

Progress toward Management of the Atlantic Bluefin Tuna ¹

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The Atlantic bluefin tuna (*Thunnus thynnus thynnus*) is a wide ranging, long lived species, and a popular and important multiple-use resource. Over its broad range it is the object of a variety of sport and commercial fisheries, both long term and recently derived. In recent years, concern about severe declines in catches in many fisheries has been followed by international recommendations and the United States' actions to manage and conserve this resource. This report outlines Atlantic bluefin tuna management progress that has been made in the U.S. through November 1975. This progress is discussed under three categories: Regulations and Management, Catch Statistics, and Research.

All tonnage weights in this report are in short tons; short tons x 0.90718 = metric tons.

REGULATIONS AND MANAGEMENT

International

International action to manage has come from the International Commission for the Conservation of Atlantic Tunas (ICCAT), formed in 1969. The U.S. is one of 15 member countries. At its November 1974 meeting, ICCAT modified and adopted a U.S. proposal that became effective 10 August 1975 as an ICCAT recommendation. This recommendation specified two actions: (1) that taking and landing of Atlantic bluefin tuna less than 6.4 kg (14 lbs) should be prohibited (with incidental catch tolerances), and (2) that fishing mortalities be limited to recent levels for 1 year. This recommendation was extended for an additional 2 years at the November 1975 meeting of ICCAT.

In the western North Atlantic, meetings were held early in 1974 and 1975 between representatives of the U.S. and Canada regarding management of Atlantic bluefin tuna. Unilateral action resulted from each country, as catch restriction recommendations in 1974 and regulations in 1975.

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United States

No regulations or recommendations that would restrict the catch of Atlantic bluefin tuna existed for U.S. waters prior to 1974. The 1974 catch restriction recommendations for U.S. fishermen were based on gear type by area, and are summarized as follows:

Cape Cod and north – Based on giant tuna, usually heavier than 300 lbs, the purse seining quota was set at 225 short tons (ca 675 fish); “other commercial” catches at a quota of 250 short tons (ca 750 fish); sport fishing with no quota but a tag-and-release recommendation.

Mid-Atlantic U.S. – Based on small or school tuna, usually weighing less than 115 lbs, the purse seining quota was set at 1200 tons, and minimum and maximum sizes of 14 and 115 lbs; sport fishermen with a bag limit set at one fish per angler per day, and minimum and maximum sizes as for purse seiners.

These recommendations were published for the National Marine Fisheries Service in the Federal Register (24 June 1974). They were not widely publicized except to purse seine operators. Our interpretations of their effects are discussed under the section on catch statistics.

The State of Massachusetts adopted regulations in 1974 to limit the catch of giant bluefin in waters off Massachusetts. These required the advance licensing of fishermen and the reporting of all bluefin landed in Massachusetts. No other states actively participated in Atlantic bluefin tuna regulation during 1974 and 1975.

In early 1975, proposed regulations for the taking of bluefin were published in the Federal Register (2 April 1975, 18 April 1975). These were prepared in anticipation of the possible listing of the bluefin as a threatened species under the Endangered Species Act of 1973. This action was abrogated by subsequent federal legislation that established the Atlantic Tunas Convention Act of 1975, Public Law 94-70. The President signed this Act into law on 5 August 1975. The Act and its regulations became effective upon publication in the Federal Register (13 August 1975). Its apparent effects on the 1975 fishing season are discussed under the section on catch statistics. The catch restrictions were based primarily on catch quotas by weight ranges and gear types. They are outlined in Table 1.

Weight Restrictions

The U.S. regulations supported the ICCAT recommendation to prohibit the taking of bluefin less than 14 lbs round weight (fish less than 2 years old). These younger tuna are very susceptible to over-fishing, and this catch restriction will help increase the catches of larger bluefin. The U.S. regulations further prohibited the taking of bluefin between 115 and 300 lbs (the weight class referred to as mediums). This weight class, presumably representing direct recruitment to the spawning stock, apparently has been severely reduced by fishing and has been relatively rare in U.S. catches in recent years. Tolerances were permitted, however, (as incidental catches) for taking these two weight classes by two kinds of gear only. Purse seine vessels fishing for Atlantic bluefin between 14 and 115

Table 1. Outline of ICCAT recommendations and of U.S. regulations for taking Atlantic bluefin tuna under the Atlantic Tuna Convention Act of 1975 (Public Law 94-70), by weight class and gear type

WEIGHT (LBS)	ICCAT RECOMMENDED CATCH LIMITS	U.S. BLUEFIN TUNA REGULATIONS (P.L. 94-70)			
		PURSE SEINE	ANGLING (ROD & REEL)	HAND GEAR (HARPOON, HAND LINE)	INCIDENTAL (not fishing for bluefin tuna)
< 14	NO CATCH	TOLERANCE (15% in number or 4% in weight, included in total)	TOLERANCE (1 per angler, per day, included in total)	NONE	TOLERANCE (2% of total weight of other fish per trip; per 30 days for traps)
14-115	LIMITED (restricted fishing mortality to recent levels)	1,100 TONS	4 per angler, per day	NONE	TOLERANCE (2% of total weight of other fish per trip; per 30 days for traps)
115-300	LIMITED (as above)	TOLERANCE (15% in number or 4% in weight, included in total)	TOLERANCE (1 per angler, per day, included in total)	NONE	TOLERANCE (2% of total weight of other fish per trip; per 30 days for traps)
> 300	LIMITED (as above)	200 TONS	2,250 BLUEFIN TUNA (no more than 200 of these from South of Chatham, Massachusetts)		TOLERANCE (2% of total weight of other fish per trip; per 30 days for traps)

lbs were allowed tolerances beyond these limits not to exceed either 15% of the total number or 4% of the total weight taken on any one trip. Persons angling for bluefin between 14 and 115 lbs were allowed to take one larger and one smaller fish per day. In addition, persons or vessels fishing for species other than bluefin (with any gear) were allowed to incidentally take bluefin of any size that did not exceed 2% of the total catch per trip (per 30 day period for traps).

Quotas

The total quotas for weight categories by gear type are given in Table 1. A special provision for bluefin greater than 300 lbs stipulated that no more than 200 of the total quota (2,250) could be taken south of a line extending from the entrance to Chatham Harbor, Massachusetts, east into the Atlantic Ocean. Bluefin of any size that were taken as incidental catches were included in their respective weight-gear class quotas, where applicable.

Seasons

The season for catching bluefin by all allowable kinds of gear was opened on 1 January 1975, although the regulations did not become effective until 13 August 1975. The purse seine quota for school tuna had already been exceeded when the regulations became effective, and the season was closed when the

regulations were published in the Federal Register. The season for purse seining for bluefin greater than 300 lbs was closed on September 22 by notice in the Federal Register (September 24) after the catch of the last set exceeded the quota. The season for fishing for bluefin greater than 300 lbs by other than purse seining (essentially by hand gear) was closed on September 16, by publication of this closure notice in the Federal Register (September 12). There was no closed season for angling for bluefin between 14 and 115 lbs.

Enforcement

The 1975 regulations became effective late in the fishing season. There was one incident of enforcement arrest (where a vessel was apprehended for purse seining after that season closed). One state participated in enforcement through a NMFS contract to make late and post season boat patrols off Rhode Island. NMFS enforcement personnel made late and post season cutter patrols (with the Coast Guard) and air patrols in Cape Cod Bay, and checked dealers, processors, markets, and air freight companies in New York and New England.

CATCH STATISTICS

Although some catch statistics of Atlantic bluefin tuna landed along the northeastern U.S. have been recorded since 1947, total numbers, weights, and most of the specific size and gear records prior to 1975 are fragmentary and incomplete. A major effort of the Southeast Fisheries Center Miami Laboratory toward management of the Atlantic bluefin tuna has been to improve catch statistics. Records for 1975 are more comprehensive and complete than any prior year, but further improvements are needed. The catch records are discussed under seven categories: purse seine for school tuna, purse seine for giant tuna, sport fishing for school tuna, hand gear fishing for giant tuna, traps, other gear catches of school tuna, and other gear catches of giant tuna. Total U.S. catch estimates and records by gear type and general fish size for 1973, 1974, and 1975 are given in Table 2. U.S. catch estimates for regulated weight classes by different gear types for 1975 are given in Table 3.

Purse Seine for School Tuna

Fishing by U.S. purse seiners in 1973 was unrestricted.

The 1974 catch was 13% less in total weight than in 1973, and was 27.5% less than the recommended catch quota. Two factors promoted this lower catch: (1) most purse seine captains voluntarily restricted their catches of the relatively abundant one-year-old age group, and (2) availability of older fish was limited by their relative scarcity and bad weather.

The 1975 catch by U.S. vessels was 72% higher than mandated by the 1975 quota. Only about 10% of the total number of bluefin landed were 1-year-old fish, weighing less than 14 lbs. With the exception of 58.1 tons, the entire U.S. catch for 1975 was made prior to August 13 when the regulations became

Table 2. U.S. catches of Atlantic bluefin tuna for 1973, 1974, and 1975, by gear type for general fish size in numbers of fish and weight in short tons (Estimated values are followed by an asterisk)

GEAR TYPE	1973 CATCH	1974 CATCH	1975 CATCH
Purse seine	1,000 tons	870 tons	1891.47 tons
(school tuna)	—	—	161,427 tuna*
Sport angling	?	206 tons*	128.07 tons*
(school tuna)	?	45,000 tuna*	16,860 tuna†
Purse seine	321 tons	53 tons	303.04 tons
(giant tuna)	—	167 tuna	1,068 tuna‡
Hand gear	686 tons*	543 tons*	780.17 tons*
(giant tuna)	2,056 tuna §*	1,500 tuna *	2,336 tuna ††
Traps	22.7 tons*	12.2 tons*	7.91 tons
	48 tuna*	49 tuna †††*	48 tuna §§
Other incidental	?	?	2.23 tons*
	?	?	20 tuna *
Totals	2,029.7 tons	1,684.2 tons	3,112.89 tons
			185,227 tuna

† includes 35 ABT of 3.07 tons, each between 115 and 300 lbs; excludes ABT greater than 300 lbs

‡ includes 32 ABT of 1.48 tons, each less than 115 lbs

§ minimum size or weight not known

|| minimum weight is 115 lbs

†† includes 5 ABT of 0.57 tons, each between 115 and 300 lbs

††† includes 16 tuna of 0.31 tons, each 14-115 lbs; one tuna of 0.075 tons, of 115-300 lbs; and 32 tuna of 11.8 tons, each greater than 300 lbs

§§ includes 8 ABT of 0.07 tons, each less than 14 lbs; includes 16 ABT of 0.48 tons, each between 14 and 115 lbs

|||| includes 15 ABT of 0.63 tons, each between 14 and 115 lbs

effective. The 1975 fishery began in late June, and 9 U.S. and 2 Canadian seiners participated.

Purse Seine for Giant Tuna

Despite concentrated efforts by one purse seiner in Cape Cod Bay during September 1974, the catch was relatively low, only 24% of the recommended quota.

Table 3. U.S. catches of Atlantic bluefin tuna during 1975 by four weight-classes for different gear and fishing types, in short tons and numbers of fish (numbers are beneath tons and in italics)

GEAR TYPE	WEIGHT-CLASS				TOTALS
	< 14	14-115	115-300	> 300	
Purse seine (school tuna)	67.06 <i>15,779</i>	1822.0 <i>145,614</i>	2.41 <i>34</i>	—	1891.47 <i>161,427</i>
Purse seine (giant tuna)	—	1.48 <i>32</i>	2.26 <i>19</i>	299.3 <i>1,017</i>	303.04 <i>1,068</i>
Sport angling (school tuna)	55.4 <i>12,064</i>	69.6 <i>4,761</i>	3.07 <i>35</i>	—	128.07 <i>16,860</i>
Hand gear (giant tuna)	—	—	0.57 <i>5</i>	779.6 <i>2,331</i>	780.17 <i>2,336</i>
Traps	0.07 <i>8</i>	0.48 <i>16</i>	0.06 <i>1</i>	7.3 <i>23</i>	7.91 <i>48</i>
Incidental	—	0.63 <i>15</i>	—	1.6 <i>5</i>	2.23 <i>20</i>
Totals (tons)	122.53	1894.19	8.37	1,087.8	3112.89
Totals (numbers)	<i>27,851</i>	<i>150,438</i>	<i>94</i>	<i>3,376</i>	<i>181,759</i>

Two purse seiners fished for giant bluefin in Cape Cod Bay in September 1975, and caught 303 tons, 51% greater than the quota. Fifty-one of the 1,068 tuna caught were smaller than 300 lbs round weight (5% of the total number, 1.2% of total weight).

Sport Catch of School Tuna

Prior to 1975, no reliable statistics are available on the sport catch of small bluefin tuna along the mid-Atlantic coast of the U.S. In 1975 contracts were negotiated with Adelphi and Rutgers universities to conduct a detailed survey of the bluefin tuna catch off New Jersey and New York. The total estimated catch of bluefin tuna by sport fishermen in 1975 is estimated at about 17,000 fish. About 78% were landed in New Jersey and 15% in New York. Seventy-one percent of the catch consisted of fish less than 14 lbs.

In the restricted category for 115-300 lb bluefin, where a tolerance of only one per angler per day was allowed, there were no apparent major violations. Only about 80 fish of this weight range were caught by sport fishermen in 1975 (about 0.5% of the total number caught). We noted from our survey records that the bag limit of four tuna per angler per day was exceeded in a relatively few instances, and on trips where bluefin were caught, the average number of bluefin caught per angler per trip was less than one.

Hand Gear Catches of Giant Tuna

The principal areas of capture of giant bluefin tuna by harpoons, hand lines, and rod and reel in the U.S. are from Cape Cod Bay through Maine. Relatively few have been landed south of Chatham, Massachusetts, in recent years. Records of these catches have been kept for Cape Cod Bay and vicinity since 1947. Adequate catch records for most other areas were not obtained prior to 1975. In 1974, the State of Massachusetts kept records for that state, and the National Marine Fisheries Service attempted to obtain and compile the numbers and sizes landed in other states. In 1975, the National Marine Fisheries Service assumed responsibility for maintaining catch records from all areas.

There was little compliance by fishermen with the recommended quota for 1974. We recorded an estimated 1,500 bluefin landed in the U.S. in the weight category of 115 lbs and greater with total weight estimated at 543 tons.

In 1975, the National Marine Fisheries Service attempted to maintain an updated total of giants (greater than 300 lbs) landed in the U.S. during the fishing season so that the season could be closed when the 2,250 quota was caught. Our estimate of 2,000 giants caught as of September 10 was the basis for the decision to close the fishing season for giants at 0001 hours on September 16. Obviously the within season estimate was low. Only 46 giants were recorded as landed during September 11 through 15, and our current recorded catch of 2,359 giants is 4.8% higher than the quota set, although 5 of these giants are known to have been caught after the season closed. Of this total recorded catch, only 2,331 were caught by hand gear. An additional 28 giants from incidental catches (see below and Table 3) were added to the total, as required by the regulations.

Only 46 giant bluefin were recorded as landed south of Chatham (Louisiana to Rhode Island) in 1975. This was only 23% of the 200 giant quota allotted for that area.

Hand gear caught only 4 bluefin weighing between 115 and 300 lbs north of Chatham in 1975 (all by harpoon). South of Chatham about 80 of these fish were caught (all by rod and reel).

The flow of these economically valuable giant bluefin from catching vessel to their ultimate destination is often diverse or indirect (including landings, dealers, processors, truck drivers, transport boats, and airplanes). Sampling catches at various sites and from various sources frequently produced duplicate records of individual fish. To ascertain these duplications, we determined that the minimum data needed were: date caught or landed, name of catching vessel, captain's name, landing name, dealer or other destination, and weight (round or dressed). We attempted to obtain all of these items, as well as kind of gear used, from all giants landed in 1975, and we were successful in obtaining all 7 of these items for about 10% of the total recorded catch.

Traps

Catches by stationary fish traps have been declining in recent years. We know of only three sites with traps that caught bluefin in 1975. At Narrangansett Bay a single day's trap catch produced 12 bluefin weighing a total of 159 lbs. The trap at Chatham caught 1 bluefin of 19 lbs. In Provincetown, where traps have been catching bluefin for about 65 years, two traps caught 35 bluefin weighing a total of 15,716 lbs between July 24 and October 20. Catches of bluefin weighing less than 300 lbs at the Provincetown traps for the last 3 years (in percentage of total catch by number and by weight, respectively) were: 1973, 17 and 2.6%; 1974, 35 and 3%; 1975, 34 and 6.6%.

Other Gear Catches of School Tuna

We received reports that in 1975 school tuna were landed by commercial gill-net boats, swordfish longline boats, and offshore lobster boats using hook and line. Accounts of the numbers and sizes of tuna caught by these methods are as yet fragmentary, but we suspect that they probably amount to less than 5% of the total number caught by sport fishermen.

Other Gear Catches of Giant Tuna

We have records of only 5 giant bluefin caught by other gear in 1975 (2 each by longline and paired trawl and 1 by dragging).

RESEARCH

Research activities have concentrated on several important aspects of the biology and population dynamics of Atlantic bluefin tuna. One of the initial problems facing any rational management scheme is the accurate determination of the number of stocks in the North Atlantic. There is firm evidence from tagging that trans-Atlantic migrations do occur in some years. Based on this evidence ICCAT has recommended that for the present the North Atlantic be treated as having a single stock of bluefin. We are attempting to make a more accurate determination of stock definition in the Atlantic. Studies on morphometrics and meristics, for example, reveal significant differences between eastern and western Atlantic specimens. Western Atlantic bluefin have a greater number of pectoral fin rays, a longer second dorsal, and in juveniles, a greater number of gill rakers. These studies suggest that more than one stock exists in the North Atlantic, and work is continuing to expand and refine these analyses. We are also examining the use of biochemical techniques for stock identification and some preliminary work on western Atlantic samples has been completed.

We are also placing a great deal of emphasis on age and growth studies. The last important analysis on age and growth of bluefin was done in 1960 and the techniques used may have been somewhat subjective.

In 1974, two reports summarized recent efforts to improve aging techniques. These utilized the rings (presumed to represent annuli) on both vertebrae and otoliths, with otoliths providing the more promising results. In general these studies showed two important things: (1) Giant Atlantic bluefin tuna live longer than previously believed. An otolith of a fish believed to be 27 years old has been examined, while a previous maximum age of 18 years (based on scale

interpretation) had been reported. (2) Giant Atlantic bluefin tuna of one age may be of quite variable size (in body length and in weight), so that the size ranges of fish of different ages may overlap appreciably.

The Southeast Fisheries Center Miami Laboratory is currently refining aging techniques for Atlantic bluefin tuna. We collected samples of vertebrae from approximately 1,300 fish and otoliths from about 750 fish of various sizes caught along the northeast U.S. in 1975. From these, a tentative age structure analysis is planned for completion during 1976.

One of the most important tasks in the Atlantic Bluefin Tuna Program is an analysis of the population dynamics of Atlantic bluefin and an annual assessment of the status of stocks. New analyses are being conducted utilizing the method of cohorts and treating the North Atlantic as both a single stock system and as one containing both an eastern and western stock. Considerable emphasis is also placed on providing sound scientific data for use in determining catch quotas for the U.S. fishery and for making allocations of catch between the various fisheries. We are continuing our tagging work in cooperation with Woods Hole Oceanographic Institution, and these studies provide us with estimates of annual mortality rates and allow us to monitor the status of the immature stocks as they move through the purse seine fishery.

Other studies include new estimates of the fecundity of western Atlantic bluefin, new analyses on the spawning distribution and spawning seasons, larval abundance estimates, aerial surveys of the spring migration of spawning and post-spawning adults past the western edge of the Bahama Banks, and an analysis of the sex distribution among the various fisheries on both sides of the Atlantic.

SUMMARY

Progress was made in 1974 and 1975 toward effective management of the stock or stocks of Atlantic bluefin tuna. Efforts and interest related to this goal, both international and within the U.S., continue to increase.

Although the estimated total catch increased in 1975, (ca 55% over 1973 and 87% over 1974), it obviously would have been much higher without the application of the Atlantic Tuna Convention Act of 1975 late in the 1975 bluefin fishing season. The catch for these years is less than half of the catch of a peak year such as 1963 when 6,361 tons were taken by purse seine alone.

Although the estimated 1975 U.S. catch of bluefin tuna less than 14 lbs appears excessive, it is only about 17% of the estimated 138,000 bluefin tuna of that size caught by purse seine alone off the U.S. in 1966.

There are indications that various provisions of the Act will be modified for 1976 to more effectively conserve, to make optimum use of the resource, and to more equitably partition the harvest to the various user groups. Results from improved catch statistics and expanding research on the biodynamics of the Atlantic bluefin tuna will contribute to this.

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