

PRELIMINARY ANALYSIS OF THE CANADIAN ATLANTIC BLUEFIN TUNA FISHERY DURING 1982

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At the 1981 ICCAT meeting, it was recommended that the catch of bluefin tuna in the west Atlantic be reduced substantially and that fisheries be prosecuted for the purpose of monitoring stock abundance. An overall west Atlantic bluefin quota of 1160-mt and a Canadian allocation of 250 mt were agreed to at the February, 1982 meeting on Western Atlantic Bluefin Management Measures held in Miami, Florida, U.S.A.

As a result, substantial changes were made in the regulations for the Canadian Atlantic bluefin tuna fishery in 1982. The fishery was placed under sub-area allocations for the first time and the catch limit was reduced from two to one fish per vessel per day.

In addition, sampling was intensified in an effort to provide more detailed biological data. The catch monitoring system used for quota control provided a means of obtaining individual weights for 100% of the catch. The sampling program previously used in the bluefin ageing study was expanded, primarily in Prince Edward Island and St. Margaret's Bay to provide a better idea of age composition, and seasonal growth rates. Some of the preliminary findings are presented here and will be updated as material is analyzed.

1. Catch

Reports from Canadian fishermen indicate that the local abundance and availability of giant bluefin in all traditional fishing areas improved in 1982. There were also reports of smaller bluefin in several areas, but area closures prevented these being documented. Sub-area quotas were filled quickly in all areas, resulting in the closure of most areas to

bluefin fishing much earlier than in previous years.

The total bluefin catch in Newfoundland waters was 2.8 mt (Table 1). The average weight of 9 tuna caught was 314.9 kg. A total of 94 tuna weighing 38.3 mt were caught by New Brunswick and Quebec fishermen in Chaleur Bay. The average weight was 406.9 kg. The fishery off Prince Edward Island was partially closed at the end of August due to an unequal distribution of catches. The partial closure was lifted in late September because catches had not improved in the open area and the remainder of the quota was taken in a few hours. The quota for the trap net fishery in St. Margaret's Bay was exceeded very early in the season and impounded fish had to be released. Harvesting of the remaining impounded fish is not yet complete. The fishery in St. Georges Bay has not yet reached the quota.

Both the temporal and spatial patterns of catches in the Canadian bluefin fishery in 1982 are a reflection of sub-area quotas and not local abundance or availability as has been the case in the past.

2. Effort

There was a general decline in the number of participants in the fishery this year, due to the reduced quota and resulting shorter seasons. The sport fishery and charter-boat industry were adversely affected by the shortened season. The use of "tended line" or "keg gear" in the fishery increased in 1982, particularly in Prince Edward Island.

Logbook coverage improved in 1982; however no analysis of 1981 or 1982 effort data has been attempted to date since a comparison of the efficiencies of the "tended line" gear and the traditional rod and reel gear has not yet been determined.

2.1 Tended Line or Keg Gear Fishery

A new method of fishing for bluefin tuna was introduced to the Canadian fishery in 1981. Referred to as "tended line" or sometimes as "keg gear", this new handgear has been widely accepted and is replacing the rod and reel gear in many areas, especially in Prince Edward Island (86% of the 1982 P.E.I. catch taken by tended line).

Each vessel is permitted to use two 150 foot lines of 3/8 inch polypropylene rope and these lines must be attached to the vessel while fishing. One 15/0 hook is attached to each line by a wire or nylon leader. A small buoy is attached about 30 to 40 feet in front of the hook to act as resistance to wear down a hooked tuna and a larger buoy is attached to the shipboard end of the line to serve as a location marker in the event that all the line is run out.

Tended lines are used in two ways, trolling and "still fishing". Trolling is essentially the same technique as rod and reel. Fifty to 60 feet of line is streamed from a five to six foot post off the stern as the vessel is under way, while the remainder of the line lies coiled in a box in the bottom of the vessel. "Still fishing" is often used in conjunction with other fisheries and the lines are set from a stationary vessel while the fishermen are hauling trawls or nets and while they are cleaning their catch. Fish that fall from the trawl or net, discards and entrails serve as chum to attract tuna to the area of the baited lines. Hooks are baited with mackerel, squid, hake, cod, or with the guts removed from groundfish.

Many fishermen employ both "still fishing" and trolling and the same fishing grounds are covered. The advantages of tended lines over rod and reel gear are: (1) a greater chance of boating a tuna once it is hooked; (2) a tuna can usually be boated much more quickly; (3) the equipment is much less expensive; (4) it allows more efficient use of manpower for a

multi-species commercial vessel.

3. Catch Composition in 1982

3.1 Size Composition

A length frequency was constructed from the samples from Prince Edward Island during August 1982 (Fig. 2). Fifty-three percent of the sampled fish ranged from 265-279 cm, carapace fork length. Males ranged from 225 to 294 cm with most (23%) between 275 and 280 cm. Female tuna in the sample ranged from 235 to 279 cm. Fifty-two percent of the females were between 260 and 270 cm.

3.2 Average Weight Composition

The average weight of tuna caught off Prince Edward Island during 1982 was 406.4 kg (Table 2). In August, the average weight was 402.1 kg and increased to 416.9 kg in September (Table-3). The average weights observed in 1982 were less than those of 1981; however, there is a trend of increasing average weight since 1974 (Fig. 3).

Weight frequency was calculated for both sexes separately from detailed samples from Prince Edward Island (Fig. 2). The average weight of female tuna was 370.5 kg and that of males 415.2 kg.

3.3 Age Composition 1982

Otoliths were collected for 46 percent of the catch off Prince Edward Island. Ages read from a stratified sample ranged from 14 to 31 years old. No age composition could be obtained from this sub-sample but results from the total sample and samples collected from the trap fishery in St. Margaret's Bay will be reported at a later date.

3.4 Sex Ratio

The sex was determined of 176 giant bluefin caught in the waters off

Prince Edward Island during August 1982. Male fish outnumbered females by a ratio of 1.599. This is comparable to the ratios of 1.44 in August 1974 and 1.51 in September 1974 reported by Butler (1974). The ratio of male to female giant bluefin calculated by Baglin (1982) for the western Atlantic using data from 1975-79 was 1.74.

3.5 Weight Frequency of Canadian Catch

The weight frequency (in 10 kg intervals) for the total Gulf of St. Lawrence fishery shows a relatively stable pattern with minor fluctuations from 1971-74 (Fig. 4). During 1975-77, the mode shifts from 350 to 400 kg. In 1978 and 1979 there is an increase in the proportion of larger fish, although the mode remains at 400 kg. In 1980, there is a sharp decline in the number of larger fish in comparison to previous years. The weight composition for 1981 returns to the pattern of 1979.

Weight frequencies of the August Prince Edward Island catches were examined separately to account for any biases introduced by seasonal and areal changes in the distribution of catches from year to year (Fig. 5). The variations observed in the total Gulf weight frequencies for 1980 and 1982 are not seen in the August Prince Edward Island weight frequencies. A continuous shift to larger fish is evident since 1971.

Conclusions

The bluefin tuna fishery in 1982 in Canadian waters was regulated by strict quota control. Temporal and spatial patterns of catch and of effort reflect sub-area quotas rather than local abundance or availability. Fishing effort was reduced and "tanded line" fishing was more common in 1982 than rod and reel fishing. The sex ratio of bluefin landed in Prince Edward Island in 1982 was 1.59 males to females. Males were larger than

females. Average weight decreased in the Gulf of St. Lawrence in 1982, however, August Prince Edward Island weight frequencies from 1971-1982 indicate a continuous trend of increasing proportion of larger fish entering the fishery since 1971.

References

- Baglin, R.E. Jr. 1982. Reproductive biology of western Atlantic bluefin tuna. Fish. Bull. 80: 121-134.
- Butler, M.J.A. MS.1974. Prince Edward Island Bluefin Tuna Research Program 1974. 165 p.

Table 2. Size composition of Bluefin Tuna captured in five localities along the Canadian Atlantic coast in 1982 (all gears).

Size Class (kg)	PEI		NFLD		N.B.		QUEBEC		N.S. ²		TOTAL	
	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot
230	1		3								1	2
240											1	4
250	1		3	1	111						1	2
260				1	111						3	5
270			8								2	1
280	2		5								3	5
290	2		5	1	111						6	12
300	5		13	1	111						3	6
310	3		8								3	9
320	5		16	3	333						9	13
330	10		25			1	20		1	40	12	23
340	15		39			5	93	1	23		21	41
350	18		47			4	73	2	47	2	26	51
360	22		57	1	111	2	99	6	140	6	240	37
370	36		94	1	111	6	113	2	47		45	88
380	14		36			2	39	5	116		21	41
390	27		70			6	118	5	116	4	150	42
400	38		99			1	20	3	70	2	80	44
410	34		89			4	78	4	93	1	40	43
420	29		76			6	118	2	47	1	40	38
430	20		52			2	39	5	116	1	40	23
440	24		62			2	39	2	47	2	80	30
450	17		44			2	39	4	93		23	45
460	13		34			3	59			1	40	17
470	12		31			2	39				14	27
480	11		29					1	23	1	40	13
490	10		25							2	80	12
500	1		3			1	20			1	40	3
510	5		13			1	20	1	23			7
520	1		3									1
530						1	20					2
540	2		5									1
550	1		3									1
560			3									1
TOTAL	384	1000	9	1000	51	1000	43	1000	25	1000	512	1000
Mean Weight		405.4		314.9		406.9		406.9		408.7		

¹ dot figures are rounded off.

² Preliminary data.

Table 1.

Total Number of Bluefin Tuna Caught in Canadian Atlantic (1970-1982).

Gear	Prov.	1970		1971		1972		1973		1974		1975		1976		1977		1978		1979		1980		1981		1982					
		n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot				
Trap	N.S.																														
Handgear	P.E.I.	99		173		482		650		1048		343		650		448		437		317		389		515		384		141			
	N.B.							3		93		148		180		196		35		55		118		26		51		51			
	P.Q.	15		9		12		16		30		6		26		95		11		20		90		29		43		43			
	N.S.	419		76		104		37		30		33		6		5		2		1		1		3		81		60			
TOTAL		532		258		598		706		2042		982		1336		1705		1032		576		777		747		688 ²					

Total Weight (mt) of Bluefin Tuna Caught in Canadian Atlantic (1970-1982).

Gear	Prov.	1970		1971		1972		1973		1974		1975		1976		1977		1978		1979		1980		1981		1982						
		n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot	n	dot					
Trap	N.S.	275		72		36		141		255.7		144.0		172.1		367.9		221.3		30.6		46.6		40.7								
Handgear	P.E.I.	355.0		133.5		256.9		178.2		180.0		128.6		155.0		219.2		156.1		21.8		47.3		10.9		20.8						
	N.B.	33.8		57.3		71.8		77.9		14.7		21.8		47.3		10.9		20.8														
	P.Q.	1.9		2.1		10.5		37.9		4.9		8.1		36.1		11.6		17.5														
	N.S.	8.8		10.4		1.8		1.5		.6		.4		.3		.9		2.8														
TOTAL		476		206		297		367		655.2		347.3		513.2		668.8		429.6		244.2		305.9		319.7		207.4 ²						

¹ Under quota regulations

² Total to date, N.S. not filled quota yet. N.S. numbers are projected.

Table 3. Size composition of large Bluefin caught off Prince Edward Island during August and September of the 1982 season (number of fish and round weight per mille by 10 kg intervals).

Size Class (Kg)	August		September	
	# of Fish	ppt	# of Fish	ppt
230	1	4		
240				
250			1	9
260				
270	2	7	1	9
280			2	18
290	2	7		
300	5	18		
310	2	7	1	9
320	5	18	1	9
330	6	22	4	36
370	10	37	5	45
350	14	51	4	36
360	17	62	5	45
370	32	117	4	36
380	12	44	2	18
390	21	77	6	54
400	31	114	7	63
410	27	99	7	63
420	16	59	13	117
430	14	51	6	54
440	11	40	13	117
450	12	44	5	45
460	7	26	6	54
470	9	33	3	27
480	5	18	6	54
490	5	18	5	45
500	1	4		
510	2	7	3	27
520	1	4		
530				
540	2	7		
550	1	4		
560			1	9
<hr/>				
TOTAL	273	999	111	999
<hr/>				
Mean Weight (Kg)	402.1		416.9	

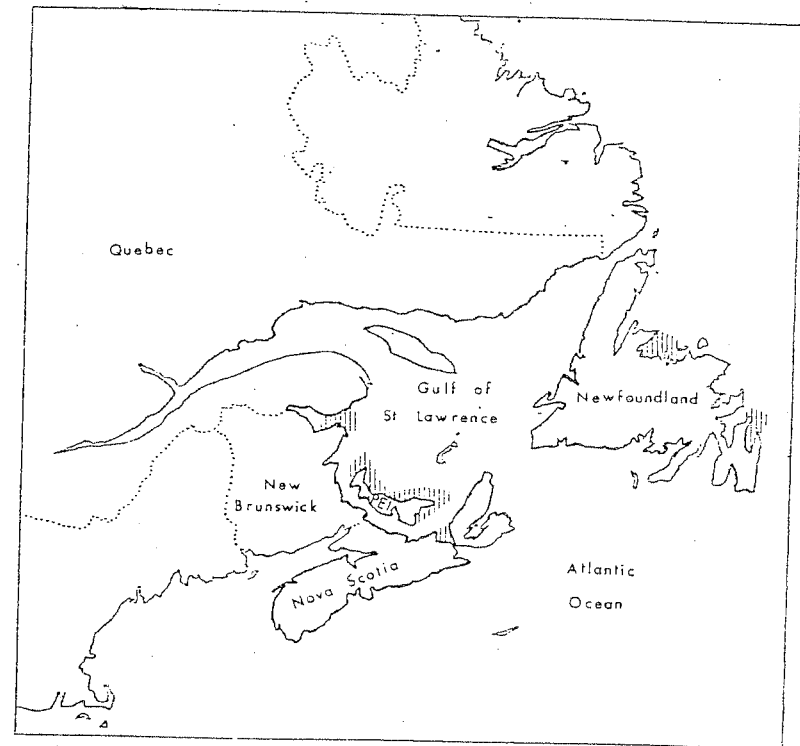


Figure 1. Bluefin tuna fishery in Canadian Atlantic.

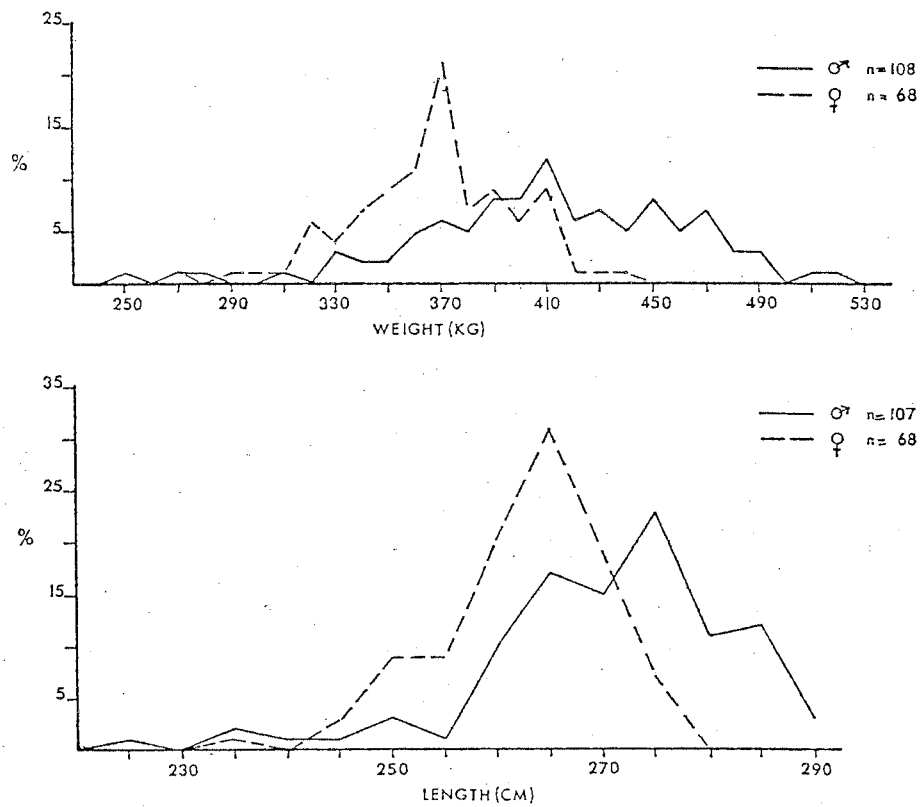


Figure 2. Weight and length frequencies of male and female bluefin tuna landed in P.E.I. during 1982.

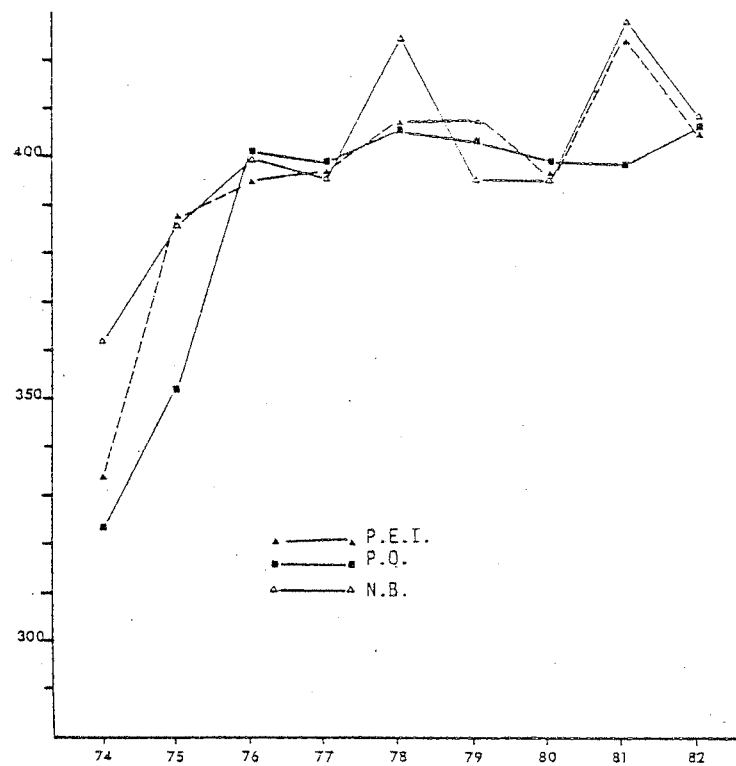


Figure 3. Annual average weight (kg) of bluefin tuna landed in Prince Edward Island, Quebec, and New Brunswick, 1974-1982.

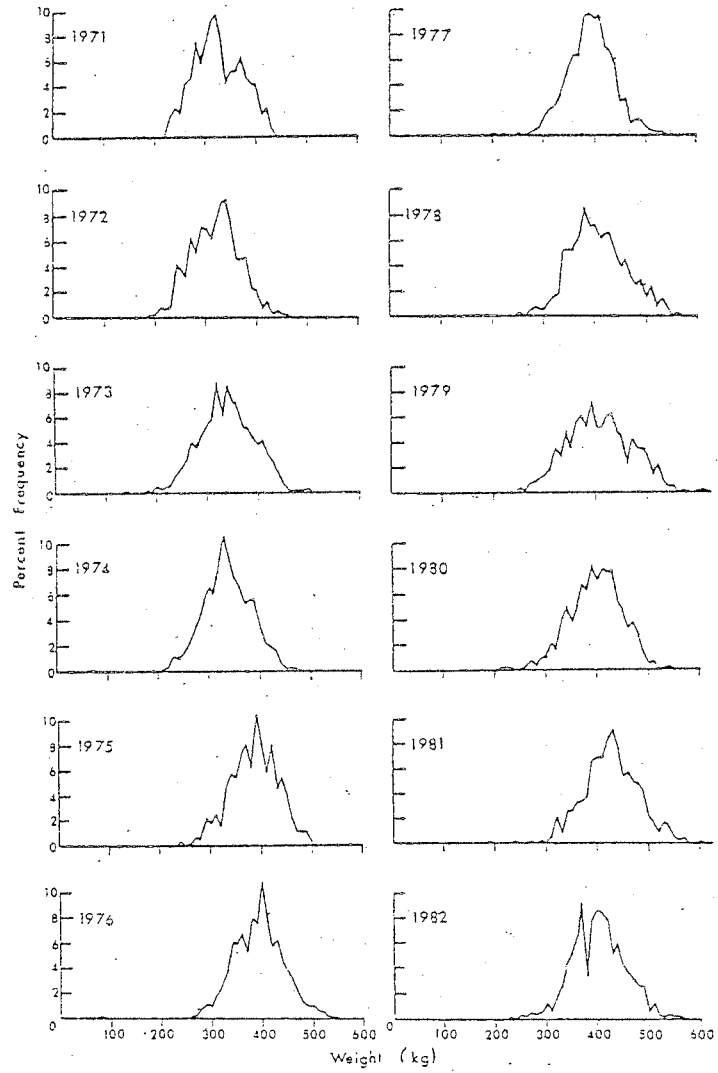


Figure 4. Weight frequency of bluefin tuna landed in the Gulf of St. Lawrence 1971-1982.

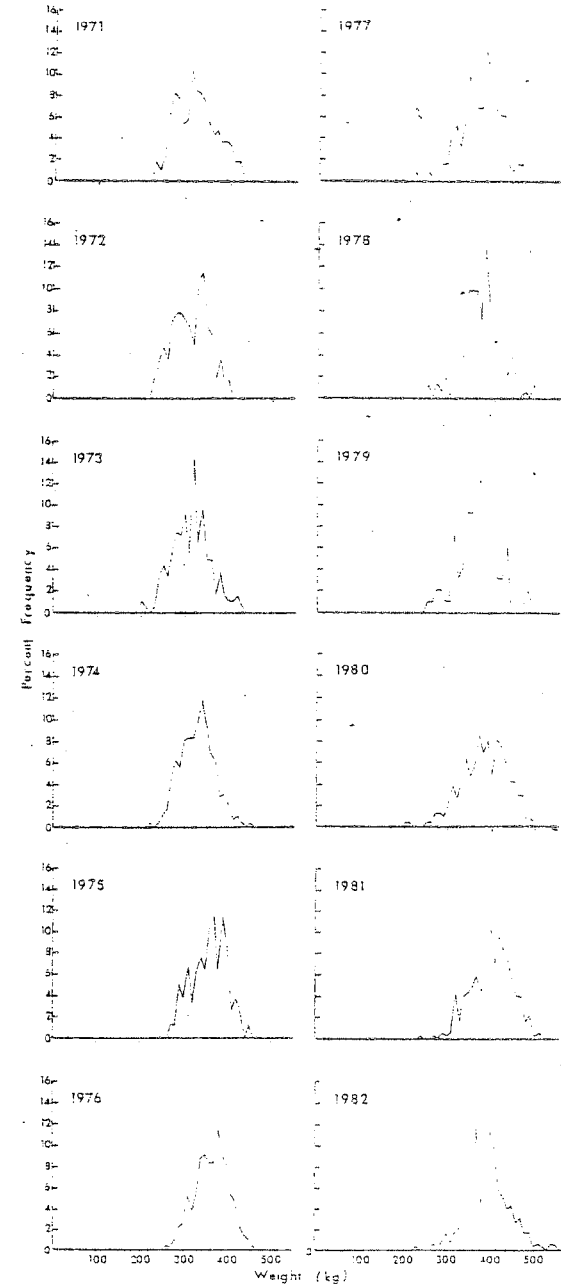


Figure 5. Weight frequency of bluefin tuna landed in P.E.I. during August 1971-1982.