

CATCH RATES IN THE CANADIAN ATLANTIC BLUEFIN FISHERY

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SUMMARY

Canadian bluefin tuna landings in 1986 were the lowest in over 20 years; a portion of the catch was taken by a Japanese longline vessel under charter. The mean size of fish landed in 1985 and 1986 are about equal and are down about 4 percent for the highest mean weight in 1984.

The Canadian inshore tuna log record data base from 1975 to 1986 has been reanalyzed and catch per unit effort indices generated from the data. The effort data have been divided into two major time periods--that prior to 1981 and that including and after 1981--with 1981 being the year of introduction of tended line gear. Both of these time periods provide strong catch-effort relationships for the province of Prince Edward Island and slightly poorer relationships for New Brunswick. All series indicate a drastic decline in abundance over the last five years in particular and the last ten years in general.

RESUME

Les débarquements canadiens de thon rouge en 1986 ont été les plus faibles depuis plus de 20 ans. Un pourcentage des prises a été effectué par un palangrier japonais affrété. La taille moyenne du poisson débarqué en 1985 et 1986 est presque égale ou inférieure à environ 4 % du poids moyen le plus élevé de 1984.

La base de données des livres de bord des prises littorales de thonidés canadiennes de 1975 à 1986 a été analysée de nouveau ainsi que les indices de la prise par unité d'effort produits par les données. Les données de l'effort ont été divisées en deux principales périodes --avant et après 1981, y compris 1981, cette dernière étant l'année de l'introduction de la ligne surveillée "tended line". Ces deux périodes montrent une relation prise-effort élevée dans la province de l'île du Prince Edward et une relation légèrement plus faible dans le New Brunswick. Toutes les séries indiquent une forte baisse de l'abondance, en particulier depuis ces cinq dernières années et, en général, les dix dernières années.

RESUMEN

Los desembarques de atún rojo en Canadá en 1986 fueron los más bajos de un período de 20 años, y una parte de las capturas fue llevada a cabo por un palangrero japonés alquilado. El tamaño medio de los peces desembarcados en 1985 y 1986 fue aproximadamente igual o inferior a aproximadamente un 4% respecto al peso medio máximo en 1984.

Se ha analizado nuevamente el registro de la base de datos canadiense de capturas costeras según los cuadernos de bitácora, de 1975 a 1986, así como los índices de captura por unidad de esfuerzo deducidos a partir de los datos. Los datos de esfuerzo se han dividido en dos períodos principales de tiempo: el anterior a 1981 y el posterior a ese año, incluyendo 1981, siendo éste el de la introducción del arte de línea con barrilete. Ambos períodos indican una fuerte relación captura-esfuerzo en la provincia de Prince Edward Island, y una relación ligeramente inferior en New Brunswick. Todas las series indican un fuerte declive en la abundancia durante los últimos cinco años, en particular, y en los últimos 10 años en general.

INTRODUCTION

Atlantic bluefin tuna (*Thunnus thynnus*, L.) are presently harvested in Canadian waters by three major gear types: tended line, rod and reel, and trap net. The Canadian fishery exploits large bluefin tuna (ie. fish over 120 kg.) which migrate north for summer feeding. The fishery takes place on the continental shelf off Nova Scotia (N.S.) and Newfoundland and in the waters of the southern Gulf of St. Lawrence, in recent years particularly around the waters of Prince Edward Island (P.E.I.).

Over the last decade important shifts in the gear mix have occurred. The major shifts have been through three phases, from a purse seine fishery off New England in the late 1960's and early 1970's to a successful commercial trap net fishery in the mid to late 1970's in St. Margaret's Bay, N.S.; to the present commercial tended line fishery in the southern Gulf of St. Lawrence. A relatively stable sport rod and reel fishery along the coast of Nova Scotia and later in the Gulf of St. Lawrence has persisted throughout much of this period. Canadian large fish landings have remained relatively constant over the past decade averaging about 400 tonnes per year (Table 1). The proportion of the total west Atlantic bluefin tuna landings by Canada has varied considerably over this time, the major catches have been made by Japan and the U.S.A.

CATCH

Canadian landings in 1985 and 1986 were under strict quota control with options available to re-allocate surplus local quota from regions of low catch to regions having more successful fisheries. The total landings in 1985 were 330 fish (Table 2) weighing 143.5 tonnes (Table 3) and in 1986, 97 fish weighing 41.3 tonnes, both down considerably from the high of 1008 fish and 439.3 tonnes in 1983. In 1986 an additional 343 smaller fish weighing 32 tonnes were caught by a Japanese longliner on charter to a St. Margaret's Bay firm. The 1986 landings (including the charter) were the lowest catch in over two decades, the landings to date for 1987 (as of 1/Oct/87) are up slightly, the majority being from the St. Margaret's Bay trap fishery - 60 of the approximately 120 fish. The average weight of bluefin tuna in the 1985 and 1986 P.E.I. catch was 468.4 kg and 446 kg respectively. These values are approximately equal the 1983 and 1984 values of 433.4 kg and 457.5 kg respectively (Fig. 1). The provisional estimate for the 1987 mean weight in the P.E.I. fishery is 431 kg, the second consecutive year of decrease in size.

The distribution of landings since the early 1970's (Table 2) indicates that the overall distribution of bluefin tuna has changed. The areas presently sustaining the Canadian fishery are P.E.I., St. Georges Bay (N.S.) and Baie de Chaleur, New Brunswick, all in the southern Gulf of St. Lawrence.

The St. Margaret's Bay (N.S.) and Newfoundland fisheries have all but collapsed in the last five to ten years. This drop in catch may be interpreted as an indication of a change in migratory patterns, possibly due to environmental conditions. The St. Margaret's Bay trap fishery failed in 1986 yielding the lowest catch since ranching operations began - 2 fish that died in the pounds. The 1987 trap fishery catch is slightly better although it is estimated that only 60 or less fish have been captured so far this year.

In 1987 several experimental fisheries have been started within the Canadian fishery. A limited number of inshore and offshore longline fisheries and additional trap fisheries in St. Georges Bay (Nova Scotia) have been licenced. Results to date have not been encouraging due to the low overall abundance of large bluefin in these northern waters. Additional offshore charters of Japanese vessels are also scheduled for later in the year. During the last week of September 1987 there have been reported sightings of numerous schools of 'jumpers' and landings of 14 small fish (50 to 150 kg) off southwestern Nova Scotia.

CATCH PER UNIT EFFORT

Compulsory submission of log records has been a license requirement since 1975. At this time measures were introduced to restrict fishing mortality in compliance with ICCAT advice. Log record coverage has varied over the years. The accuracy and/or representativeness of this coverage can not be ascertained.

The log records between 1980 and 1986 were not used to define fleet distribution, however, from interviews with vessel owners it appears that fishing distribution pattern for the P.E.I. fleet has not changed significantly from that reported for the 1975 to 1978 period (Hurley et al. 1979).

To standardize the quality of the log data, a minimum threshold level of reported log days was chosen. Two different threshold levels were tested, only vessels that reported at least 10 and 20 log days of fishing for the season were utilised. Each province was investigated as far as the data would allow, in past analyses (Clay, MS1985) only 20 day threshold levels were assessed. This arbitrary choice was based upon the assumption that fishermen recording 20 or more log days of effort are active tuna fishermen and conscientious about submitting completed log records. A limit of twenty submitted log days was chosen because in many areas the migratory bluefin are available to the inshore fishermen for only a portion of the season - a month was considered to have at least 20 'fishable' days. A second run was carried out in this re-analysis using 10 day levels to compare the results. Ten days were chosen because some areas have had seasons of only 10 to 20 fishing days in certain years.

Canadian bluefin catch rates

The analysis of the log books from P.E.I. and New Brunswick fishermen (Fig 2 and 3) shows two distinct Catch Per Unit Effort (CPUE) trends. The data between 1975 and 1980 represents only rod and reel fishing operations - although there were both sport and commercial fishermen. This first data set indicates a decline in CPUE over the time period (Fig. 3). Tended line gear was first introduced to the fishery in 1981 and by 1982 an estimated 86% of tuna fishermen were using it. This second data set (1981 to 1986) shows a dramatic decline in the tended line CPUE. During this latter period the CPUE of the rod and reel fishery has stabilized, although it still shows a downward trend. This index can not be assumed equivalent to the index prior to 1981, it must be assumed that only the more successful of the charter rod and reel fishermen have remained with this gear.

Comparing the two threshold levels (10 and 20 days) shows little difference for P.E.I. (Table 4) and thus the 20 day level was chosen. The other provinces have much smaller data sets, often with less than a dozen boats represented. New Brunswick, the largest of these latter data sets, shows a difference in the threshold levels - in this case the 10 day level appears superior due to the greater number of vessels represented. This may be due to the shorter season available to this fishery. The CPUE for New Brunswick using the 10 day threshold level indicates a similar declining pattern of abundance to that of P.E.I.

These two CPUE indices both indicate a decline in abundance of giants in these northern waters. The mobile rod and reel fishery (pre 1981) shows a slower rate of decline than the passive by-catch tended line gear.

ACKNOWLEDGEMENTS

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Canadian bluefin catch rates

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TABLE 1. Landings of bluefin tuna from the the ICCAT area in thousands of tonnes.

YEAR	-----WEST ATLANTIC OCEAN-----		U.S.A.	JAPAN	OTHER	TOTAL	EAST ATLANT. & MEDIT.	TOTAL
	CANADA	small large						
1970	1.2	0.5	3.8	0.1	0.3	5.7	10.4	16.1
1971	0.9	0.2	4.1	1.4	0.2	6.9	10.8	17.7
1972	0.3	0.2	3.1	0.3	0.1	4.1	11.3	15.4
1973	0.6	0.3	1.6	1.1	0.1	3.7	10.5	14.2
1974	0.1	0.7	3.7	0.9	0.2	5.6	18.0	23.6
1975	0.3	0.3	2.9	1.5	0.1	5.1	21.0	26.1
1976	0.3	0.5	1.9	2.9	0.3	5.9	22.5	28.4
1977	0.3	0.7	2.1	3.7	0.2	6.9	18.8	25.7
1978	0.2	0.4	1.9	3.1	0.2	5.8	14.8	20.6
1979	0.0	0.2	2.3	3.6	0.2	6.3	12.2	18.4
1980	0.0	0.4	1.5	3.9	0.1	5.9	13.1	19.1
1981	0.1	0.3	1.2	3.8	0.2	5.6	13.4	19.3
1982	0.0	0.3	0.7	0.3	0.2	1.4	21.7	23.2
1983	0.1	0.4	1.3	0.7	0.2	2.7	21.0	23.7
1984	0.0	0.3	1.2	0.7	0.1	2.4	24.8	27.2
1985	0.0	0.1	1.4	1.1	0.1	2.7	22.4	26.0
1986	0.0	0.1	-	-	-	-	-	-
1987	0.0	0.1	-	-	-	-	-	-

1987 provisional nominal landings

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TABLE 2. Landings of Atlantic bluefin tuna by numbers of fish from Canadian fisheries by province. The trap net fishery is from St. Margaret's Bay, Nova Scotia (N.S.); the N.S. catch is from the rest of the province. These statistics do not include the Canadian purse seine fishery off the New England coast.

YEAR::PROV	TRAP NET ⁺	P.E.I.	N.B.	QUE.	N.S.	NFLD	TOTAL
1965	286	-	-	-	73	283	642
1966	306	-	-	-	30	388	724
1967	614	5	-	-	23	179	821
1968	356	13	-	-	53	<604>	<1026>
1969	680	31	-	-	12	<585>	<1308>
1970	458	99	-	-	15	418	990
1971	208	173(201)	-	-	9	76	466
1972	104	482	-	-	12	104(259)	702
1973	508	653	4	-	19	33	1217
1974	865	1048	93	6	22	30	2064
1975	452	343	148	6	-	33	982
1976	474	650	180	26	-	6	1336
1977	948	448	196	95	13	5	1705
1978	530	437	35	11	17	2	1032
1979	72	317	55	20	111	1	576
1980	129	389	118	90	50	1	777
1981	93	515	26	29	81	3	747
1982	157	392	53	43	61	7	713
1983	17	789	125	54	20	3	1008
1984	8	384	78	17	100	3	590
1985	27	221	47	11	20	4	330
1986*	2	75	2	5	8	5	97
(charter)	343						+343
AVERAGE	347	373	83	32	37	126	918
Percent	38	41	9	3	4	14	100

* provisional nominal landings

+ 1965 to 1972 includes small portion of incidental longline catches
 - no fishery
 blank no data
 (xxx) fish caught but not necessarily landed (usually associated with tagging program).
 <xxx> estimated values

Canadian bluefin catch rates

TABLE 3. Landings of Atlantic bluefin tuna by weight (tonnes) from Canadian fisheries by province. The trap net fishery is from St. Margaret's Bay, Nova Scotia (N.S.); the N.S. catch is from the rest of the province. These statistics do not include the Canadian purse seine fishery off the New England coast.

YEAR::PROV	TRAP NET ⁺	P.E.I.	N.B.	QUE.	N.S.	NFLD	TOTAL
1965	81	-	-	-	18.4	<75.7>	<175.1>
1966	87	-	-	-	7.2	<103.8>	<198>
1967	174	1.6	-	-	6.2	47.9	229.7
1968	101	4.2	-	-	13.8	161.6	280.6
1969	193	10.0	-	-	3.2	156.6	362.8
1970	130	33.3	-	-	6.2	111.6	281.1
1971	59	64.3	-	-	3.0	<20.3>	<146.6>
1972	29	155.7	-	-	<4.6>	<27.8>	<217.1>
1973	144.4	221.0	<1.5>	-	6.1	9.9	<382.9>
1974	255.7	355.0	33.8	1.9	<7.1>	8.8	<662.3>
1975	144.0	133.5	57.3	2.1	-	10.4	347.3
1976	172.1	256.9	71.8	10.5	-	1.8	513.1
1977	367.9	178.2	77.9	37.9	5.4	1.5	668.8
1978	221.3	180.0	14.7	4.9	8.1	0.6	429.6
1979	30.6	128.6	21.8	8.1	54.7	0.4	244.2
1980	46.6	155.0	47.3	36.1	20.6	0.3	305.9
1981	40.7	219.2	10.9	11.6	36.4	0.9	319.7
1982	68.3	157.9	21.1	16.1	25.8	2.3	291.5
1983	6.6	341.7	52.4	22.1	8.9	1.0	439.3
1984	2.7	174.5	33.3	7.3	45.4	1.1	264.2
1985	11.7	103.0	20.1	4.0	<3.4>	1.2	143.5
1986*	<1.0>	33.1	1.0	1.9	2.7	1.7	41.4
(charter)	32.0						+ 32.0
AVERAGE	109.1	145.3	33.2	12.7	14.4	34.0	317.1
PERCENT	34	46	10	4	5	11	100

* provisional nominal landings

+ 1965 to 1972 includes small portion of incidental longline catches
 - no fishery
 blank no data
 (xxx) fish caught but not necessarily landed (usually associated with tagging program).
 <xxx> estimated values

Table 4. Four indices of bluefin tuna abundance from the west Atlantic. Rod and reel (R&R) and tended line (TL) are the only two gears utilized in these series. The rod and reel pre-1981 are not considered comparable to the rod and reel post 1981 - see text.

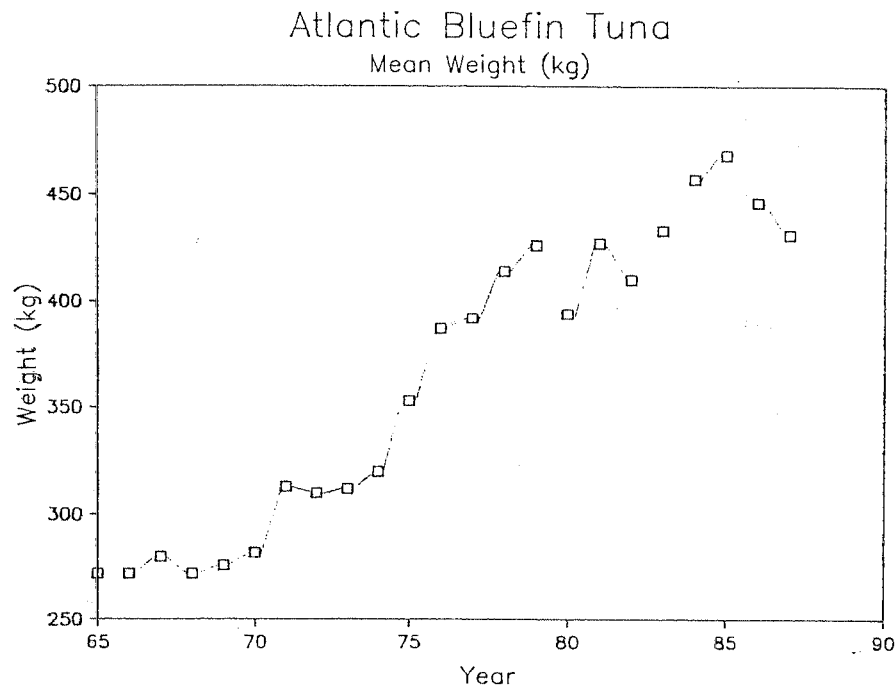
20 day threshold

Year	P.E.I.		Nova Scotia		New Brunswick		Quebec	
	Rod & Reel	Tended Line	Rod & Reel	Tended Line	Rod & Reel	Tended Line	Rod & Reel	Tended Line
75	.09				.16			
76	.13				.18			
77	.09				.25		.18	
78	.09				.07			
79	.07				.16			
80	.07		.07		.23			
81		.21		.02		.03		
82	.06	.18	.07	.04				.03
83	.08	.13	.01	.03	.33		.04	
84	.03	.10	.04	.01	.15	.09		.04
85	.02	.05				.11		
86	.02	.05				.04		.03
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10 day threshold

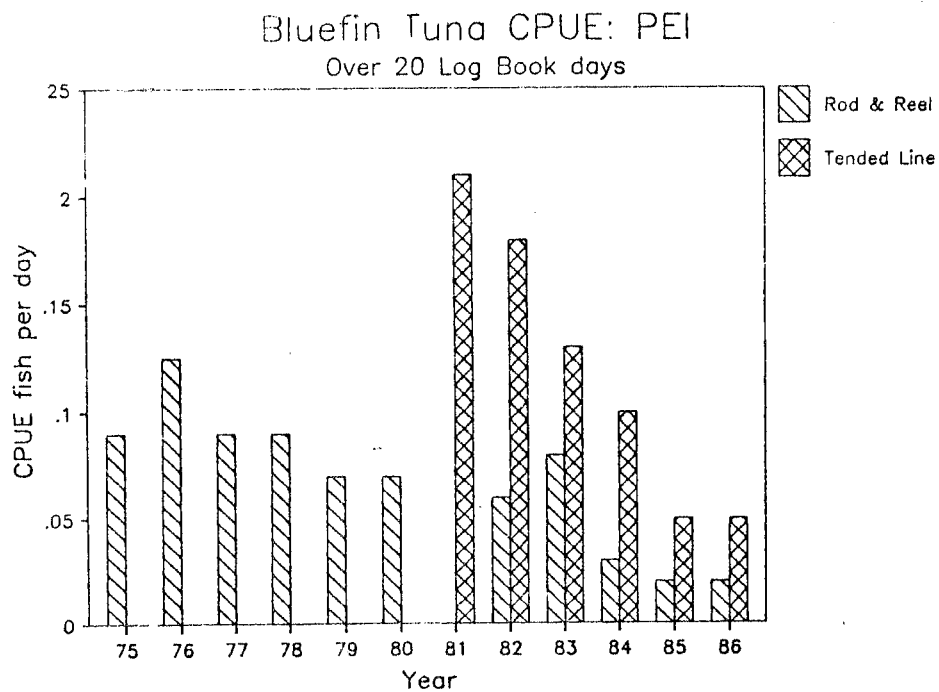
Year	P.E.I.		Nova Scotia		New Brunswick		Quebec	
	Rod & Reel	Tended Line	Rod & Reel	Tended Line	Rod & Reel	Tended Line	Rod & Reel	Tended Line
75	.09		.01		.20			
76	.125				.21			
77	.09		.01		.22		.18	
78	.09		.04		.06			
79	.07				.13			
80	.07		.06		.19			
81		.21	.05			.03		
82	.06	.19	.09	.05	.10	.07		.03
83	.08	.13	.01	.03	.29	.38	.04	.06
84	.03	.09	.15	.01	.12	.08		.04
85	.02	.05				.05		
86	.02	.05				.04		.03
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Figure 1. Mean round weight (kg) of bluefin tuna landed in southern Gulf of St. Lawrence by the P.E.I. inshore fishery.



Canadian bluefin catch rates

Figure 2. Catch per unit effort indices calculated from log books of bluefin tuna fishermen from P.E.I. Only the higher threshold of 20 days is shown on this figure (see text).



Canadian bluefin catch rates

Figure 3. Catch per unit effort indices calculated from log books of bluefin tuna fishermen from New Brunswick. Only the lower threshold of 10 days is shown on the figure (see text).

