

1995

Atlantic Bluefin Tuna Management

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Atlantic Bluefin Tuna Management

by
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*A paper submitted in partial fulfillment
of the requirements for the degree of
Master of Marine Affairs*

University of Rhode Island
1995

Major Paper
Master of Marine Affairs

Approved 
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University of Rhode Island
1995

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I. Introduction

International management of Atlantic Bluefin Tuna under the International Commission for the Conservation of Atlantic Tunas (ICCAT) and federal management under the U.S. National Marine Fisheries Service (NMFS) has certainly been contentious. Atlantic bluefin tuna have been managed at the international level by ICCAT for the past 25 years. NMFS is the organization responsible for implementing ICCAT recommended conservation and management measures in the United States. ICCAT has management authority over tunas and tuna-like species including bluefin tuna, swordfish, and marlin, but the "western" Atlantic bluefin tuna is the only species for which ICCAT has ever recommended catch quotas. In an attempt to halt an apparent decline in the abundance of bluefin tuna in the western Atlantic, ICCAT has recommended strict management measures including catch quotas, minimum sizes, "no-sale" provisions, and spawning area protection since 1981. ICCAT had recommended in 1993 an additional 50% reduction in the western quota for the 1994 and 1995 fishing seasons, but at their recent 1994 meeting decided to abandon the planned reduction and adopt a 10% increase. ICCAT also recommended for the first time in 20 years catch restrictions in the eastern Atlantic and Mediterranean.

This research paper attempts to explain this apparent "turn-around" by ICCAT and the events which influenced it, the most significant being the recent repudiation of past ICCAT scientific assessments by the U.S. National Academy of Sciences' National Research Council. This paper chronicles Atlantic bluefin tuna management over the past 25 years at the international level under ICCAT, and at the federal level under NMFS. The positions of the two primary interest groups, the fishing industry and conservationists, will be reviewed and

maximum benefit to society over the long term. Fishery management for conservation purposes has been adopted internationally and is required by the Law of the Sea, Article 61:

"The coastal State, taking into account the best scientific evidence available to it, shall ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over exploitation. . . . Such measures shall also be designed to maintain or restore populations of harvested species at levels which can produce maximum sustainable yield, as qualified by relevant environmental and economic factors, . . ." (U.N. 1982)

Conservation of highly migratory species requires that they be managed over the entire range of the stock. Regulatory measures applied to only a portion of the stock will not be effective. The only way to manage bluefin tuna is through international cooperation between the nations through which these fish migrate, and other nations whose fishermen participate in the fishery. This has also been recognized at the international level as evidenced by Article 64 of the Law of the Sea which states:

"The coastal State and other States whose nationals fish in the region for highly migratory species listed in Annex I shall co-operate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone." (U.N. 1982)

One of the major aspects fishery management is allocation, given the fact that there are not enough fish for all fishermen. Allocation distributes the

opportunity to participants in the fishery. This has always been controversial and the decisions are always political. The NOAA Fishery Management Study (NOAA 1986) assessed the current U.S. fishery management system created under the Magnuson Act, which essentially left the conservation and allocation decisions to regional councils. The study concluded that fishery management would be significantly improved by a clear separation between conservation and allocation decisions. Separating conservation and allocation is done for the purpose of giving priority to maintaining the resources for future generations. The NOAA study considered several alternative arrangements to accomplish the separation of conservation and allocation, ranging from single entities such as all-Federal and all-Private, to shared management. The study concluded that conservation and allocation decisions could not be made by the same body. The preferred alternative was conservation by NOAA and allocation by the regional councils.

There are a number of general principles which should govern the regulation of fishing (Royce 1984):

- 1.) Most people being regulated must agree about the need for regulation, and how it is supposed to work. This requires a knowledge of the resources and a respected forecast of the consequences.
- 2.) The regulation must be enforced else violators will destroy confidence in its effectiveness.
- 3.) Joint actions are required for stocks migrating between political jurisdictions.
- 4.) Regulation must be based on continuing scientific assessment of the condition of the stock and fishing effects. This requires reliable statistical databases and an experienced scientific staff.

5.) Regulation must be consistent on the part of all political entities, which requires development of suitable laws in each.

6.) Regulation requires confidence on the part of the people being regulated that the system is fair and effective.

7.) Regulation must be taken early in the development of a fishery to be effective. Long-established fisheries are tough to regulate due to vigorous opposition by those who expect to incur large economic losses as a result of regulation.

These general principles are essentially common sense considerations. Fishermen do not like to be regulated, and gaining their confidence that regulation is going to be fair and effective is critical.

James Joseph, director of the Inter-American Tropical Tuna Commission (IATTC), the Pacific counterpart to ICCAT, outlined several concepts that international tuna management organizations need to follow in order to be effective (Senate 1989):

1.) Stocks of highly migratory species must be managed over their entire range: management over only a portion of that range cannot be effective.

2.) The basis of management must be an understanding of the biology, population dynamics, abundance, and fishing and environmental effects on abundance of the stock derived from scientific study which also must apply over the range of the stock.

3.) The economics of fishing must be considered. Overcapitalized fisheries are difficult (impossible) to manage in terms of cooperation.

4.) Enforcement of conservation measures and regulations must be equitable and uniform if management is to be effective.

5.) Effective management will require compromises on the part of all nations.

Evaluation of tuna management alternatives in the past has focused on determining to what degree they provide adequate solutions to basic accepted tuna management problems. Four general problems associated with the scientific study and management of tuna have been identified (Joseph and Greenough, 1979):

- 1.) Collection of basic fishery statistics, biological data, and analysis.
- 2.) Distribution of catch between users.
- 3.) Rapid increase in fleet carrying capacity.
- 4.) Enforcement of conservation regulations adopted by involved nations.

For an international management structure like the ICCAT/NMFS bluefin tuna management to be effective, it seems that some of these problems need to be solved at the international level, and others at the domestic or federal level. Scientific data collection and assessment and strict enforcement, both over the range of the stock, need to be addressed at the international level. Fair allocation and overcapitalization need to be solved by individual nations.

III. Fishery and Resource Descriptions

Resource

Bluefin tuna (*Thunnus Thynnus*) are a long-lived and rapid-growing species. The consensus in the biological community is that these fish do not spawn until approximately 8 years of age, and can grow as large as 1500 lbs.

and as old as 30 years. Bluefin tuna are one of the largest fish, and one of the fastest, capable of burst speeds up to 55 mph. In the western Atlantic, they range from Brazil to Newfoundland, and in the eastern Atlantic from Norway to the Canary Islands and into the Mediterranean Sea. Two distinct spawning areas have been identified; the Gulf of Mexico and the Mediterranean Sea. Fish tagged on both sides of the Atlantic have been recaptured after completing trans-Atlantic migrations. For assessment and management purposes ICCAT and NMFS have grouped bluefin tuna by age, weight, and fork length into size classes (Table 1).

Table 1, Atlantic Bluefin Tuna Designations

Age (Yr.)	ICCAT Designation	NMFS Designation	Length (in.)	Weight (lb.)
0-1	Small	Young School	0-26	<14
2-3	Small	School	26-45	14-66
4-5	Small	Large School	45-57	66-135
6-7	Medium	Small Medium	57-70	135-235
8-9	Medium	Large Medium	70-77	235-310
10+	Large	Giant	> 77	> 310

Fishery

The Atlantic bluefin tuna fishery would have to be considered one of the most complex fishery management scenarios, spanning across multiple jurisdictions (local, state, federal, and international), and comprised of several gear types. In the eastern Atlantic and Mediterranean, bluefin tuna have been exploited for thousands of years. The most significant components of the eastern Atlantic fishery include Spanish and French baitboats, French gillnets, and a mid-Atlantic Japanese longline fishery. The Mediterranean fishery is

comprised of many gear types, most employed by non-ICCAT countries.

French, Italian, Turkish, Croatian, and Tunisian purse seines take approximately 70% of the total Mediterranean catch.

In the western Atlantic, no directed bluefin fishery existed until the 1900's, when a sport fishery for small and medium bluefin developed along the U.S. east coast and a giant fishery developed in the Gulf of Maine and Canadian waters. Up until 1960 the commercial fishery in the west was for the most part incidental catch. Commercial purse seining directed at small bluefin expanded rapidly in the 1960's to support a canning industry. The western Atlantic longline fishery developed in the 1970's with the Japanese taking approximately 10,000 giants from the Gulf of Mexico spawning area in a single year.

The current U.S. Atlantic bluefin tuna fishery is comprised of two separate components, a purse seine fishery and a handgear fishery. The purse seine fishery is comprised of 5 vessels which operate under a non-transferable individual vessel quota system. This IVQ system, which was established in 1982, splits the quota equally among those 5 vessels, and effectively excludes new entrants from the purse seine fishery. The IVQ system eliminates the rush to fish; these 5 vessels wait for high densities of bluefin to appear each year and fill their quotas in a few week period. The handgear fishery is open access and is comprised primarily of harpoon and hook and line gear. This fishery is comprised of a large number (approximately 11,000) of permitted vessels which target all sizes of bluefin including giants. The U.S. fishery has been categorized based primarily on gear type for management and permitting purposes:

<u>CATEGORY</u>	<u>DESCRIPTION</u>
General	Handgear: Handline, Harpoon, or Rod & Reel
Harpoon	Harpoon Only
Angling	School & Medium Only
Purse Seine	Giant & Large Medium Only
Incidental	Longline/Split North and South
Reserve	Discretionary

The U.S. Atlantic bluefin fishery includes a large number of permitted vessels of which a fraction catch and sell fish. In 1993 only 10% of those vessels with a bluefin tuna permit actually sold a bluefin (Table 2). The General Category is characterized by a large number of fishermen catching a small number of fish; most fishermen catch no fish at all. Of the 9336 permitted vessels, only 8% caught and sold at least one fish. The gross revenues for this category in 1993 were approximately \$12 million, with 609 mt of bluefin landed. The Harpoon Category is the smallest category in terms of value and volume, with \$750,000 in gross revenues in 1993 and 57 mt landed. The Purse Seine category consists of only 5 vessels, which landed 295 mt in 1993 with gross revenues of \$5.4 million.

Table 2, 1993 NMFS Catch Statistics (NMFS 1994).

Category	# Vessel Permits	# Vessels Catching		Total Landings (mt)	Gross Revenues (Thousands)
		At least one fish	Success Rate (%)		
General	9,336	778	8%	609	\$11,999
Harpoon	132	34	26%	57	\$742
Purse Seine	5	5	100%	295	\$5,385
Incidental	607	167	27%	85	\$1314
Total	10,081	983	10%	1,046	\$19,440

A new market developed in Japan in the 1970's for fresh giant bluefin tuna flown directly to Japanese markets, and the ex-vessel price has increased from \$0.20 per pound in the 1970's to \$10-15 per pound in 1993. The average wholesale price currently averages \$15-20 per pound, and the record price paid in 1992 for a single fresh 715 lb. bluefin was \$69,273.30 (\$97 per pound). "The animal is as big as a sports car, goes from 0 to 60 about as fast as a Porsche, and it can be worth about as much as a Porsche" (Craft, 1994). The high ex-vessel price paid by the Japanese for fresh bluefin tuna, upwards of \$10,000 for a single prime 500-700 lb. giant, has blurred the distinction between recreational and commercial fishing in the U.S. bluefin fishery. Most giants, whether caught by commercial, charter boat, or recreational fishermen end up in Japan.

The resource and fishery characterizations reveal several major management concerns. The fact that these fish are so long-lived and do not spawn until age 8 presents some unique management problems. Mistakes in this fishery such as significant overfishing in the 1960's and 1970's take years to correct, and the impact of conservation and management measures may take tens of years to appear. The bluefin fishery has been long established throughout the Atlantic, especially in the east, where it dates back to the ancient Phoenicians. These "traditional" fisheries will be difficult to change. The U.S. Atlantic bluefin tuna fishery is overcapitalized, which will make management more difficult. Finally the extremely high price paid by the Japanese for fresh bluefin will further complicate management.

IV. Federal Management

ICCAT recommended conservation and management measures have been implemented at the federal level by NMFS since 1975 under the authority of the Atlantic Tunas Convention Act (16 U.S.C. 971). The Magnuson Fishery Conservation and Management Act (16 U.S.C. 1801) was passed in 1976 to govern fisheries within the U.S. 200 mile exclusive economic zone, but specifically exempted highly migratory species including bluefin tuna from its purview. The Fishery Conservation and Management Amendments of 1990 (U.S. Public Law 101-627) amended both the Magnuson Act and the ATCA in the area of highly migratory species management. The 1990 Amendments gave the Secretary of Commerce for the first time management authority over tuna in the U.S. EEZ under the Magnuson Act and also directed the Secretary to develop and implement fishery management plans (FMPs) for Atlantic highly migratory species. The 1990 Amendments do not clearly address the relationship between the Magnuson Act and the ATCA. The Secretary of Commerce is still issuing regulations under the ATCA until an FMP for bluefin tuna is developed and regulations issued under the Magnuson Act.

Atlantic Tunas Convention Act

Although the ICCAT convention entered into force in 1969, the first management recommendations were not made until 1974, and were to be implemented by the member nations in 1975. At this time the U.S. did not have enabling legislation in place under which it could enforce ICCAT recommendations on U.S. fishermen. The U.S. tried unsuccessfully to implement the restrictions through NOAA under the Fish and Wildlife Act (16 U.S.C. 742), the Marine Migratory Sportfish Act (16 U.S.C. 760), and the Endangered Species Act (16 U.S.C. 1531). Finally the Atlantic Tunas

Convention Act was passed by Congress in 1975 which allows the Secretary of Commerce to implement ICCAT recommendations.

The ATCA was enacted to provide the framework for U.S. participation in ICCAT. The ATCA provides for the appointment of three U.S. Commissioners to ICCAT along with an Advisory Committee. The Commissioners are appointed by the President and can serve no more than two three year terms. Only one Commissioner can be a government employee, and to date this has been a NOAA official. The other two Commissioners represent both commercial and recreational fishing interests. The conservation groups are not represented at the Commissioner level. The Advisory Committee is made up of 5-20 individuals from various interest groups, including conservationists. The U.S. ICCAT position is developed each year after consideration of scientific and management input from a variety of sources including NMFS, its Southeast Fisheries Center, NOAA, the Advisory Committee, and the Department of State. The U.S. position is then negotiated at the ICCAT convention each year by the Commissioners.

The ATCA provides the Secretary of Commerce with the authority to adopt regulations necessary carry out the purposes and objectives of ICCAT and the ATCA, and to promulgate regulations to carry out the recommendations of ICCAT (16 U.S.C. 971d). The Secretary of Commerce has delegated its management responsibilities under the ATCA to NOAA, who has further delegated them to NMFS. NMFS has established bluefin tuna quotas, catch rates, seasons, and licensing requirements for U.S. fishermen pursuing bluefin tuna since 1975.

The 1990 Amendments provide that any regulations promulgated under the ATCA shall be consistent with FMPs implemented under the Magnuson Act and:

"... that no regulation promulgated under this section may have the effect of increasing or decreasing any allocation or quota of fish to the United States agreed to pursuant to a recommendation of the Commission."
(16 U.S.C. 971)

NMFS has argued against this provision in the ATCA that limits the Secretary of Commerce from issuing regulations that would increase or decrease the total ICCAT quota (House 1993a). They would like the ability to reduce domestic quotas, unilaterally if necessary, for conservation purposes. Some ICCAT recommendations have been applied by NMFS in a manner to further maximize conservation efforts, such as a larger minimum size for sale of bluefin tuna in hopes of speeding the recovery of the spawning stock. While this measure does not violate the ICCAT quota provision, it does place an additional burden on U.S. fishermen relative to foreign Atlantic bluefin tuna fishermen.

Magnuson Fisheries Conservation and Management Act

Under the Magnuson Fisheries Conservation and Management Act the United States claimed management authority over the fishery resources within the U.S. 200 mile Exclusive Economic Zone. From 1976 through 1992, highly migratory species including Atlantic bluefin tuna were the exceptions to the rule. The Fishery Conservation Amendments of 1990 made fundamental changes to the way the U.S. manages bluefin tuna under the Magnuson Act. The exemption for highly migratory species was abolished effective January 1, 1992:

"The United States shall cooperate directly or through appropriate international organizations with those nations involved in fisheries for

highly migratory species with a view to ensuring conservation and promoting optimum utilization of such species throughout their range, both within and beyond the exclusive economic zone." (16 U.S.C. 1812)

The 1990 Amendments grant the Secretary of Commerce management authority over highly migratory species on the east coast including Atlantic bluefin tuna (16 U.S.C. 1854). These amendments also require the Secretary to "diligently" pursue management measures through international management entities such as ICCAT, and to prepare fishery management plans for highly migratory species. On the west coast, these same pelagics are managed by the regional councils. It seems that the situation on the east coast with multiple councils, two primary user groups, and one non-user group at odds with each other, precluded bluefin management at the council level.

The 1990 Amendments direct the Secretary of Commerce to undertake a number of actions while preparing FMPs for highly migratory species including conducting public hearings as well as consulting ICCAT Commissioners and Advisory Groups, affected councils, and the Secretary of State. These actions should include an evaluation of the effects of conservation and management measures on affected fishery participants, and minimize any disadvantage to U.S. fishermen in relation to foreign competitors. The conservation and management measures contained in the highly migratory FMPs are required to consider traditional fishing patterns of U.S. vessels and be fair and equitable in allocating fishing privileges among U.S. fishermen. Finally the Secretary is required to allow U.S. fishermen to catch any quota provided by international organizations such as ICCAT:

"With respect to highly migratory species for which the United States is authorized to harvest an allocation or quota under a relevant

international fishery agreement, the Secretary shall provide fishing vessels of the United States with a reasonable opportunity to harvest such allocation or quota." (16 U.S.C. 1854)

The 1990 Amendments clearly support international management of highly migratory species. The amendments do however mandate a change at the federal level, by directing the development of FMPs through a public process, and management measures consistent with the principles of the Magnuson Act. All fishery management plans must be consistent with the national standards and with regulations implementing recommendations by international organizations in which the United States participates (16 U.S.C. 1851). The national standards (16 U.S.C. 1851) clearly stress fair and equitable allocation with no one receiving an "excessive" share.

Management under the Magnuson Act has not yet materialized. NMFS is still implementing ICCAT recommendations under the authority of the ATCA because there does not exist a FMP for bluefin tuna. NMFS is not apparently in any hurry to implement an FMP for bluefin, and development of the Atlantic bluefin FMP is moving at glacial pace. It took NMFS 2 years to publish the process by which they intend to develop the plan, and past history has shown the start-to-finish time for FMP development to be on the order of 3-5 years. Some controversy can be expected as interest groups attempt to influence regulatory changes under a new era of management through domestic Fishery Management Plans (Chase 1992).

NMFS Allocations

In August 1975 NMFS promulgated its first bluefin tuna regulations under the ATCA in order to implement ICCAT recommendations. The NMFS chose to

prohibit fishing for bluefin tuna less than 14 lb. and for bluefin 115-300 lb. (but did allow an incidental catch), and chose to limit catch by means of a quota to keep fishing mortality at recent levels. The purse seine vessels were limited to 1179 metric tons, and the rest of the fishery was limited to 2250 fish (>300 lb.).

To implement the 1981 ICCAT recommendations which limited the overall U.S. catch of western bluefin to 605 mt, NMFS decided to allocate the quota among several categories (Table 3). The major outcome in 1982 was the elimination of the directed purse seine fishery for bluefin tuna. Two main reasons were cited: 1.) that purse seine fishing was not suited for scientific monitoring purposes in small localized fisheries and 2.) domestic purse seiners are involved in other fisheries where they can catch substantial amounts of yellowfin and skipjack tuna.

The 1982 ICCAT recommendations increased the U.S. quota for scientific monitoring to 1387 mt, and NMFS chose to increase all segments of the fishery by an equitable amount and reinstated the directed purse seine fishery. NMFS stated that the purse seine category was one of the traditional bluefin fisheries, and even though there are a small number of participants compared to General category and recreational fisheries, NMFS did not believe it should be eliminated or severely restricted.

To implement the 1991 ICCAT recommendations, NMFS chose to spread the 10% reduction equally across the 1992 and 1993 seasons and base its allocation on a 10% reduction of the average 1983-1991 landings in each category. This was not simply a 10% reduction of the previous year's quota. The net effect was that Angling category, which had historically exceeded its quota by up to 400%, realized a 75% increase in its allocation for 1992, while the General, Purse Seine, and Incidental categories incurred a 20% decrease. NMFS also promulgated a regulation prohibiting the sale of any bluefin less

than 70", which was beyond the ICCAT recommendation of 47". These regulations most severely affected the Angling category, since they are only permitted to catch fish less than 70".

The 1993 ICCAT recommendation again reduced the western Atlantic quota by 15%, but the U.S. only realized a 1% reduction due to Japan's forfeiting a percentage of its western share. Therefore the allocation for 1994 remained the same for each category, with the 1% reduction taken from the Reserve Category.

Table 3, NMFS Atlantic Bluefin Tuna Allocations (mt)

Category	1982	1983-1991	1992-1993	1994
General	258	590	531	531
Harpoon	39	54	53	53
Purse Seine	0	386	301	301
Angling	90	126	219	219
Incidental	195	137	113	113
Reserve	22	94	31	18
U.S. Total	605	1387	1248	1235

For the past 12 years NMFS has not changed the allocation percentages among categories, with the exception in 1991 of increasing the Angling quota to better reflect small fish catch. They have basically stuck with proportional reductions since the original allocations in 1981-82; the easiest and least controversial method of implementing the ICCAT reductions; but probably not the most equitable.

Bluefin Tuna DEIS

In preparation for implementing the proposed ICCAT quota reduction in the western Atlantic in 1995, NMFS published a Draft Environmental Impact Statement (NMFS 1994) for a regulatory amendment to the western Atlantic bluefin tuna fishery which examined a wide range of allocation alternatives under several quota levels. NMFS recognized that the proposed 1995 quota reduction was severe enough to cause significant impact on the natural and human environment and warrant an EIS. NMFS's objective is to implement the ICCAT recommendation under the ATCA and remain consistent with the National Standards contained in the Magnuson Act. The "proposed action" identified in the DEIS was the implementation of the 1995 ICCAT quota reduction. The objectives of this action were identified as:

- 1.) To control fishing mortality so as to ensure the long-term sustainability of the resource, and to promote stock recovery to levels consistent with providing the ICCAT objective of MSY.
- 2.) To provide the data necessary for monitoring the status of the bluefin tuna stock.
- 3.) To use an interactive management process consistent with MFCMA to determine allocation between user groups, areas and seasons, considering historical fishing patterns, socio-economic effects, and other relevant factors.

The DEIS identified and analyzed five potential quota levels and four domestic allocation schemes. One of the quota levels was the pending ICCAT recommendation, which NMFS would be required to implement in 1995. One of the allocation schemes was the traditional proportional reduction which NMFS has used for all prior quota adjustments. The DEIS also looked at three

potential access control alternatives in order to address the issue of overcapitalization of the Atlantic bluefin tuna fishery.

QUOTA LEVELS

A. Return to 1993 Level	2394 mt
B. Status Quo (1994 Level)	1995 mt
C. Current ICCAT Recommendation (1995)	1200 mt
D. Reduce Quota	800 mt
E. No Fishing Alternative	0 mt

DOMESTIC ALLOCATIONS

- A. Status Quo (Proportional Reduction)
- B. Eliminate Purse Seine Fishery
- C. Eliminate Gulf of Mexico Incidental Fishery
- D. Eliminate Small Fish (< 70") Fishery

ACCESS CONTROLS

- A. Lottery
- B. Limited Entry/Fleet Quota
- C. Individual Transferable Quota (ITQ)

The environmental consequences of these alternatives, both biological and socio-economic, were assessed and compared. The biological measures used to compare alternatives were based on stock size projections and the socio-economic measures included commercial present value, angler consumer surplus, and employment. NMFS used a computer model to predict these measures over a 16 year period, from 1994 to 2010. The DEIS results are predicated upon the 1993 ICCAT stock assessment, such that any change in that assessment would invalidate the DEIS.

In terms of biological consequences, quota levels A, B, and C all resulted in projected declines in stock size over the next 16 years. The other two

alternatives (D and E) both resulted in rebuilding of the stock. For each quota level examined, allocation alternative D (No Small Fish) increased the stock size most rapidly. The proposed 1995 ICCAT quota recommendation of 1200 mt results in a declining stock for all allocation alternatives except for D (No Small Fish). The implementation of the 50% ICCAT quota reduction (1200 mt) will not rebuild the stock under any of the allocation schemes examined. A reduced quota level (800 mt) or no fishing (0 mt) were required to rebuild the stock according to this assessment.

In terms of socio-economic consequences, the traditional proportional allocation (A) leads to the least negative impact on all involved, but this alternative does not maximize the total commercial and recreational benefits. For all the quota levels examined, allocation alternative B (No Purse Seine) maximizes the total economic benefits. Also allocation B could result in increased employment, since currently the purse seine fleet of 5 vessels commands 24% of the U.S. quota, while the 11,000 vessels in the General category share 48%. The negative consequences of allocation B would be those negative economic impacts associated with the elimination of the purse seine fishery.

Table 4, Total Economic Benefits (\$Millions) at Year 2010

Quota Levels:	A.	B.	C.	D.
Domestic Allocations	Return to (2394 mt)	Current (1995 mt)	ICCAT (1200 mt)	Reduced (800 mt)
A. Proportional	117	117	133	97
B. No Purse Seine	133	144	160	116
C. No GOM Incidental	116	117	130	95
D. No Small Fish	36	36	43	30

The Access Control Alternatives were intended to address the issue of overcapitalization of the bluefin fishery by reducing the number of participants. With only 10% of the permitted vessels landing fish in 1993, it was apparent that this fishery was overcapitalized. Each alternative was assessed in terms of socio-economic consequences and impacts such as employment, economic efficiency, acceptability, cost, and equitability. The results for each alternative varied widely, but the DEIS did conclude that a correctly designed ITQ system would maximize economic efficiency, and that the other two alternatives would maximize employment at lower and less stable pay.

Given the recent NRC findings invalidated the scientific basis of the DEIS, the biological consequences of the quota levels and allocation alternatives in the DEIS are meaningless. But assuming we still are going to have some type of quota in Atlantic bluefin tuna fishery, the socio-economic consequences of the allocation alternatives are still relevant. Domestic allocation alternative B (No Purse Seine) maximizes economic benefits and perhaps increases employment. The ITQ access control alternative, if designed correctly, would maximize economic efficiency.

Audubon Study

A study conducted by the Audubon Society (Nemerson, Camhi, and Safina 1994) attempted to quantify the impact of ICCAT's proposed 50% catch reduction on U.S. fishermen in terms of its extent and distribution. The study assessed the effects of reallocating the reduced quota among existing categories, and also limiting access to the fishery. Reallocation seemed feasible because it was felt that the current allocation had a disproportionate distribution of quota, employment, and income among categories. Limiting access seemed to be in the interest of the fishery given the declining stock and

increasing number of fishermen. Audubon looked at the following four allocation schemes:

- 1.) 1992 NMFS (current distribution)
- 2.) Direct Employment
- 3.) Direct plus Indirect Employment
- 4.) No Purse Seine Category

The 1992 NMFS allocation scheme would simply cut the quota in half without changing the percentage allocation among categories. The Direct Employment scheme based allocation on the number of people directly employed (fishermen) in each category. Because the General Category by far employs the most fishermen, it would receive the largest increase in allocation. Basing the allocation on Direct and Indirect Employment, which includes land-based associated activities such as marinas, tackle shops, and charter boats, results in the largest increase for the Angling Category. Any reallocation scheme that seeks to bring quota allocation in line with employment distribution among sectors will transfer quota away from the Purse Seine category where 3% of the workforce, which equates to less than 10 full-time employees, currently receives 24% of the quota.

Table 5, Audubon Quota Reallocation Percentages

Category	1992 NMFS	Direct	Direct & Indir.	No Purse Seine
General	41.2%	68.2%	51.2%	57.4%
Harpoon	4.2%	5.6%	4.3%	5.7%
Incidental	10.8%	10.8%	10.8%	10.8%
Purse Seine	23.7%	2.4%	1.9%	0%
Angling	17.2%	10.6%	29.5%	23.7%
Reserve	2.4%	2.4%	2.4%	2.4%

There were two approaches used to limit access within each category. The "top-down" method retained the highest earners, and the "bottom-up" retained the more numerous low earners. Access was further limited by either maintaining the 1992 average income per fisherman, or reducing that income by 25% to expand access. The Top Down-Maintained Income approach minimized the number of fishermen in the fishery and maximized average income. Conversely the Bottom Up-25% Income Cut provided the widest commercial access at the lowest average income.

Both the NMFS DEIS and Audubon Study show an inequitable distribution of the ICCAT quota, and both show potential benefits by reallocating that quota. Enhancing employment and maximizing economic value are two of the main objectives of fishery management. Eliminating or simply bringing the purse seine quota into line with employment results in fairer distribution, increased economic benefits, and perhaps increased employment. A large economic impact will be incurred by a few individuals, who have reaped substantial benefits over the past 12 years at the expense of other participants. The purse seine fishery probably cannot be eliminated or reduced without litigation. These purse seine vessels have in the past challenged their exclusion from state waters in the U.S. District Court of Massachusetts (Chase 1993).

Clearly too much fishing capacity exists than needed to harvest the ICCAT quota, and too many participants exist to allow them to make a reasonable profit. Limiting access to the fishery was shown to be warranted in both studies, and should maximize economic value. NMFS is considering limiting access into the Atlantic tuna fishery, and has taken the first step by setting a control date (59 FR 45262 1994). NMFS feels that the Atlantic tuna

fisheries, including bluefin tuna, are overutilized and overcapitalized and has effectively closed these fisheries to commercial boats not in the fishery as of September 1, 1994. NMFS is attempting to discourage new entries into the fishery based on economic speculation. The control date is set before planning begins for limited access regimes to help distinguish established tuna fishermen from speculative entrants.

V. International Management

ICCAT History

Management of bluefin tuna began when the International Commission for the Conservation of Atlantic Tunas was opened for signature on May 14, 1966 in Rio de Janeiro amid concern over the rate of exploitation and declining abundance of Atlantic tuna stocks. The convention was ratified by the U.S. in 1967 and entered into force March 23, 1969 and originally consisted of 16 member nations including the United States, Canada, and Japan. There are currently 22 member nations. ICCAT's objective is to maintain populations of tunas and tuna-like species at levels which would permit maximum sustainable catch. Its two main responsibilities are scientific stock assessment and recommendation of conservation and management measures.

The Commission proposes conservation measures in the form of recommendations, which are non-binding, to member nations designed to meet its objective of maximum sustainable catch. There are two groups within ICCAT which support the Commission; the Panels, and the Scientific Committee on Research and Statistics (SCRS). The SCRS is composed of scientists and biologists from member nations and conducts annual stock assessments. The Panels are broken up by species, and are made up of representatives from the

member nations who fish those particular species. Proposals are submitted by individual member nations under the Panel forum, deliberated and approved by the Panel, then forwarded to the Commission for promulgation as final ICCAT recommendations. Panel 2 is responsible for Atlantic bluefin tuna, and its membership includes the U.S., Canada, Japan, France, Korea, Morocco, Portugal, and Spain:

Panel 1	Tropical Tunas	Albacore, Skipjack
Panel 2	Temperate Tunas North	Bluefin, Albacore
Panel 3	Temperate Tunas South	Bluefin, Albacore
Panel 4	Other Species	Bigeye, Atlantic Bonito, Billfishes, Other

ICCAT Recommendations

Major bluefin tuna recommendations were made by ICCAT in 1974, 1981, 1982, 1991, and most recently in 1993. In 1974 the SCRS report indicated that total Atlantic bluefin catches had declined from 40,000 mt in 1964-65 to 12,000 mt in 1973. The SCRS proposed two actions in light of the declining catch; 1.) a short term reduction of fishing intensity on giants to protect spawning fish and 2.) a long-term reduction in purse seining (and other gear catch) of small fish. The 1974 ICCAT recommendation was 1.) prohibit the taking of bluefin tuna less than 14 lb. with incidental catches limited to 15% of the total landing weight, and 2.) limit the fishing mortality to “recent levels” for one year (ICCAT 1975). The determination of “recent levels” was left up to each member country. These conservation measures were renewed annually from 1975 through 1981.

In 1981 ICCAT recommended stringent measures in the western Atlantic which significantly reduced the allowable catch (ICCAT 1982). The SCRS did its analysis in 1981 based on two separate Atlantic stocks, a western Atlantic stock, and a separate eastern Atlantic/ Mediterranean stock. The SCRS reported that in the western Atlantic stock levels were depleted to very low levels, and recommended that total catch in the western Atlantic be reduced to as near zero as feasible. ICCAT recommended that the three major contracting parties which fish the western Atlantic, the U.S., Japan, and Canada, meet again before February 1982 and decide the final quota. They met in Miami in February 1982 and set the final quota at 1160 metric tons (605 U.S., 305 Japan, 250 Canada) for monitoring of the bluefin stock, and prohibited directed fishing in the Gulf of Mexico, a traditional bluefin spawning ground.

In 1982 ICCAT recommended an increase in the western Atlantic quota to 2660 mt citing a need for improved data from the fishery (ICCAT 1983). The SCRS recommended that the 1981 assessments not be used because of changes in historical data and an erroneous stock-recruitment relation used in those efforts. New analyses using a "Virtual Population Analysis" (VPA) technique showed significantly different estimates of stock size. The SCRS also stated that the current 1160 mt quota was not sufficient for adequate "scientific monitoring" of the bluefin stock. Based on these SCRS recommendations, ICCAT recommended that the quota be increased to 2660 mt (1387 U.S., 700 Japan, 537 Canada) for scientific monitoring purposes and that no more than 15% of the western catch be smaller than 47" fork length. These measures were continued from 1983 through 1991.

In 1991 ICCAT recommended additional management measures in the western Atlantic including a 10% reduction in the catch quota (ICCAT 1992). The SCRS found that the overall exploitable biomass had declined to between

10-23% of the 1970 level, and that large fish (8+ years) had continued to decline since 1982 and were currently at 10% of the 1970 level. The SCRS also found that the catch of small fish had continued, and that the increased fishing mortality had reduced the potential for increase of the stock. The SCRS assessment showed that the populations of older fish (10+) had not improved since implementation of the 1982 regulations, and that high catches of small fish had continued slowing the recovery of the entire stock. The SCRS also raised concerns about under-reported and unreported catches based on review of Japanese market statistics which showed additional annual catches of 200-700 mt coming from the western Atlantic. The 1991 ICCAT recommendation included 1.) a 10% reduction in catch for 1992/93 (2394 mt), and 2.) no sale of bluefin less than 66 lb. /45" fork length (or limited to 8% total catch weight). Also in 1991 a Resolution Concerning Catches of Bluefin Tuna by Non-Contracting Parties was adopted by ICCAT in which the Commission resolved to "encourage" non-Contracting parties fishing in the Convention area to join and participate in ICCAT. A joint statement by the U.S., Canada, and Japan proposed restrictions consistent with the General Agreement on Tariffs and Trade (GATT) on the import of Atlantic bluefin tuna from countries which are not Contracting (member) Parties or are not participating in the ICCAT management program.

During the 1993 ICCAT meeting the Commission again adopted new management measures for the western Atlantic bluefin tuna fishery (ICCAT 1994). ICCAT scientists reassessed the status of the western stock in 1993 and concluded that it was continuing to decline despite strict harvesting quotas since 1981 and would continue to do so unless catches were further reduced. The SCRS estimated that biomass levels had declined over the past 20 years to 8-26% of the level estimated in 1975. Their analyses indicated that the

continued catch at 1992-93 level of 2394 mt would result in continued decline in spawning stock biomass. They concluded that a 50% reduction from 1991 levels was necessary to just keep the stock from being depleted further. ICCAT therefore in 1993 recommended a 50% reduction in the western Atlantic bluefin tuna quota from 2394 mt in 1993, to 1995 mt in 1994, and finally 1200 mt in 1995. The 1995 reduction was contingent upon updated SCRS scientific information available in 1994. ICCAT also recommended that the contracting parties in the western Atlantic conduct studies in 1994 and 1995 and develop a recovery program aimed at achieving a 50% increase in spawning stock biomass by 2008.

ICCAT Management Issues

There are two major issues which have been raised concerning ICCAT management of Atlantic bluefin tuna, the two-stock hypothesis and the apparent lack of regulation in the eastern Atlantic and Mediterranean. ICCAT has been managing Atlantic bluefin tuna under the premise that two separate stocks exist, a western stock and an eastern stock which includes the Mediterranean Sea, since 1981. The two-stock hypothesis currently used by ICCAT is based on the assumption that mixing of western and eastern Atlantic bluefin tuna is limited. ICCAT has divided the Atlantic into two separate management units; 1.) west of 45°W longitude and 2.) east of 45°W longitude including the Mediterranean Sea (Figure 1). These management units were defined based primarily on the existence of two distinct spawning areas in the Gulf of Mexico and the Mediterranean Sea.

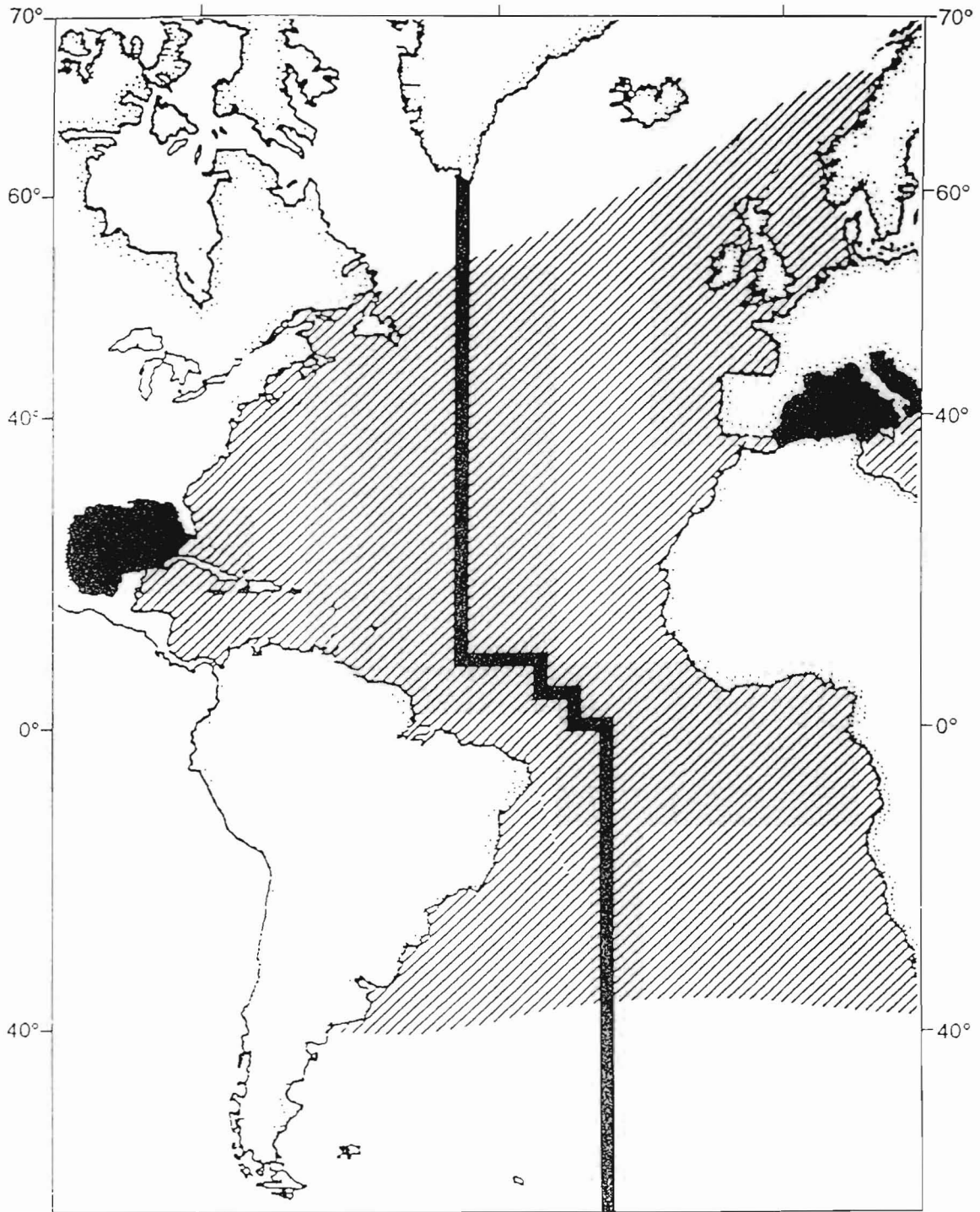


Figure 1, General Distribution of Bluefin Tuna in the Atlantic Ocean. Darkened areas indicate known spawning areas. The solid line separates the ICCAT eastern and western management units. (NRC 1994)

Additional evidence supporting the two-stock assumption included the coastal abundance of small fish on each side, a high proportion of tagged fish recaptured on the same side, and relatively low catch rates by longline vessels in the central Atlantic.

From 1969 through 1980 ICCAT had managed Atlantic bluefin tuna as a single stock. The management measures recommended in 1974 applied to both western and eastern countries. The SCRS in 1981 pointed out that although scientific evidence was not sufficient to determine with certainty stock structure, the current evidence was pointing towards two separate stocks. They completed their assessment in 1981 for both the single and separate stock hypotheses, and the results and suggested management measures under each premise were quite different. Under the single stock hypothesis, the assessment showed the abundance of Atlantic bluefin had declined to low levels, that total catch of adult fish should be held to 9500 mt, and the catch of small fish should be eliminated. The 9500 mt level was effectively a 20% cut in the total Atlantic catch, and the small fish measure would have eliminated 5900 mt caught primarily (90%) in the Mediterranean. If managed as separate stocks, the eastern component seemed stable and required no additional management measures beyond the 1974 minimum size and mortality recommendations. The western stock however was depleted to very low levels and the SCRS suggested near zero catch for both adult and small bluefin. ICCAT ultimately adopted the two stock hypothesis in 1981, made no recommendations for the eastern Atlantic and Mediterranean, and recommended significant catch reductions in the west.

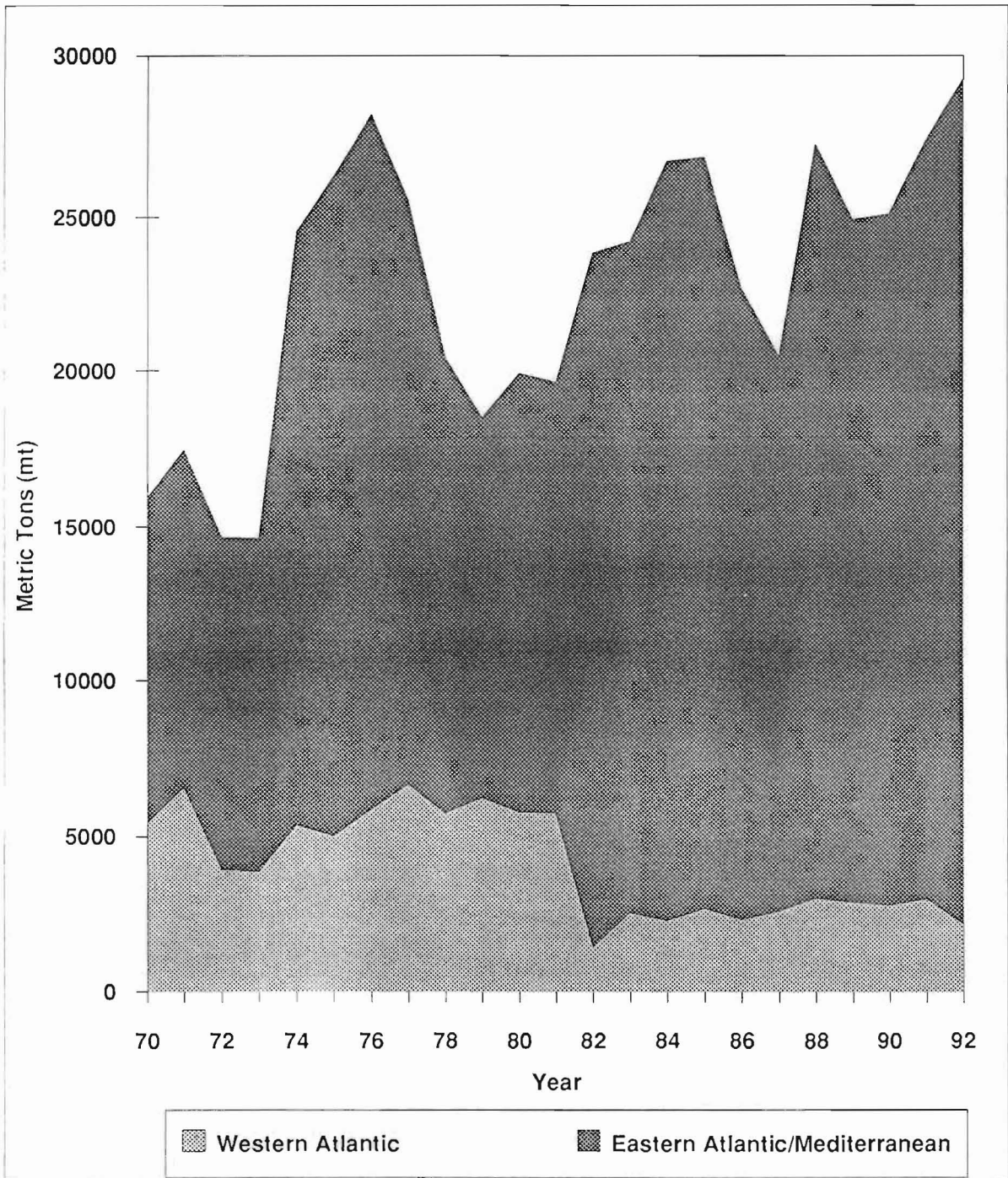


Figure 2, Total Catch of Atlantic Bluefin Tuna. The western Atlantic has been under a catch quota since 1982. The Mediterranean had record highs in 1992. (ICCAT 1994)

The U.S. fishing industry has argued that NMFS was instrumental in creating and forcing ICCAT adoption of the two stock theory in order to allow the west to take unilateral conservation sacrifices in the face of unresponsive eastern European and Mediterranean governments (House 1993a) They feel that the impact of the 2 stock hypothesis is that the burden of conservation has been placed on the west, which only represents 8 % of the total Atlantic catch, while the remaining 92% of the catch in the east goes essentially unregulated.

The original justification conceived by NMFS was arbitrary, first starting at an equidistant dividing line between the U.S. and Europe at 40°W, and subsequently moved by ICCAT in 1982 to 45°W. They feel that the two stock theory is not supported by NMFS tagging results which show captures of bluefin tagged in the western Atlantic and recaptured in the eastern Atlantic and Mediterranean. The existence of a mid-Atlantic Japanese longline fishery "on-the-line" also does not support the idea of separate stocks. The Japanese catch in an area within 150 miles of the dividing line has increased from 11 mt in 1981 to over 1000 mt in 1991 and 1992.

While the western stock has been subjected to multiple management measures since the adoption of the two-stock hypothesis in 1981, ICCAT has not recommended a single measure for the eastern stock since 1974, when ICCAT recommended an Atlantic-wide minimum size and a cap on mortality at "recent" levels. Since the adoption of the two stock hypothesis by ICCAT in 1981, the western Atlantic fishery has operated under an array of catch quotas, minimum sizes, no sale provisions, and spawning area restrictions. The total western Atlantic bluefin catch has been decreased by 60% since 1974 through implementation of catch quotas. ICCAT has not recommended conservation and management measures for the eastern Atlantic and Mediterranean since the 1974 measures were adopted for the entire Atlantic. The total eastern

Atlantic and Mediterranean bluefin catch has increased by 40% since 1974, and catches in the Mediterranean in 1992 were the highest ever recorded by ICCAT at 19520 mt. The east has not complied with the 14 lb. minimum size (Table 6), with the 1992 ICCAT Infractions Committee (ICCAT 1993) reporting significant catches of undersized bluefin. Spawning bluefin are targeted in the east for roe, and a significant amount of the eastern catch (>5000 mt) is either unreported under-reported to ICCAT. A significant portion of this unreported catch is made by non-ICCAT Mediterranean countries. ICCAT has not been effective in the east primarily due to lack of enforcement of existing measures and lack of new measures. While ICCAT documents the lack of compliance in the east each year, it has not been able to do anything to address it.

Table 6, East Atlantic and Mediterranean Bluefin Tuna Catches (in Numbers) (ICCAT 1993)

	1988	1989	1990	1991
Total Catch	816690	392076	673702	363235
< 6.4 Kg	555754	755325	743662	722022
% <6.4 Kg	60%	34%	47%	33%

VI. NRC Assessment

To prepare for the 1994 ICCAT meeting, NOAA asked the National Academy of Sciences' National Research Council to conduct an independent assessment of the scientific basis for Atlantic bluefin tuna management (NRC, 1994). The NRC convened a committee of fishery managers and scientists from several organizations and universities to conduct this technical review and

evaluation and published its findings in August 1994. Given that the two most contentious issues concerning bluefin management were the definition of management units (i.e., 2-stock hypothesis) and the indices of abundance, the NRC focused primarily on the scientific basis for assumptions about stock structure and abundance used in previous stock assessments.

In addressing the 2-stock hypothesis the NRC studied stock structure and conducted a review and analysis of tagging data. The NRC defined a fish stock as all fish belonging to a given species that live in a particular geographic area at a particular time. These areas may be defined by political boundaries for fisheries management, but a stock defined this way generally will not reflect biologically meaningful management units.

The NRC reviewed genetic studies for evidence of stock structure, and found that most of the studies were incomplete or inadequate to address the 2-stock issue. However, none of the studies found genetic differences between eastern and western Atlantic bluefin tuna, which is consistent with a single population in the Atlantic. The NRC also reviewed nongenetic studies including microconstituent analyses. Each spawning area (the Gulf of Mexico and Mediterranean Sea) has a different chemical elemental signature which shows up in the bony material of the fish, and this can be used to identify the origin of a fish caught outside the spawning area. These studies have confirmed that fish caught in west were spawned in the Mediterranean and vice versa, supporting the hypothesis of movement between east and west.

Tagging-recapture data provided the NRC with the strongest evidence available for transatlantic movement. The NRC reviewed and reanalyzed tagging data to estimate the degree of fish movement. Bluefin were tagged in the western Atlantic from 1954-1987 with 15,000 fish tagged by NMFS. Eastern Atlantic/Mediterranean bluefin tuna have been tagged since 1911. Tagging

and recapture activity for both east-to-west and west-to-east migrants is summarized in Table 7. The NRC reanalyzed this tag and recapture data and computed east-to-west transfer rates of 2-3%, and west-to-east transfer rates of 1%.

Table 7, Atlantic Bluefin Tuna Tag and Recapture Data

Location	# Released	Size	Total Recaptured	Trans-Atlantic Recaptures
Bahamas	1709	Giant	17	9
NW Atlantic	1881	Giant	81	9
Coastal U.S.	468	Medium	10	1
NW Atlantic	17700	Small	2180	46
East Atlantic	599-604	Giant	53	0
East Atlantic	6144	Small	419	19
East Atlantic	107-232	Unk.	3	0
Mediterranean	3993	Small	70	0
Mediterranean	20-30	Unk.	0	0

The NRC reviewed ICCAT's previous scientific assessments including abundance indices (CPUE) and VPA analyses. The NRC reanalyzed the data used to compute the abundance indices and found significant data processing errors (by NMFS) which resulted in a apparent dramatic decline in bluefin tuna in the 1992 ICCAT SCRS assessments. Once the errors were corrected by NRC, this decline disappeared. The NRC also found ICCAT's VPA analyses inadequate in terms of considering uncertainties, specifically mixing between east and west. The SCRS assessments are based on a model (ADAPT) which assumes the population is closed (i.e., no migration or mixing). The NRC conducted a reassessment factoring in both the levels of mixing derived in the tagging analysis and the corrected abundance indices. They also conducted a

number of sensitivity runs to determine the consequences of other assumptions. Their stock assessment results are presented in Table 8. The percentage (%) values represent the ratio of current spawning stock size to both the 1988 level and the 1975 level.

Table 8, NRC Stock Assessment Results (Ratios)

	Emigration		Stock Size (N8+)	
	East	West	1993/1988	1993/1975
a. ICCAT Base Case	0%	0%	76%	14%
b. NRC Base Case	2%	1%	92%	18%
c. Increase Emigration	3%	1%	127%	36%
d. All Ages Emigrate	2%	1%	130%	43%

Allowing exchange (emigration) from east to west results in a more optimistic appraisal of the status of the western stock than the ICCAT stock assessment. The ICCAT Case, which does not account for mixing (0%), yields similar results to the 1993 ICCAT SCRS assessment with the current spawning abundance at 76% relative to 1988, and 14% relative to 1975. The NRC Base Case, which has factored in a conservative level of mixing (2%), shows little change in abundance of the spawning stock since 1988 (92%). Increasing emigration to 3% results in an increased spawning abundance (127%) relative to 1988 (i.e., the stock has grown). The most optimistic NRC excursion (d.) assumed that all ages emigrate (cases b. and c. assumed movement of only 0-6 year old fish) and resulted in even a larger spawning stock. Based on its assessment the NRC concluded that the current abundance of bluefin tuna in the western Atlantic has been stable since 1988, and that the absolute level of

the spawning stock (N8+) is 2-5 times greater than ICCAT's 1993 estimate. At the same time the NRC assessment shows that the spawning stock has declined substantially since the 1970s, to about 80% of its 1975 level. (Figure 3).



Figure 3, NRC Assessment of Spawning Stock Biomass. Case 1 is the NRC base case(2% mixing). Case 2 is includes 3% mixing. Case 7 is ICCAT's assumption (0% mixing) but with data processing errors corrected. (NRC 1994)

The NRC concluded that the available biological evidence was consistent with a single stock hypothesis in the north Atlantic, and that their reevaluation of tagging data confirms enough mixing between the western and eastern Atlantic to alter previous ICCAT SCRS stock assessments. The NRC also concluded that the ICCAT SCRS assessments of abundance of eastern

and western Atlantic bluefin tuna do not provide the most defensible interpretation of available scientific data, and reanalyses show no evidence that the abundance of western Atlantic bluefin tuna has changed significantly between 1988 and 1992.

The NRC assessment certainly casts doubt upon the management of Atlantic bluefin tuna under ICCAT by disputing the scientific basis for ICCAT's separate management practices for eastern and western Atlantic bluefin tuna. The key issue concerning stock structure is not whether one or two stocks exist, but the extent of movement between these stocks. ICCAT and NMFS stock assessments have not accounted for mixing; they assumed a closed system even though their own tagging data proved conclusively that bluefin do migrate in both directions across the Atlantic. The incorporation of a low level of mixing by the NRC turned a significantly declining stock into at least a stable stock. Given the emphasis placed on scientific assessment by both ICCAT and NMFS, it seems almost inconceivable that they had not previously examined these sensitivities. The "best available" scientific data does not necessarily imply that it is adequate or reliable.

NMFS responded to the NRC assessment by convening a team of experts to evaluate the NRC findings and make recommendations about policy and management issues raised by the report. (NOAA 1994) This task force was to work closely with U.S. ICCAT Advisors and Commissioners; fishing industry groups; conservation organizations; and Congress to help establish the U.S. position on Atlantic bluefin tuna for the upcoming 1994 ICCAT meeting. NMFS was encouraged that the stocks appear to have stabilized since 1988, but pointed out that it is clear that the stocks are only a fraction (20%) of what they once were. Finally NMFS did take credit for the NRC findings given the fact that

NOAA commissioned the study, ". . . the study reflects our commitment to seek the very best science for our policy and management decisions" (NOAA 1994).

VII. Interest Group Positions

Fishing Industry

As a result of increasing regulatory restrictions and environmental group involvement in the Atlantic bluefin tuna fishery, fishermen and industry have organized under various groups including the East Coast Tuna Association, Blue Water Fishermen's Association, Coalition of United States Bluefin Tuna User Groups, United Boatmen of New Jersey and New York, General Category Tuna Association, and Montauk Boatmen's and Captain's Association. There are several bluefin tuna management issues which these groups share in common. They feel that international management of Atlantic bluefin tuna is required and support U.S. participation in ICCAT. Commercial fishermen and industry believe that the current system of bluefin tuna management through ICCAT and NMFS is fundamentally sound, but do believe that some major changes are required to improve the process. They suggest implementation of both effective Atlantic-wide international management and an improved domestic management system.

Fishermen do not support further reductions in the western Atlantic quota. They generally feel that they have been subjected to unwarranted and unequitable quotas in the western Atlantic, while the unrestricted fishermen in the eastern Atlantic and Mediterranean have benefited from their sacrifices and logged record catches in recent years. They feel that they have shouldered the entire Atlantic bluefin tuna conservation burden, while they only harvest 4% of

the total catch. They feel that imposing regulations only in the west, which represents only a small fraction of the total Atlantic catch, will not work. They feel that ICCAT should focus its conservation efforts on the eastern Atlantic and Mediterranean.

Fishermen strongly disagree with the scientific basis for U.S. and ICCAT decisions, which has been driven by stock assessments based on the two-stock hypothesis. Fishermen feel that NMFS and ICCAT stock assessments have more political basis than scientific basis. They believe that Congress through provisions in the ATCA and Magnuson Act sought to protect fishermen from being disadvantaged with respect to foreign fishermen, but that nevertheless NMFS has taken positions to unilaterally restrict U.S. fishermen.

Commercial and recreational fishermen do differ on the domestic management of the bluefin quota, specifically where should the authority reside? Recreational fishermen favor "equitable" regulations consistent with FMPs prepared and implemented under the Magnuson Act and the Regional Councils. They disagree with past NMFS allocation practices, especially the traditional 25% purse seine allocation and current 8% tolerance on small fish which severely restricts recreational and charter fishermen. Commercial fishermen certainly oppose transfer of any authority from Secretary of Commerce to the regional councils given that the councils are currently dominated by recreational and other non-commercial interests, which would leave them with inadequate representation.

The fishing industry is using the NRC findings to build support for a rescinding of the recent ICCAT quota reductions (1992-93 10% and the 1994-95 50% reduction), which would bring the western Atlantic back to its 1991 quota of 2660 mt, which prevailed from 1982-1991 (Ruais 1994). They argue that the decline of the stock stopped in 1988 according to the NRC under a

2660 mt quota which was severely abused. The U.S. failed to comply with minimum size restrictions from 1983-1991 and the 2660 mt quota was exceeded 6 out of the 9 years it was implemented. Given that these abuses have been corrected since 1991, 2660 mt should be "safe" until more accurate assessments can be made by ICCAT in the future, factoring in NRC recommendations.

The fishing industry certainly has the ear of their politicians. The U.S. Congress recently expressed its concern regarding the management of Atlantic bluefin tuna with House Concurrent Resolution 169 (House 1993b). Its purpose was to encourage greater international cooperation and urge reconsideration of current management programs regarding Atlantic bluefin tuna. The Resolution made several findings and specified several actions in response to those findings. It found that the Atlantic bluefin tuna stock had declined significantly over the past 25 years; that the two-stock theory and the 45 degree dividing line were arbitrary; that ICCAT measures for the western stock had been implemented but those for the eastern stock had not; and that harvest by non-member nations was adversely affecting ICCAT efforts. The Resolution states the sense of Congress that U.S. and ICCAT should continue to promote conservation of Atlantic bluefin tuna; that the U.S. should seek compliance by ICCAT members or threaten certification under the Pelly Amendment to the Fishermen's Protective Act of 1967; that the U.S. and ICCAT study the validity of the two stock working hypothesis; and finally that the U.S should encourage non-members to participate in the ICCAT process and abide by its recommended measures.

In response to the 1993 quota reductions and the 1994 NRC findings there has been significant political interest in the U.S. ICCAT position. A letter dated October 1993 from Congressmen Studds and Senator Mitchell to the

Secretary of Commerce certainly echoed U.S. fishermen and industry concerns regarding lack of compliance by eastern countries at the expense of significant sacrifices by U.S. fishermen (Senate 1993). A more recent September 1994 letter from Congressmen Torkildsen of Massachusetts to NMFS called for implementation of the NRC recommendations and a rescinding of ICCAT's 1991 and 1993 quota reductions under threat of formal hearings (Torkildsen 1994). The fishing industry seems to have the ear of politicians. While political pressure did not seem to influence NMFS or ICCAT decisions in 1993, this more recent "post-NRC" pressure may have an impact in 1994.

Conservationists

The western environmental movement has made bluefin tuna a "flagship" cause, using ICCAT's own scientific assessments to support their actions. Conservationists including the Center for Marine Conservation (CMC), World Wildlife Fund (WWF), and National Audubon Society have organized under a joint initiative known as "ICCAT Watch". ICCAT Watch was created in 1992 to highlight the failure of ICCAT to conserve bluefin tuna and focus public attention on ICCAT's mismanagement of Atlantic fisheries. Conservationists feel that ICCAT management has not been effective given the fact that several fish stocks under its purview, including bluefin tuna, swordfish, and marlin have declined by 50-90% over the past 20 years. They support ICCAT's proposed 50% reduction in western Atlantic harvest levels in 1995, but feel that "even this seeming draconian measure may not be enough to reverse the bluefin's decline" (England 1994). Conservationists feel that the bluefin tuna represents everything wrong with fisheries management, and that the unusually high price that bluefin commands in the Japanese market will chase the species toward

extinction (Craft 1994). "The result of this ocean-going buffalo hunt is a bluefin breeding population that plummeted 90% over the last 20 years, a decline more severe than that of the endangered African elephant (England 1994)."

They feel that increasing pressure from conservation groups has been responsible for ICCAT conservation and management measures (quotas, no-sale provisions, etc.) for western Atlantic bluefin in 1991 and 1993. They first petitioned in 1991 to have the bluefin tuna listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the first time a marine fish had been proposed. CITES is a treaty with approximately 120 signatories designed to control the commerce of species endangered by international trade. An Appendix I listing under CITES for species threatened with extinction significantly restricts or constrains international trade of those species. An Appendix II listing for species thought to be endangered only mandates monitoring and documentation of international trade, and certification by each country that their commerce is not harmful to the listed species. In 1991 the National Audubon Society proposed that western Atlantic bluefin tuna be listed under CITES Appendix I, which would have suspended exports to Japan. The U.S. chose not to seek a listing, and consequently Audubon and the WWF got Sweden (who in the past had a productive bluefin fishery) to propose both the western Atlantic bluefin under Appendix I and the eastern Atlantic and Mediterranean bluefin under Appendix II. The Appendix I listing would have suspended 1% of Japan's total tuna imports, but 15-20% of its bluefin imports. Under extreme pressure from the Japanese, Canadian, and U.S. fishing industry, Sweden withdrew its petition at the 1992 CITES meeting in Kyoto, Japan, conditioned on ICCAT pursuing future quota reductions. Although this effort ultimately failed, ICCAT did reduce the western Atlantic quota by 10% in 1991, and again by 50 % in 1993.

Conservationists still felt that an Appendix I listing may be required if ICCAT in 1993 did not implement adequate conservation and rebuilding measures. They also felt that an Appendix II listing might be the best way to monitor Atlantic wide catch of bluefin, including non-ICCAT catch. In 1994 Audubon, WWF, and the CMC formally petitioned to list the Atlantic bluefin under CITES Appendix II. Kenya proposed listing the Atlantic bluefin on Appendix II on June 10, 1994. Under pressure from Japan, which supplies much of Kenya's foreign aid, the listing proposal was withdrawn less than one month later. Conservationists, given the expected significant quota cut by ICCAT in 1995, did not pursue an Atlantic bluefin tuna CITES listing any further. No marine fish were proposed for listing on CITES Appendices at the Ninth meeting of CITES, held in November, 1994 in Ft. Lauderdale, Florida.

Conservationists feel that the NRC Report has added to the controversy more than it has resolved Atlantic bluefin tuna management issues. They feel that ICCAT should honor its mandate to make Atlantic bluefin tuna fisheries sustainable by reaffirming the planned 1995 35% quota reduction. They do realize that the proposed reduction is subject to review at the 1994 ICCAT meeting, and given the recent NRC findings, ICCAT may cancel the proposed reduction. They feel that the NRC findings are being used by the commercial tuna industry to pressure on Congress into pushing for the abandonment of the scheduled 1995 quota cuts. While the tuna industry has seized upon the NRC findings to justify abandoning the quota, conservationists feel that no data has come to light, in the NRC report or elsewhere, that would warrant such action. Given the fact that the NRC findings show the bluefin population has "plummeted" by 80% since 1975, and that the bluefin is showing no sign of recovery or response despite quota cuts enacted since 1991, they feel the 50% quota reduction must be implemented in 1995. By any standard, an 80%

decline in less than two decades is catastrophic, and leaves the western Atlantic population in acute need of rebuilding (Sutton 1994).

The conservationists, who had based their actions on primarily on ICCAT and NMFS assessments which showed a significantly declining western stock, have been undercut by the NRC assessment, and have lost the momentum and pressure they were able to generate in the early 1990's. Fishermen appear to have a much stronger case against further quota cuts in the western Atlantic given the apparent (NRC) stabilization of the western stock.

VIII. 1994 ICCAT Decision

ICCAT held its 1994 meeting in Madrid, Spain from November 27 to December 2, 1994 during which it made some fairly significant and historic decisions regarding Atlantic bluefin tuna. Conservation and management recommendations were made for both the western Atlantic and the eastern Atlantic and Mediterranean. In the west, the planned 1995 35% quota reduction was abandoned, and replaced with a 10% increase. ICCAT established a new 2200 mt quota for 1995 and 1996 under which the U.S. was allocated 1311 mt, Canada 535 mt, and Japan 353 mt. A schedule was also developed which determines the future share (%) allocation of any future quota levels in the western Atlantic.

ICCAT finally recommended an array of new measures in the east; the first recommendations since 1974. Recommended measures for the eastern Atlantic and Mediterranean include:

- 1.) Prevent an any increase in fishing mortality rate for 1995 and beyond.
- 2.) Prevent any catch by vessels under their jurisdictions in 1995 in excess of the level of catch in 1993/94.
- 3.) Reduce catch from the 1993/94 level by 25% by 1998.

- 4.) Cooperate in the development of a long term recovery plan by 1998.
- 5.) Comply with the Contracting Parties obligations to implement the 1974 recommendation of a 6.4 kg minimum size.
- 6.) Prevent catch of age 0 fish (< 1.8 kg).
- 7.) Provide sufficient data requested by SCRS to improve stock assessments.

IX. Conclusions

This independent review of Atlantic bluefin tuna management concludes that ICCAT has improved management slowly over the past 25 years, and given their most recent 1994 recommendations, has established an "effective" management program at the international level . ICCAT has certainly benefited from active participation by the primary interest groups in recent years, who have continually raised issues with stock assessments, quota levels, and equitable regulation over the range of the stock. Management at the federal level cannot be considered effective, due primarily to NMFS's continued inability to fairly allocate the U.S. quota.

This management system, at both the international and federal level, has been shown to respond to political pressure, and both conservationists and the fishing industry have influenced policy. The attempt by conservation groups in the early 1990's to list Atlantic bluefin tuna under CITES influenced ICCAT's decision to reduce quotas in the western Atlantic in 1991 and 1993. These actions caused the fishing industry to organize and push, through their politicians, for more equitable regulation across the Atlantic, and caused NOAA to commission an independent review of ICCAT's management assumptions and scientific assessments. Both of these actions apparently had a significant impact on ICCAT's most recent management decisions. Had these groups not

been so active over the past 5 years, the western fishery probably would still be operating under a 1983 quota level which had no scientific basis, ICCAT would be reporting declining stock conditions based on flawed scientific assessments, and 90 % of the Atlantic bluefin fishery would still be virtually unregulated.

Ludwig, Hillman, and Walters (1993) suggest that effective management approaches usually consider a variety of possible strategies and hypotheses, favor actions that are robust to uncertainties, and finally favor actions that are reversible. Perhaps ICCAT's recent "reversal" concerning the western Atlantic quota is evidence of an effective approach.

This examination of Atlantic bluefin tuna management illuminates the major issues faced at both the international and federal levels. At the international level the issues include reliable scientific assessment, compliance, and fair and equitable management over the range of the species. At the federal level the issues are fair allocation and overcapitalization. ICCAT's recent 1994 conservation and management recommendations have resolved two of the international management issues. The increase in the western Atlantic quota obviously reflects a reassessment of stock conditions in light of the NRC findings. ICCAT's recommendation of new measures for the eastern Atlantic and Mediterranean should alleviate the concerns of western fishermen and politicians as to the fairness of ICCAT regulation over the range of the stock. The remaining unresolved issue is compliance. The east has yet to comply with ICCAT's "non-binding" 1974 recommendations. The problem faced by ICCAT is not determining proper conservation measures, or getting member nations to adopt those measures, it's gaining compliance under a system which has no clear way to enforce them.

At the federal level, both the allocation and overcapitalization issues remain unresolved. NMFS has proven over the past 15 years that it cannot

fairly distribute the ICCAT quota by continuing to allocate a substantial share to 5 purse seine vessels on the basis of "traditional" access. Recent studies by both NMFS and the Audubon Society have shown the current allocation to be disproportionate, and have shown that fairer and more equitable distribution, increased employment, and increased economic benefits could be realized through reallocation. For the past 20 years under the ATCA, fair allocation of the ICCAT quota was not mandated. Under the Magnuson Act as amended by the 1990 Amendments, the development of an Atlantic bluefin tuna FMP is mandated, and allocation under that FMP is required to be fair and equitable. All of the more equitable allocation schemes which have been examined result in reductions in the strictly commercial categories, especially the purse seine category, and increases in the General and Angling categories which benefits recreational fishermen. Contention at the international level has been reduced given ICCAT's 1994 recommendations, but more controversy at the federal level will occur as domestic management of Atlantic tuna moves away from the ATCA and more in line with the Magnuson Act, starting with development of an Atlantic bluefin tuna FMP.

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