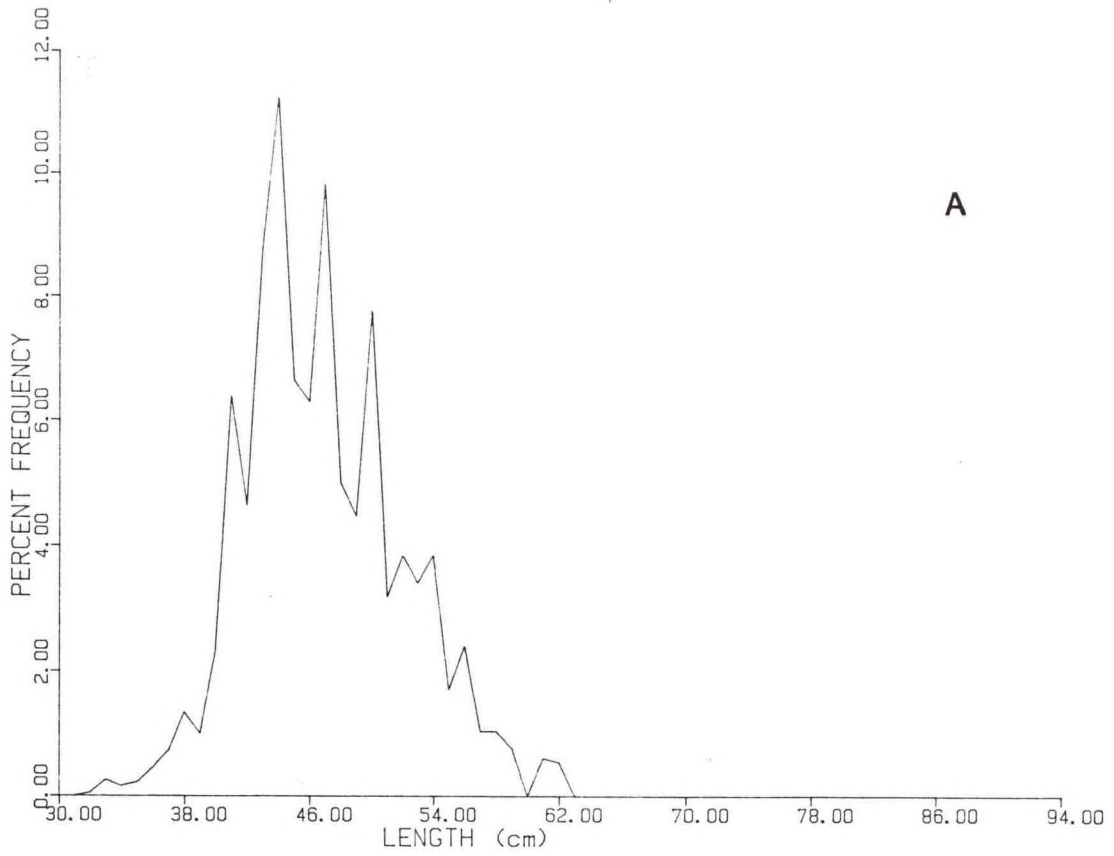


Figure 3. Estimated length composition of skipjack tuna trans-  
 shipped from (A) eastern Atlantic purse seine catches, and (B)  
 eastern Atlantic baitboat catches.

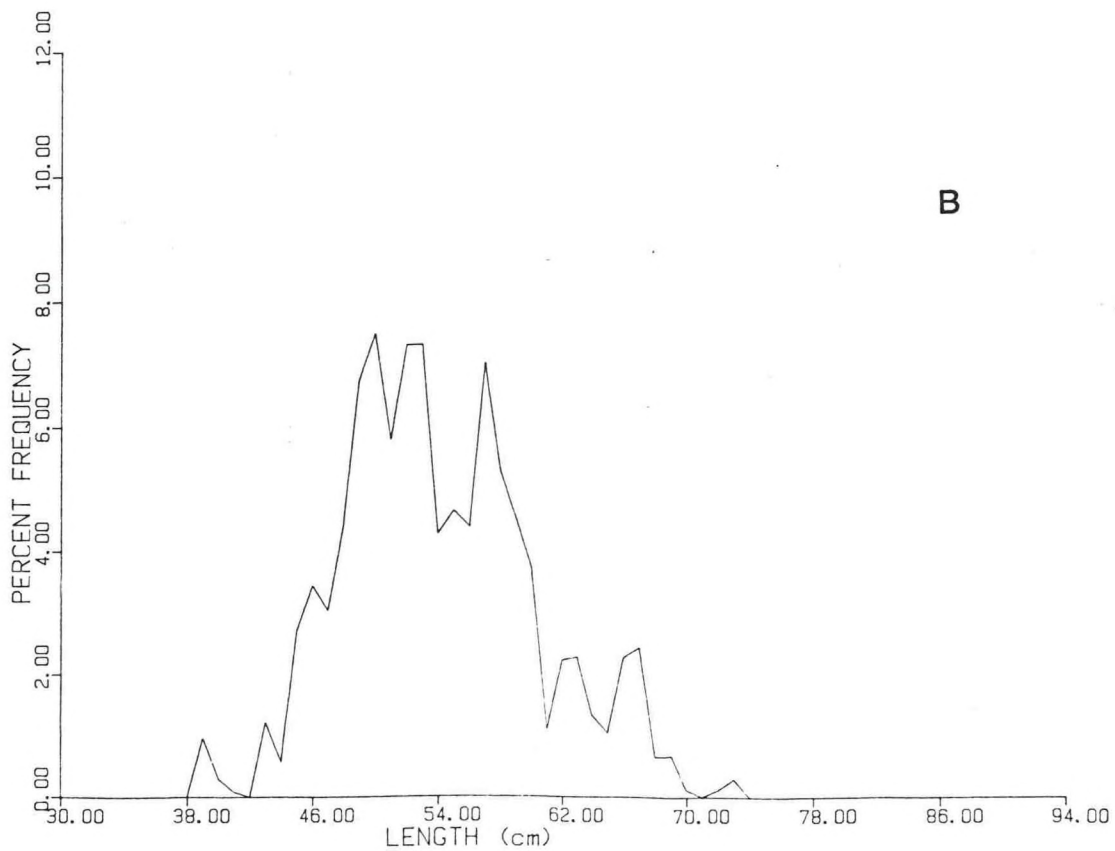
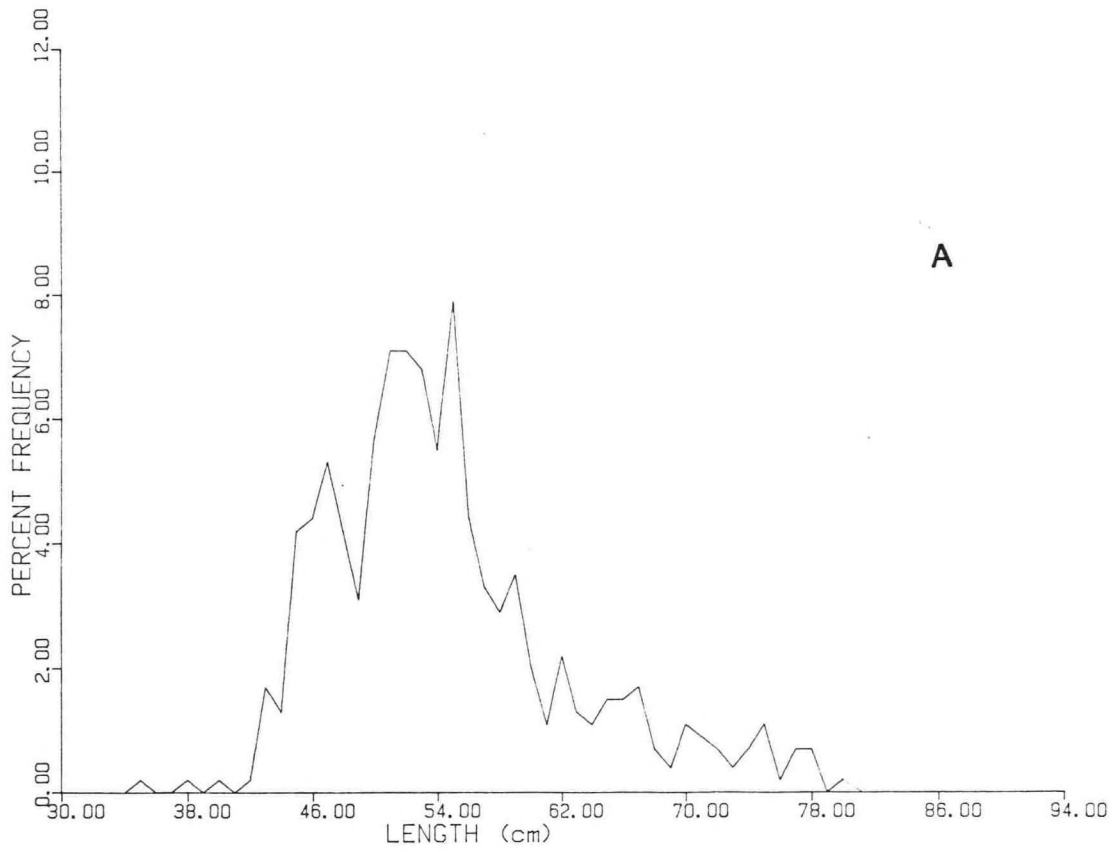


Figure 4. Estimated length composition of skipjack tuna trans-  
shipped from (A) western Atlantic purse seine catches, and (B)  
western Atlantic baitboat catches.

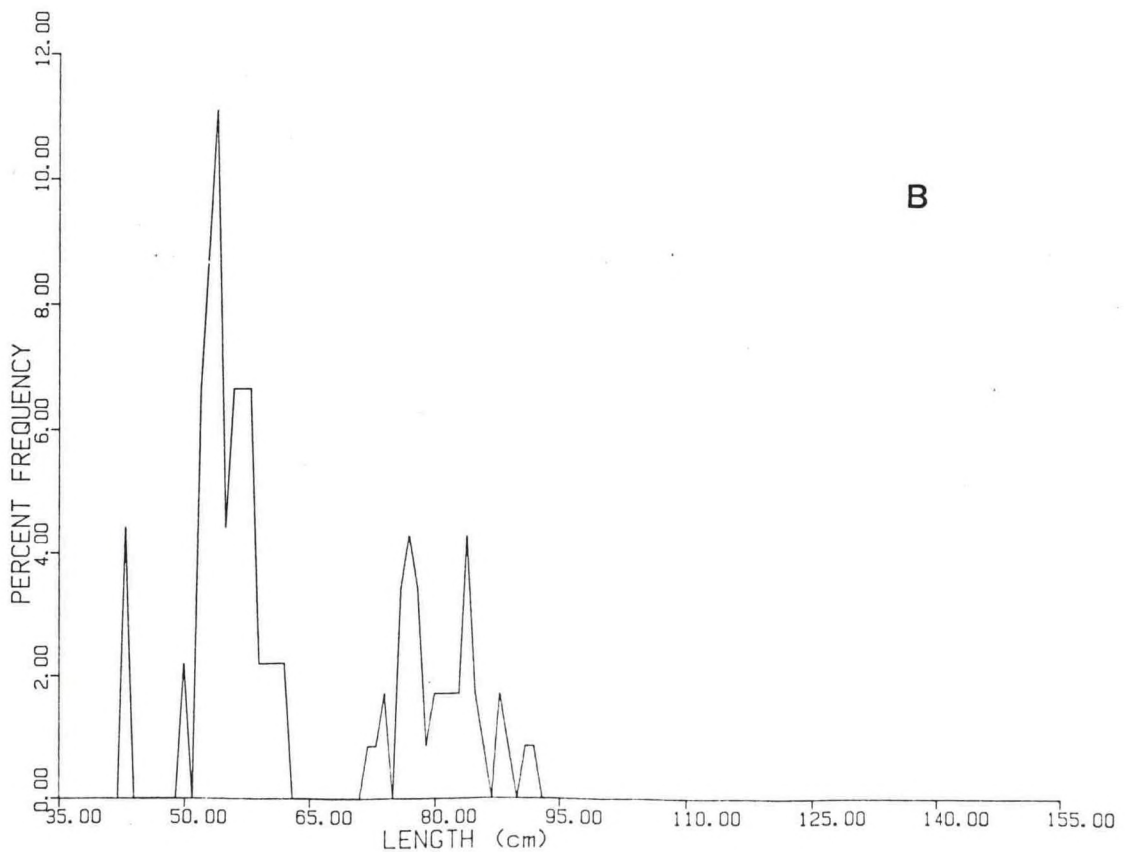
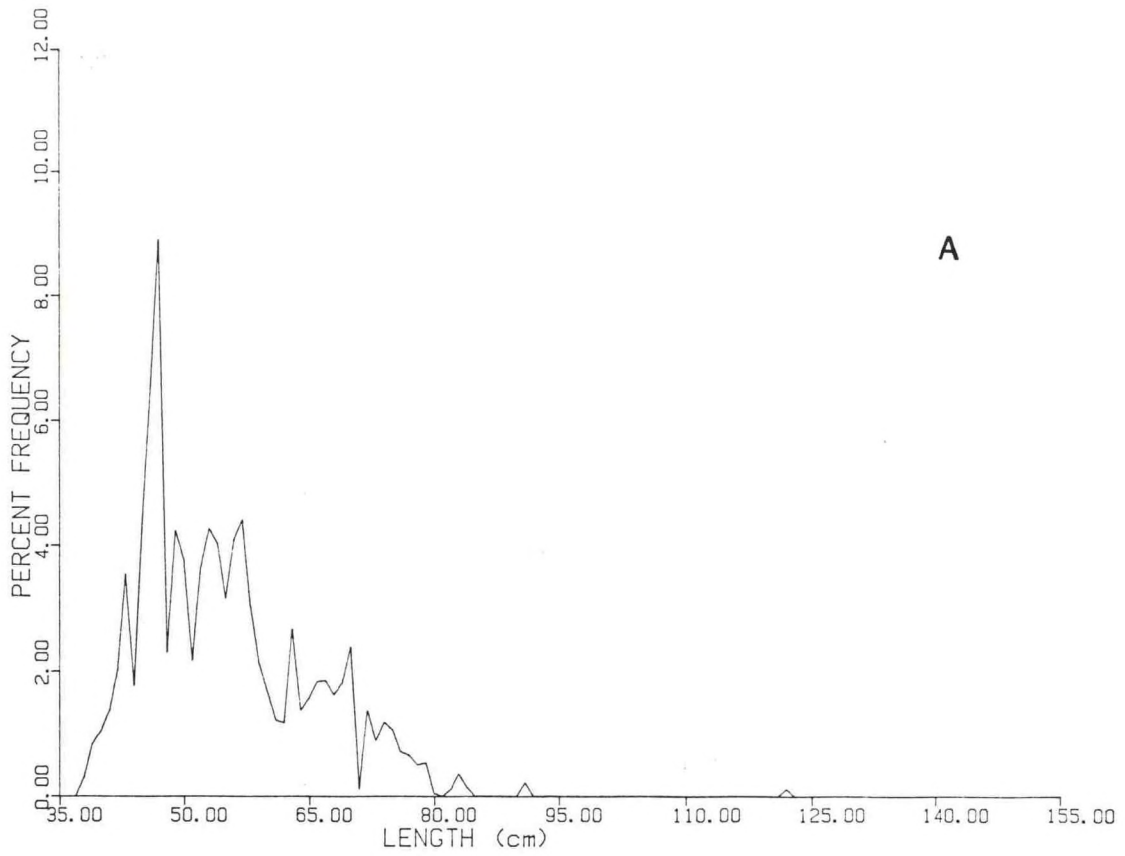


Figure 5. Estimated length composition of bigeye tuna transshipped from (A) eastern Atlantic purse seine catches, and (B) eastern Atlantic baitboat catches.

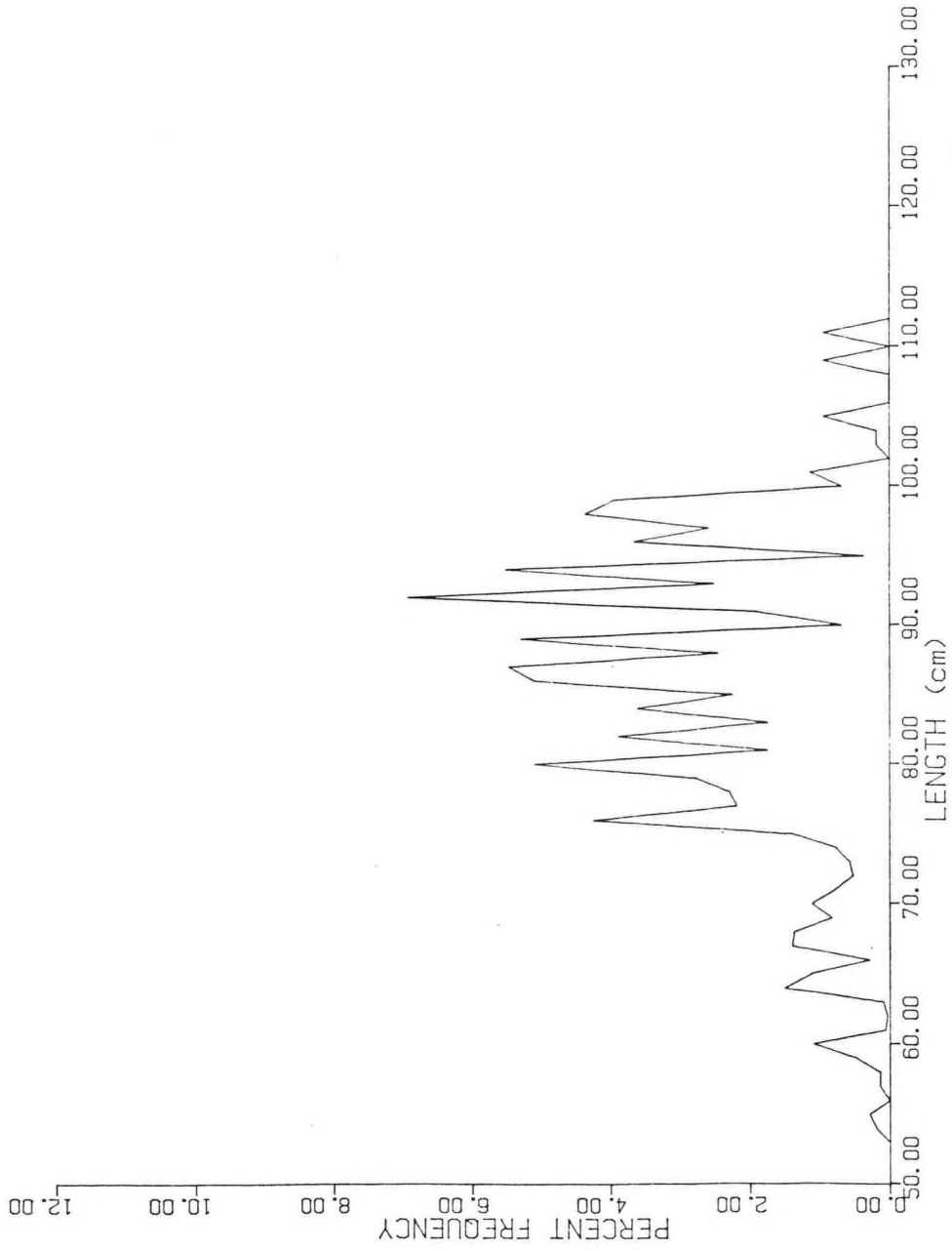


Figure 6. Estimated length composition of albacore tuna trans-shipped from southern Atlantic longline catches.

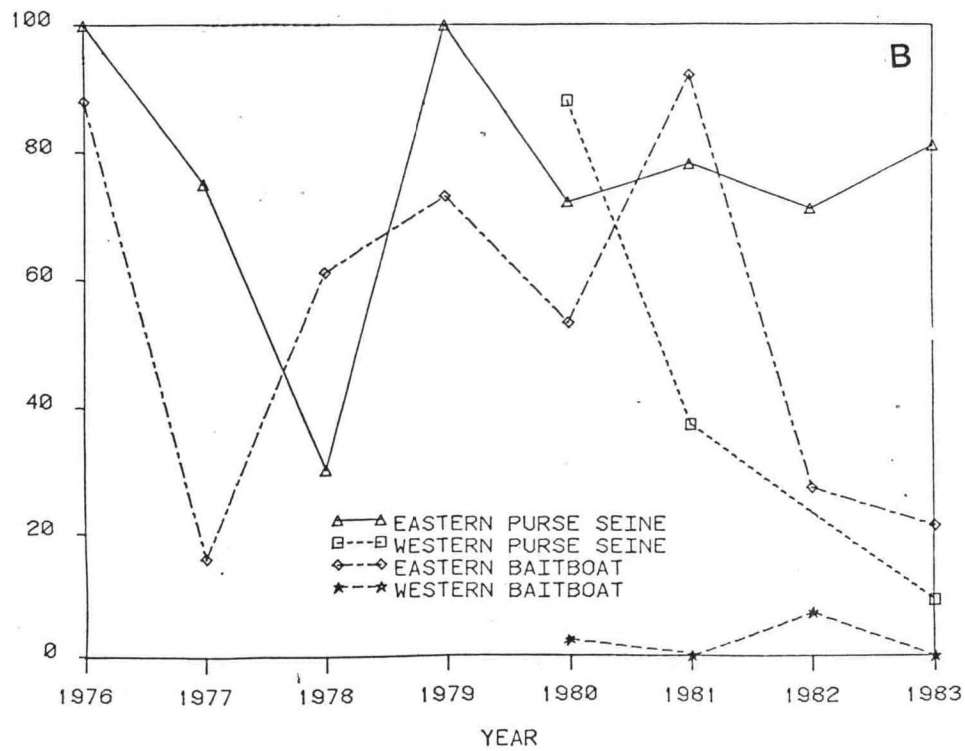
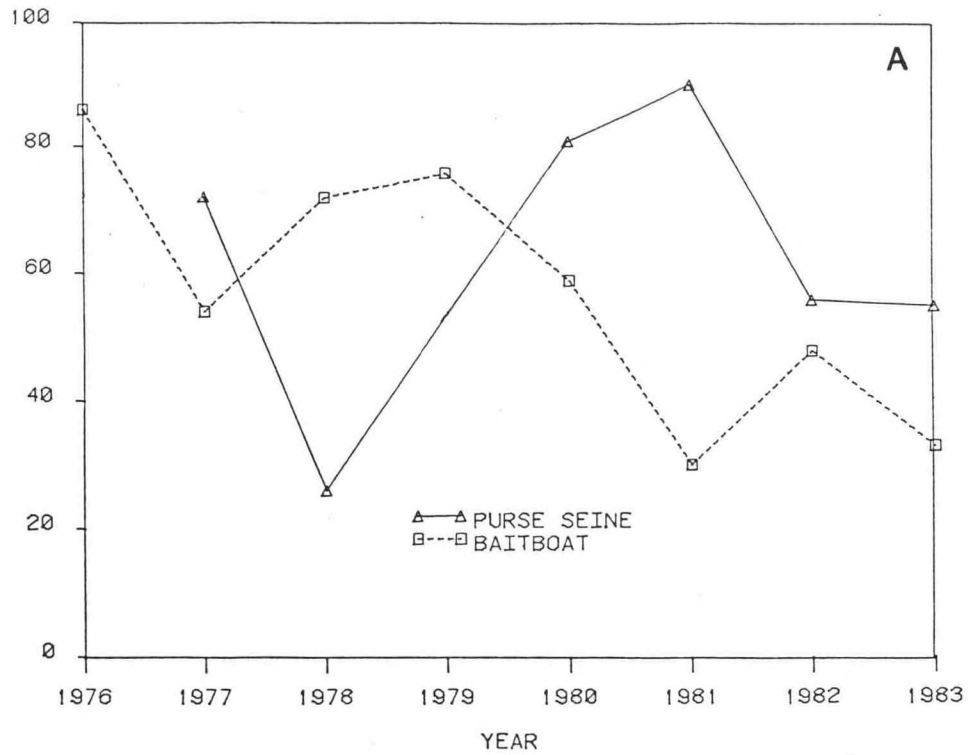


Figure 7. Percentage (by number) of fish less than 55 cm, by gear, for (A) eastern Atlantic bigeye tuna transshipments and (B) eastern and western Atlantic yellowfin tuna transshipments.