# Regional Fisheries Management Organizations: An Examination of the International Commission for the Conservation of Atlantic Tuna as an International Fisheries Policy Instrument

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**ABSTRACT**

Tuna regional fisheries management organizations (RFMOs) are intergovernmental organizations that carry out a diversity of tasks concerning the various tuna (and tuna-like) fisheries of the world including stock management and data collection. Over time, due to declining stocks, it has become clear that these organizations have limitations and there are issues that must be resolved for the preservation of the tuna fishery and other fish stocks worldwide.

The political ecology governing the International Commission for the Conservation of Atlantic Tuna (ICCAT) illustrates RFMO structure and international fisheries policy in general and the issues facing the legislative and administrative components that comprise ICCAT. This report outlines the structure of one RFMO, ICCAT to illustrate in more detail the inner workings of a RFMO with a large membership. Looking closely at the specifics of the management of two particular stocks, Atlantic bigeye tuna and Atlantic swordfish, we can glimpse the complexity of the politics of migratory fish management, international fisheries policy in general, and the magnitude of the task set out for these voluntary, non-binding institutions.

This paper is focused on how the RFMO manage the fishing of stocks. And in so managing, examines the political, social, and biological issues facing the legislative and administrative components that comprise ICCAT. The mandates of each RFMO governing tuna species worldwide are compared to reveal consistencies and inconsistencies in the basic documents governing these organizations.

Finally, there is a summary of the issues undermining RFMO success including under reporting, misreporting, illegal, unregulated, unreported catches, fleet overcapacity, political gamesmanship, and lack of enforcement of conservation and management measures. In addition, and as a result of the examination of modern pressures on current policy, suggestions will be made for new measures to strengthen existing policy that include consideration of environmental, legal, political, economic, and social aspects of the highly migratory fish trade.

## Introduction

Tuna regional fisheries management organizations (RFMOs) are intergovernmental organizations that carry out a diversity of tasks concerning the various tuna (and tuna-like) fisheries of the world including stock management and data collection. These organizations are joined voluntarily by member states as international agreements to manage the multitude of interests in these highly migratory fish stocks.

In this report I will outline the structure of one RFMO, The International Commission for the Conservation of Atlantic Tuna (ICCAT) to illustrate in more detail the inner workings of a RFMO with a large membership. Looking closely at the specifics of the management of two particular stocks, Atlantic bigeye tuna and Atlantic swordfish, we can glimpse the complexity of the politics of migratory fish management, international fisheries policy in general, and the magnitude of the task set out for these voluntary, non-binding institutions.

This paper is focused on how the RFMO manage the fishing of stocks. The International Commission for the Conservation of Atlantic Tuna (ICCAT) illustrates RFMO structure and the political, social, and biological issues facing the legislative and administrative components that comprise ICCAT. I will compare the mandates of each RFMO governing tuna species worldwide to discuss consistencies and inconsistencies in the basic documents governing the organizations.

Finally, there will be a summary of the issues undermining RFMO success including under reporting, misreporting, illegal, unregulated, unreported catches, fleet overcapacity, political gamesmanship, and lack of enforcement of conservation and management measures. In addition, and as a result of the examination of modern pressures on current policy, suggestions will be made for new measures to strengthen existing policy that include consideration of environmental, legal, political, economic, and social aspects of the highly migratory fish trade.

**Background**

RFMOs, through the statutory authority of their member nations, have the legal authority to manage the fishing for these stocks, and are guided by international agreements such as the United Nations Convention for the Law of the Sea of 10 December 1982 (UNCLOS), the 1995 United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks (UN Fish Stocks Agreement), and the 1995 United Nations Food and Agricultural Organization Code of Conduct for Responsible Fisheries (FAO Code).

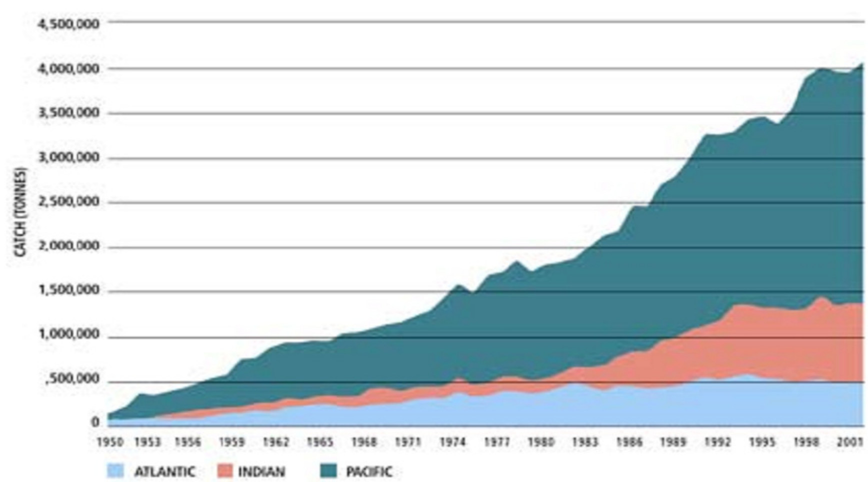
The UN Fish Stocks Agreement enhances mandates already in place through UNCLOS. The UN Fish Stocks Agreement focuses international fisheries management on the RFMO as an institution that is used for strengthening cooperation to conserve stocks for ongoing harvest at maximum sustainable yield (MSY) (M. e. a. Lodge & Anderson, 2007). In spite of the assumed positive intentions of the UN Fish Stocks Agreement, many fisheries have continued to decline. Tracing the cause of these stock declines is a complicated task and includes looking at management successes and failures associated with RFMO management regimes, as well as assessment of changing conditions in stock habitat, climate, and anthropogenic influences.

<u>World Fish Trade</u>

International trade in seafood continues to be a prominent industry. 37% of global fish production enter international trade, making fish one of the most traded "agricultural products", and accounting for 13% of overall world agricultural trade (World Bank, 2008). This makes fishing big business, putting pressure on the political machinery to allow continued fishing at what may be unsustainable levels. Government subsidies increasing fleet capacity send more fishers out to sea, for fewer fish (Pauly, 1998). Economic and social pressures to maintain jobs and a way of life are ubiquitous across all nations.

In the last decade, landed fish prices have stagnated. Total landed values from the world's fisheries peaked in the 1980's coinciding with the peak in catch volumes recorded in 1988 (Sumaila et al, 2007). Total real landed values was about US$24 billion in 1950, from 1950-the early 1970's it rose steadily to US$90 billion, then increased to a peak of US$100 billion at the end of the 1980's and subsequently began it's decline to US$80 billion in 2000 (Sumaila et al, 2007). There are less fish to catch, requiring more effort to catch those that are available (Pauly, 1998). Coupled with extensive fleet overcapacity the result is less profit for fishers.  Most recent totals for 2006 put total world trade for fish and fishery products at US$86.4 billion (World Bank, 2008). Additional downward pressure on wild fish prices is caused by aquaculture which accounted for 46% of world food fish production in 2003, an increase of 29% over levels for 1984 (Anderson, 2007).

Today combined ocean catch of albacore, bluefin, bigeye, and yellowfin tuna comprise over 7% of all wild fish landed and account for 11% of the total value of fish landings (World Wide Fund for Nature, 2007).




**Increased global catches of the principle market species of tuna from 1950–2004**
Increased global catches of the principle market species of tuna from 1950–2002. Although some 80 countries fish for tuna, over 70% of all catches were made by just ten countries in 2002: Japan, US, Taiwan, Spain, Indonesia, Philippines, South Korea, France, Mexico, and Venezuela

Most of the tuna stocks are recorded by the FAO as fully exploited or over exploited leaving little room for RFMOs to increase catch quotas without endangering stock declines (World Wide Fund for Nature, 2007).

What is a RFMO?

RFMOs were created to function as a method to bring the diverse needs of many nations together to create an international fisheries policy instrument that would eliminate inconsistencies between all nations fishing a migratory stock, and to conserve the stock for purposes of long term harvest for all involved nations. RFMOs were created to manage stocks that move between two or more nations Exclusive Economic Zone (EEZ) and as the RFMO name suggests, these fish are managed by *region*. Migratory stocks regions are determined by studies of the migration, habitat, and spawning areas of individual stocks and regions typically encompass an ocean and it's adjacent seas.

The first RFMO to manage tuna, the Inter American Tropical Tuna Commission (IAATC), was created in 1949 between the United States and Costa Rica to manage yellowfin, skipjack and other related catches in the Pacific Ocean (United States and Costa Rica, 1949). The need for cooperative management became clear over time as the harvest of the fleets of one nation was shown to affect the ability of other nations to harvest the same migratory stock. Similarly, coastal states engaged in the fishery for a migratory stock were also affected by distant water fleets who were authorized by coastal states to fish in a coastal EEZ, by illegal fishing in coastal waters, and by those involved in harvest of migratory stock from the largely unregulated high seas.

The RFMOs as an international fisheries management instrument were initially created voluntarily by governments involved in migratory fish harvest that recognized the need to mutually manage the species of concern. Later, with the ratification of UNCLOS in 1982, more specific mandates were applied. First, UNCLOS formally established in Article 57 the 200 mile exclusive economic zone (EEZ) (United Nations, 1982). Article 63 requires coastal States and other States fishing for the same stock to cooperate in the management of stocks that cross EEZs or that cross both EEZs and high seas to seek to agree on measures for stock conservation through the establishment of regional or sub-regional organizations (United Nations, 1982).

States that are involved in the harvest of highly migratory stocks like tuna are required in Article 64 to ensure conservation and optimum utilization of these stocks both within and beyond the EEZs of the affected coastal States (United Nations, 1982). The requirement to mange stocks found in the high seas through the establishment of appropriate regional or sub-regional fisheries organizations is reiterated in Article 118 and 119 and includes a mandate for the sharing of scientific data (United Nations, 1982).

The 1995 UN Fish Stocks Agreement continues to refine certain provisions in UNCLOS, but it also introduces some new provisions (Van Dyke, 2006). More specifically, the UN Fish Stocks Agreement was created to answer the mandates in UNCLOS but also to address concerns over the management of high seas fisheries raised in the United Nations Conference on Environment and Development (United Nations, 1995). Article 5 outlines the general principles which constitute the foundation of the agreement, including a duty to cooperate, share scientific data, protect both the fish stocks themselves and the marine environment that surrounds them, and use appropriate enforcement measures (United Nations, 1995).

Some clauses in the UN Fish Stocks Agreement serve to strengthen the role of RFMOs and others stress peaceful dispute resolution utilizing dispute resolution procedures outlined in UNCLOS (Van Dyke, 2006). The precautionary principle, defined and explained in Article 6, is required to be applied in the development of management measures (United Nations, 1995). Indeed, many would assert that the precautionary principle has gained almost universal acceptance as the rule that should govern all activities affecting the ocean environment (Van Dyke, 2006).

The duty to cooperate is stressed in Articles 7 and 8 obligating States to attempt to take into account the RFMO management measures when fishing for a RFMO managed stock both in the coastal EEZs and on the high seas (United Nations, 1995). Any nation state engaging in the fishery of a highly migratory stock is encouraged to join the RFMO that manages the stock, emphasizing the need to ensure open membership to all RFMOs (Van Dyke, 2006).

In Article 11, the criteria are outlined for new membership including preferential treatment for developing nations, but the language also indicates that some new entrants to a fishery could be excluded if current fishing nations have developed a dependency on the shared fish stock in question (Van Dyke, 2006). Article 25 (1) (B) calls for developed nations to facilitate the participation of developing nations wishing to enter a fishery above other nations (United Nations, 1995).

Not covered in the UN Fish Stocks Agreement is an obligation for non-members to abide by the conservation measures called for under RFMO membership. Some have proposed that it has become "customary international law" for non-members to cooperate with RFMO rules when fishing for a protected species on the high seas (Van Dyke, 2006).

## Current RFMOs Managing Tuna and Tuna-like Species

There are currently 20 Regional Fisheries management agreements worldwide that establish RFMOs and RFMAs. (Meltzer, 2005). Some have single species focus like the Agreement on the International Dolphin Conservation Program 1999 (AIDCP-IATTC) or the Convention for the Conservation and Management of Pollock Resources in the Central Bering Sea 1995 (Donut Hole), and others manage multiple species like tuna RFMOs that manage tuna and tuna-like species including billfish.

RFMOs make two kinds of fishery management decisions: *biological conservation decisions* including Total Allowable Catch (TAC), fish size limitations, adoption of measures relating to fishing methods and gear, moratoriums, and open and closed seasons and *allocation decisions* including allocation of TAC to the membership, limitations on fleet size, and access limitation.

Largely as a result of the establishment by UNCLOS of the 200-mile EEZ, the principles guiding RFMOs and the UN Fish Stocks Agreement are protective of state's rights. Consequently, state sovereignty is at the core of the RFMO decision making process (McDorman, 2005). This principle of state sovereignty is both strength, in that it allows equal votes for each state, and a weakness, in that by fostering the individuality of each nation it is often difficult to reach a consensus among nations that have highly diverse needs. Also in keeping with the basic principle of state sovereignty, contracting parties are left to enforce ICCAT in a way that dovetails with their national fisheries policy.

<u>The Five Tuna and Billfish RFMO:</u>

The five current tuna RFMOs are:

**<u>IATTC</u>**

The IATTC – Inter American Tropical Tuna Commission: Established 1949

<u>Member States</u>: Columbia, France, Nicaragua, Spain, Costa Rica, Guatemala, Panama, United States, Ecuador, Japan, Peru, Vanuatu, El Salvador, Mexico, Korea, and Venezuela.

<u>Geographic region</u>: The Eastern Pacific Ocean

**<u>ICCAT</u>**

ICCAT – International Commission for the Conservation of Atlantic Tuna: Established 1966

<u>Member States</u>: Algeria, Angola, Barbados, Belize, Brazil, Canada, Cape Verde, China (People's Rep. of), Côte d'Ivoire, Croatia, Equatorial Guinea, European Community, France (St. Pierre et Miquelon), Gabon, Ghana, Guatemala, Guinea (Rep.), Honduras, Iceland, Japan, Korea (Rep. of), Libya, Mexico, Morocco, Namibia, Nicaragua, Norway, Panama, Philippines, Russia, São Tomé e Principe, Senegal, South Africa, Syria, Trinidad & Tobago, Tunisia, Turkey, United Kingdom (Anguilla, Bermuda, St. Helena, Turks and Caicos), United States, Uruguay, Vanuatu, and Venezuela.

<u>Geographic region</u>: Atlantic Ocean and adjacent seas including the Mediterranean

**<u>CCSBT</u>**

CCSBT– Commission for Conservation of Southern Bluefin Tuna: Established 1994

Member States: Japan, Australia, Korea, Taiwan, New Zealand, Indonesia with cooperating non members holding quota allocations in Philippines, South Africa, and the European Community.

Geographic region: Southern Ocean and Southern Bluefin Tuna Stocks Globally

**WCPFC**

WCPFC– Western and Central Pacific Fisheries Commission: Established 2000

Member States: Australia, China, Canada, Cook Islands, European Community, Micronesia, Fiji, France, Japan, Kiribati, Korea, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, and Solomon Islands.

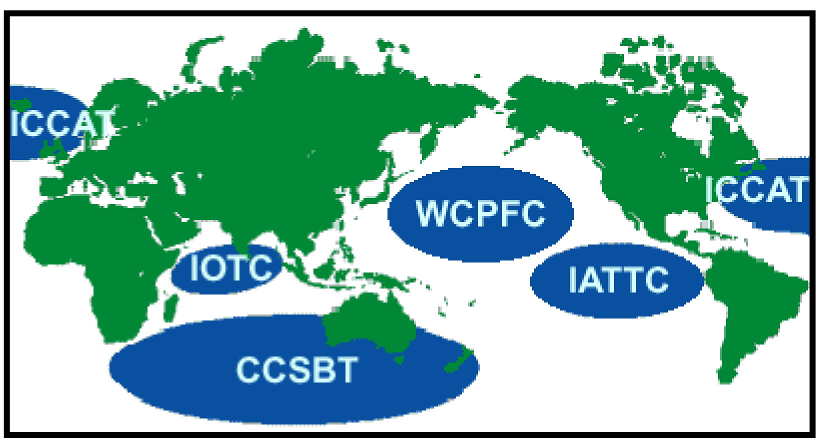
Geographic region: The western and Central Pacific Ocean

**IOTC**

IOTC– Indian Ocean Tuna Commission: Established 1982

Member States: Australia, China, Comoros, Eritrea, European Community, France, Guinea, India, Iran, Japan, Kenya, Korea, Madagascar, Malaysia, Mauritius, Oman, Pakistan, Phillipines, Seychelles, Sri Lanka, Sudan, Thailand, United Kingdom, and Vanuatu.

Geographic region: The Indian Ocean and adjacent seas




RFMO Establishment Objectives

IATTC was established by international convention and is *responsible for the conservation and management of* tuna and tuna like species within the specified geographical area (IATTC, 2009).

ICCAT describes itself as an *inter-governmental* fishery organization responsible for the *conservation* of its named species (I. C. f. t. C. o. A. T. ICCAT, 2009). ICCAT lists its intentions as *providing a mechanism* for contracting parties to agree on *management measures* in addition to compiling fishery statistics, stock assessments and research to *develop science-based management advice* for its members (I. C. f. t. C. o. A. T. ICCAT, 2009).

CCSBT list its *objective* to be the assurance of the *conservation and optimum utilization* of the global southern bluefin tuna fishery through appropriate management (CCSBT, 2009). As the dual goals of fishery management, conservation and optimum utilization are difficult to effectively reconcile. Thrown into the multi-nation arena of the RFMO, it becomes even more complicated. RFMO management is often the story of how a diverse group of nations can reach a consensus on a natural resource. And also the story of how these same nations fail to reach a consensus.

WCPFC objective is to *ensure through effective management long-term conservation and sustainable use of highly migratory fish stocks in accordance with UNCLOS and the UN Fish Stocks Agreement* (WCPFC, 2009). It also contains special participatory arrangements for non-members. This is the newest of the tuna RFMOs and has some differences that reflect thoughtful discussion of existing RFMO components and how to improve upon them. This is the only tuna RFMO to mention long term conservation as a goal and to specifically name the two international agreements that are the genesis for the organization itself. It is notably the first RFMO to be established since the implementation of the UN Fish Stocks Agreement in 1995 (WCPFC, 2009).

The WCPFC was established through the adoption of the Honolulu Convention in 2000. The negotiation of the Honolulu Convention took place in seven meetings occurring over a five year time frame (WCPFC, 2009). One of the innovations and differences in the Honolulu Convention is the voting system, which is by consensus on many issues, but by chambered voting on others (Van Dyke, 2006).

Chambered voting is divided into two sectors with two different interests, one consists of the ten distant water fishing nations and the other of the sixteen island nations (Van Dyke, 2006). This innovation sets the WCPFC apart from the other tuna RFMOs and helps to reduce the implications of state sovereignty in the voting process by creating voting blocks along lines drawn to reflect common interests of participating nations.

IOTC also promotes itself as an *inter-governmental* organization listing its mandate as *management* of tuna and tuna-like species (IOTC, 2009). They list their *objective* as *promoting cooperation among members* with the goal of ensuring through management *optimum utilization* of stocks and *sustainable development* of fisheries (IOTC, 2009). Similarly to ICCAT, the goal of cooperation is paramount and primary to the organization. Equally important is the goal of optimal harvest of the fish stock in question.

<u>RFMO Issues</u>

A recent panel of experts examined all the mandates of the multitude of RFMOs and found that there are significant differences in mandates from one RFMO to another, as well as marked differences in the implementation of the mandates set out for the organizations in the UN Fish Stocks Agreement (M. e. a. Lodge & Anderson, 2007).

Both ICCAT and the IOTC list themselves as bodies to promote consensus building for management measures between States but not as hard regulating entities. ICCAT lists its objective as conservation; CCSBT lists theirs as conservation and optimal use, IATTC conservation and management, WCPFC long-term conservation and sustainable use. The concepts of conservation and optimum utilization are taken directly from UNCLOS so it is not surprising to see them in one form or another in each of the tuna RFMOs. But the dual concepts of conservation and optimal use are often at odds with each other. From a business standpoint, optimal use is a clear and immediate goal, but without long-term conservation this goal cannot be sustained from year to year, making conservation of significant importance as well. However, coupled with the impossibility of complete knowledge in fisheries science, maximum harvest for immediate profit tends to overshadow the precautionary principle that is more associated with long-term conservation.

In addition, the difficulties associated with reaching agreements under a management regime that is set up to protect state sovereignty cannot be underestimated. The politics of RFMO management are intensely complicated, not only from the standpoint of the differing needs of different nations such as developing and developed nations, but also from the standpoint of political agendas between nations that encompass other issues beyond fishing that may be swept into the behind-the-scenes trading that goes on between nations before the vote on a new regulation or quota.

RFMO structure also allows nations to object or abstain from management measures, further exacerbating the situation. And a lack of consequences for bad behavior does not create the kind of deterrent needed for concise cooperation.

RFMO management does seem to work when nations are able to agree that a stock is in trouble and that stronger management is needed. Internal castigation of members who ignore conservation measures or quotas does serve as a powerful and often effective deterrent for bad behavior. Without the benefit of these institutions, there can be no doubt that the state of our world oceans today would be worse than our current situation.

**ICCAT**

ICCAT was conceived of and approved at the Conference of the Food and Agriculture Organization of the United Nations at its 13th session in Rome 1965 (The Conference) to prepare and adopt a convention to establish a commission for the purpose of conservation of tuna and tuna-like fish. It was the second RFMO established for tuna and tuna-like fish after the Inter American Tropical Tuna Commission was established in 1950. The basic texts for ICCAT were first issued in 1972, and then revised in 1977, 1985, 2003, and 2005. The Conference met for the first time in Rio de Janeiro in May of 1966. ICCAT documents as prepared and revised remain open for signature by any nation wishing to become a member state at UN FAO headquarters in Rome (I. C. f. t. C. o. A. T. ICCAT 1966).

There is a formal agreement between the UN FAO and ICCAT that ensures communication and cooperation between the two agencies. Each agency is obligated to have a representative at each others meetings, they can request technical cooperation from each other, and they can craft special agreements or arrangements for joint action to attain objectives of common interest (I. C. f. t. C. o. A. T. ICCAT 1966).

The purpose of ICCAT is to maintain population levels of tuna and tuna-like fishes that will permit the maximum sustainable catch for food and other purposes. The convention area includes all waters of the Atlantic Ocean including adjacent seas. Currently, ICCAT is composed of 46 contracting parties and each of the contracting parties has three delegates all of whom together form the Commission (I. C. f. t. C. o. A. T. ICCAT 1966)

The Commission has the authority to adopt rules and regulations necessary to carry out its functions. Each contracting party has one vote in the decision-making process and majority takes decisions, with two thirds constituting a quorum. Meetings are held every two years at a minimum or as needed. The Commission is mandated to study abundance, biometry, and ecology of fishes, the oceanography of their environment, the effects of natural factors on their abundance, and the effects of human factors on their abundance. These studies are for the purpose of ensuring maintenance of tuna populations at levels that "will permit maximum sustainable catch and which will ensure effective exploitation of these fishes in a manner consistent with this catch." (I. C. f. t. C. o. A. T. ICCAT 1966).

ICCAT management measures have two basic compliance levels. The least binding is a *resolution* that encourages members compliance but does not require it. The second is a *recommendation* that requires members to not only comply, but also to monitor and enforce the measure in their home EEZ and also on their citizens fishing on the high seas.

The Commission appoints an Executive Secretary who is responsible for all the accounting, budget estimates, fund dispersal, and report preparation. The Executive Secretary must also coordinate programs of investigation and, most importantly, collection and analysis of data relating to current and maximum sustainable catch of tuna stocks (I. C. f. t. C. o. A. T. ICCAT 1966). The Commission mandates establishment of two standing committees, the Standing Committee for Finance and Administration (STACFAD) and the Standing Committee on Research and Statistics (SCRS) and each contracting party must be represented on each committee. In addition to the panels and committees there was established in 1993 a Permanent Working Group for the improvement of ICCAT statistics and Conservation Measures (PWG). This group focuses a great deal on the issues associated with non member states who fail to comply with ICCAT conservation mandates (NOAA, 2006).

ICCAT scientific advising provided by the SCRS includes management objectives and assessments that are conducted separately by four different panels or subcommittees for each stock group. Panel 1 has tropical tunas (including bigeye, yellowfin, and skipjack tunas), Panel 2 has North Atlantic bluefin and albacore tunas, Panel 3 handles South Atlantic bluefin and albacore tuna, and Panel 4 covers Atlantic swordfish, billfish and other ancillary species (NOAA, 2006). The full commission must then approve recommendations developed at the panel level.

Recommendations can be made under four different scenarios: 1) at the initiative of the Commission if a panel has not been established 2) with the approval of 2/3 of all contracting parties if a panel has been established 3) on the proposal of a Panel 4) on the proposal of multiple Panels if the recommendation relates to more than one geographic area, species, or group of species. Each recommendation becomes effective for all contracting parties 6 months *after* the date the Commission transmits the recommendation to the contracting parties (I. C. f. t. C. o. A. T. ICCAT 1966).

Any contracting party can make objections within the 6-month period and the recommendation will not become effective for an additional 60 days. Within that 60-day period, any *other* contracting party can object. At the expiration of the objection period, the recommendation then becomes effective for all Contracting Parties *that did not object.* If the objection is presented by less than ¼ of the Contracting Parties, the objections are considered to have no effect. However, if a recommendation has more than ¼ and less than a majority of the contracting parties, the recommendation will become effective *only for those parties who have not raised an objection.* Under Article 13, any contracting party can propose amendments. Amendments that impose new obligations must be accepted by ¾ of the contracting parties.

Contracting parties "agree to take all action necessary to ensure the enforcement of this Convention" (I. C. f. t. C. o. A. T. ICCAT 1966). Contracting parties are required to furnish, upon request of the Commission, any available statistical, biological or other scientific information and/or when it is not available, allow the Commission to contract for it with the cooperation of the member state (I. C. f. t. C. o. A. T. ICCAT 1966). The members are charged with collaboration to set up a system of international enforcement to be applied to the Convention area *except* the territorial sea and any other waters where a state has jurisdiction over fisheries (I. C. f. t. C. o. A. T. ICCAT 1966).

Through this institutional structure, ICCAT determines management measures to attain the conservation and use goals set out by the basic documents that design this institution. It is in agreement with and adherence to these goals that member states join these organizations and participate in their membership.

## ICCAT Management of Atlantic Swordfish

Northern Swordfish has been commercially fished in the Atlantic for more than a century. Most fish are harvested by Canada, the United States, and Spain but also engaged in the fishery are Portugal and other EC nations, Japan, China, Taiwan, and developing countries Brazil, Morocco, and Trinidad and Tobago. ICCAT SCRS began having concerns over stock decline in 1979 but it was not until 1987 and 1988 that two scientific workshops were convened to study northern swordfish. During the 1980s, some countries took conservation actions within their own EEZs including restrictions on effort and size in Canada, and later in the 1980s reduction in catches in the US (Webster, 2009). The Committee itself did relatively little in the way of stock management until there was worsening news from the SCRS in 1989 (Webster, 2009). In 1990, the SCRS asserted that rebuilding northern swordfish to levels able to sustain MSY would require a 50% reduction in catch (Webster, 2009). Politically, there was some disagreement among member nations about what measures should the committee take. The US, supported by Canada, proposed limiting fishing to current levels but Japan, Spain, and South Korea all opposed the measure on the basis of a lack of scientific information (Webster, 2009).

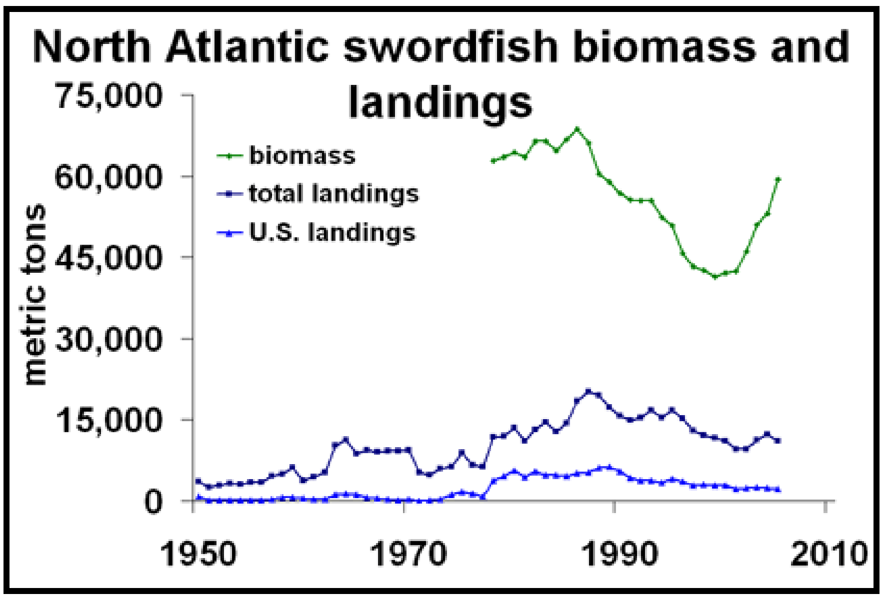
The first conservation measures for swordfish were taken by ICCAT in 1990 (NOAA, 2008). The commission decided to limit catches to 1988 levels, a year that recorded some of the highest historical landings (90-02 SWO ICCAT, 1991), and a measure was adopted for a minimum size restrictions on fish. Size limits are often implemented to allow the fish to reach spawning age before it is subject to fishing pressure, in the case of the swordfish, sexual maturity occurs between the ages of 5 and 7 years and at an approximate length of 47 inches (NOAA, 2008). Sometimes, the establishment of a minimum size can result in a higher percentage of dead discards as the smaller fish continue to be caught in both purse seine and longline fisheries, but often don’t survive.

In 1992 SCRS reported estimated biomass of swordfish at between 84% and 95% of that needed for MSY harvest. By 1994, the SCRS lowered estimated MSY biomass to 68% capacity and assessed fishing effort at 180% (Webster, 2009). The SCRS reported replacement (not rebuilding just maintaining stock levels) yield for the year was 13,800 tons (94-14 SWO . ICCAT 1995).

By 1994 reports were sufficiently grim to spur some collective agreement between the participating fishing nations resulting in management measures that included quotas for the main producers of 13,200 tons in the following allocation: Canada 1,500 MT, Portugal 1,500 MT, Spain 6,230 MT, United States 3,970 MT in 1995 and lowering total quotas to 11,800 in 1996 (94-14 SWO . ICCAT 1995).

In addition to the large producers, developing and coastal states were allowed to increase landings by 1,600 MT. Additional catch came in the form of an allowance for Japan to keep up to 8% of its total bigeye landings as swordfish by-catch (Webster, 2009). This pushed totals for the year to approximately 7% over replacement yield for 1995, and 3% over in 1996 (Webster, 2009). Concern over IUU fishing was shown voiced in the 1994 meeting and the PWG was called upon to put a plan together to deal with non contracting parties engaged in the fishery and included the possibility of implementation trade sanctions against offending nations. (94-14 SWO. ICCAT 1995).

Biomass estimates for the 1995 season were slightly lower than the previous year. A resolution was passed that instructed the SCRS to create a recovery plan for the stock (95-11 SWO. ICCAT, 1996). In 1996 the stock estimates had dropped to 58% MSY and the SCRS suggested quotas of 10,000 tons but also indicated that there was a small chance that catches of 12,000 tons might be allowable while still rebuilding the stock (96-7 SWO  ICCAT, 1997). A new three year allocation scheme was adopted in the 1996 resolutions dividing the total quota between nations as follows: Canada 10%, Japan 6.5%, Portugal 7.5%, Spain 41.25%, United States 29%, Others 6% (95-11 SWO. ICCAT, 1996). The three year plan set total quotas at 11,300 tons in 1997, an amount higher than that suggested by the SCRS, but lower than the 12, 000 MT the SCRS thought might be sustainable and this total was to be reduced by 300 tons each of the two subsequent years (96-7 SWO ICCAT, 1997). In addition, greater restriction were placed on "other fishing states" who had collectively landed twice as much as their 6% share allowed (96-7 SWO ICCAT, 1997). These countries were instructed to reduce their catch by 45% (96-7 SWO ICCAT, 1997).




In 1999 ICCAT established a 10 year rebuilding plan for Atlantic swordfish (NOAA, 2008). In spite of these management measures, records indicate that landings exceeded quotas by 11% each of the next three years, this figure excluding the dead discards that were certainly occurring as a result of the minimum size limitation. Concurrently, fishing effort was reduced as countries chose to redeploy their fleets to more profitable fisheries, including some that left the swordfish fishery for the tuna fishery. By 1999 biomass estimates had increased slightly, from 58% to 65% and fishing mortality was estimated by the SCRS at 1.34 times that of MSY (99-2 SWO ICCAT 2000) .

The 1999 rebuilding plan had some significant political negotiations attached to it. Japan's consent was obtained through a quota swap form the EC, designed to protect Japan's bigeye tuna fishery (Webster, 2009). Bigeye had moved north during this time, closer to the preferred Northern Swordfish habitat. Swordfish by-catch by Japan's bigeye tuna fleet was at twice Japan's yearly quota (Webster, 2009). If Japan continued to ignore this problem and report overages every year, they risked not only credibility issues in ICCAT going forward, but also trade sanctions. Japan managed to save the situation by agreeing not to block consensus on the rebuilding plan in exchange for transfer of the EC's Northern swordfish quota to Japan for Japan's southern swordfish quota to the EC (Webster, 2009). Japan further required its longline fleets to discard all swordfish dead or alive beginning in 2000. In this way Japan came into compliance without negatively effecting their bigeye tuna fleet.

Quotas for 2000 were established at 10,600 tons and reduced over the next two years by 100 tons per year (99-2 SWO ICCAT 2000). In addition, and for the first time addressing the dead discard issue, there was a portion of the TAC set for dead discard allowances in the amount of 400 tons the first year, and reducing by 100 tons in the subsequent two years (99-2 SWO ICCAT 2000).

By 2002, the biomass estimates for swordfish had increased to 94% although this number did not take into account IUU fishing or dead discards, it seemed that the rebuilding effort had begun to pay dividends and the SCRS recommended a TAC of 14,000 tons for 2003-2009 in order to achieve a 50% chance of rebuilding to support MSY in 10 years and the committee adopted a resolution setting quotas at that level (Webster, 2009).

During the next three years, with TAC already determined, the US was consistently under catching it's quota by about 1000 tons per year but US did not want to give up its quota even as some developing nations were agitating for more quota. ICCAT chose to award the 1000 ton underage to other states without reducing US quota resulting in an allowable catch of 15,345 tons for 2003.If the US did catch it's TAC, there would be significant overages for the year.

In 2006 the ICCAT put out supplemental recommendations for the rebuilding program that included a TAC of 14,000 for years 2007 and 2008 including a measure to add the unused portion of US quotas to TACs in the amount of 2,690 tons over a two year period, allocated primarily to other contracting parties (-. ICCAT, 2006). This was reflective of a 50% probability of stock recovery to MSY in a 10-year period as had been laid out in the 1999 rebuilding program.

A special provision was added requiring that quota excesses in any year be subtracted from subsequent years and likewise, shortfall from any given year could be added to the following years quota (-. ICCAT, 2006). Minimum size requirements were reinstated with additional detail. In 2008 the terms of the 2006 amendment were extended to 2009. Today, swordfish biomass is reported by NOAA at 99% MSY (NOAA, 2008).

The information from the SCRS has indicated a rebound in population in recent years. This increase can be traced back to the management measures implemented by ICCAT in part, but consideration should also be given to other factors at work including shifts in market preferences (mercury scare), environmental factors (changing water temperatures causing a northerly migration of the fish), shifts in fishing effort to more profitable species due to declines in market prices for swordfish (NOAA, 2008).

ICCAT Management of Atlantic Bigeye Tuna

Atlantic bigeye tuna have been fished commercially along with other tuna species since the 1960's. Bigeye are fished for with both purse seine and longline gear. Juvenile and small adult bigeye often school up near the surface with other tuna species such as skipjack and yellowfin and it is these populations that are primarily caught with purse seine gear. Longline gear targets the more mature fish in deeper water.

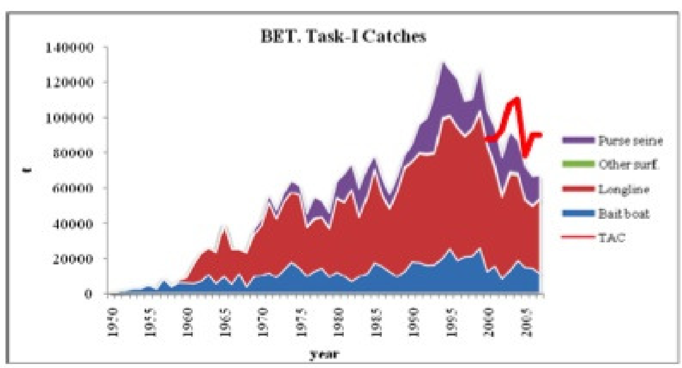
In the United States, Atlantic bigeye (a separate population and management regime from the Pacific bigeye populations) are managed domestically in the US EEZ by the Highly Migratory Species Management Division of the NOAA Fisheries Service through the Consolidated Atlantic Highly Migratory Species Fishery Management Plan (NOAA, 2008). Under this plan, among other management measures, there is an imposed minimum size limitation of 27 inches to protect juvenile bigeye until the spawning age of approximately 3-4 years (NOAA, 2008). Internationally, these fish are also managed by ICCAT, and as a participating member state, the US also adheres to the management regime put in place through this RFMO.

Atlantic bigeye tuna are currently not considered to be over fished by NMFS Highly Migratory Species Management Division and they similarly do not consider that over fishing is currently talking place (NOAA, 2008). However, due to a significant stock decline in the 1990s due to an increase in worldwide demand, the species remains under close watch by both the domestic fisheries and ICCAT. Based on the last scientific review in 2006, biomass for MSY is estimated at 92% (NOAA, 2008). Bigeye landings increased steadily from the mid 1970s until the peak year of 1994 where historic high landings of 132,000 MT were reported (NOAA, 2008). Since then, catches have fallen to below 100,000 MT in 2000 to 76,000 MT in 2006, a total landings figure that had not been that low since 1988 (NOAA, 2008).

Beginning in the mid 1980s, bigeye landings grossed the highest revenues of all the tunas increasing the competition level for this commercially desirable species and, as a consequence, landings almost doubled from 1985-1995 (Webster, 2009). In 2000, bigeye tuna brought in global revenues of US $3 Billion, making it the most valuable of any marine species at the time (Webster, 2009).

In 1992 the US suggested restrictions on bigeye landings should be adopted based on the findings of the scientific committee that reported landings exceeded maximum sustainable yield (Webster, 2009). The scientific committee suggested that instead of restricting landings, a minimum size requirement could result in conserving a greater percentage of juvenile fish and create consequent biological increases by increasing the breeding population (Webster, 2009). Countries like Ghana who were primarily engaged in surface fisheries for skipjack and other small tropical tunas vociferously objected to the size limitation (Webster, 2009).

Fish Aggregating Devices (FADs) began being incorporated to tuna fishing in the early 1990s and by 1995 ICCAT noted an increase in the catch of small fish as a result of the devices (B.-. ICCAT, 1995). ICCAT urged reduction of catches to below MSY estimates over concerns that small fish were being landed by the purse seine fisheries and that longliners were landing large quantities (NOAA, 2008). The minimum size regulation, in place since 1980 had been all but ignored evidenced by ICCAT research showing that 65% of the total number of fish caught in 1994 was below the set minimum (B.-. ICCAT, 1995). At the same time, ICCAT expressed concern over increased longline landings that had resulted in landings that substantially exceeded MSY estimates (B.-. ICCAT, 1995). The inevitable result was a significant decline in bigeye population and landings after a peak harvest of over 120,000 tons in 1995 (Webster, 2009).




BET-Figure 3. Trend of bigeye catches (1950-2007) by major tuna fishery. Red line indicates past TAC level set for major country/entity for 2001-2007. For other countries, fleet size limitation (average number of boats in 1991 and 1992) was set

In 1995 scientific evidence put bigeye biomass at 90-92% needed to sustain MSY. By the end of 1995, the only consensus that emerged from ICCAT negotiations was a resolution encouraging countries to reduce bigeye catch below that needed to sustain MSY and a resolution to study the incidences of undersize fish landings and how the use of FADs could be regulated to decrease such landings (B.-. ICCAT, 1995). By 1996, little had changed except the scientific assessment indicated stocks were at 70-120% of the level needed to support MSY.

Scientific evidence put bigeye biomass at 90-92% needed to sustain MSY in 1995. At the ICCAT meetings the management debate continued unresolved. Japan proposed restrictions on purse seine landings and time/area closures for FADs. Spain and France, both home to large purse seine fleets objected and countered that longliners (like Japan) take the majority of the species and therefore should be subject to the biggest cuts (Webster, 2009). The US, not highly invested in this fishery, supported both sides. Taiwan was under pressure from all sides to reduce their longline fleets. By the end of 1995, ICCAT issued a non-binding resolution encouraging countries to reduce bigeye catch below that needed to sustain MSY (95-11 SWO. ICCAT, 1996). By 1996, little had changed except the scientific assessment indicated stocks were at 70-120% of the level needed to support MSY and the debate between the surface and the longline member states continued.

The longlining nations, US and Japan, supported by Canada, again proposed catch limits of 80,000 tons and the surface fishing nations, led by the EC, opposed. The same forces that had been conspiring against unified management were at work again. The longliners looked positively on reducing catch rates in expectation that the result over time would be in more, larger fish for capture (Webster, 2009). The EC led coalition succeeded in keeping catch limits to those in 1991 and 1992, higher that the 80,000 proposed by the longline countries to preserve the quota availability for surface fishing for smaller fish in a multi species environment.

With fishing pressure continuing unabated, it is no surprise that the 1997 estimates for Bmsy came in at 60-80%. Even though it was current science indicated that that catches of 60,000-70,000 tons were required to sustain MSY, the scientific committee recommended catch limitations of 85,000 tons representing a reduction of about 20% off the existing catch ceiling (96-7 SWO  ICCAT, 1997). The US supported this measure, but conflicts between nations once again precluded any binding response from the Committee (Webster, 2009).

At the same time, the focus of the debate within participating ICCAT nations began to take a turn. In 1998 restrictions on new fleet capacity were being proposed as a possible solution and developing nations such as Brazil and China felt they should be exempt from restrictions on vessel limits (Webster, 2009). The committee instructed members to reduce or limit the number of vessels targeting bigeye to the same levels that existed in 1991-1992. Because of their objections, an exemption was created that was aimed at placating developing nations exempting those nations whose average catch for the previous five years had been 2,000 tons or less from the capacity restrictions (Webster, 2009).

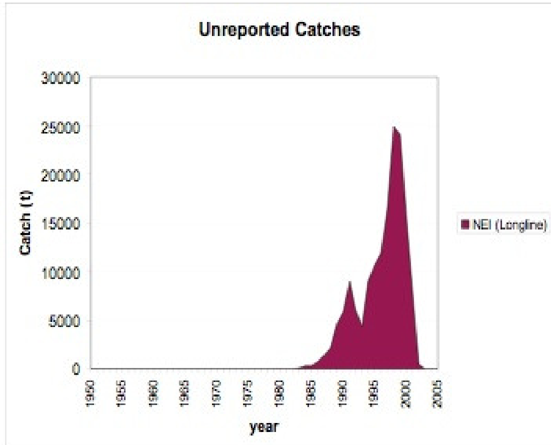
Thus the focus of the bigeye debate had moved from tension between surface and longline fishers, to fleet overcapacity, and the battle lines were drawn differently, but still the divisiveness of the ICCAT membership precluded majority decisions for strong management practices (Webster, 2009). The 1998 management measures for the year finally included the *instruction* to reduce capacity, a *nonbinding resolution* for the scientific committee to investigate possible rebuilding scenarios for bigeye, and a *recommendation* to establish a closed season for FADs in a well known spawning area(Webster, 2009).

The SCRS was ordered to asses the results of the observer program, in place since 1996 and report the results the following year (97-14, 1997). ICCAT turned the following year to an examination of the number of vessels fishing for BET to try to make some headway into regulating the skyrocketing catches of BET (97-13, 1997).

Stock assessment had moved from slightly underexploited in 1990 to severely over fished in 1998 (98-16, 1998). The results of the study of the number of fishing vessels requested the previous year spurred a resolution to limit the number of vessels involved in the BET fishery to the average that any nation had been fishing in 1991 and 1992 (98-3, 1998). But 1999 landings were over 120,000 tons, the highest since the peak in 1994. The scientific committee warned of a possible stock collapse and expressed concern over an increase in longline effort and catch by several member states in spite of previous conservation efforts by the committee (00-1, 2001). ICCAT requested a rebuilding plan be developed by the SCRS (NOAA, 2008). ICCAT management so far had been unable to reach a consensus that kept up with capacity, technology or demand (Webster, 2009). The scientific committee warned of a possible stock collapse and a resolution proposed by the US included reduction of TAC to 80,000 tons over a three year period, including allowing trade sanctions against those nations who failed to comply, but in the end, no new management measures were undertaken for the year (Webster, 2009).

In 2000, the scientific committee did not do a new stock assessment, but the assumption going into the meeting was that the harvest rate from 1999 probably resulted in lower populations for the current year (Webster, 2009). Developing nations were again considered via an exemption for those who had caught less than 2100 pounds in 1999 and were not required to limit their catches (01-1, 2002). Taiwan was allocated 16,500 tons to be landed using no more that 125 vessels, and China was limited to 4,000 tons and 30 vessels after showing a marked growth in their fleet from buying excess vessels from Taiwan (Webster, 2009).

Bigeye tuna landings declined from 2000 onward. With clear evidence of declining catches in front of them, ICCAT began to take more seriously the issues of overcapacity, flags of convenience and fish caught by nations outside of the ICCAT convention, specifically IUU fishing (Webster, 2009). In 2001, the requirement for Chinese Taipei to limit catches to 16,500 MT was reiterated and a limit of 4,000 MT was imposed on china (00-1, 2001). An additional resolution included an urgent request for Japan and Chinese Taipei to urge their citizens to cease interactions with IUU tuna longline vessels (00-2, 2000) implying that there was evidence that these nations were either abetting the IUU vessels or were engaged in trade with them for fish landed in contravention to ICCAT regulations.




**BET-Figure 4.** Estimated longline IUU catches recorded as NEI in the ICCAT database.

Two committees were formed to monitor catches by non-contracting parties and to monitor member states fishing outside ICCAT guidelines. For these offenders, trade sanctions could be imposed in the form of prohibiting imports by ICCAT nations of bigeye from all offending nations (Webster, 2009). The committees identified eight non-contracting parties that had been fishing without regard to ICCAT regulations and sent letters notifying these nations of the potential trade sanctions to be imposed upon them if their fishing fleets continued to ignore ICCAT protocol (Webster, 2009).

In 2000, Japan launched an initiative to curb IUU fishing by Chinese and Taiwanese vessels. Ironically, many of the Taiwanese vessels had been previously owned by the Japanese and were sold to the Taiwanese when Japan reduced its efforts for bigeye tuna. Japan and Taiwan announce in 2001 a plan to destroy 62 Japanese built longline vessels that had been identified as IUU fishing vessels. In return, Japan gave each country a portion of its bigeye quota, effectively, a side payment (Webster, 2009).

In 2002 landings were 73,000 tons, 26,000 tons below the TAC. From 1998-2003, limits on bigeye had not changed. Management practices changed only in the form of restrictions on fishing practices and more vigorous monitoring and enforcement measures (Webster, 2009). The resolutions for the years

2001, 2002, and 2003 are almost carbon copies of each other. No real changes were being made until a multi year conservation program came out in the form of a recommendation in 2004.

The 2004 Plan covered the years spanning from 2004-2008, calling for a TAC of 90,000 tons, vessel numbers limited to 1991 and 1992 levels, reductions of over harvest tonnage from future TAC, closed areas for FADs during the November spawning season with vessel monitoring systems (VMS) required for boats engaged in fishing during that time, and increased data collection requests (04-01, 2004). In 2005, ICCAT cracked down on Chinese Taipei for exceeding quotas and fish laundering and cut their quota to 4,600 tons, as well as imposing additional vessel number restrictions and increased reporting requirements (05-02, 2005).

Comparison of Atlantic Bigeye Tuna and Swordfish Management Results

The proportion of overexploited or depleted fish stocks worldwide has increased from 10% in 1970 to 25% today (G.T. Crothers, 2007). As of the last stock assessment in 2006 by the SCRS, Atlantic bigeye tuna are listed as 92% of the biomass needed to support MSY and are also listed as not over fished and over fishing is not occurring (NOAA, 2008). In 2007, the SCRS updated the 2006 findings with a recommendation that an international cap of 85,000 MT be implemented to allow the stock to rebuild and also indicated concerns over IUU fishing and fish laundering associated with bigeye (NOAA, 2008).

Atlantic swordfish are listed as 99% of the biomass needed to support MSY and are also listed as not over fished and over fishing is not occurring (NOAA, 2008). The rebuilding plan, implemented by ICCAT in 2000 had projected a 10 year horizon for stock recovery, but the 2006 assessment indicates recovery has occurred three years ahead of schedule (NOAA, 2008).  In the case of these two species of fish, and by our own domestic assessments, biological conservation has been effectively accomplished.

## Identification of Problem Areas

### Overview

Intergovernmental organizations such as RFMOs set up the structure for constructive discussion and implementation of conservation measures for stock management. They provide a mechanism for nations to agree on conservation measures, but do not provide a consequential legal system for enforcement or monitoring. These organizations, and in particular ICCAT have large numbers of participants and therefore many differing opinions and agendas to satisfy. As with all of the RFMO institutions, they are voluntarily joined and enjoy voluntary participation. In this context, nations will be unmotivated to participate unless they feel it will be beneficial to them in the short or long term. In the case of HMS, and the multitude of member states in any individual RFMO, divergent interests on the part of each state makes compromise of management goals part of the expected norm (G.T. Crothers, 2007). Objection procedures allow ways around conservation requirements, and the scientific committee gives advice, not mandates for management.

As a result, the process of achieving conservation may be slower than it would be with a less democratic process, but perhaps it is the democratic nature of the process that draws member states to join and participate. There is no doubt however, that the politics of the RFMO dynamic often slow decisions made by majority voting.

As an example, there is often tension between member states based on those who surface fish and those who long line (Webster, 2009). Skipjack tuna are often found schooling at the surface with small bigeye and yellowfin. Management measures aimed at stock conservation for bigeye and yellowfin can be at odds with the fishers who target skipjack (Webster, 2009). Adult bigeye and yellowfin are often targeted by longliners for sale as sushi or steaks. Longliners will wish to protect juvenile bigeye and yellowfin. This type of difference between member states often slows the consensus process.

In addition, objection procedures in ICCAT structure, allows political blocs and ways around compliance without repercussions (Webster, 2009). For instance, Country A can make side payments to Country B in exchange for a cooperative vote on a recommendation or Country A can threaten to withhold consent on a recommendation that may be important to Country B but not to themselves, in order to ensure a Country B's vote on a measure that highly impacts the fishers from Country A. In this manner a broader range of political issues is played out in the arena of international fisheries management, once again, slowing the process, and sometimes, skewing the outcomes.

All of these processes become political when tossed into the international forum of RFMO fishery management. Different member states with different needs and imperatives for their home state have inevitably a plurality of positions on a single issue. The RFMO institution allows for these divergent positions but in so doing, often slows or delays a strong management outcome.

## Allocation

Equitable allocation is a necessary component to successful fisheries management and one of the most difficult issues grappled with by fisheries policy makers on a daily basis. FAO estimates that one third of total worldwide marine capture are internationally shared stocks falling into three broad categories: Transboundary stocks ( fish that cross more than one EEZ), Straddling Stocks (includes highly migratory and adjacent high seas stocks), and Discrete High Seas stocks (FAO., 2006). Shared fish stock management requires cooperation between states on two levels, both willingness to share science, *and* active management including the development of joint management programs are essential to effective management measures (Gulland, 1986).

RFMO allocation schemes are based on Total Allowable Catch (TAC) as allocated across membership. The allocation schemes are generally based on a total yearly international quota, agreed upon by the participating members and based on the scientific recommendations of the SCRS, then allocated to individual nations based on variable criteria.

Allocation is generally based on criteria in Article 11 of the UN Fish Stocks Agreement. It first requires assessing the status of the stock and existing fishing effort (United Nations, 1995). Then UN Fish Stocks Agreement instructs RFMOs to assess fishing patterns and practices of new and existing participants, a measure that would likely include an assessment of fleet capacity. Next required is an assessment of the contributions to conservation and management made by members, an assessment that includes domestic management measures taken in each nations home EEZ (United Nations, 1995). And finally, the needs of coastal communities largely dependant on fishing for the stocks, states whose economies are largely dependent on fishing for living marine resources, and the needs of developing nations are all considered (United Nations, 1995).

In an individual RFMO, it is probable that other political negotiations take place that are more opaque to the outside observer. Allocations are decided by committee and must be agreed upon by the majority through the voting process. Allocation negotiations are most likely politically charged and lengthy until most involved parties are in some way satisfied.

Some are critical of the allocation process and assert that RFMO decisions on allocations often give little motivation for non member states to join (G.T. Crothers, 2007). Long term cooperation between member states involved in the fishery are predicated on the expectation that long term benefits from the arrangement will equal the long term benefits the member state expects to receive if they don't join the RFMO (FAO., 2006). For RFMOs to be effective enforcement must occur or the cooperating nations will have less incentive to participate. Side payments or other agreements are sometimes used between nations to trade allocations and introduce an economic facet to the process.

Others allege that RFMOs do not provide mechanisms for allocation that balance conservation interests with economic and social interests of states (Nandan, 2005). Conservation measures often impact the ability of fishers from a member nation to make a living. Conservation measures impact the ability for a nation to put it's fishing fleet to work. There is also the issue of allocation to new members and developing nations. Allocations based on historical catch leave the door open for over fishing when additional allocations must be made for developing nations as new members (Van Dyke, 2006).

New members must either increase the overall quota, or decrease the amount of each nation already allocated quota under the existing management regime. Since members do not have individual quotas, there is no obvious economic solution to a quota system unless shares are voluntarily allocated to another nation or the committee diminishes the share of one nation to give to another.

Member states need to assess the benefits of membership based on quota allocation but new membership allocation diminishes member's capacity to anticipate what quotas they will be given from year to year. If the members do not feel that being part of the RFMO is advantageous, then they may decide to leave. The dilemma further presents itself that nations engaging in IUU fishing undermine the stability of the RFMO so RFMO membership will want offending nations to join the RFMO, even though it requires allocating quota to them (Munro, 2006). If a contracting party feels quotas are unfair, the expectation is low that they will enforce its mandates in light of state sovereignty and resultant economic impact and social impact. This could also be exacerbated by the tension between the developed and the developing nations, a battle of the haves versus the have-nots.

In addition, utilizing total allowable catch allocation schemes only does not present the full range of negotiating options and incentives to nations. Allocation could be more broadly applied through an examination of net economic benefits and the use of side payments between states (Munro, 2006). Negotiation using all aspects of net economic benefits could result in solutions that will be palatable to more parties (Munro, 2006).

Other allocation issues include allocations based on historical catch leading to disproportionate amounts of catch going to developed nations who have had bigger fleets (Van Dyke, 2006). This issue also confounds the issue of developing nations and those who come in as new members. The 1995 Un Fish Stocks Agreement language relating to the preferential treatment of developing nations requires allocations to be made for these new members.

### Monitoring, Enforcement, Flags of Convenience, and Unregulated Fishing

The 1995 Agreement requires contracting parties to have programs in place for monitoring flag vessels, national inspection schemes, national observer programs, and vessel monitoring systems (United Nations, 1995). Article 21(1) gives every party of a RFMO the right to board and inspect other vessels on the high seas that is party to the same agreement to check for violations such as using prohibited fishing gear, having improper markings or identification, fishing without a license, fishing in violation of an existing quota, failing to maintain records, or tampering with evidence needed for an investigation (United Nations, 1995). It is likely a rare occurrence that any nation would to risk the political embarrassment of boarding another state’s vessel to check on a suspicion without having some very solid information that a violation was occurring to even attempt to utilize this provision. UNCLOS history shows an inability to enforce high seas regulation illustrated by failures of stocks of Alaskan Pollock in the Bering Straight donut hole, and of cod on Georges Bank off Newfoundland (G.T. Crothers, 2007).

Additional pressure is exerted on the RFMO system and on fisheries in general by flags of convenience. Flags of convenience issue from nations who are not members of an RFMO, and/or who deliberately fail to join an RFMO so that they can provide the opportunity for fishers to operate outside of the RFMO quotas and restrictions. These flags of convenience are a for-profit industry for these nations and represent vessels that ignore the conservation standards needed for fish stock health. Although the UN Agreement allows member states to take action against non-member states who participate in these activities (United Nations, 1995) , enforcement measures are weak and often not pursued (M. Lodge, 2007). The FAO Code language in section 8.2.7 provides detailed direction for flag states to enforce measures against vessels that ignore fishery regulations but many nations select the short-term profit of flag sales over the long-term conservation of fish stocks (United Nations FAO Code).

Reporting by member states does not have any third party monitoring system. In the case of an open access resource, if member states are aware of other member states exceeding quotas, political will to adhere to enforcement diminishes (Webster, 2009). In addition, enforcement costs money. Fisheries Management including monitoring, control, surveillance can cost from 1-14% of the value of the landings (World Bank, 2008). Many less developed countries lack the funds to devote to fisheries enforcement.

The 1995 UN Fish Stocks Agreement establishes management of highly migratory stocks to RFMOs. It further states in Article 8(4) that only states that are members of the RFMO or agree to its rules can have access to the fishery. But, the high seas is an unregulated environment so there are fleets who fish RFMO stocks on the high seas because they do not believe they are bound by the 1995 UN Fish Stocks Agreement. This is considered unregulated fishing. When ICCAT imposes on its membership conservation measures that increase stock biomass, and non-member states fish the stocks on the high seas (free riding), it creates a situation that diminishes the incentive for states to be members and agree to conservation measures (Munro, 2006).

Countries that operate outside the ICCAT convention are a persistent problem for tuna management. Boats that carry the flags of convenience are not bound by the conservation standards set by the RFMO. Although the UN Agreement allows member states to take action against non member sates engaging in this type of behavior, enforcement measures are often not pursued (M. Lodge, 2007).

Tracking Landings and Catch Identification

Because of the difficulty in identifying fish after they have been processed and because of subtleties in taste, the identity and origin of fish has frequently been an issue and often been the subject of fraud. Correctly identifying a fish species is critical species conservation so that the public does not buy laundered or other illegally caught fish. Particularly in today's world where fish may be caught in one country, processed in a second and shipped to a third for consumption or retail sale, tracing a fish back to its source of procurement is increasingly important. For RFMO fish identification is important to enforcement because of the ability to trace fish back to its place of procurement and the producing country for purposes of monitoring RFMO quotas and conservation measures and for tracking IUU fishing and fish laundering operations.

There are several programs currently in place for following the movement of fish after they are removed from the procuring vessel, but none that have been universally accepted by the international community. Tracefish is a program establishing traceability of fish in accordance with the European Article Numbering and Uniform Code (EANUCC) (Tracefish, 2000). Tracefish was funded by the European Commission to respond to increasing informational demands from buyers and consumers, and was developed as the most practical way to transmit the information. Tracefish marks each product with a unique identifier and then uses an electronic file to transmitting the data (Tracefish, 2000).

The electronic information transmitted with each unit of fish includes date of capture, species, where caught and procuring fishery, including boat name and gear used (Tracefish, 2000). Each unit is given a unique ID and the electronic folder stores all information for the recipient. The electronic folder is also effective if the fish changes hands more than once, each handler can include additional information in the electronic file.

The Marine Stewardship Council (MSC) also has a certification program that follows fish as it changes hands. All MSC certified seafood must have a chain of custody document with any fish bearing the MSC logo (Council, 2009). Chain of custody certification by the MSC involves paying a fee to its subsidiary, MSC International and may rely on documentation by a third firm such as Tracefish for the relevant information (Council, 2009).

In 2002 ICCAT established a statistical document program (SDP) to create a mechanism for the marketplace to verify that the bigeye landings were in accordance with ICCAT regulations and TAC (I. C. f. t. C. o. A. T. ICCAT, 2009). Fish that lack the appropriate paper trail are not legally sold in the marketplace. IUU catch is often "laundered" for the market by member states that accept IUU catch and falsely document the catch from a legal source.

In 1992 the commission created and put into place the Bluefin Tuna Statistical Document Program (BSD) requiring the use of an ICCAT approved reporting system to help track the origin of catches dockside (NOAA, 2006). The BSD program mandates that exports of bluefin have documents that indicate the location and flag of the vessel that brought the fish to the dock (NOAA, 2006). This information is then used by the Compliance Committee to review contracting parties fishing activities and by the PWG to assess the catches of non contracting parties (NOAA, 2006).

Not Enough Science

The questions of fishery science in RFMO management include, is there enough research, is it accurate, and does the RFMO adhere to the advice given by the scientific committee. Requirements to share information between member states and between RFMOs are variously ignored and shown compliance (Van Dyke, 2006). Nations may turn over significant masses of data to RFMO scientific committees on demand and as a matter of cooperation, but there is no realistic way to determine if what they turn over is in fact the entirety of their data (Van Dyke, 2006), or if it has been edited to conceal productive fishing locations, other "proprietary" information, or quota excesses.

An as yet unpublished study led by scientists from the Technical University of Denmark, soon to be published in Conservation Letters describes a new computer model run on Northeast Atlantic and Mediterranean bluefin populations indicating an almost certain population crash if fishing levels continue at current levels without significant cutbacks in quotas by ICCAT (Economist, 2008a). One scenario results in stock collapse even with a total moratorium, another raises the possibility of the species population plummeting to levels that would qualify it as critically endangered (Economist, 2008b). Here, it appears, the science that exists is being ignored or subsumed by the political negotiations of the member states.

In view of this information, Spain and Japan, both vigorous tuna fishing nations, voted in favor of a moratorium (Economist, 2008b). The EU said it would be in favor of new conservation measures then backed off the position by lobbying for higher quotas than suggested by the SCRS and rallying behind shorter seasons and improved management (Economist, 2008b). This stock may fall prey to the short term economic gains created in the public marketplace. This stock may crumble under the political tug-of-war between nation states involved in ICCAT and in the fishery outside ICCAT.

RFMO set their own management goals. With no static definition of sustainability, management goals often grow from political alliances that protect short term economic goals of certain blocs of member states (G.T. Crothers, 2007). One of the most difficult tasks for the RFMO institution is to keep members motivated to continue membership and participate in the conservation of the fish stocks. If this balance is not achieved, motivation can move in the direction of free riding and non cooperation (G.T. Crothers, 2007).

Lack of Political Will

RFMOs are often criticized for a lack of political will. Historically, economic interests have always exerted the most pressure on politics and often these economic interests trump the pressure exerted by those in favor of conservation. In the case of RFMO management, there is no accountability on the part of the RFMO itself for fisheries management outcomes or performance. If the stock collapses, the RFMO will have failed in its mandate, but there are no real world consequences.

In addition, there is no accountability in the marketplace. The consumer side does not bear any responsibility to trace the fish as being caught in accordance with management regimes, so illegally caught fish are easily sold in the marketplace.

Excess Fleet Capacity

In spite of diminishing catch volumes, the global fleet has increased numerically by approx 75% in the past 30 years (World Bank, 2008). Many assert that management failure to address the overcapitalization problem must not be overlooked when assessing fisheries issues today (G.T. Crothers, 2007). ICCAT is widely criticized in particular for its management of Atlantic Bluefin tuna. The Mediterranean purse seine fleets for bluefin tuna exceed capacity by almost double what is needed to land ICCAT quotas (WWF Mediterranean, 2008). By some estimates current world-wide marine catch could be accomplished with half of the fishing fleet fishing operating today (World Bank, 2008).

The purse seine fleet in the Mediterranean increased by 37% during the period between 1997 and 2008 (WWF Mediterranean, 2008). Estimates of tuna catches needed to make the fleet break even financially far exceed the quotas allocated by ICCAT. Libya runs a substantial fleet of 39 purse seiners. Turkey has 240 involved in the hunt for bluefin. Both Turkey and Libya, together accounting for 49% of the Mediterranean purse seine fleet, rejected their bluefin quota allocations set by ICCAT in 2007 and set their own quotas that exceeded ICCAT. It is often the opportunity to capitalize on government subsidies that drive the increase in fleet size and the concurrent increase in fishing pressure.

Excess fleet capacity is currently proving to be one of the worst problems with which ICCAT is now faced (WWF Mediterranean, 2008). For example, bluefin tuna catches in the Mediterranean Sea account for 50 % of all bluefin caught in ICCAT territory (WWF Mediterranean, 2008). Fleet under-productivity as a result of overcapacity has attempted to maintain profitability by increasing fishing effort, reducing labor costs, lobbying for subsidies, and investing in technology (World Bank, 2008).

## Recommendations for the Future

### Sustainable Development

Among the factors at play in a fishery experiencing depletion are *biological factors* like rate of reproduction/recruitment, years to sexual maturity, natural mortality rate and *economic factors* including capacity/overcapacity of the fishery, cost of production, price of the catch. Changing the mandates of the ICCAT documents from assurance of maximum sustainable catch to a standard of sustainable development can afford the Commission more latitude to interpret stock assessments based on a precautionary principle rather than maximum exploitation. Maximum sustainable catch as a standard seems, in the case of ICCAT, to encourage harvest rates at the high end of stock estimates. If estimates are incorrect, there is little margin for error when maximum harvest is the goal. Here, sustainable harvest can be thought of as utilizing the precautionary principle when there is any doubt as to exact stock status.

Sustainable development could require the use of the lowest stock estimate from the scientific committee as the basis for its TAC allocations. For instance, when the stock estimate for yellowfin tuna is given by the SCRS as 70-120%, the sustainable development mandate would require TACs based on the lower estimate. Other possible enhancements could require including an IUU factor in TAC so that TAC was not constantly pushed over maximum yield limits by illegal harvest.

### Standardize Practices Across RFMOs

An independent panel studying RFMOs found that there is no systematic approach to carrying out the mandates of the UN Fish Stocks Agreement and relatively little in the way of trading information on best practices occurring between the existing RFMOs (M. e. a. Lodge & Anderson, 2007). More standardized practices across RFMOs and for information sharing and transparency could improve regulations already in place.

The nature of the RFMO as a sovereignty protecting institution is one of the reasons for it’s failures (Webster, 2009). The objection procedure further exacerbates the situation, but to date, the only consequences to objecting to an important management objective is criticism by other members and in the public eye (Webster, 2009).

### Explore Applicability of ITQ Implementation

Transboundary stocks pose challenges associated with multiple coastal states managing stocks that cross boundaries. Highly Migratory fish pose an even more complex problem in that management is typically handled by RFMOs and involves higher numbers of participants than transboundary agreements, and allows access to new participants. Other opportunities for reform include investigation of an adaptation from an open access fishery to a property rights system inclusive of quotas and limited licensing.

New members would be required to buy quota from existing members such as occurs in a typical Individual Transferable Quota (ITQ) system (Munro, 2006). However, a change to an ITQ system inevitably brings up the issue of existing members having "property rights" to an open access resource, a concept that has not garnered much political support.

Require Resolution

In the 1982 UN Convention, Article 63(1) requires coastal states to engage in discussions to develop a management structure to manage the transboundary stock, but it does not require states to reach an agreement on this point, only to try to reach an agreement. So, not reaching a management agreement becomes the default option, which can also be thought of as non-cooperation (Munro, 2006). If there are no negative results from this (which happens if there are no allocation issues), then this will likely be the way things remain. However, if it becomes clear that there is more to be gained by cooperative management, then a cooperative management will likely be developed and implemented. In the case of the RFMO, the management structure must be self enforcing since there is no independent third party enforcement agency, and no court system (Munro, 2006). Controlling and deterring free riding is listed by some as a top priority when faced with managing transboundary stocks (M. e. a. Lodge & Anderson, 2007).

If RFMO documents required that there be resolution on every management measure that was proposed, then perhaps fewer management objectives would remain unresolved during the negotiation process based solely on a lack of consensus.

As a component of required resolution, the chambered voting can be thought of as an additional tool to help to resolve differences among individual nations on each management mandate. The pervasive doctrine of state sovereignty in RFMO management often results in national interests taking precedence over environmental protection (Webster, 2009). National interests are often motivated by economic gain. Consensus decision making gives individual members power to block regulations they feel are detrimental to the interests of their own country, and the institution itself has no means to enforce rules on non cooperating nations (Webster, 2009). With a greater number of member states, conflicting management goals often result in a gridlock on the way to management objectives (Munro, 2006). One possible solution can be seen in the voting system adopted by the Honolulu Convention, a system that includes chambered voting thereby consolidating votes into two bodies and reducing the impact of state sovereignty.

The voting system in the Honolulu Convention is by consensus on many issues, but by chambered voting on others (Van Dyke, 2006). Chambered voting is divides the members into two sectors with two different interests, one consists of the ten distant water fishing nations and the other of the sixteen island nations (Van Dyke, 2006). Envisioning an application for ICCAT, voting could sometimes be divided between purse seine nations and longline nations using a chambered voting process. This technique could help to streamline divergent national interests and make the decision making process for multi-government institutions more efficient and more self-enforcing.

For example, ICCAT could apply the chambered voting concept to band together developing nations and developed nations to reach collective agreements and vote as two coalitions. The concept as introduce by Monroe is that of a **Grand Coalition** i.e. the RFMO and the creation of **sub coalitions** (Munro, 2006). The Honolulu Convention divides Pacific Island nations into the developed nations and developing nations coalitions to decide on management regimes for tuna. The developed nations were concerned with the long-term viability of the resource and the developing nations were more concerned with the short-term gain. The haves placed a higher value on the resource. Cooperative management was achieved through the use of side payments to the less affluent nations from the more affluent nations (Munro, 2006). Coastal nations that invest in the fishery in such a manner as to foster conservation and stock growth, could be rewarded with higher allocations (Van Dyke, 2006).

Broader Use of Trade Sanctions

Punishing those who engage in destructive fishing practices, destructive gear, quota exceedences (hogging the fish), flag vessels, and subsidizing fleets is also suggested for RFMO reform (Van Dyke, 2006). One method to achieve this type of reform is to allow trade sanctions against nations who consistently violate conservation measures called for under the RFMO regime. ICCAT has guidelines for effective conservation management, but lack of enforcement can cripple their effectiveness. Linking trade of RFMO products to traceability of compliance with RFMO standards is a measure that can be enforced dockside. If a contracting party has exceeded its quotas, allow seizure of the catch and stop its delivery to the marketplace. Development of more efficient tools to track catch and catch quotas would aid in this process and create jobs.

General Agreement on Tariffs and Trade (GATT) was conceived of and drafted during the years following WWII. The purpose was to reduce trade barriers among members in order to remove distortions in international markets to ensure that goods and services were not discriminated against based on their country of origin (Hunter, 2007). As a response to the War, the theory was that increased trade would improve political relationships and lead to a more economically integrated global system by reducing trade barriers that had been implemented during the war as protectionist measures (Hunter, 2007).

The preamble to the Marrakech Agreement establishing the WTO states that its goals include "the optimal use of the worlds resources in accordance with the principles of sustainable development seeking both to protect and preserve the environment and to enhance the means for doing so." (Uruguay Round, 1993) making it a vehicle for establishing multinational environmental agreements.

Trade sanctions are generally looked upon as being imposed on the same sector as the dispute, but if over time that is not practical, it is possible for sanctions to be imposed on other sectors (Hunter, 2007). In the case of ICCAT, trade sanctions would first be imposed on the landed catch in question, and only if this was proven to be ineffective would the WTO then hear a petition to impose sanctions on another sector. WTO dispute resolution procedures could serve as an efficient dispute resolution mechanism for contracting parties who fail to observe the conservation mandates of the RFMO if trade sanctions and subsidy reduction were approved enforcement measures under the RFMO infrastructure.

### Increased Enforcement of IUU Fishing

IUU fishing is showing itself to be a significant issue including undermining the effectiveness of the RFMO management. RFMO quotas will be ineffectual at conserving a sustainable stock biomass in light of IUU fishing because allowed levels of harvest will show results of continued stock decline, even if the science has correctly been interpreted and been implemented in the RFMO decision making process (FAO., 2006).Those parties who perceive they can make greater profits outside the confines of the management and conservation programs offered by the RFMOs will free ride the system (FAO., 2006). Greater enforcement to prevent IUU fishing including international cooperative enforcement agencies can assist in reducing this problem and aid in stock rebuilding and conservation for long term harvest.

Reduce Fleet Overcapacity

Reduction in fleet overcapacity also presents itself as a pressing mandate. Commencement of a buy-out program to purchase boats and reduce fleet overcapacity through the use of funds currently earmarked for subsidies and through public/private partnerships will help to increase the efficiency and profitability of the resulting reduced fleet leaving less boats to pursue diminished fish stocks. The decrease in economic pressure to make fleets profitable can ease fishing pressure.

Eliminate Government Subsidies

Global fisheries related subsidies constitute between 15 and 20% of aggregate dockside revenues (Mattice, 2004). Over fishing by subsidized foreign fleets makes it difficult for developing countries who don’t have the same financial resources to develop their own fisheries (Mattice, 2004). Fisheries subsidies often function in such a way as to limit non-subsidized participants access to the shared resource (Mattice, 2004). Subsidies often result in subsidized producers increasing catches thereby limiting the accessibility of that fish stock to all other fishers (Mattice, 2004). The outcome creates more of the race to the bottom mentality that has characterized the open access nature of fisheries and contributed to the degradation of the natural resource that is our common world heritage.

A phase out of subsidies for fleet enhancement or other market distorting programs together with enforcement through the WTO can also help to diminish overcapacity issues. Public funds could be re-directed to enhance fisheries via new jobs created to rebuild fish stocks, design fisheries reforms, and help mitigate economic and social hardship (World Bank, 2008). WTO rules on subsidies are binding and can be enforced through the WTO dispute settlement system (Mattice, 2004). Subsidies that contribute to fleet overcapacity distort trade, undermine sustainable utilization of fish stocks, and hamper sustainable development i.e. less developed countries sell fishing rights because they can't cost effectively develop their own fleets (Mattice, 2004).

Modification of Allocation Criteria

For fishery management, the allocation of the benefits of the fishery can be viewed in two ways: total allowable catch quotas or overall net economic returns of the fishery over time. The addition of economic criteria to allocation schemes can enhance the options available for RFMO to achieve stock conservation and decrease overfishing.

The North Pacific Fur Seal Treaty of 1911 is a good example of net economic allocation in a fishery conservation context. The economic benefits of this industry were maximized, then divided among the various nations engaged in one way or another in the harvest of fur seals (Conference, 1911). Some of the nations were not actively engaged in the harvest of seals, but had legal rights as coastal nations to the use of seal habitat. Seal harvesting nations made side payments to nations with seal harvest rights in exchange for those nations to give up seal harvest. By dividing up the harvest proceeds as an economic whole rather than as a quota, the seal industry was protected against an over capacity of harvesters. In addition, the resolutions promoted compliance, deterred non participation by offering incentives (side payments) and solved a problematic situation by allocating the economic benefits to all concerned weather they were physically involved in seal harvest or not (Conference, 1911).

Independent International Audit Group

Some suggest holding the RFMOs to an independent standard will help to keep the institutions themselves accountable for their results. The creation by the UN of an independent environmental standard setting body to dictate the standards to which the RFMOs are held could help to hold the RFMOs to achieving a particular conservation standard (G.T. Crothers, 2007).

**Conclusion**

The cases of Atlantic bigeye and Atlantic swordfish represent both ICCAT success and failure. In each instance, the decline of the stock is what fostered the stricter management regimes to allow for recovery. In the case of bluefin, declining stock estimates are a call to action for ICCAT. Strict management measures for bluefin stock recovery have yet to be implemented or enforced. What is not yet known is if bluefin have been fished beyond recovery or if in fact, stronger management measures can result in slow recovery in similar fashion to the swordfish and bigeye cases.

Strengthening RFMOs as international fishery institutions could help to speed up the consensus process by eliminating some of the areas that forestall decisive action. Suggestions for reform can strengthen the RFMO institutions already in place and fortify the organizations abilities to achieve both conservation and harvest mandates. As an international fisheries management tool, they are essential to maintaining highly migratory fish stock populations, and as such must urgently be assessed for performance and improved upon in accordance with modern issues and political pressures.

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