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INTRODUCTION

The Inter-American Tropical Tuna Commission (IATTC) came into existence in 1950, after its convention, signed by representatives of Costa Rica and the United States in 1949, was ratified. It was the first international tuna organization, and only the third international fisheries organization, whose staff has had the responsibility for performing scientific research, the others being the International Pacific Halibut Commission, established in 1923, and the International Pacific Salmon Fisheries Commission, established in 1937. The current members of the IATTC are Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, the United States, Vanuatu, and Venezuela. The first Director of the IATTC was Dr. Milner B. Schaefer, who was in that position from 1950 to 1963. He was followed by Dr. John L. Kask (1963-1969), Dr. James Joseph (1969-1999), and Dr. Robin L. Allen (1999-present).

The success of the IATTC showed that it was possible to carry out research and management on an international, high-seas fishery successfully. Since then other international organizations for tuna management, including the International Commission for the Conservation of Atlantic Tunas (1969), the Forum Fisheries Agency (1979), the Commission for the Conservation of Southern Bluefin Tuna (1994), and the Indian Ocean Tuna Commission (1996), were established.

Appropriately, the 50th anniversary celebration was held in Costa Rica, one of the two charter members of the IATTC. Persons who have held important positions in international fishery management in various parts of the world spoke at the celebration. Their presentations, except for that describing the Indian Ocean Tuna Commission, are reproduced in this volume.

PROGRAM

Keynote address

Mr. John Caddy, Research Fellow, Imperial College, London, and CINVESTAV, Mérida, México

Other presentations

Mr. Campbell McGregor, Commission for the Conservation of Southern Bluefin Tuna

Dr. Robin Allen, Inter-American Tropical Tuna Commission

Mr. Adolfo Ribeiro Lima, International Commission for the Conservation of Atlantic Tunas

Mr. Alejandro Anganuzzi, Indian Ocean Tuna Commission

Mr. Michael Lodge, International Seabed Authority

Dr. James Joseph, consultant

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INTRODUCTION

The situation of global resources and marine ecosystems

Before looking at the question of how tuna fishery management fits with the legal instruments mentioned in the title of this paper, it would seem to be a good idea to briefly review the situation of marine fisheries as we find it today, and ask whether tuna fisheries are showing similar trends to other resources. In recent years considerable concern has been expressed over the declines in landings of key fish species globally, with a number of reviews (*e.g.* FAO 1997, Caddy *et al.* 1999, Caddy and Garibaldi, 2000), pointing to the fact that for many key FAO areas, landings of marine species have already peaked as early as the 1970's in some areas and have since been falling, with particular concern for groundfish resources of continental shelves.

Here we are seeing a move offshore of fleets into deeper water previously thought to be unfishable to take orange roughy and other long-lived species in a move that is almost certainly not going to be sustainable. Voices were raised in alarm by Pauly *et al.* (1998), who see 'fishing down of the food web' as a global threat, whereby top predators (and these include tunas) are depleted and replaced by species lower in the food web such as sardines or anchovies (or presumably, in the case of offshore tuna resources, frigate tunas, squid and mesopelagic fish). In a recent review of fisheries trends by trophic category, Caddy and Garibaldi (2000) found evidence in some systems to support the 'fishing down the foodweb' hypothesis especially for groundfish stocks of temperate shelves, but also pointed to other driving factors such as technological improvements, changes in market preference, as well as in some areas, increases in productivity of marine coastal waters due to increased nutrient runoff to marine coastal ecosystems (*e.g.* Caddy 1993a). For tropical areas outside upwelling zones, tunas make up the majority of piscivores, and as can be seen from fig 1, their landings have increased dramatically over recent decades: does this mean that tuna fisheries are destabilizing oceanic ecosystems? The definitive answer to this question remains unanswered, but certainly there are ecological problems to be faced, as discussed next.

Impacts of tuna fisheries on the ecosystem

The Code (FAO 1995a) has twenty or more exhortations to do something to conserve the health and well-being of ecosystems, but really we have no operational definitions of what is to be aimed for apart from a collection of single species targets. How relevant are ecosystem considerations to the status of tuna stocks? Certainly there is evidence of serious depletion of bluefin tuna stocks and rates of exploitation of other tunas would better be reduced, certainly for economic reasons and most probably for stock conservation and ecological reasons also. The general picture from the landings record (fig 1) for tropical areas outside upwelling zones, is of a more recent rise in landings which has increased the mean trophic level of all marine catches from some tropical areas over recent years since tunas now make up a higher proportion of the total.

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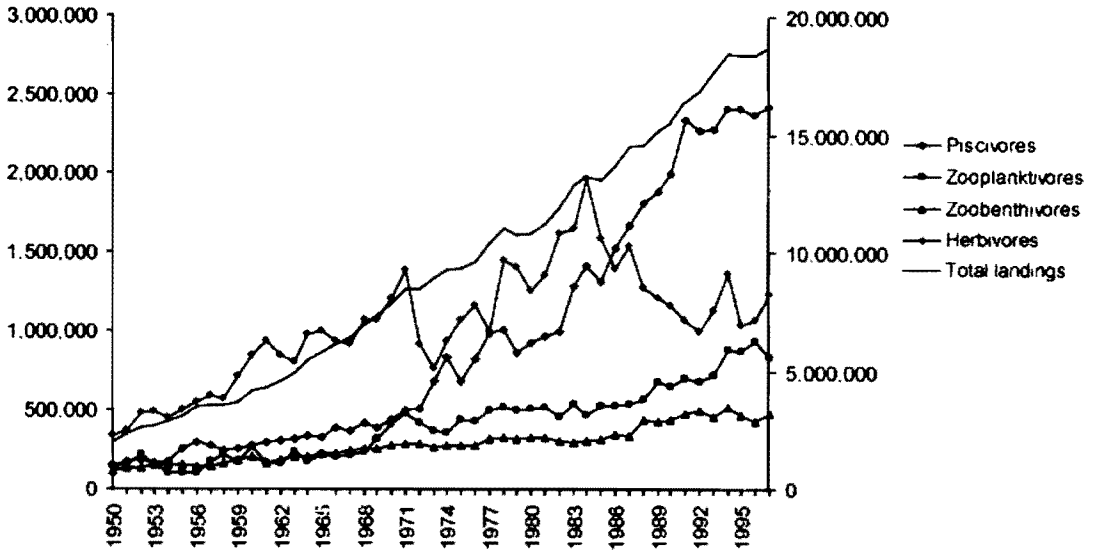

FIGURE 1. Trends in catches broken down by trophic category (left axis) and in total landings (right axis) for FAO Tropical Areas 31, 51, 57, and 71 outside upwelling zones (from Caddy and Garibaldi, 2000).

The question may be asked whether the reduction in tuna stocks from virgin conditions implied by fishing at around MSY in some cases, is likely to lead to an expansion of food organisms at the lower trophic levels that support tuna stocks? I believe the answer may be yes, but that most of these food organisms such as oceanic squids, and other scombrids, are unlikely to be available to exploitation by man in an economic manner: tuna stocks are the only marketable schooling resources providing convenient large 'packages' of protein for funneling oceanic production to man in a commercially and technologically feasible fashion, though this may conceivably change with technology and market conditions.

Olson and Boggs (1986) estimated that at least 11,690 tonnes of prey were consumed daily by the population of yellowfin tuna in the CYRA during 1970-1972, mainly by frigate tunas (especially *Auxis*), or about 1.4 million tonnes a year of this species. Reducing the stocks of yellowfin drastically would increase stocks of *Auxis*, which is believed to eat, among other things, yellowfin tuna juveniles. If this is correct, reducing tuna biomass significantly could in theory reduce yellowfin recruitment! To the contrary, fishing *Auxis* might reduce somewhat tuna food supplies, but would almost certainly be economically inefficient. Other tuna food items such as squid and mesopelagic fish are also marginally harvestable offshore, so that a 'food cushion' appears to exist for tunas. Thus, the main threat to tuna fisheries from changes in the offshore food web seems to be to allow *Auxis* populations to grow, by reducing tuna stocks to a low level.

One other aspect of tuna ecology is beyond the reach of tuna managers, if you consider that tunas horizontally integrate biological production from both oceanic food chains (where we have seen that their food resources are relatively secure from exploitation) but also harvest shelf resources which are subject both to overfishing and more extreme environmental changes than ocean systems. While chaos theory seems to show that the whole subject of forecasting ecosystem changes as a result of fishing or environmental changes is largely wishful thinking at this stage, and while I cannot see overfishing of shelf prey species as having an overriding impact on tuna stocks, I can see the possibility of EDSO phenomena (*e.g.*, Bakun 1996) and possibly even global warming, impacting ocean systems and affecting tuna distribution and abundance, but would not wish to hazard a guess in which direction. One interesting phenomenon

that might be worth commenting on, is the (I understand) higher proportion of bluefin catch recorded by ICCAT which have been taken from the Mediterranean as opposed to the Atlantic in recent years, which suggests that feeding conditions in the former area are better, and we know that cultural eutrophication has increased forage fish abundance there, which could be the reason.

With respect to assessment of the tuna resources, we see the development of ever more sophisticated modelling approaches (*e.g.* SPARCLE, Fournier *et al.* 1996), but apparently slow progress is being made in estimating life history parameters as input for tuna assessment models. For example, the value for the natural mortality rates (M) used for yellowfin, bigeye and skipjack all come from old estimates, and in some cases from other oceanic areas. In my view, new modelling techniques and management measures, in addition to effort and catch controls, need to take more explicitly into account dispersal and migration rates, and ensure through spatially differentiated exploitation patterns that adequate escapement to spawning is assured.

If we consider the broad picture however, for many small tuna species and tuna-like resources or other highly migratory species, there is currently insufficient information to arrive at an assessment or a scientifically-based management system. If we consider the Caribbean and Gulf of Mexico, where tuna fisheries come under jurisdiction of ICCAT, there seems to have been a trend of increasing fishing capacity in the countries of the WECAFC (Western Central Atlantic Fisheries Commission) regulatory area (Mahon 1996). Several species such as blackfin tuna, king and Spanish mackerel, and dolphin fish are of major importance, and increasing trends in landings are evident, but their by-catch in tuna fisheries goes largely unreported. Interactions between large scale commercial, small scale artisanal and recreational fisheries will inevitably intensify as Small Island Developing States (SIDS) demand their share of ocean production.

This brings to mind Article 5.2 of the Code which says (*inter alia*) ... 'relevant international organizations ... should give full recognition to the special circumstances and requirements of developing countries, including in particular the least developed among them, and small island developing countries', while Articles 24 and 25 of the Fish Stock Agreement specify that these special requirements include their need to meet nutritional requirements, to avoid impacts (by high seas harvesting) on artisanal fishers harvesting the same resource, and the provision of financial and other assistance, including assisting their active participation in fishery management organizations. It must be seen that the question of how these requirements can be achieved while restricting access to avoid overfishing, becomes a serious one, and will be discussed later.

A short review of the current situation of distant water fisheries

Newton (1999) notes that distant water catches in 1972 made up 16% of total marine catches, but had dropped to 4% by 1995, and that in many areas, distant water fleet operations had been replaced by coastal state fleets. Despite this decline, the capacity of distant water fleets has not been reduced: a question we will discuss later.

In fact, over recent years tuna fisheries have increased greatly in importance from 20% of high sea catches and 45% of value, to 41% of catches and 82% of total landed value of high seas catches – in other words, tuna fisheries are the most important high seas fisheries today, and the others are of relatively minor economic importance in value terms. It is for this reason that we will consider in a broad-brush fashion the economics of the offshore fishery in what follows.

The overcapitalization issue

As noted by Greboval and Munro (1999), excess fishing capacity is affecting the sustainability of many fisheries, undermining management efforts and leading to economic waste, and tuna fisheries are not excluded from this generalization. They note that over the decades 1970-90, world fishing capacity grew at a rate eight times greater than the growth of landings. FAO Technical guideline No 4 for Responsible fisheries, an adjunct to the code on fisheries management issues notes that 'It is... in the interests of the

users and the resource to maintain potential fishing capacity at a level commensurate with the long term stock productivity'. As noted earlier, unfortunately this is a state that is rarely realised for reasons we will discuss further.

It is perhaps relevant here to recall that Smith and Hanna (1990) divided fishing capacity into four components:

a) Number of vessels

b) Size of vessel

c) Technical efficiency of operation

d) Potential fishing time per year.

My general impression is that in terms of managing capacity of high seas fishing fleets, attention has been mainly paid to the first two factors, and less so to the other two.

Greboval and Munro (1999) distinguish between pure open access fisheries and regulated open access fisheries: tuna fisheries perhaps fit into both categories. Each has ill-defined property rights, but the second type, which probably includes some of the better managed tuna fisheries, although controlling the overall global harvest, rarely are able to exert effective control over vessel participation in the fishery.

Newton (1999) notes that the most accessible information on high seas fisheries are those for tuna, where ICCAT, IATTC, IOTC and the South Pacific Commission collect data on catches and tuna vessels. Improved coordination between tuna commissions would be a precondition to a proper analysis of global overcapacity of tuna fleets, given that some boats may fish (legally or illegally) in more than one commission area in a single trip. He referred to the concept of a world tuna body or umbrella organization, an idea floated without success by IATTC at the FAO Technical Consultation on High Seas Fishing (FAO 1992), where the response, unfortunately, from other participants was that "this was an issue that lay outside its (the Consultation's) competence, and that the consultation recognized that 'regional fisheries bodies were responsible to their members' ". Given this attitude, the advantages of the Compliance Agreement as a management tool become readily evident: as for the 1995 UN Fish Stock Agreement, it requires flag states to license their vessels operating on the high seas and maintain a record of authorized vessels. This record will be updated and made available from FAO electronically as soon as the agreement goes into effect, so that the existing global capacity can then be determined.

While it serves little purpose to weep for an idea whose time has not yet come, such an international umbrella organization for tuna commissions with the Compliance Agreement mechanism incorporated, could at the very minimum, serve a useful coordinating, and information-furnishing role. In fact the secretariats of tuna commissions have already initiated a process of consultation that will serve to exchange information. One would like to add that it would also be useful for setting uniform standards of acceptance of new members, and might eventually provide a coordination mechanism for regional Satellite Tracking Systems, to be discussed next. The fundamental obstacle for most regional bodies to reaching agreement not only on conservation measures but also on measures to coordinate the work of different commissions, is not only their different membership, but the requirement for participants to adopt measures unanimously by concensus. Very little likelihood of change is going to occur in the absence of an improbable step forward in assigning access or stakeholders rights to users of high seas resources.

The other element of the overcapitalization issue that deserves mention relates to the question of technology dumping. A fleet that sells its older vessels to new participants while upgrading its own, ensures that the total capacity of the regional fleet can only increase. When we add to this the advantages in economic terms of operating older vessels under flags of convenience, and the arms-length distance this provides from actually implementing fisheries agreements reached by Commissions, we see the seductive logic of not keeping capacity under control. Additional pressures on fleet caps are added to by incentives provided to support ship building, when from a conservation perspective, incentives to scrap older vessels would be much more appropriate. In fact, in an analysis of all vessels over 100 tons in the global fishing fleet

within the Lloyd's data base (Smith 1999) shows that the peak years of construction were in the 20 years from 1968-88, (no separate data provided for tuna fishing boats unfortunately).

Considering that industrial fishing vessels seem to have an effective half-life for operation of some 30+ years (Caddy 1993), we have been living recently on 'fossil investment' from the 1960's to 1980's, but may soon expect global fleet renewal to become more intensively pursued, especially since with rising fuel prices globally, obsolescence of less efficient older vessels will be accelerated. Smith (1999) goes into more detail on this issue, and notes that fleet reduction due to vessel losses occurs at about 1.5% per year for the first 25 years, and due to decommissioning and losses at 60% per year over the remainder of their life span. One can only hope with Newton (1999) that fisheries commissions will bring up the issue of the suitable replacement coefficients to be used for offsetting increased technological efficiency when major rebuilding programs begin.

Tuna fisheries require international management

The problem of fisheries management for highly migratory resources transcends the already complicated problem faced in managing demersal and small pelagic resources, namely that of establishing the state of resources, quotas and technical measures, but different government processes and different interests of countries also need to be taken into account.

There is a need to obtain international agreement (in some cases on the science as well as on the management measures) which makes management of highly migratory resources far more difficult than that of national resources, and hence complicates the process of agreeing on effective and binding measures.

Some progress is being made however, and new perspectives and mechanisms are being developed. For example, the ICCAT Bluefin Tuna Statistical Document Program is a trade measure designed to improve compliance with ICCAT Resolutions by prohibiting imports of bluefin unless accompanied by a certificate saying that the fish caught met with ICCAT conservation measures. ICCAT has also taken the lead with respect to implementing specific measures against countries fishing Atlantic bluefin tuna through its BFT Action plan, which under Recommendations 96-11 and 96-12 prohibits import of bluefin and products from 3 states operating: 'in a manner that diminishes the effectiveness of ICCAT regulations' – Given that the main importing country is Japan, an active ICCAT member, this measures has the potential for success.

Nonetheless, the difficulties facing tuna commissions in achieving agreements of members and non-members is noteworthy. An example is provided by ICCAT Resolution 95-3 on Compliance, an extract of which reads " Satellite tracking and catch reporting systems under the responsibility of flag states should be encouraged". The point here that even an active Commission is not being given an operational role in actively implementing and policing resolutions by its members.

The relevance of the CCRF agreement, the UN Fish Stocks Agreement and the Compliance Agreement to tuna fisheries

The pace with which these new management agreements have been accepted and applied by coastal states, in the latter two cases despite a lack of ratification, is gratifying and surprising. They all provide useful directions and embody an often sophisticated common understanding of the complexities and practicalities of fisheries. Given that the general thrust of these agreements is highly positive, I believe the most useful approach to my terms of reference for this talk is to consider how the Code of Conduct and UN Fish Stock Agreement can accommodate the particular features of tuna fisheries, as far as their management is concerned, and what difficulties their application faces.

The story of how the UN Fish Stock Agreement was harmonized with the Code of Conduct during their largely contemporaneous development does not require telling here, but simply to note that the two instruments are compatible as far as they deal with Highly Migratory resources, and that both of them contain essential elements of that other legal instrument, the Compliance Agreement. This now looks to be

gaining a further lease of life with proposals for adding extra provisions governing satellite monitoring systems; a high priority in my view for all distant-water fisheries, which without this technology are largely unmonitorable.

Certainly, the global nature of the FAO Code means that a number of Articles, such as that on coastal area management are of doubtful relevance to most tuna fisheries. Even within Article 7 which deals with fisheries management, there are issues which are more particular to EEZ management, and although relevant to management of domestic and inshore tuna resources, should not be overemphasized in a global context.

One of the considerations that needs to be borne in mind in translating the Code into an operational series of actions is that due to its development by governments, it has come to resemble a code of conduct for governments, which needs to be interpreted anew at each level: that of the fishing enterprise, the fleet and the individual skipper involved in interpreting its provisions. Although now accepted by many governments, the Code's provisions are more persuasive than binding. How the Code is to be applied in the case of tuna fisheries remains an open question, and this paper can only highlight particular aspects. Certainly one of the roles of the tuna commissions will be to consider how key clauses of the instruments mentioned can be brought to the attention of the tuna industry, and translated into a form whereby their practical implications are more easily understandable.

As noted by Newton (1999), although Article 17 of the Fish Stock Agreement states that members of such organizations "shall take measures consistent with this Agreement and international law to deter activities of such vessels which undermine the effectiveness of conservation and management measures" – it is not specified what international action will lead non-cooperating states to revoke authorizations of their vessels to fish. Although Article 20 para 4 urges cooperation between states to identify vessels reported to have undermined regional conservation measures, other than blacklisting, it is not obvious what action can be taken. The Compliance Agreement with a proposed 24 hour access to a world list of authorizations to fish seems to provide the basic tool to at least ascertain, without boarding, whether a vessel has the required authorization to fish in the area in question.

The code and fishery economics

One other aspect of the Code and Fish Stock Agreement that causes perplexity at first sight, relates to the almost complete absence or specific mention of economic considerations, which surely underlie fisheries for tunas as for other resources. One particular drawback here is that it is very difficult to use any economic or tax measure internationally in tuna fishery management. This seems to be because in spite of the undoubted efficiency of these mechanisms in other domains, not all countries participating in high seas fisheries share similar costs, market values, or similar perceptions of the importance of access to fishing grounds for food security or other political ends, nor is there a regulatory body with the power to impose taxes. For the same general reason, we have seen few application of rights-based methods such as ITQ's in tuna fisheries, since for obvious reasons, the definition of 'stakeholders' and an identification of their rights to fish, is still submerged in the global commons of the high seas where many tuna fisheries operate.

One might for example have supposed that the knowledge that maximum economic yield (MEY) exists at a lower level of fishing than MSY, in a more rational world, might have led to a clause in one of the above instruments such as:

"All participants, whether fishing for a straddling or highly migratory resource inside EEZ's or on the high seas, should seek to avoid wastage of economic resources by prior negotiation of a fair share of allowable production. This can alternatively be expressed in terms of the fleet capacity or the total fishing power needed to harvest their share."

Probably the equitable negotiation of allocations by fleets and by nations is the most difficult aspect currently faced by international fisheries, even for shared stocks when the number of parties involved is

known, and new approaches are desperately needed (*e.g.* Caddy 1996). It becomes an even more intractable problem where an undefined number of potential new entrants must be taken into account. The other major obstacle is that national fleets do not share common economic systems, hence an allocation of a TAC which would produce a net benefit to one, might lead to an economic loss for another. It would also seem misleading to suppose that fishing fleets are necessarily and exclusively seeking monetary return - in fact for many fleets direct or indirect subsidies make it difficult to judge their economic performance. Indirect benefits of a high seas fishery in terms of projected political and economic influence for the government concerned, in maintaining its influence in an area, or ensuring that their industry provide for food security even at a loss to the sector, may both override purely economic considerations.

One of the few clauses of the Code specifically mentioning economics is 7.4.3, which reads:

"Studies should be promoted which provide an understanding of the costs, benefits and effects of alternative management options...in particular, options related to excess fishing capacity and excessive levels of fishing effort."

Note that this falls far short of saying that capacity should be curtailed, or that fisheries should be operated in an economically efficient fashion. This was a question examined recently at an FAO meeting on the management of fishing capacity, held in October 1998 (FAO 1999), which identified this as one of the key questions to be addressed by fishery commissions.

Evidently, as noted by section 7.2.2b of the Code on Management Objectives, managing resources in an open access situation, or one where allocations have not been fixed, presents major difficulties, but as an observer of the process, it is my impression that neither the Code nor the Fish Stock Agreement provide a water-tight seal against increases of effort or access.

Article 10 of the UN Fish Stock Agreement, under 'Functions of subregional and regional fisheries management organizations and arrangements', clause (b), says that States "shall agree, as appropriate, on participatory rights such as allocations of allowable catch or levels of fishing effort", while clause (i) recommends States to: "agree on the means by which the fishing interests of new members of, or participants in, the organization or arrangement will be accommodated".

Under Article 11 on new members or participants, clause (a) urges that the state of stocks and existing level of effort should be considered, but under clauses (d) and (e), it states that the needs of coastal fishing communities mainly dependent on fishing the resources, and (f), the interests of developing states in whose jurisdiction the stocks also occur, must also be taken into account. How are these clauses to be operationalized without destroying the cap on total fishing pressure we are seeking?

The impression this gives to a person such as myself trained in stock assessment, is of a certain 'elasticity' in the concept of sustainable yield that underlies these proposed arrangements. It is not stated anywhere that existing participants must relinquish some of the Total Allowable Catch (TAC) or equivalent fleet fishing power or capacity in order to provide for these valid considerations, but this surely must be the case?

The problem identified from an economic perspective by Greboval and Munro (1999) is that there exist at least two types of 'Capital' relevant to fisheries: the existing biomass of fish forms the natural capital, which if properly maintained will yield a stream of benefits to society indefinitely. The other more obvious form of capital are those economic resources invested in the fleet. They point out that management failures come when these two sources of capital are not in balance or equilibrium with each other, or where there is excessive mobility of fleet capital between different resources. I presume by this latter qualification, they mean that this could lead to 'pulse fishing' and 'rotational depletion' of unit resources fished in succession by the same fleets.

One other implication (or lost opportunity) resulting from excessive fleet development is illustrated by the record tuna catches last year, which are reported to have seriously depressed markets recently. This sug-

gests another good reason for global coordination in putting a cap on capacity at the level of tuna industries. Though the likelihood of agreement on a 'cartel' restricting global tuna catches to keep prices high seems even more remote than for the other 'global umbrella' for cooperation mentioned earlier, the implication is that net revenues would rise if global effort fell. In this connection, a coordinated response to the ecocertification of tuna products (*e.g.* Deere 1999) could also have a useful role to play in supplanting over-simplistic concepts as 'dolphin-safe' labelling of tuna products. At the same time, both market-driven mechanisms suggest that indicative bioeconomic analyses could be very useful in reinforcing the advantages of fishing at a reference point significantly below that yielding MSY.

Some shared and straddling stock issues

The need for cooperation between authorities of coastal states for shared stocks (see Hancock 1999) and between coastal and DWFN's for straddling and highly migratory resources, is stressed in the Code and the UN Fish Stock Agreement. What comes out very clearly from 'competitive fish games' and their modelling (see *e.g.* McKelvey 1985) is that if there hasn't been a prior agreement on allocations and on cooperation, the overcapitalization problem will arise and will prove intractable, since all parties will have capacity in excess of that needed. This leads to short term competitive games in which participants try to pay off investment in vessels before seeking agreement, and this inevitably leads to stock depletion. Ruseski (1997) suggests that this is precisely why there is a powerful motivation for subsidy programmes, in that there is a race to seize a greater share of the temporary profits from a fishery before the stock is depleted.

In the 1979 book on International Management of Tuna by Joseph and Greenough and in Joseph's 1983 article "International Tuna Management Revisited" (in Global Fisheries Perspectives for the 1980s, edited by Rothschild) suggest new approaches to rationalizing tuna fisheries. Clearly the idea of limiting access to international fisheries by conventional 'top-down' governmental mechanisms with national allocation either frozen in time or subject to change by negotiation, is the conventional way to go, but hasn't proved very practical judging from the relatively few such agreements that appear to be in force.

Are there other approaches? The notion of a joint company with shares held by countries is seductive and has some similarities to the PAQ system suggested by Joseph and Greenough (1979). Such a joint company might have shares held by the countries involved or their fishing industries may be directly involved with the governments as guarantors?

Shares might be negotiated initially both in terms of established national allocations of the resource or in capacity units, and could be partly based on catch but also on the extent of national contributions to the joint arrangement. Such shares could be traded between participants on a temporary or longer term basis.

As noted, such a parastatal company could be partly or wholly in the private sector under supervision by the States concerned, paying dividends to participating States or their private sectors either directly or as licence fees or taxes, and preferably also paying the costs of fisheries research and MCS for this and other resources. Where necessary, this parastatal body could also licence national vessels of participating countries for harvesting, or agree to joint ventures of various kinds without the pressure that the benefits are seen as going to only one economy. This kind of arrangement might offer other additional advantages through bulk purchase of vessels, fishing gear and equipment abroad at favourable rates, allow joint advertising and marketing of product, and pay for vessel and fishermen insurance schemes *etc.*

Thus, the idea of, for example, a 'Pacific Ocean Living Resources Consortium' presupposes participants get a proportion of the established TAC or total allowed fishing capacity by paying a share towards the costs of administration of the Consortium. It would be nice to suggest that countries bid in open auction for catch or capacity shares, but this would result in the richer countries getting most of the pie, which we have seen is not in line with the Code or Fish Stock Agreement provisions for protecting developing countries. Something of potential relevance is currently being negotiated by the 22 member countries of the General Fisheries Council for the Mediterranean (GFCM), to fund its activities (GFCM 1999), which

could present some useful ideas for a system for allocating tuna resources. The GFCM scheme proposes a scale of contributions made up of three parts: a basic fee (about $3-4000 per country), a catch component making up 60% of the budget, and a Gross National Product (GNP) component making up the remainder. Poorer countries would end up paying relatively less than rich ones. A comparable (and purely hypothetical!) scheme for sharing a global TAC or Capacity Ceiling would be for country (i) to receive a share as follows:

Share (of catch[2]) = 0.75 * TAC *[Recent national tuna catch (i)/Total recent catches] +

0.25 * TAC* [X(i) / Sum of X(i)'s]

- where for country i, X(i) = [(Highest GNP of member countries) – GNP (i)]

Other indices than GNP could of course be used, and the GFCM is debating whether the contribution to the FAO or the UN budget might be preferable to GNP, and certainly other indices can be envisaged using the same general principle.

Use the 'best scientific advice available' or 'precaution'?

These two phrases summarize the 'sea change' in perception that has occurred between the Law of the Sea and the recent legal instruments we are discussing. The first phrase from the LOS occurs at least 6 times in the Code, under General Principles (6.4), in the first clause of Article 7.1.1 (Fisheries Management), 7.2.1 under Management Objectives, 7.3.1 Management Framework and Procedures, 7.4.1 Data Gathering and Management Advice, and under article 7.5.3 where we first see the emergence of the precautionary approach. At first reading, this would seem to suggest an emphasis on science as a necessary basis for making decisions, while only secondarily, "the absence of adequate scientific information should not be used as a reason for posponing or failing to take conservation and management measures" - Article 7.5.

In the UN Fish Stock Agreement (UN 1995), the precautionary approach appears 'up front' so to speak, right after 'General Principles' where it is mentioned specifically, thus suggesting that this principle be given prominence. Perhaps this is appropriate, given that the possibilities of obtaining accurate, timely and detailed scientific information as a basis for management decisions is less likely for high sea fisheries than for inshore or national fisheries. Article 6 enjoins states to be cautious when making decisions in information-sparse environments, and first introduces the theme of stock-specific reference points. Annex II to the Agreement takes this further, developing what has become one of the more operational aspects of precaution, namely the division into target and limit reference points suggested in a background paper to the conference (later expanded as Caddy and Mahon 1995). Thus, in addition to taking uncertainty on size and productivity of stocks, the level of fishing and environmental considerations into account, States should develop specific reference points for these criteria.

Limit reference points, fisheries control laws and management plans

One of the aspects of these new or limit reference points (LRP's), in the case of MSY, is that 'when approached, they should not be exceeded' – as opposed to the older use of MSY as a target reference point, where the error the fishery realized in attempting to control fishing effort so as to 'hit' this target, could be as much as ± 30%; where the '+30%' could, and often did, have negative effects that were not easily reversible.

[2] A similar approach could be applied to capacity. The 75:25 division is purely for purposes of illustration.

TABLE 1. Level, change, and structure indicators of fishery subsystems (modified from Seijo and Caddy, 2000)

Fishery Subsystems	Level indicators	Change indicators	Structure indicators
Resource			
• Recruitment, R_t	Seasonal recruitment	Recruitment trends	Distribution of recruits,
• Biomass, B_t		Trend in $B_t/B\infty$ ratio	Distribn. of biomass,
• Spawning biomass S_t	Current $B_t/B\infty$	Trends in S_t/B_t ratio	Distribn of spawners.
• Total mortality Z_t	Current S_t/B_t	Changes in Z_t	Age- and space-specific total mortality
	Current level of Z_t		
Resource users			
• Plant & fleet investments	Current rate of fleet investment	Trends in fishery investment	Age composition of the fleets
		Trends in gear, navigation	
	Catchability & selectivity	Technology and changes in ir catchability/ selectivity	Fleet specific fishing power
• Fishing power			
• Fishing effort	Fishing days	Trends in allocation of fishing days to the target species	Fleet specific effort Indices of spatial effort concentration
• Costs	Unit cost of effort	Changes in costs of fishing	Fleet specific unit cost of effort.
	Variable costs over catch rate	Changes in transfer costs from port to fishing grounds	
	Transfer costs/total costs		
• Revenues	Revenues per unit of effort	Changes in real prices of species and sizes.	Fleet specific revenues per unit of effort.
• Rent	Rent per unit of effort	Present value of rent with different prices of time	Fishery rent distribution between fleets.
Resource managers			
• A Management plan ?			
• Enforcement and rights allocation	Current rate of infringements or of annual seizures and prosecutions	Trends of compliance Trends of self-policing	Distribution of costs and benefits of fishery management
• Benefit/cost of fishery regulation	Enforcement costs	Rate of increase in the number of fishermen	Changes in resource use rules
	Information costs	Rate of increase in the number of free riders (*i.e.* non-contributing users)	
	Number of active fishermen/ boats		

A simple precautionary decision rule to illustrate the idea, might be one that says that: 'Evidence of increased stock size will only allow a maximum of (say) 10% increased effort or catch in a year, but evidence of decreasing stock size will lead to an immediate (say) 25% drop in TAC or effort'. Under such a decision rule, although optimum economic yield might not be achieved in many years, it is unlikely that any but the most serious disaster will lead to stock collapse.

One comment I must make on this issue that I have had the opportunity to make at other fishery commissions such as NAFO, is the negative influence resulting from scientific efforts to develop only one or two very sophisticated reference points, as seemed the case until recently for ICES and NAFO, based on spawning success in previous years. Apart from requiring a large research effort to update the data series the LRP is based upon, it is 'putting too many eggs in one basket', and in addition is not easily explained to fishermen and industry.

A more recent approach stems from the FAO technical consultation on the precautionary approach held in Sweden in 1995 (FAO 1995b), which looked at the management system underlying the use of reference points, the decision rules (which are agreed actions when reference points assume values believed to be critical or dangerous), and the management procedure and plan that should have been developed around a pre-discussed series of objectives for the fishery. Further extensions of this new precautionary frame of reference for fisheries management were developed at the FAO-Australia Technical Consultation on Sustainability Indicators in Marine Capture Fisheries, Sydney 18-22 January 1999, where a series of indicators were developed (see *e.g.* above table) which could form the basis for a more complete monitoring of all aspects of the fishery as it responds to economic, social and environmental changes. Seijo and Caddy (2000) showed that there are 2 alternative approaches to use of fishery indicators and the values they assume at those reference points which are believed to mark significant changes in the fishery:

1) Conventional control theory approach, which often incorporates a Bayesian Framework, attempts to understand and measure interactions between key variables in the fishery system and the type of uncertainty they are subject to. Since addition of a precautionary framework to the model requires incorporating judgements as to the effect, magnitude and importance of changes, in effect this approach usually reduces in practice to the second option below.

2) An empirical approach which regards the fishery as a system of feed-back loops where key variables can be defined and measured, but their interactions are unlikely to be precisely defined or even understood. Under this approach a series of measures which are believed to be meaningful, make up a matrix of variables whose values can be classified as 'green' for favourable, 'orange' for uncertain and 'red' for unfavourable. The 'traffic light' approach I suggested for NAFO (Caddy 1998a) is now used for managing shrimp fisheries in the Northwest Atlantic. Shrimp (like tunas) are not easy to age, and cohort analyses are uncertain at best. A 'traffic light' approach allows the management response to be adjusted depending on the number of 'lights' which turn from green to red on the 'management board.'

The incidental effects of fishing, ecocertification and CITES

The Code has several clauses on incidental effects of fishing:

- Article 7.2.2 d : "biodiversity of aquatic habitats and ecosystems is conserved and endangered species are protected",
- Article 7.2.2 g: ..."catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species are minimized"
- Article 7.5.2 says that the precautionary approach should be used to ensure that uncertainties related to (inter alia) "discards, non-target and associated or dependent species are minimized".
- This theme crops up again under Article 8.5 on fishing gear selectivity.

On the same theme, , Article 10(d) of the UN Fish Stock Agreement considers that one of the functions of a fisheries management organization is to "obtain and evaluate scientific advice, review the status of the stocks and assess the impact of fishing on non-target and associated or dependent species".

It can be seen here that there are two sources of preoccupation: 'conserved or endangered species' where CITES criteria are of immediate concern, including marine mammals and turtles, and more recently, sharks and sea birds for tuna fisheries. The most recent areas of concern other than excess capacity, relate to sea birds (discussed above) and sharks, for both of which a recent FAO meeting discussed a Code of Practice and/or Action Plan to reduce these by-catches (FAO 1999). A recent series of case studies issued by FAO (Shotton 1999) contains some interesting observations on incidental shark and ray catches in tuna fisheries. In the western and central Pacific, some 16 shark species are taken in longline sets, and 10 species by purse seine. Although the shark hooking rate for longlines is low, and for purse seines even lower (0.15% by weight – Williams 1999), sharks are long-lived and low fecundity animals, so perhaps the tuna industry needs to keep this issue under review, otherwise accusations of causing impacts on 'associated or dependent species' may be made under this heading.

'Associated species' are presumably other species (also *e.g.*, dolphins for the purse seine fishery) taken incidentally to tunas especially if ecologically significant numbers are killed in the process. 'Dependent' species refers to situations where the dependent species is a predator: (an example here are capelin fisheries, whose management should leave enough biomass to feed their predator, cod) – this particular category does not seem to have much application to tuna fisheries for reasons mentioned elsewhere in this paper.

With respect to compliance with the above articles, the tuna purse seine fishery has had to face criticism over the last few decades concerning dolphin by-catch, to which, in my view it has reacted in an ecologically adequate fashion. The main incidental problems faced now seem to be in the area of bird and turtle by-catch by long liners, where attempts are being made to reduce by-catch (*e.g.* of endangered albatross) through specific setting procedures, and the issue of FAD's.

The FAD issue is a particularly sensitive one, since much of the skipjack catch in the Eastern Pacific where FADs which are vital to the operations of Ecuador, the US and Spain in particular. Other countries fish mainly on dolphins for large yellowfin, and see the FAD fishery as exploiting small yellowfin which reduces the total yellowfin catch. Elsewhere, ICCAT has proposed Recommendation 98-1, involving a seasonal closure of large areas to the use of FAD's the eastern tropical Atlantic, prohibiting sets on floating objects, natural or otherwise. IATTC held an international workshop on this issue in 1992 (*e.g.* Arenas *et al.* 1999), and the results suggest that by-catches of marine turtles and other species, and high rates of discard of incidentally-caught species will occur in FAD fisheries. If correct, the implications of this need to be investigated, especially within the context of oceanic food webs.

The role of tuna commissions and some current drawbacks

Newton (1999) notes two principal areas of concern relevant to our discussion – namely that tuna commissions, while jealously guarding their own area of responsibility over the world's oceans, in fact leave the resources of large oceanic areas still unprotected, *e.g.* the tuna stocks of the Western and Central Pacific Ocean. Although tuna fleets move between oceans and management areas, there appears to an outsider not to be a great deal of coordination between individual commissions in matters of conservation and management of inter-ocean stocks and fleets.

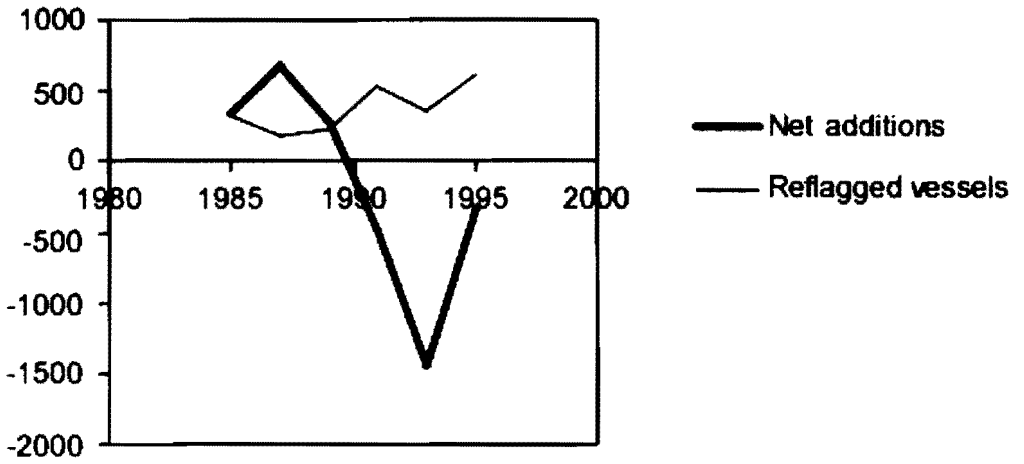

FIGURE 2. Changes in the size of high seas fleets (which direct their effort at any species) registered by Lloyds, and trends in reflagging (from Smith 1999).

The other concern mentioned by Newton (1999) is that a significant percentage of tuna fishing vessels are flying flags of convenience, which is contrary to the spirit of the UN Fish stock agreement and the Code. Both ICCAT and IOTC have made moves towards combating this erosion of the value of their regulations, but evidently there are powerful economic arguments behind the practice. The figure shown above from Smith (1999) for the global fleet shows that these numbers have increased recently, and although he gives no comparable figure for tuna vessels, this must be a major source of concern.

Although attaining the objective that any nation fishing for tunas (or other high seas resource) must do so under the authority of a regional fisheries body is becoming more effective, so far the use of penalties to gain compliance has been confined to ICCAT, with an undetermined level of success at bringing miscreants into the fold. Other tuna bodies should consider the precedent of market-related regulations however, and one may even suggest, look to coordinated measures that will make such approaches effective, instead of simply persuading the 'miscreants' to move to an adjacent, more accomodating management area.

Tuna fisheries involve international markets and highly mobile fleets, and in some cases shared stocks. Inter-regional cooperation is also required to ensure measures in one area do not cause problems in another. One example was the restriction imposed at the end of 1999 in the eastern Pacific, which caused a movement of some purse seiners to the west. This 'flight from regulations' in the eastern Pacific in the 1970s, had flow-on effects to Atlantic fisheries, and also contributed to the development of the US fleet in the western Pacific, but such uncoordinated approaches lead to pulse fishing of unprotected areas.

The need for coordination between commissions

Some other clauses that may provide difficulties for some tuna commissions are those relating to transparency. Clause 7.1.6 of the Code and Articles 12 (1) and (2) of the Fish Stock Agreement note that representatives of IGO's and NGO's should ideally be given access to reports of meetings of Commissions and timely access to records and reports. One may ask how many Tuna Commissions are currently implementing this clause and the associated requirement for 'transparency', or are they relying on the codicil to this clause: "subject to the procedural rules on access to them"?

With respect to MCS, both under the Code and the Fish Stock Agreement this function is exclusively national: thus Article 7.1.7 enjoins states to establish 'within their respective competencies and capacities' effective measures for fisheries monitoring, surveillance, control and enforcement... and the Fish Stock

Agreement dedicates articles 18-23 incl and nine pages of text to its provisions. The advantages that would be conferred by close cooperation regionally in MCS functions, is that it significantly increases effectiveness at relatively low cost and would increase the level of compliance regionally. In fact, a Regional Register and regional observer programme has apparently been very effective in the South Pacific (Anon 1999). The role of a regional body in this (Article 20, 1) is seen as providing a venue for states to discuss provisions for cooperation in enforcement, but nothing more. There are evidently major problems when it comes to prosecution of fishers from other member states of a commission, and this is reflected in Article 20(5) "States shall, *to the extent permitted by national laws*".... "make evidence available to prosecuting authorities in other states".

One may question whether in the light of problems in regional cooperation, extending cooperation to the global level would result in benefits. I would say the answer in principle must be positive; however one may doubt the immediate efficiency of any immediate agreements. However, the extent to which states which are members of a commission would be ready to cede some state rights for operational authority to a strengthened regional organization, and to what extent such body (or the States themselves) would have the authority to board vessels outside of EEZ's, seems to require further discussion. This rapidly becomes a key question (see FAO 1998), once VMS systems become uniformly adopted for monitoring offshore fisheries.

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THE INTER-AMERICAN TROPICAL TUNA COMMISSION

by

Robin L. Allen, Director[1]

INTRODUCTION

In 1949, Costa Rica and the United States negotiated a Convention which reflected the need for cooperative management of tuna fisheries in the eastern Pacific Ocean. The Convention established a Commission to manage tuna fisheries, with a focus on yellowfin and skipjack tunas and other fish taken by tuna fishing vessels, in particular baitfish. Over the last 50 years, other countries had joined the Commission, and at the time of writing the members were Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, United States, Vanuatu, and Venezuela. Colombia and Spain have notified the member governments of their intention to join; a protocol to amend the convention that would allow the European Community to join has been agreed by the Commission and is awaiting ratification, and Taiwan has indicated its desire to become a Party.

In this paper, I will outline what I see as some of the most important periods or challenges in the history of the Commission, with the point of view that remembering how difficult issues were dealt with in the past may be of assistance in facing tomorrow's issues.

1950-2000

Throughout its history, the issues facing the Commission have also varied greatly. In the Commission's first Annual Report the investigation priorities were collection and compilation of fisheries statistics, investigation of the biology and utilization of bait species, and plans for an oceanographic survey. This reflected the Commission's concerns about the effects of the increase in the size of the tuna fisheries in the eastern Pacific Ocean (EPO) since the second world war and, in particular, of the collapse of the bait fishery in the Gulf of Nicoya, in Costa Rica. From the earliest days, and indeed in the Convention itself, it was well understood that management of these fisheries required knowledge of the oceanographic systems, as well as the fishery. In recent years universities and other public agencies are doing a large amount of oceanographic research and monitoring, with readily-available results, which has reduced the need for independent studies by the Commission.

In the 1950s most of the tuna fishing in the EPO was done by bait boats, which first had to capture bait which was held alive to be used to attract and excite a school of tuna, which were then caught with pole-and-line gear. The success of fishing depended on the availability of both bait and tuna, making this an interesting example of a multispecies fishery.

It is interesting that for the most part the Convention establishing the IATTC was written very generally, and applies almost as effectively today as in 1950. The one part that time passed by was the prominence given to fish used as bait in the tuna fisheries. In the late 1950s technological developments made purse-seining, which does not depend on bait, a far more effective fishing method, and by 1961 most of the fleet had been converted from bait boats to purse seiners.

Yellowfin quotas

Prior to 1960 the Commission's investigations had established that none of the tuna or baitfish stocks of concern to the Commission had been subjected to fishing intensity above the level that corresponded to the average maximum sustainable yield (AMSY). The Commission's Annual Report for 1957 noted that it was apparent that the fishery was affecting the yellowfin population, but that there was no likelihood of overfishing in the near future. The report concluded that there was no sign of the fishery affecting

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skipjack stocks and that year-to-year fluctuations were largely fishery independent, a conclusion that has not yet been changed.

However, by 1960 the fishing effort had increased sharply, in part because of the conversion to purse seining, and the Commission reported that the level of fishing effort had reached the level which would provide the AMSY, and in one area may have surpassed it. Accordingly, in 1961 the Commission noted the need for conservation action, and proposed the establishment of a limit of 83,000 short tons (75,296 metric tons) for 1962. The member Governments were unable to implement a quota for yellowfin until 1966, and in that year the Commission established the yellowfin regulatory area (CYRA), in which the fleet was restricted during part of the year. From then until 1979, and subsequently in 1998, 1999, and 2000, fishing for yellowfin tuna in the CYRA has been restricted for part of the year. The mechanism of the restriction evolved over time, and included mechanisms to allow for fishing for other species in the restricted area, with an incidental allowance for yellowfin, allowing vessels to complete fishing trips, and special allowances for countries with developing fisheries. The former complicated calculations of estimates of when a closure should begin because of the amounts of yellowfin which would be taken. The latter later became an important issue during negotiations about access to the fishery at the end of the 1970s, a subject of a later section.

In 1966, the fishery was restricted in September after there had been the opportunity to collect data from several fishing trips from most vessels. There was adequate time to prepare information with which to estimate when the closure should take place, and the economic impact on the fleet was not great. However, as the fleet continued to grow, the restrictions were implemented earlier, and in 1972 the unrestricted fishery closed on 5 March. Such early closures were difficult to implement because there was little opportunity to gather data before the estimated closure date, and they caused major economic problems for the fleet. Eventually the restrictions effectively allowed each vessel only two fishing trips in the restricted area; this probably encouraged owners to build larger vessels to maximize their catches in a restricted time. The economic effects of achieving conservation seemed to be to encourage even more fishing effort as participants in the fishery raced to catch as much as possible before the season was restricted.

Offshore expansion of the fishery

The initial yellowfin restrictions were applied at a time when the fishery was carried out within about 200 miles of the coast and in the vicinity of a few offshore islands and banks. Subsequent to 1966 fleets moved offshore, by 1969 the area of operation included most of the CYRA, and by 1974 the area exploited extended out to between 140° and 150° west longitude. In the late 1960s the Commission noted that the catch rates in the fishery were greater than those forecast by the staff's population dynamics models.

While there were a variety of other factors, including the shorter season, increased efficiency of vessels, and a change in size composition of catch, which may have caused the increased catch rates one of the possibilities was that the stock being exploited at the time had a greater productivity than before, and accordingly the Commission embarked on a series of investigations to determine if that was the case. This included an increased emphasis in tag-and-release experiments, and genetic and morphological studies to endeavor to determine how much fish in the inshore and offshore areas mixed. None of these studies provided conclusive results.

More directly, the Commission embarked on an experimental overfishing program. The program was based on based on previous experience of overfishing in the early 1960s, when the stock had been able to recover from previous overfishing, which reduced the catch rate (a surrogate for abundance) to 2.9 short tons (2.6 metric tons) per day. The model used by the Commission, based on historical data, predicted that catches greater than the estimated AMSY would reduce the catch rate. The catch was allowed to exceed the estimated AMSY in a controlled way, and, in fact, the catch rate did not fall by as much as predicted. The result of the program was an understanding that the productivity of the stock in the

expanded area was greater than that of the inshore area, but less than if the offshore areas were completely separate from the inshore area.

Allocation problems in the 1970s

In the early years of the Commission US vessels made most of the catches of tunas in the EPO. This meant that there were initially no difficult issues of allocation of catches or fishing opportunities among the countries participating in the fishery. It was relatively easy to facilitate development of tuna fisheries in coastal countries by creating small quotas for those countries. However, by 1975 the combined catch of countries other than the US reached 42% of the total yellowfin catch (Figure 1), and claims for allocation to countries became more serious. In that year, Mexico announced its intention to convene a meeting to draft a new tuna convention. The interests of the dominant US fleet and those of the countries with aspirations to develop their fisheries proved to be too difficult to reconcile, and the negotiations failed to reach a conclusion. This failure had serious consequences for cooperation in the eastern Pacific, and, in particular, led to the withdrawal of Costa Rica and Mexico from the Commission for several years.

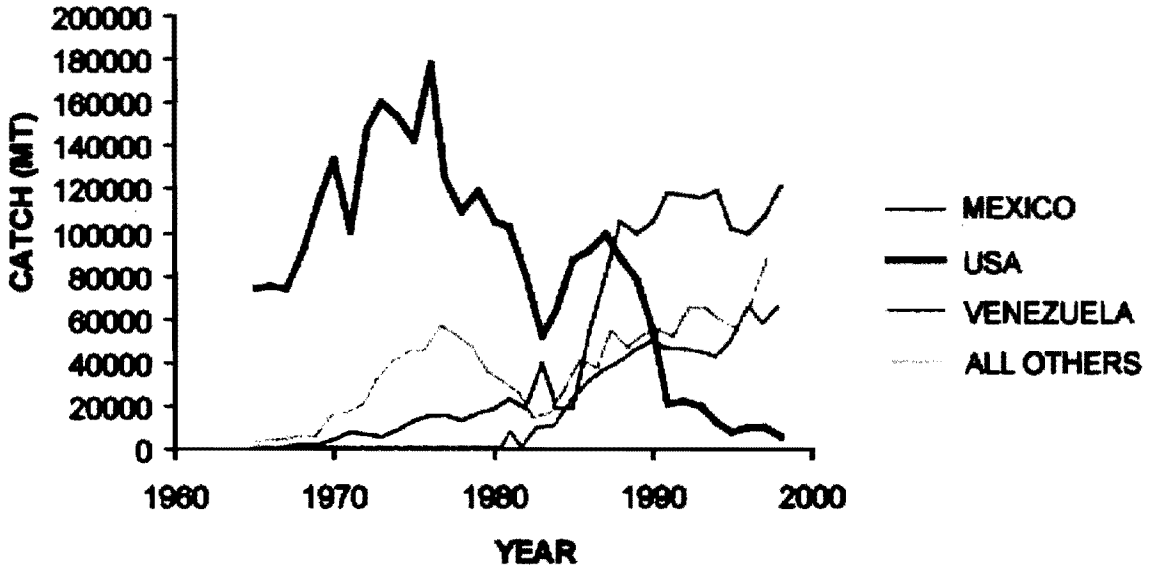

FIGURE 1. Catches of yellowfin tuna in the CYRA by surface gear.

Dolphins and the International Dolphin Conservation Program

Purse-seine vessels locate schools of tuna by observing free-swimming schools at the surface of the ocean, or by finding schools that are associated with floating objects (either flotsam artificial fish-aggregating devices (FADs)) or with dolphins. The latter association is used for about one half of the catch of yellowfin tuna. When yellowfin are located in this way the vessel encircles both the dolphins and the tuna and subsequently extricates the dolphins before loading the tuna onboard. Techniques to do this have evolved considerably over the last 40 years, so that today almost all dolphins can be removed from the net without harm. However, up to 1976 there were hundreds of thousands of dolphins killed annually (Figure 2). As the fishery became internationalized, the mortality began increasing again and the IATTC agreed that it should be concerned with the issue, and in 1980 initiated its Tuna-Dolphin Program, which included collection of data with observers, biological studies, and gear technology.

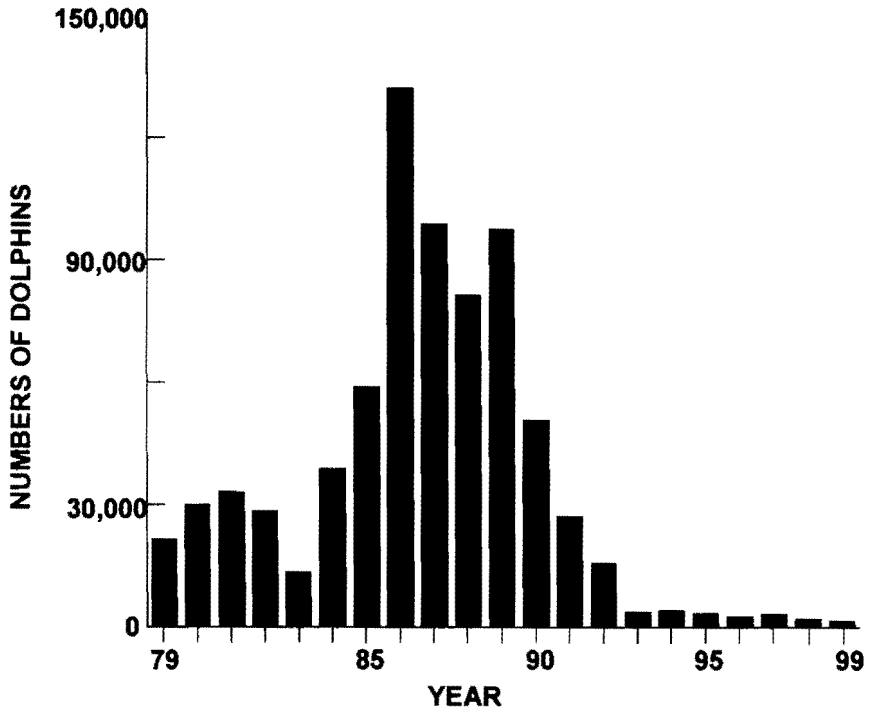

FIGURE 2. Mortalities of dolphins due to purse-seine fishing for tunas in the eastern Pacific Ocean.

In the early 1990s the US government began using unilateral trade measures to encourage other countries to reduce the mortality of dolphins. In 1990 the US canning industry, under threat of boycotts from some environmental groups, adopted a policy of buying yellowfin tuna only from fishing trips that did not include sets made on dolphins. That, and subsequent legislation, effectively closed the US market to imports of tuna caught in the EPO. This encouraged fishing on unassociated schools and floating objects. Both of these techniques produced smaller yellowfin, on average, than did fishing on dolphin-associated tunas, and both produced relatively large bycatches of billfishes, sharks, dorado, wahoo, sea turtles, *etc.* In the meantime, international initiatives to address the mortality of dolphins led to the La Jolla Agreement of 1992. This object of this agreement, which included almost all the countries with purse-seine fleets in the EPO, was to reduce dolphin mortality. The La Jolla Agreement provided for 100% observer coverage on all large purse-seine vessels, a system of individual vessel mortality limits, and the use of obligatory operational procedures to reduce mortality. Observer data were reviewed by an International Review Panel, which included representatives of governments, the fishing industry, and environmental groups. The Agreement set a target of less than 5000 dolphins killed per year by 1995, and, in fact, by 1993 achieved this target. While the La Jolla Agreement met its objectives with respect to reduced dolphin mortality, it did not resolve the problem caused by the closed US markets and the incentives to fish without encircling dolphins. Further negotiations led to the 1995 Declaration of Panama and the adoption of the 1998 Agreement on the International Dolphin Conservation Program (AIDCP), which enhanced protection for dolphins and was intended to resolve the marketing issues. Embargoes by the United States against members of the AIDCP are in the process of being lifted for qualified countries, but labeling constraints remain in place. The nature of the La Jolla Agreement was both an independently signed voluntary agreement among governments with an interest in the purse-seine fisheries for tunas in the EPO and as binding resolution of the IATTC. The AIDCP is a legally-binding agreement among purse seining countries in which certain objectives are to be met through the IATTC, and to which the IATTC provides services, including its secretariat.

MANAGEMENT CONCERNS IN 2000

The major fisheries management concerns during 2000 can be seen in the active permanent working groups. For fisheries management issues, working groups on bycatch and purse-seine capacity were established in 1998, and one on compliance was established in 1999. The role of each, and the underlying issues, are described below. During 2000, a scientific working group addressed issues relating to the use of FADs and bigeye tuna management. While the latter two working groups addressed only issues relating to conservation, underlying both, and in fact most other management decisions, are questions of access to, and allocation of, resources.

Bycatch

The purse-seine bycatch working group was established to address bycatches, which might be interacting with local fisheries, particularly in Panama and Costa Rica. However, before this particular concern the Commission had been concerned about how the levels of bycatch and discards of small tunas that were occurring when vessels set on tuna schools associated with floating objects. For many fishermen the use of floating objects as a tuna-aggregating feature had seemed a useful alternative to setting on schools of yellowfin associated with dolphins. However, while this avoided problems with encirclement of dolphins, it soon became clear that this fishing method produced relatively large bycatches of unwanted species compared to other methods of purse seining for tunas, and tended to catch small yellowfin and bigeye. The concerns of the Commission were reinforced by sections of the Code of Conduct and the Fish Stocks Agreement which reflect a global understanding that fisheries management ought to be concerned with the impacts of fishing across the ecosystem, rather than just the species being targeted.

Capacity

The profitability of tuna purse seining in the late 1970s was such that the fleet in the EPO grew rapidly (Figure 3). (At that time prices paid to fishermen for yellowfin and skipjack were greater than they are now.) The first problem with the large fleet was the need for restrictions on fishing earlier and earlier in the year to try to conserve the stock (Figure 4). The allocation issues discussed above led to difficulties in

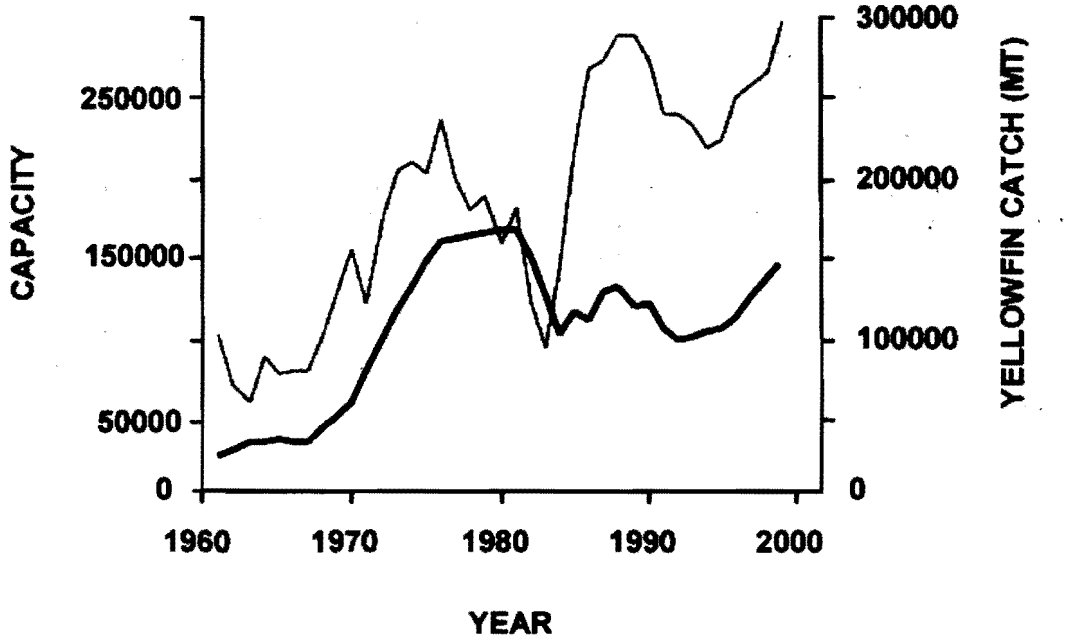

FIGURE 3. Total fish-carrying capacities of tuna purse seiners (heavy line) and total catches of yellowfin by surface gear (light line) in the eastern Pacific Ocean.

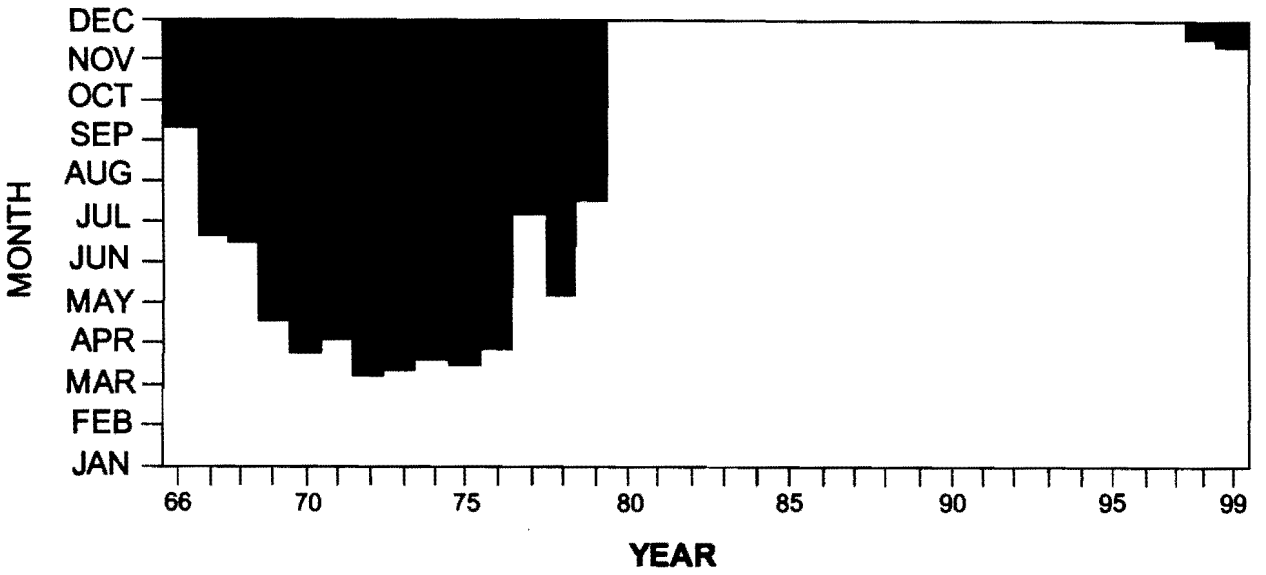

FIGURE 4. Restricted periods (heavy shading) for fishing for yellowfin tuna in the Commission's Yellowfin Regulatory Area.

obtaining agreement and ultimately to no agreement on the closure of the CYRA. The fleet growth, coupled with a concentration of fishing on floating objects and unassociated schools, caused a large decline in the stock of yellowfin tuna that had very severe consequences on the industry. The reduced stock and other factors, including a strong El Niño, restrictions associated with dolphins, and the attractiveness of the western Pacific fishing grounds, caused an exodus of the US fleet, which at that time was the largest component of the eastern Pacific fleet.

By 1983 the yellowfin stock had recovered, and, in fact, had grown to a greater size than immediately before the decline. However, the fishing fleet remained at relatively low levels until the 1990s when the purse-seine fleet again approached the size it had been in the late 1970s. Once again, there have been restrictions on yellowfin catches and the Commission is endeavoring to initially limit further growth of the purse-seine fleet and then to reduce its size.

Compliance and enforcement

During the period between 1966 and 1977, when yellowfin restrictions were in force, the restrictions applied effectively only to vessels of the United States. That made it practical and acceptable for the monitoring and enforcement of the restrictions to be carried out entirely by that country.

Today there are fleets from many countries involved in the fishery, and the Commission members have taken a collective interest in monitoring compliance with the conservation resolutions of 1998 and 1999. This has been expressed in the establishment of a compliance working group and of use of data collected by the staff to provide evidence of compliance or non-compliance with management measures. The compliance working group is to exchange information on measures countries have taken to implement Commission resolutions and to examine data relating to compliance.

Access and allocation

While the issues of bycatch and capacity are driven primarily by conservation objectives, they interact with questions of access to the fishery and allocation of fishing opportunities.

The 1988 resolution aimed at controlling the growth in fleet capacity acknowledged an agreement by the fishing countries to restrain their fleets within national caps, and noted the rights of other coastal states to develop fleets. Effectively, it established at least a partial allocation of fishing opportunities. It was been recognized that any allocation had to have sufficient flexibility to allow coastal countries to exercise their

rights. The Commission's working group has also noted that there is a need for any restraint of this sort to take account of other components of the tuna fishing fleet, and specifically the longline fleet.

Measures to control bycatch and the discards of small tunas have two general thrusts. The first is whether those undesirable catches can be reduced by employing appropriate technology, but failing that, by restricting the amount of fishing on floating objects. Because the fleets of some countries specialize in fishing on floating objects, restricting the amount on fishing on those amounts to restricting access to parts of the international fleet to the fishery. Further, because fishing on floating objects is currently the primary method of catching skipjack (Table 1) these restrictions amount to restrictions on the total skipjack catch.

TABLE 1. Catches (metric tons) of yellowfin, bigeye, and skipjack tuna by three purse-seine modes of fishing in 1999.

	Yellowfin	Bigeye	Skipjack
Dolphin sets	147,715	0	1,295
Unassociated sets	112,791	4,388	87,624
Floating-object sets	37,823	31,469	180,416

The interaction of catches of small yellowfin or bigeye tunas taken by setting on floating objects and the catches of either large yellowfin tuna in association with dolphins or large bigeye tuna taken on longlines brings allocation issues directly to the fore. In the absence of technology to catch skipjack without associated catches of small yellowfin and bigeye, catching skipjack in association with floating objects will reduce the catches available for the other two methods. Consequently, the Commission has had to consider whether catches of skipjack on floating objects ought to be restricted to allow greater catches of yellowfin or bigeye in the other fisheries. Similarly, setting on unassociated schools also produces small yellowfin and reduces the catches available to purse seiners fishing on dolphins. In general, different countries are engaged in each of the fisheries, and hence this becomes an issue of allocation among countries.

INSTITUTIONAL ISSUES (CONVENTION, CONTRIBUTIONS, AND MEMBERSHIP)

The 1949 Convention predates most modern ideas of international fisheries management. The Convention is an empowering rather than a prescriptive instrument, so it has been possible for the Commission to change with the times. Nevertheless, the members have recognized that there would be advantages in bringing the convention up to date. In 1995, IATTC members and other interested countries committed themselves to the Declaration on Strengthening the Objectives and Operation of the Convention Establishing the IATTC. This was followed up in 1998 with the establishment of a working group to review the functions of the IATTC and its Convention. The working group has met four times, and is considering a negotiating text.

While the revised convention is expected to address issues of membership and financial contributions, these issues were seen to be sufficiently urgent to warrant them being treated independently, with the expectation of achieving results which could be implemented more quickly than a new convention. Membership has been addressed, at least partially, with the 1998 Resolution on the Participation of Taiwan in the Work of the IATTC and the 1999 Protocol to Amend the 1949 Convention on the Establishment of an Inter-American Tropical Tuna Commission to permit the adherence of the European Union. The 1949 Convention gives general directions for financial contributions to the Commission. The contributions have been based on a formula that used utilization in each country as its basis. While this worked well for much of the life of the Commission, the formula is clearly in need of revision now. The 1999 resolution on financing the IATTC established a working group, which is developing a new formula consistent with the 1949 Convention and has recommended contributions for the current (1 October 1999-30 September 2000) and next fiscal year based on its work.

FUTURE ISSUES

Foremost in the work of this Commission is the imperative to provide a scientific basis for the management of tuna fisheries. This involves continual improvement in data collection and in techniques of stock assessment. Changes in fishing technology and in the participants in the fishery provide ongoing opportunities and challenges in both areas. Knowledge of various aspects of the biology of tunas is also improving.

Apart from that need, the most obvious management issues for the future are, of course, those being addressed today whose resolution is not obvious. In my view, foremost among those are how to manage access to the fishery to ensure that both conservation objectives and social and economic objectives are met, and how to provide all participants with an assurance that the measures adopted by the Commission are complied with.

The current Convention does not mandate management to achieve social and economic goals and, at least to date, these have not been included in the discussions for a revised Convention. However, even without those types of objectives being explicitly stated, they will have to be addressed if the Commission is to deal successfully with conservation.

With the exception of the 1998 Resolution on Fleet Capacity, the Commission has directed its fisheries management resolutions to measures that control catches directly. The basis for this has been that limiting catches is sufficient to ensure that the fishery is sustainable, at least on a biological basis. The same result could have been achieved by limiting fishing effort. In the past, there have been periods when there was considerable excess capacity and it was necessary to restrict the yellowfin fishery in the CYRA. As noted above, these restrictions reduced the period of unrestricted fishing to as little as three months of the year. Initially these restrictions affected mostly the dominant US fleet, and the resulting issues of compliance and deteriorating economic performance could be addressed unilaterally. However, by the late 1970s the fishery was becoming more international, and questions of access to the fishery at a time when there was excess fleet capacity were increasingly difficult and ultimately impossible to resolve.

In 1999, there were various restrictions applied to purse seining in October and November, and discussions about their implementation foreshadowed the sorts of difficulties that might be expected in future. There are two reasons for expecting that conservation goals will require increasingly strict application of measures to reduce catches. The first is that as long as a fishery is profitable additional effort will be attracted. Certainly the purse-seine fleet has grown over the past ten years, and apparently is continuing to do so. The second is that the fishery has apparently been enjoying a relatively high level of abundance of yellowfin tuna over the past twenty years. The analyses of the stock condition have pointed out that recruitment over the 1981-1998 period was high, compared to that for the previous twenty years. While it is hard to completely separate this from other factors, it seems likely that the recruitment in the 1980s and 1990s was associated with favorable oceanic conditions. Oceanographers have identified a decadal-scale change in the EPO, which has been associated with warmer-than-normal temperatures during that period, which may now be ending. If that is so, we might expect future sustained yields of yellowfin in the EPO to be reduced. The current high catches of bigeye and skipjack might also depend on transitory environmental conditions. It would be extraordinarily rash to rely on the experience of just the past two or three years as a guide to the level of future sustainable catches. Thus, unless action is taken, we should be prepared for a future with a larger fleet, a smaller resource, more difficulty in achieving agreement on conservation measures, and reduced profitability. While the 1949 Convention is not concerned with economic issues, their impact on conservation decisions will be so great that they cannot be ignored, and management schemes which try to do so will inevitably fail.

It seems to me that it is inevitable that successful management of this fishery, and indeed most others as well, requires some arrangement to restrict access to it. If a cap is placed on the fleet size, the obvious way to administer it is to use limits for each Party, as in the 1998 Capacity resolution.

Doing so will require an agreement on an initial level of capacity for each Party, probably a mechanism to reduce capacities towards a target level, and a mechanism to adjust Party's capacities to match changing situations. While negotiations are well on the way to achieving the first step, I believe that negotiations among Parties will prove to be too cumbersome a mechanism to use to make the adjustments that will be required over time. The changes will need to reflect changing levels of interest among industries of each Party, accommodating the interests of new entrants and wishes to change flags of vessels.

New entrants could be accommodated in the fishery, or the share of an existing Party could be increased, only if some existing allocations are reduced. It is hard to see how that could be negotiated without industry involvement in arrangements that benefit all Parties. In future, it would be best if changes in allocations were arranged via commercial transactions among the participants. Governments could remove themselves from questions of allocation, and focus on the conservation and best use of the fish stocks.

There is every likelihood that the type of measures seen during 1999 and 2000 will continue to be required for the well being of the fishery in future. For these measures to be effective, they must be complied with. One of the factors in achieving that will be collecting and sharing information on compliance among the Parties.

The changes of the last few years and those to come have required substantial changes in the staff of the Commission. The Commission was originally established with a staff concerned only with scientific data collection and analysis. This role widened in 1980 to include gear technology. The 1992 La Jolla Agreement brought with it a role in providing information on compliance, with both observers and permanent staff preparing information for the International Review Panel. This has been further extended with the work of the Compliance Working Group. The staff currently performs all the analyses of data required to provide information on compliance with IATTC measures and fisheries management. Another change for the staff has come with analyses to support the Capacity Working Group and the requirement to draft a plan of action for capacity. In addition to having a capacity for scientific analysis, the staff is expected monitor the fishery to provide compliance information, and to provide legal and fisheries management advice.

CONCLUSION

The first 50 years of the IATTC have been full of changes. The fishing methods, participants, conservation issues, and international law relating to fisheries have all shown remarkable change. That almost all of the 1949 Convention is relevant today is a tribute to those who wrote it. The value of empowering a Commission, rather than prescribing its role, should not be lost on those writing new conventions.

There are many lessons in the history of the fishery and the Commission that we need to remember as we embark on the next 50 years. One of the most important is that there is always more to learn about the way fish stocks and their environment change. As soon as we think we understand what is happening, we should be prepared for the unexpected. To cope with this, management systems have to be flexible and adaptable.

The second important point is that management of this fishery (and any other) is about the actions of people and their effect on fish stocks. While conservation is properly the paramount goal of the Commission, it cannot be achieved without the support of governments and fishing industries, and this will not be achieved unless the measures to achieve conservation are seen to be fair and to provide reasonable returns to those who participate. As we have seen from the past, the overall quotas which we still use today will fail when fishing pressure becomes too great. It is clear that the greatest problem facing the management of this fishery is the need to find a way of allocating access to the fishery in a way that will fairly address the rights and obligations of all countries and their industries that wish to participate at a level consistent with good conservation.

THE DRAFT CONVENTION ON THE CONSERVATION AND MANAGEMENT OF HIGHLY MIGRATORY FISH STOCKS IN THE WESTERN AND CENTRAL PACIFIC OCEAN

by

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Secretary, Multilateral High Level Conference on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

INTRODUCTION

I am grateful to the Director of IATTC to have been given this opportunity to participate in this very important and timely symposium on the status of world tuna fisheries. Those of us who have been closely involved in international fisheries over the past few years live in interesting times. Since the early 1990s, we have seen a definite shift in emphasis in the norms that govern the exploitation of fisheries resources. Better conservation of resources has become the paramount consideration.

Only two weeks ago, the first meeting of the United Nations Informal Consultative Process on Oceans stressed the need for all States to give full effect to the legal framework for conservation and management as contained in the United Nations Convention on the Law of the Sea and the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks.

Regional organizations play a critical role in managing international fisheries. It is important, however, that such organizations are effective. Where necessary, existing regional fishery management organizations should be reviewed to ensure that their mandate and procedures are fully consistent with the legal framework established by the Convention and the Agreement. In this regard, IATTC has taken the lead and set an important precedent in reviewing its existing convention so as to better equip itself to meet the challenge of better conservation and management. Organizations such as the North-East Atlantic Fisheries Commission, the Northwest Atlantic Fisheries Organization (NAFO) and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) have also taken action to update their procedures. At the same time, new organizations are being established in areas which were not previously regulated, such as the Western and Central Pacific and the South-East Atlantic.

The purpose of my paper is to review some of the most interesting provisions contained in the draft Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.[3]

The draft Convention is a direct response to the 1995 Agreement. That Agreement, as its long title suggests, consolidates and elaborates upon certain provisions of the 1982 United Nations Convention on the Law of the Sea relating to the conservation and management of straddling fish stocks and highly migratory fish stocks. In particular, the Agreement elaborates upon articles 63, 64 and 116 to 120 of the 1982 Convention by, amongst other things, prescribing the mechanisms for international cooperation between coastal States and high seas fishing nations in order to achieve long-term sustainability of high seas fisheries resources. The two instruments together create a seamless regime between the high seas and areas under national jurisdiction.

One of the key mechanisms for international cooperation envisaged by the Agreement is the establishment of subregional or regional fisheries management organizations or arrangements. Indeed, most of the substantive provisions of the Agreement are intended to be implemented by and through regional fisheries

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organizations and several articles of the Agreement are devoted to an explicit description of the nature and functions of such organizations.[4]

BACKGROUND TO THE CONFERENCE: THE MAJURO DECLARATION

Following the entry into force, on 16 November 1994, of the 1982 Convention, the South Pacific Forum Fisheries Agency, in December 1994, convened a multilateral high-level conference on South Pacific tuna fisheries.[5] The broad objective of the conference was to promote the full implementation of responsible fishing operations by fishing vessels operating in the South Pacific region, particularly in the light of the then ongoing United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks as well as the series of consultations convened by FAO to develop a Code of Conduct for Responsible Fisheries.

A second multilateral conference was convened at Majuro, Marshall Islands, in June 1997, following the adoption of the UN Straddling and Highly Migratory Fish Stocks Agreement, in order to consider issues relating to the establishment of a regional mechanism for the conservation and management of highly migratory fish stocks. The most important outcome of the conference was the Majuro Declaration in which participants in the conference declared, amongst other things, their commitment to establish a mechanism for the conservation and management of highly migratory fish stocks in the Western and Central Pacific Ocean in accordance with the 1982 Convention and the Agreement within an overall time-frame of three years from June 1997.

The significance of the Majuro Declaration cannot be over-estimated. The Central Western Pacific supports one of the most commercially important tuna fisheries in the world. While the greatest part of this fishery takes place in the exclusive economic zones (EEZs) of a number of small island developing States and in the adjacent high seas areas, the tuna stocks are, for the most part, harvested by the fleets of distant water fishing nations. This might seem a clear case for international cooperation for conservation and management of the stocks, yet, since the establishment of 200 nautical mile EEZs and fisheries zones in the early 1980s, the island States of the region have staunchly resisted calls for the establishment of an international tuna management organization as envisaged by article 64 of the 1982 Convention.[6] Indeed, several attempts to establish a multilateral dialogue on the issue in the 1980s, such as an attempt to establish a multilateral management regime for the South Pacific albacore stock, failed in the face of distrust between the coastal States of the region and the distant water fishing nations.[7]

Structure and process

Following the adoption of the Majuro Declaration, four further sessions of the Multilateral High-Level Conference (MHLC) were convened.[8] The sixth session took place at Honolulu in April 2000. The final session of the Conference is scheduled to take place in Fiji Islands in late August 2000. It is anticipated that the Convention would be opened for signature at that time.

Participation in the first session of the Conference was by invitation of the South Pacific Forum Fisheries Agency, as convener of the Conference. Subsequently, other States and entities with an interest in the highly migratory fish stocks in the region have been invited to participate in the Conference, either as full participants, or as observers. Currently, 29 States and entities are participants in the Conference.[9] A further three States and entities participate as observers.[10]

At the Majuro session, in 1997, the Conference decided to appoint as its permanent chairman Ambassador Satya N. Nandan of Fiji Islands. Ambassador Nandan was also, of course, the chairman of the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks.

The method of working adopted by the MHLC has been very similar to that of the UN Conference. In 1998, Ambassador Nandan issued a working paper consisting of a set of articles for a draft Convention. At the end of the session, the Chairman revised the working paper in the light of the discussions and this revised paper formed the basis for discussions at the fourth session of the Conference in February 1999.

At the fifth session, in September 1999, a preamble and final clauses were added to the working paper and further revisions issued. At the sixth session, in April 2000, the working paper evolved into a draft Convention. As was the case in the UN Conference, most of the work of MHLC has been conducted in informal session, open to all participants.[11]

THE DRAFT CONVENTION

In its current form,[12] the draft Convention consists of 45 articles, contained in 12 parts, and three annexes. The document takes as its starting point the provisions of the UN Straddling and Highly Migratory Fish Stocks Agreement and this is readily apparent from the structure of the document, which follows very closely the structure of the Agreement. In some areas, however, such as compliance and enforcement, the document contains a far greater level of detail than the Agreement and in this respect, existing regional arrangements were taken into account, such as the provisions of the multilateral treaty on fisheries between the United States and the members of the Forum Fisheries Agency.[13] The document also draws upon the work done by FAO, including the FAO Code of Conduct for Responsible Fisheries and the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. In addition, a number of other international fisheries agreements were used as precedents, including those establishing NAFO, IATTC, the International Commission for the Conservation of Atlantic Tunas and the Commission for the Conservation of Southern Bluefin Tuna, as well as the Bering Sea Agreement and the proposal currently under consideration for the South-East Atlantic.

The objective of the draft Convention, as set out in article 2, is to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the Central Western Pacific in accordance with the 1982 Convention and the Agreement.

The convention area

In addition to the area commonly referred to as the Central Western Pacific, the provisions of the Convention also apply to a substantial portion of the Pacific Ocean. The size of the area to be covered by the Convention was one of the most difficult issues to resolve, subject to a range of competing political, geographic, scientific and biological considerations.

By the end of the fifth session, agreement had been reached on the southern and eastern boundaries of the proposed Convention Area, but it appeared to be impossible to reach a consensus on the northern and western boundaries. Despite lengthy negotiations and numerous constructive suggestions, it proved impossible to find an acceptable western boundary that does not impinge upon sensitive political areas such as the South China Sea and the archipelagos waters of Indonesia and the Philippines. To the north, a boundary of 23°30' North was originally proposed. Several delegations considered that such a boundary would exclude a substantial portion of the stocks[14] and an alternative boundary at 50° North was suggested. While this would include all the relevant stocks, it would also cause political difficulties for some delegations, particularly Japan and China, and was therefore unacceptable. Accordingly, the current Convention text defines the western and northern boundaries of the Convention Area by reference to the migratory range of the stocks, leaving it for the proposed Commission to define the area of applicability of specific conservation and management measures. It is understood, however, by all participants that the Convention Area is not intended to include waters in South-East Asia which are not part of the Pacific Ocean; nor is it intended to include the waters of the South China Sea as this would involve States which are not participants in the Conference.

In the south, the proposed Convention Area abuts the CCAMLR area at 60° South. In the east, south of the equator, the line is drawn at 130° West, so as to include French Polynesia and part of the Pitcairn Islands' EEZ, and north of the equator, at 150° West. It will be noted that this creates an overlap south of the equator with the area covered by the IATTC, although IATTC does not currently regulate the area in question. In order to deal with this situation, a specific provision is included in the draft Convention requiring cooperation with IATTC in the area of overlap.[15] An additional proposal was made by one dele-

gation during the sixth session to extend the eastern boundary in the north to the mainland of the United States, in order to allow the Commission the possibility of regulating the albacore fishery in that area. It was felt by some delegations, however, that the proposal would lead to unnecessary duplication of effort by the proposed Commission and IATTC and that conservation and management in that area would best be achieved by cooperation between the two organizations.

Conservation and management

Part II of the draft Convention, consisting of four articles, sets out the principles for conservation and management of highly migratory fish stocks. These are based substantially on the corresponding articles in the 1995 UN Agreement. The application of the precautionary approach, in accordance with the guidelines contained in Annex II of the 1995 UN Agreement, is enshrined in the draft Convention together with the principles and measures for conservation and management set out in articles 5 and 6 of the Agreement. Most importantly, however, article 7 of the draft Convention provides that the principles and measures enumerated in article 5 shall be applied by coastal States within areas under national jurisdiction in the Convention Area in the exercise of their sovereign rights for the purpose of exploring and exploiting, conserving and managing highly migratory fish stocks. It is clear, therefore, that in this respect the draft Convention applies both to the high seas and to areas under national jurisdiction. The objective is to ensure that there is, as far as possible, a seamless regime for conservation and management throughout the region.

Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

To implement the objectives of the Convention, a new institution is created, called the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. The draft sets out in detail the powers and functions of the Commission, based largely upon the provisions of articles 10 and 11 of the 1995 Agreement. The Commission would have two subsidiary bodies; a Scientific Committee and a Compliance Committee, which would provide scientific and technical advice respectively. The draft describes the nature of the conservation and management measures that may be taken and, consistent with the 1995 UN Agreement, sets out the principles on which such measures must be based.

One of the interesting features of the draft Convention is a provision which allows the Commission to appoint "scientific experts" to conduct scientific analyses and provide independent information and advice. The findings and recommendations of the scientific experts would be reviewed by the Scientific Committee prior to their consideration by the Commission.

Decision-making

The provisions on decision-making within the proposed Commission are without doubt the most controversial and innovative provisions of the draft Convention.

Article 10, paragraphs (j) and (k), of the UN Straddling and Highly Migratory Fish Stocks Agreement states that members of regional fisheries management organizations shall "agree on decision-making procedures which facilitate the adoption of conservation and management measures in a timely and efficient manner" and "promote the peaceful settlement of disputes ...". Article 28 of the Agreement provides further that "States shall agree on efficient and expeditious decision-making procedures within subregional and regional fisheries management organizations and arrangements and shall strengthen existing decision-making procedures as necessary." In adopting these provisions, the UN Conference was mindful of the fact that traditional decision-making procedures such as objection or consensus procedures, without adequate dispute settlement procedures, have rendered a number of fisheries organization ineffective or have left member States no other course but to take unilateral enforcement action.

The procedure that has been developed in article 20 of the draft Convention reflects the generally accepted view at MHLC that there must be recourse to a prompt and effective procedure for decision-making, which would avoid the possibility of deadlock on important and urgent conservation and management issues. The general rule, as stated in article 20, is that decision-making shall be by consensus. The Convention identifies a number of key issues upon which consensus is required. These include the adoption of rules of procedure, decisions on allocation of total allowable catch or levels of fishing effort, adoption of financial regulations, adoption of the budget and the formula for assessment of contributions to the budget, admission of new members and adoption of amendments to the Convention. If all efforts to reach a decision by consensus have been exhausted, decisions by voting on matters of substance, other than those for which consensus is required shall be by a four-fifths majority.

The objective of the scheme that has been proposed is to remove the traditional "opt-out" provision which is found in many existing fisheries agreements and which effectively permits States unilaterally to undermine the conservation and management measures agreed on by the majority. In supporting this approach, many participants in the Conference have stressed the need to give priority to conservation and sustainable utilization objectives over strictly economic objectives. The proposed formula for decision-making has not yet achieved universal support. Certain distant-water fishing nations continue to be concerned that they will be forced to endure a "tyranny of the majority" in which they will always find themselves outvoted on matters of substance. Clearly, however, a four-fifths majority is a very high threshold which can only be achieved if there is broad agreement. For example, if there were 25 members of the Commission, at least 21 members would have to vote in favor of a substantive proposal. Given the diversity of interests in the Conference, it appears exceedingly unlikely that such a high majority would consistently act against the interests of a minority of States.

To further safeguard minority interests, however, the Convention contains a number of other interesting provisions. Thus, in the event of deadlock within the Commission on an issue requiring consensus, there is a procedure for conciliation in order to achieve consensus within a reasonable time. Further, in the event that a member of the Commission objects to a decision, the draft provides a system for independent review of that decision, with the possibility for the Commission to modify, amend or revoke its decision in the light of the findings and recommendations of the review panel.

Dispute settlement

Article 30 of the UN Straddling and Highly Migratory Fish Stocks Agreement adopts the dispute settlement mechanism set out in Part XV of the 1982 Convention and applies it to disputes concerning the interpretation or application of the Agreement. Paragraph 2 of that article also applies the mechanisms in Part XV mutatis mutandis to disputes between contracting parties concerning the interpretation or application of a subregional, regional or global fisheries agreement relating to the conservation and management of straddling fish stocks or highly migratory fish stocks, "including any dispute concerning the conservation and management of such stocks".

The draft Convention takes this approach one step further by providing, in article 31, that "the provisions relating to the settlement of disputes set out in Part VIII of the Agreement apply mutatis mutandis to any dispute between members of the Commission concerning the interpretation and application of this Convention, **whether or not they are also parties to the Agreement.**" [Emphasis added].

It has been pointed out that the effect of article 30 (2) of the 1995 UN Agreement is to add to the dispute settlement provisions of the 1982 Convention by expanding the categories of disputes subject to compulsory jurisdiction. It would, for example, make compulsory and binding dispute settlement available to challenge the actions of contracting parties who opt out of a conservation and management decision and institute a unilateral fishing plan which threatens conservation.[16] In the context of the Central Western Pacific, however, the additional question that must be considered is whether compulsory binding settlement is available in respect of decisions affecting the high seas only, or whether, in the interests of sus-

tainable management, coastal States may also be held accountable in some circumstances for compliance with their obligations in respect of highly migratory fish stocks within the EEZ.

The traditional view is that, under article 297 (3) of the 1982 Convention, disputes concerning the exercise of sovereign rights within the economic zone are excluded from compulsory binding settlement procedures. It is arguable, however, that the effect of the 1995 UN Agreement, which places clear obligations on coastal States with regard to the management of EEZ stocks, is to make coastal States accountable for ineffective management of such stocks, where this results from a failure to observe the basic principles for conservation and management set out in the Agreement. This would require a narrower interpretation of article 297 (3) of the 1982 Convention, to cover only the exercise of coastal State discretion on matters which are purely of EEZ concern.[17]

If anything, the draft Convention is even more explicit than the UN Agreement in placing obligations on coastal States to better manage their EEZs and to cooperate for the purpose of achieving compatibility. Article 7 of the draft Convention, for example, establishes an unqualified obligation on coastal States to apply the principles and measures for conservation and management within areas under national jurisdiction. It will be interesting to observe in the future how coastal States respond to decisions of the Commission which might require them to constrain fishing effort within the EEZ and how assiduously fishing nations seek to ensure that coastal States fulfill their obligations under the Convention.

Compliance and enforcement

Like the 1995 UN Agreement, the draft Convention contains very strong provisions on compliance and enforcement. There is no doubt that this aspect of the Agreement was the most difficult issue of all for many of the fishing nations participating in the UN Conference. If anything, the practical implementation of the provisions of the Agreement has given rise to even greater difficulty for the fishing nations in the context of the draft Convention.

In article 24, captioned "Flag State duties", the draft Convention reproduces, almost verbatim, the central provisions of the FAO Compliance Agreement.[18] The Convention provides that no member of the Commission shall allow any fishing vessel entitled to fly its flag to be used for fishing for highly migratory fish stocks in the Convention Area beyond its limit of national jurisdiction unless it has been authorized to do so by the flag State authorities. The Convention further provides that such authorizations shall be issued only where the flag State is able to exercise effectively its responsibilities in respect of the vessel under the 1982 Convention. In addition, it is a condition of any authorization issued by the flag State that certain basic minimum terms and conditions for fishing in the Convention Area are observed. These minimum terms and conditions are set out in Annex II of the draft Convention. One of the functions of the Commission would be to maintain a record of all fishing vessels authorized to fish in the Convention Area by members of the Commission and to make that information available to all members.

On this issue, while some fishing nations have taken issue with the level of detail in the draft Convention, the basic objectives of promoting transparency and better flag State control (a basic requirement of article 94 of the 1982 Convention) are generally accepted as important.[19]

Article 25 establishes the procedures for compliance and enforcement. It is based in large part upon the far-reaching enforcement provisions contained in article 4 of the multilateral fisheries treaty between the United States and the members of the Forum Fisheries Agency.

Perhaps the most radical innovation in the UN Straddling and Highly Migratory Fish Stocks Agreement is the way in which it confers on members of regional fisheries organizations the right to enforce those measures on the high seas against vessels of States Parties to the Agreement whether or not such States are also members of the relevant regional fisheries organization. Pursuant to article 21 of the Agreement, regional fisheries organizations are required to establish procedures for boarding and inspection. However, if within two years of the adoption of the Agreement (i.e. by 4 August 1997) any regional organiza-

tion has not adopted such procedures, boarding and inspection shall be carried out in accordance with the provisions of articles 21 and 22.

The draft Convention seeks to give practical application to these provisions by making articles 21 and 22 of the UN Agreement directly applicable to the Commission, but at the same time delaying the application of the provisions to allow the Commission time to develop its own procedures for boarding and inspection. Article 26 of the draft Convention text provides that if, within two years of the entry into force of the Convention, the Commission is not able to agree on procedures for boarding and inspection, or on an alternative mechanism which effectively discharges the obligations of the members of the Commission under the 1995 Agreement and the Convention to ensure compliance with the conservation and management measures established by the Commission, articles 21 and 22 of the Agreement shall apply as if they were part of the Convention and boarding and inspection of fishing vessels in the Convention Area shall be conducted in accordance with the procedures set out therein and such additional practical procedures as the Commission may decide are necessary for the implementation of articles 21 and 22. The latter qualification was added at a late stage during the sixth session of the Conference in the light of concerns raised by some delegations and in order to clarify the nature and application of the procedures that the Commission will need to adopt in due course.

The proposed formula represents a substantial derogation from the strict application of the 1995 UN Agreement. It has come about primarily as a result of the deep sense of unease among fishing nations with respect to articles 21 and 22 of the Agreement, particularly their application to fisheries for highly migratory species. On a strict interpretation of the Agreement, articles 21 and 22 would normally apply immediately upon entry into force of the new Convention, at least as between those members of the Commission which are also States Parties to the 1995 UN Agreement (and assuming the UN Agreement is in force by that time). In fact, under the current proposal, the application of the provisions of the UN Agreement would be deferred for a further period of two years from the date of entry into force of the new Convention, at least for members of the Commission. On the other hand, if the UN Agreement enters into force before the new Convention enters into force, then the provisions of articles 21 and 22 could be used in the Convention Area by States Parties to the UN Agreement, whether or not they are also members of the Commission, to board and inspect the vessels of other States Parties to the UN Agreement who are not members of the Commission.

OUTSTANDING ISSUES

MHLC has made substantial and rapid progress since 1997 and most of the key issues have been negotiated and resolved. During the sixth session in April 2000, it would appear that there was a satisfactory resolution of most of the critical issues surrounding boarding and inspection and compliance and enforcement. There remain, however, a number of difficult issues to be resolved before the draft Convention can be adopted. These include the issue of decision-making, where some participants still wish to see a traditional opt-out clause.

Perhaps the most difficult issue of all that the Conference must address is one that is unrelated to fishing. This concerns the participation of Taiwan in the regional arrangement. Taiwan is, of course, a major fishing entity and is implicitly recognized as such in the UN Straddling and Highly Migratory Fish Stocks Agreement (article 1 (3) and article 17 (3). One of the important achievements of the Conference to date has been the participation of both China and Taiwan in the negotiations. In the words of the Chairman of the Conference

> "Participation in this Conference is based on the fact that the participants are either coastal States or territories in the region or have fishing interests in the region. If we are going to have an effective regime for fisheries conservation and management in the region then it is obvious that all those who belong to the region or fish in the region must be involved."[20]

As presently drafted, the Convention would allow a "fishing entity, being a separate customs territory possessing full autonomy in the conduct of its external commercial relations, and whose vessels fish for highly migratory fish stocks in the Convention Area" to become a full member of the Commission, with the same rights and obligations as a Contracting Party, after affirming in writing its acceptance of the Convention regime. Such affirmation may be made only after entry into force of the Convention.

Discussions on this issue during the sixth session did not result in a formula that was acceptable to both China and Taiwan and the situation was made more complex as a result of the elections that had taken place in Taiwan shortly before the session. As the Chairman noted in his closing statement to the sixth session, "The difficulty is how to find a formula which creates a legally binding relationship without prejudging the legal and political status of such entities."

ENTRY INTO FORCE AND THE INTERIM REGIME

During the sixth session, the Conference was able to address the critical issue of entry into force. The particular concern was that the entry into force of the Convention should not be stalled for an inordinate length of time. Initially, a simplified provision was proposed whereby the Convention could be brought into force by a small number of States within two years. This proposal was not acceptable to some participants, however, and it was also considered undesirable to allow the Convention to enter into force with only a few participants. The current formula provides that the Convention will enter into force upon ratification by three States situated north of 20° North and seven States situated south of 20° North.

Closely linked to the question of entry into force was the matter of the interim regime, which would be designed to avoid the situation whereby the conservation and management objectives of the draft Convention could be compromised during the period before entry into force. To this end, the sixth session of the Conference considered a draft resolution establishing a Preparatory Conference[21], which would begin its work within a reasonable time after the adoption of the Convention and which would be empowered to consider and make recommendations relating to most of the practical and administrative arrangements for the future Commission. The participants in the Preparatory Conference would be the participants in the Conference. In this way the Commission would have before it the necessary recommendations to consider and adopt so that it would be able to begin its work without delay.

CONCLUSION

The Central Western Pacific is one of the few remaining areas where no international organization exists for the management of highly migratory fish stocks. As a result of the UN Straddling and Highly Migratory Fish Stocks Agreement, the establishment of such an organization in the region has become imperative.[22] Despite a long history of failed attempts to establish a multilateral dialogue, coastal States in the region and fishing nations have at last made a clear commitment to the establishment of a strong regional fisheries management organization, firmly based on the principles established in the UN Agreement.

The draft Convention is comprehensive and inclusive in nature. While some participants remain uncomfortable with the level of detail that is proposed, others have expressed the view that as much detail as possible should be incorporated into the Convention in order to avoid later dispute in the Commission.

Notwithstanding the level of detail in the text, the draft Convention is primarily a framework, or template, for better management of the fisheries of the region. The purpose of the Convention is to establish the necessary institutional basis for better management and to set out the legal rules for fishing in the region. It is the Commission itself that will have to deal with the most difficult and intractable issues, such as the reduction of over-capacity, how to allocate fishing opportunities and how to accommodate new entrants. For these, there can be no prescriptive or easy solutions. The region will therefore have to rely on the wisdom and shared commitment of the MHLC participants to fulfil the objective of long-term conservation and sustainable use of the resources.

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[3] As this remains the working title of the draft Convention, no abbreviation or acronym has yet fallen into common usage.

[4] Bob Applebaum and Amos Donohue, *The Role of Regional Fisheries Organizations*, in Ellen Hey (Ed.), *Developments in International Fisheries Law*, Kluwer Law International, 1999.

[5] Although the meeting in 1994 referred to South Pacific fisheries, the Conference has become known as the Multilateral High Level Conference on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific (MHLC).

[6] Since the early 1980s, the island States of the South Pacific sought to manage the tuna fisheries through the coordination of national fisheries policies through regional organizations such as the South Pacific Forum Fisheries Agency and the development of regional management initiatives to control the licensing of foreign fishing vessels in the region. The response of some distant water fishing nations to this unilateral approach was to refuse to cooperate with attempts to develop regional licensing arrangements. These fishing nations preferred instead to develop bilateral licensing arrangements with individual island States, hoping to undermine the regional arrangements by a "divide and rule" approach. Clearly, in the light of the 1995 UN Agreement, which emphasizes the need to cooperate through regional fisheries management organizations, neither approach could be considered viable and it was therefore inevitable that both sides would be compelled to cooperate.

[7] In that negotiation, the island States were prepared to countenance an international regime for the management of high seas fisheries, but were not prepared to allow fishing nations any say over the management of the same resources within the EEZ.

[8] MHLC3 (Tokyo, June 1998), MHLC4 (Honolulu, February 1999), MHLC5 (Honolulu, September 1999), MHLC6 (Honolulu, April 2000).

[9] Australia, Canada, China, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Indonesia, Japan, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Solomon Islands, Chinese Taipei, Tonga, Tuvalu, United Kingdom (in respect of Pitcairn Island), United States of America, Vanuatu and Wallis and Futuna.

[10] European Commission, Ecuador and Mexico.

[11] Official accounts of the work of the Conference may be found in the statements of the Chairman issued at the end of each session and published in the reports of the Conference. Additional information on the issues considered by the Conference may be found in the information notes issued by the Chairman prior to each session.

[12] MHLC/Draft Convention/Rev.1, dated 19 April 2000.

[13] Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the United States of America, done at Port Moresby, 2 April 1987.

[14] It would also bisect the EEZ around the Hawaiian Islands.

[15] Article 22, paragraph 3.

[16] Applebaum and Donohue, op. cit.

[17] A. E. Boyle, *Problems of Compulsory Jurisdiction and the Settlement of Disputes relating to Straddling Fish Stocks*, International Journal of Marine and Coastal Law, Vol.14, No.1, 1999.

[18] FAO Compliance Agreement, article III, paragraphs (2) and (3). The equivalent provision in the UN Straddling and Highly Migratory Fish Stocks Agreement is article 18 (3) (a).

[19] The need for greater transparency as regards the "genuine link" and improved flag State control over fishing vessels was recently highlighted during the Informal Consultative Process on Oceans at United Nations headquarters in New York, 29 May to 2 June 2000.

[20] Opening remarks by the Chairman at the fourth session, Honolulu, February 1999, Report of the Conference, Annex 2.

[21] MHLC/WP.3/Rev.2.

[22] There is in fact a binding legal obligation on States Parties to the UN Agreement to cooperate to establish a regional fisheries management organization (article 8 (5)).

COMMISSION FOR THE CONSERVATION OF SOUTHERN BLUEFIN TUNA

by

Campbell McGregor, Executive Secretary[1]

I would firstly like to thank you for inviting me to participate in the 50th anniversary celebrations of your Commission.

IATTC is an organisation to which relatively new organisations such as CCSBT, can look for ideas and support as we grow and develop. My personal contacts with your Commission staff have been helpful and rewarding and I appreciate this opportunity to attend this symposium and your Commission meeting.

BACKGROUND

The Commission for the Conservation of Southern Bluefin Tuna formally came into existence on 20 May 1994 when the Convention for the Conservation of Southern Bluefin Tuna came into force. The objective of the Convention is to ensure, through appropriate management, the conservation and optimum utilisation of southern bluefin tuna. The Convention also provides that the Commission shall decide on a total allowable catch (TAC) and its allocation among members unless other appropriate measures are agreed. The Commission may if necessary decide on other additional measures.

SBT has a wide migratory range which extends from the only known spawning ground in the Indian Ocean south of Indonesia, west to Africa and into the southern parts of the Atlantic Ocean and easterly along the west coast of Australia, through waters adjacent to southern and south eastern Australia, and to New Zealand and the south western part of the Pacific Ocean. Apart from the spawning area south of Indonesia, adult fish tend to be in the temperate waters between latitudes 30°S and 50°S. SBT can live for up to 40 years and reaches maturity after about 8 years, although there is a view that full maturity may be later. While the Commission is primarily responsible for one species of tuna, the geographical area of responsibility is extensive. It also has responsibilities, where appropriate, relating to ecologically related species and in recent years has actively participated in introducing measures designed to minimise the number of sea birds taken inadvertently by long line vessels. Member countries now require the use of tori poles or streamers attached to lines off the back of vessels. Experiments are also being conducted on alternative ways of casting bait, including casting under water.

While the Commission formally came into existence in 1994, the formality of the Convention had been preceded by collaboration and cooperation on SBT between the founding members, Australia, Japan and New Zealand in various forms, since the 1960s. These started with informal exchanges between scientists with more formal meetings commencing in the early 1980s. The commercial fishery began in the early 1950s with Japanese long line vessels taking SBT in fishing grounds south of Indonesia, together with other tropical and sub-tropical tunas. Australians started commercial operations about the same time but targeted surface schools of juvenile fish off south eastern Australia and later off southern Australia, using pole and line or bait boats, and purse seine vessels.

The fishery expanded rapidly during the late 1950s and 1960s with total recorded catches peaking at 81,600 tonnes in 1961. Australia and Japan were the only countries recording catches in that period. The Japanese fishery gradually expanded into the temperate southern waters and improvements in handling and freezing equipment resulted in SBT becoming a high value species for the sashimi market. Significant quantities of the adult fish were taken on the high seas as well as off Australia and New Zealand.

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The catches in the SBT longline fishery reduced during the late 1960s and 1970s, on average to about half the peak levels of 1961. In 1971 the Japanese industry introduced voluntary restrictions on long line fishing operations in the Indian Ocean, the Southern Ocean and Tasman Sea after concerns over the concentration of fishing effort in these areas at times where spawning stock and small fish were abundant. During the same period the catches in the Australian surface fishery gradually increased and peaked at 21,500 tonnes in 1982. This fishery concentrated on taking SBT from schools of juvenile fish passing through the Australian EEZ. Although the catches increased, from the late 1970s, the Australian fishery gradually contracted westwards into the Great Australian Bight and the south western waters of Western Australia. A particular concern to the three countries was the increased catch of small fish off Western Australia. The New Zealand scientists were also noticing a reduction in their fishery and as concern about these trends increased, there were calls in the early 1980s for catch restraint and a coordinated approach to management of the stock.

During the 1980s Australian, Japanese and New Zealand scientists and fishery managers collaborated more closely in monitoring the state of the stock and through informal trilateral negotiations agreed to observe national catch restraints in both the long line and surface fisheries. Australia introduced an individual transferable quota system to rationalise the fleet and maintain TACs at the agreed level. Japan and New Zealand also introduced annual TACs for their respective fleets. The TAC was reduced over several years to 11,750 tonnes in 1989 and it remained at that level for Commission members until 1997.

Australia continued to take surface schools of SBT for canning until the late 1980s. In the early 1990s Japanese industry conducted a project which was aimed at transferring knowledge of longline fishing techniques (Tuna Longline Fisheries Development Project). These arrangements provided Australian fishers with the opportunity to learn long line fishing techniques to target adult fish and reduce the catch of smaller fish off Australia in particular. Japanese technical experts also assisted with the establishment of tuna farming operations in South Australia in order to manage small fish resources more rationally and to increase their added value. With the development of better handling and transport arrangements and facilities for farming juvenile SBT until they are grown to a size suitable for the sashimi market, almost all the Australian quota is now taken by Australian vessels for farming and dedicated to that market.

During the 1980s, it became clear that if effective global management was to be achieved, a more formal arrangement was needed to support necessary research and to obtain international acceptance of the need to control catches. Australia, Japan and New Zealand agreed to enter into a formal arrangement for the conservation and optimum utilisation of SBT in the spirit of the provisions of the Law of the Sea, which included provisions to encourage non-member countries with a direct interest in SBT to accede to the Convention.

Although the Convention came into force in May 1994, an administrative Secretariat was not established until 1996. The current Secretariat is headquartered in Canberra, Australia with a staff of three. In many ways the CCSBT is still in the process of development. While there are currently processes in place for collection and exchange of information and scientific data, and scientific research and analysis, the Commission is examining ways of improving these processes to ensure the objective of the Convention is achieved.

CHALLENGES FOR CCSBT

Non-members

As I indicated earlier, one of the issues that promoted the establishment of this Commission was the need to provide an international framework to encourage all SBT fishing countries and entities to work together in the conservation and optimum utilisation of SBT. It is estimated that vessels from non-members currently take in excess of 4,000 tonnes per year of SBT compared with the total catch by members of 11,750 tonnes. Currently no formal TAC or country allocations exist under the Convention

but members have voluntarily limited their commercial fishing so as not to exceed their 1997 allocations. Commission members have been exercising considerable restraint in the fishery since the mid 1980s in an effort to rebuild stocks, while catches by other fleets have been observed to be increasing in recent years. Industries in Australia and Japan have been required to restructure at considerable cost as a result of the current catch restrictions and there is concern that this effort, and further and steady stock rebuilding may be jeopardised by the increased catches by non-member fleets.

In recent years Commission members have held a series of discussions with representatives from Korea and Taiwan, and more recently with Indonesia, regarding membership of the Commission and cooperation with its management arrangements. Representatives from Korea, Indonesia, South Africa and Taiwan regularly attend Commission and Scientific Committee meetings as observers and have indicated their willingness to participate in the framework of conservation and management of SBT and negotiations are continuing to reach agreement on an acceptable quota allocation. The establishment of arrangements which will facilitate their accession to the Convention and cooperation in the management of SBT will greatly assist in the effective management of this species. The main area of discussion is quota levels for new members, which I understand is not unique to the SBT environment.

Although its vessels do not target SBT at this stage, South Africa mentioned at the last Commission meeting that it had considerable interest in the work of the Commission and its efforts aimed at conserving this resource. South Africa also mentioned that it is now reviewing its position on acceding to the Convention.

At its Sixth Annual meeting held in March 2000, the Commission adopted an Action Plan to ensure the objectives of the Commission were achieved, through measures including the possible use of trade-restrictive measures consistent with Members' international obligations to address non-cooperative non-member States/fishing entities whose vessels have been catching SBT in a manner which diminishes the effectiveness of the Commission's conservation and management measures. Members expect that the Action Plan will encourage non-member States/fishing entities to join the Commission or formally cooperate with the management arrangements.

Stock assessment

Many of you will be aware that in recent years CCSBT members have not been able to reach agreement on the annual TAC for the fishery. Stock assessments and projections of future stock status are never easy and SBT is no exception. I will not expand on this area today other than to say that the Commission is concerned that every effort be made to rebuild the stock to 1980 levels by the year 2020.

A review of the Commission's scientific assessment process was undertaken by independent scientists in 1998, and in an effort to reduce the areas of uncertainty in stock assessment and reach agreement on future management arrangements, the Commission has initiated a number of recommendations from this review. While the implications of a number of recommendations are still being considered, those already implemented include:

- the appointment of independent Chairpersons to the Stock Assessment Group and the Scientific Committee, to replace persons elected to those positions from members of country delegations;
- the appointment of an Advisory Panel of five external scientists to participate in scientific meetings, help consolidate parties' views to facilitate consensus and report their own views to the Scientific Committee and the Commission; and
- preliminary discussions aimed at the development of research proposals to improve knowledge of the fishery and reduce levels of uncertainty in the stock assessments.

Further work is required to establish a more robust scientific process for assessing the state of the SBT Stock including agreement on the assessment model structure, data sets and biological parameters to be

used and procedures for evaluating computer codes and incorporating new concepts and information. A workshop to address these and related issues was held last month in Japan. While the outcomes from the Workshop will need to be considered by the Commission, participants considered that a number of positive steps had been identified to help in progressing the stock assessment. These included a program of work to resolve differences in the stock projection implementations, acknowledgment of the need to develop a new catch-at-age matrix using revised data from the fishery and a review of the rules used in developing the current catch-at-age matrix for the early years of the fishery.

While the Commission has set a long term objective of achieving recovery of the stock to 1980 levels by 2020, management strategies are being reviewed, taking into account similar discussions within other fisheries agencies and international organisations. These range from a single one which involves rebuilding stock along an agreed CPUE trajectory without declaration of reference points to a more complicated one with reference points. This is not an easy process, particularly with highly migratory species and a number of issues raised at a management strategy workshop held last month with participation of scientists and managers of members of the Commission and external scientists, will be considered further. We are also interested in progress being made on these issues by other tuna Commissions.

Statistical document program

The extensive migratory range of SBT, coupled with the fishing activities outside the Commission's management arrangements, make it difficult to establish a clear understanding of the level and distribution of global catches and for scientists to produce accurate stock assessments.

A high proportion of the SBT taken by non-members is exported to Japan (a member) and to obtain more information on these catches, the Commission recently approved a scheme for the collection of data on the international trade of SBT. The scheme came into effect on 1 June 2000 and requires Commission members to accept imports of SBT only where that importation is accompanied by a validated certificate from the exporter's country. The certificate is to include details of the quantity and origin of the fish being imported.

These developments have major implications for the future direction of the CCSBT and in particular the administrative structure necessary to effectively implement and maintain these programs. The Commission is currently supported by a small Secretariat of three staff. The Secretariat does not currently hold any data sets nor are staff directly involved in the scientific work on SBT, which is currently done by representatives of member countries. The Commission recently agreed to the establishment of a fishery database in the Secretariat and a database for the Statistical Document Program as well as hiring a database manager to manage these data within the Secretariat. These will be established later this year and will allow consolidation of the data held by Commission members and facilitate a more transparent stock assessment and the collection of data from other sources to assist in developing a better understanding of the fishery.

Regional fishery bodies, and in particular those dealing with highly migratory tunas, are facing similar challenges and the CCSBT therefore supports a closer working relationship between the tuna commissions and a broadly compatible approach to the conservation and management of tuna stocks and their environment.

THE INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

by

Adolfo Ribeiro Lima, Executive Secretary[1]

It is an honour to be here in Costa Rica in your company, celebrating this important occasion of the 50th anniversary of the Inter American Tropical Tuna Commission.

When I was invited here, I was asked to give a presentation on what are the most pressing issues facing us in the Atlantic Ocean, and this is what I shall do in this brief talk. I will not limit myself to telling you about our problems, but I also plan to tell you about what we are doing to confront these important challenges.

ICCAT is the second oldest tuna commission after the IATTC, and is based on a Convention signed in 1969. The objective of the convention is for Contracting Parties to co-operate in maintaining the populations of tunas and tuna-like fishes at levels which will permit the maximum sustainable catch for food and other purposes. ICCAT and IATTC are thus similar in their mandate at the time they were created.

There are important differences between the IATTC and ICCAT, however, one of which is the procedure for joining. If a country wishes to become a member of ICCAT all it has to do is to inform the secretariat, and its application is accepted immediately. In addition, a nation can become a Cooperating Non-Contracting Party. These nations are not members of ICCAT, but they transmit data needed for stock assessment to ICCAT and abide by ICCAT's recommendations for management.

Two other important differences between the two tuna Commissions have to do with size. First, there is the size of the area that we are concerned with, which covers the entire Atlantic Ocean, including the Mediterranean Sea. This is a rather large area, but one that is suitable to encompass the entire distributional range for most of the fish stocks that we are concerned with. The second difference in size has to do with how our respective secretariats have been set-up. IATTC's is a large staff intended to contain all of the necessary data collection and analysis capabilities in-house, either in La Jolla or in various field offices. In contrast, ICCAT's staff has been historically a small one in Madrid that provides support to meetings where members do their science and draft their recommendations. Operationally, then, our commissions are structured in different ways.

The heart of ICCAT is its Standing Committee on Research and Statistics. All scientific investigations are carried out by scientists of the member nations and Cooperating Non-Contracting Parties, who then meet in working groups or plenary sessions where they try to reach agreement by consensus on measures for management. After that the scientists of the various nations can provide advice to their delegations before the Commission meets.

Despite the differences in geographical area of competence and in the way we do our work, I believe that our commissions, and indeed most regional fishery bodies, share similar problems. I like to divide these into three classes of problems: The first set of problems have to do with objectives or, in other words, with balancing resource usage against conservation. The second class of problems are those of so-called "allocation" issues, or who-gets-what. And, finally, the third class has to do with basing decisions on scientific evidence that is neither outdated nor biased. I want to tell you about these problems from our Atlantic perspective but first I would like to tell you a little bit more about ICCAT.

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Like I said before, the ICCAT Convention dates back to 1969. Our Secretariat has been located in Madrid since the early 1970's. ICCAT currently has 28 Contracting Parties, 25 of which have Atlantic territories, and one of them is the European Community.

About 30 species are of direct concern to ICCAT .The major tunas are Atlantic bluefin, yellowfin, and bigeye tuna. Swordfish also supports important fisheries. In addition, we are concerned with billfishes such as white and blue marlins, sailfish, spearfish, mackerels and small tunas like skipjack, frigate tuna and Atlantic bonito.

The stated objective of the Commission is to maintain these populations at levels which will permit the maximum sustainable catch for food and other purposes. During our existence, we have seen the catches of our major species (yellowfin, bigeye, skipjack, albacore, bluefin and swordfish) increase from 290,000 tons to 510,000 tons, an increase of 75%. Currently, our largest yields are obtained for yellowfin (147,000 tons), skipjack (133,000 tons) and bigeye (95,000 tons). Altogether, landings for the species of our direct concern exceed 600,000 tons.

For most stocks, the largest gains in catches occurred during the 1970s and early 1980s with the geographical expansion of long-line and purse-seine fisheries. For example, catches of yellowfin tuna increased almost in direct proportion to the areas searched by tropical purse seiners; a similar expansion occurred in the eastern tropical Pacific Ocean. But we also have observed increases in catches in recent times. Some fisheries have also experienced large gains during the last decade due to changes in fishing practices or increases in fishing intensity, or both. One such example has to do with tropical tunas and the use of FADs, which have proliferated in number and in design.

Now I would like to turn your attention to one of our main classes of challenges: Balancing resource usage against conservation.

As I mentioned before, the objective of the Commission is to maintain the stocks at levels capable of producing maximum sustainable catches, or MSY. This objective in itself implies conservation, in that the potential for MSY has to be maintained over time.

In practice, fishery development has taken precedence over stock conservation. That is, in the face of uncertainty about stock status, catches have been maintained or even increased in some cases. In retrospect, some such increases have not been dangerous and have obviously benefited the fisheries. For instance, back in the early 1970s our scientists told us that the yellowfin stocks were being fished at the maximum and, yet, as the fisheries expanded in area of operation, the landings continued to increase, and the scientists' estimates of MSY also increased.

Today, about one-half of the stocks that we monitor through stock assessments are below our current estimates of the MSY population size. It is possible that, like in the yellowfin example I just gave you, the scientists are sometimes wrong and there is a potential for further increases in catches. But, it is also possible that they are correct. I don't know.

What I do know, is that now there is much more pressure to give greater consideration to conservation than we ever had in the past, almost infinitely more pressure than there was 30 or 50 years ago. This pressure is evident within our Contracting Parties, it is evident in the makeup of the delegations of observers to our meetings, it is evident in the media and campaigns by NGOs, and it is particularly evident in recent international texts such as the Code of Conduct for Responsible Fisheries and in the agreement for the implementation of the Law of the Sea as it relates to highly migratory fish stocks. With this presence, there is now much pressure to react differently to uncertainty.

With this type of pressure, I doubt that the yellow fin expansion would have happened as it did. On the other hand, you have all seen too many stories of fish stock collapses all over the world and of the disastrous economic consequences that they have spawned. I believe that this increased emphasis on

conservation will help us avoid collapses of our own and that it will also help us to rebuild the stocks that are below their maximum potential.

One very real impact that conservation pressures have had on ICCAT is that it has pushed us to make our science even more transparent than it already was. Our Secretariat is putting in place systems to better document our data and assessments, and to carry out greater quality control checks. I can safely say that we make every effort to make sure that all of the known scientific evidence be made available to our constituents and to the public at large.

But, to me, the greatest impact that the pressure for conservation has had on ICCAT is that it has pushed the Commission to look for innovative ways to make an impact. Almost from the beginning of our existence, we have had conservation measures that have made perfect sense on paper but that have been ineffective for one or another reason. For example, we have not had much success with minimum size restrictions.

In the last decade, however, our Commission has pioneered new types of conservation measures that seem to be working rather well. In 1992, the Commission recommended the creation of a Bluefin Tuna Statistical Document for tracking the imports and exports of frozen Atlantic bluefin, our most overexploited resource. During the next six years this recommendation was amended so that it would cover fresh as well as frozen bluefin, and so that it would close some loopholes. Today, the bluefin tuna statistical document seems a very effective tool to track the catches of this rather important resource.

The Commission has also been a pioneer in recommending non-discriminatory trade restrictive measures on species of concern, primarily to reduce the activities of Illegal, Unregulated and Unreported fishing vessels, also known as IUU vessels. These IUU boats are a major problem for all of our Commissions because they erode the capacity of conservation measures to work adequately, and because they are so highly mobile between the various oceans. Perhaps our Commission's leadership in applying trade measures will lead to a uniform, global treatment of this problem.

I would like to tell you now about our second major class of problems, which has to do with allocation.

Perhaps all of the problems of managing fisheries can be traced one way or another to an issue of allocation, or who-gets-what. The allocation issues are ubiquitous, have been there since long before ICCAT or IATTC were created, and will likely continue to exist as long as societies change. When the Commission started its operations, there were 9 member nations, primarily those with distant water or coastal fleets operating in the Atlantic. Today, we have 28 Contracting Parties, which is counting the European Community as one, so we have more than tripled our size. But also of importance is the fact that our members are of a different makeup, with several coastal nations that do not have developed their own fisheries substantially but-who would like a greater share of the resource allocation.

Our Commission created a working group with the purpose of examining the criteria that ought to be considered in the future if the allocation is to be re-addressed. This is a difficult task in which issues as contrasting as historical rights versus coastal rights are being addressed. The working group has met twice and has made progress in bringing to the table the various interests and points of view.

The last class of challenges that I want to mention to you today is that of keeping up with fishing technology and fishing practices.

Already, the business of collating and analysing fishery data in our Commission lags 8 months to 1 year behind the act of fishing. But the problem is much worse when we realize too late that we should have collected a given type of information that is crucial to the analyses. Such is often the case with what we call "fishing power", or the ability to monitor the fisheries' actual impact on the fish stocks.

One important example that affects all of us has to do with the use of Fish Aggregating Devices. As I mentioned before, the largest recent increases of tuna catches in the Atlantic are due directly to the use of FADs. But we don't know how many FADs there are, nor how to relate one FAD to a day's fishing on a

purse seiner. Even worse don't really know how FADs "work" to attract tunas or if FADs have an effect on tuna behavior. Meanwhile, while we do not have good data on FADs, their nature keeps changing: how they are used, how they are constructed, what equipment they have. This vicious circle adds to the uncertainty in a very negative way.

I do not want to make it sound as if the FAD phenomenon is very unique as a technological challenge, because it is not. Similar things have happened in the past with the introduction of new searching technologies for other fisheries. But the point is, the more time our Commission takes to understand what is going on, the worse our ability is to respond in time if needed.

With regards to technology, it is up to our Contracting Parties to collect the data that are necessary to perform the best analyses possible.

On that note, I would like to wrap-up this presentation by reminding you of our three challenges: Balancing conservation against usage, allocation of usage, and sound monitoring. These challenges are not new nor are they unique to ICCAT. Their solution is very difficult, but we are taking firm steps towards dealing with them.

I would like to finish by saying that, without regional commissions like ours, which are concerned with these highly-migratory stocks on the basis of large geographical areas, the problems could be much worse than they are.

ISSUES, PROBLEMS, AND ARRANGEMENTS FOR THE INTERNATIONAL MANAGEMENT OF TUNAS DURING THE 21ST CENTURY

by

James Joseph, former Director[1]

Inter-American Tropical Tuna Commission

INTRODUCTION

I have been asked to speak about the future of tuna management, particularly with respect to international arrangements for management.

At best, it is difficult to accurately forecast any event, and with tuna it is even more so. The tuna fisheries of the world are always changing, and the politics governing their management are changing even more. Therefore, in this review I will rely on my experience over the past 40 years, and attempt to present ideas regarding what I think many of the important issues and problems of tuna fisheries and their management will be during the forthcoming years and what sort of institutional arrangements might be necessary for their proper management, but I will not attempt to forecast events.

Tuna represent an important natural resource. Catches of the principal market species, skipjack, yellowfin, bigeye, albacore, and bluefin, have ranged between 3.1 and 3.6 million tons in recent years. This represents about 4 percent of the world catch of marine species, but much more than that in terms of value. Most of these principal market species, with the exception of skipjack, are considered fully exploited, and in some cases they are overexploited.

Tuna are, of course, a renewable living resource, and the rate that humans harvest them affects their abundance and ability to sustain catches. To ensure healthy resources and sustained harvests, we must have knowledge of their biology, and of their relationships to the other animals they interact with, including humans. We must also know about the effects of natural factors on their abundance. Once we have such knowledge we must put it to use through the appropriate institutional arrangements so as to ensure that the resource is managed in a sound manner. Over the last several decades we have had some successes and some failures in trying to do this for the tunas.

One of the special problems in attempting to manage tunas is the fact that they are highly migratory, travelling from waters under the jurisdiction of one nation to those under the jurisdiction of another of another and to the high seas beyond the jurisdiction of any nation. This migratory behavior requires that nations work together to properly manage them. This requirement has been codified in a number of international instruments.

We have listened today to several speakers who have told us about some of these international arrangements for the management of highly-migratory species. The oldest of these is the Inter-American Tropical Tuna Commission (IATTC), an organization that was created in 1949, long before there were any international instruments dealing with the unique needs of tuna management and the requirements for international cooperation. It was, in fact, the IATTC that provided much of the scientific information and much of the experience that led to the international guidelines that were developed for managing tunas. Such guidelines were first treated in 1958 during negotiations to draft the 1st United Nations Convention on the Law of the Sea. The first Director of the Commission, Dr. M. B. Schaefer, served as a technical advisor to the United Nations on matters related to living marine resources, and his advice did much to develop present policy for the management of tunas. Although there was never a final approval of a 1958 convention, nor a subsequent 1960 convention, the principle that tunas are highly-migratory species and that international cooperation is necessary for their proper management was firmly established. This

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principle, which was codified in Article 64 of the 1982 Convention on the Law of the Sea, called on states to cooperate in the management of tunas through regional bodies if they existed, and, if they did not, to create them.

With this mandate in mind, the International Commission for the Conservation of Atlantic Tunas (ICCAT) was created in 1969, the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) in 1995, and the Indian Ocean Tuna Commission (IOTC) in 1998. The only area of the world in which there is a major tuna fishery and for which there is no Article 64-type tuna body is the western Pacific, the area of the world's largest tuna fisheries. However, over the past few years, nations with interests in the region have been in negotiations to create such a body, and agreement on a Convention is likely to occur during the year 2000. The problems that all of these international organizations will face in the future will be very similar, and the solutions will be nearly the same.

The remainder of this presentation will deal with those problems and possible solutions.

THE SITUATION TODAY

There are several problems concerning tunas that are important today and will continue to be important in the future. Information necessary to answer the questions raised by these problems will be necessary in the years to come if we are to be able to adequately manage the tunas and the ecosystems to which they belong. These problems can be divided into two broad categories: 1) the scientific study of tunas and the fisheries for them, and 2) the management of those fisheries.

Science

It has already been mentioned that a prerequisite to proper management is knowledge concerning the resource to be managed, which, in this case, is tunas.

Human curiosity about tunas, their behavior, growth, movements, reproduction, mortalities, and a whole array of other facets of their lives, has probably existed since the first person sat on the beach gazing out at the sea. Indeed, more than 2000 years ago Aristotle wrote in his HISTORIA ANIMALIA about the behavior and other aspects of the biology of bluefin tuna in the Mediterranean Sea. He speculated on their rates of growth, their migrations, their reproduction, on what factors contributed to their catchability, and to their desirability as a food item. Some of the things he wrote about them were accurate, but most were not. Although modern science has gathered much information on tunas, some of the questions posed by Aristotle are still unanswered today.

Our knowledge of the biology of tunas has increased since the creation of the first tuna commission in 1949. We know that many of the tunas undertake extensive migrations, some crossing oceans several times during their lives. However, we are uncertain of their rates of mixing, and such knowledge is necessary if we are to understand the effects of fishing in one area on the fish of another area. A variety of techniques has been used to acquire this sort of information. There have been many studies utilizing genetic information to define genetically-homogeneous populations. However, genetic studies are of limited value regarding mixing, because it theoretically requires only very low mixing rates over very broad areas to maintain genetic homogeneity. The use of physical attributes, such as meristic and morphometric characteristics, also have been used to infer population structure. Such physical characteristics are often considered to be genetically controlled, but, in fact, they may be affected by environmental conditions, and therefore may be of limited value. Tagging data have been used to measure movements and rates of mixing. Large numbers of tunas have been tagged since the early 1950s, but many of these experiments have been on a limited and opportunistic basis, and, though they have revealed interesting facts about the movements of individual tunas, they have not been very useful in estimating rates of mixing. Large-scale, well-designed tagging experiments are needed to estimate mixing rates on a scale of time and area fine enough for use in analytical models of tuna populations that can be used for management. Because of the high costs of such experiments and the broad geographic areas that must be covered, international coop-

eration among scientists and regional organizations will be necessary if future experiments are to be successful.

Rates of growth and sizes at age have been estimated for several species of tuna. Most often the rates of growth have been estimated by studying length samples showing the progression of modal lengths through time, but, on occasion, tagging studies have provided limited information with which to estimate growth rates. There are limitations to its usefulness the study of modal progressions to estimate the growth rates of tunas because, as the fish age their growth slows, and it becomes difficult to separate the modes into age groups. Some tunas lay down daily markers on their otoliths, and this fact has proven useful in aging them, but the techniques used to identify these marks and age the fish are slow, tedious, and somewhat subjective, so they do not lend themselves to aging large numbers of fish in an efficient manner. There is a need to streamline the techniques in order to make this methodology a more practical tool. Also, research is needed to examine the possibilities of developing some other quick, but accurate, way of aging tunas, perhaps using physiological or microbiological methods. However, due to shortfalls in funding, there has been little effort directed toward this sort of research. If we are to make progress along these lines in the future, concerted joint efforts will be necessary.

Probably the single most important parameter for understanding the dynamics of tuna populations is the rate at which they die from natural causes. Over the many years that tunas have been studied, few estimates of natural mortality have been made, and these are probably not very accurate. This is especially true regarding age-specific mortality. Most of these estimates have been made either by examining the dynamics of changing age groups or from limited tagging experiments. There is an urgent need to expand these studies, to design and execute large-scale tagging experiments with the specific objective of estimating mortality, and to conduct exploratory physiological and microbiological studies of senescence that might reflect rates of mortality.

Tunas, being pelagic at all stages of their lives, are profoundly influenced by changes in their environment. If we are to understand fluctuations in distribution and abundance of tunas, we must understand how the biological, chemical, and physical characteristics of the ocean affect them. Tuna scientists have worked closely with oceanographers over the last century, and have learned many things about how certain ocean and global climatic features affect tuna distribution and abundance. It seems reasonably clear that the occurrence of global phenomenon, such as El Niño and anti-El Niño events, affect the abundance and distribution of many species of tuna. Likewise, changes in smaller-scaled features, such as eddies and fronts, seem to play an important role in determining the distribution and availability of tunas. With the advent of satellite technology, an increasingly better understanding of the dynamics of these physical phenomena will be possible. Broad cooperation among tuna scientists and oceanographers throughout much of the world will be required to make maximum use of this information for studying fluctuations in tuna abundance and distribution.

All of the biological and environmental data that have been obtained over the years is utilized with mathematical models to describe the dynamics of tuna populations, their rates of growth, their abundance, and what levels of catch they can support. Although it has been well understood that several species of tuna are taken in a single fishery, and that the tunas interact with other animals in the ecosystem to which they belong, most of the models used to describe their dynamics have been applied to a single species. This is obviously a very simplistic approach, because removing one species most likely has either a positive or negative effect on the other species with which they interact. For example, if adult yellowfin prey on young skipjack, then removing yellowfin by fishing could benefit skipjack. Likewise, if yellowfin and dolphins compete for the same food, then removing yellowfin by fishing could give the dolphins an advantage and they could become more abundant than they had been before yellowfin were harvested. Because of the great importance of this subject, intensive study of these relationships is needed, and the information gathered should be utilized in models that attempt to describe the multitude of species in the fishery or, better yet, the ecosystem in general. The first inroads into developing such an understanding and the first attempts at modeling the ecosystem to which tunas belong, utilizing such tools as *Ecosim* and

Ecopath, are now underway. However, to make substantial progress in this field will require a broad based approach to the problem, in which scientists and scientific institutions from around the globe participate. Notwithstanding the fact that single-species models have many shortcomings and limitations, they should not be abandoned for the more sophisticated multispecies and ecosystem models until the latter have been shown to be superior.

The necessity of having adequate statistics on the catch and fishing effort generated to make that catch is fundamental. For many of the major tuna fisheries of the world, adequate statistics of catch and effort by species and time and area strata are collected for use in analysis and modeling. For others, however, adequate statistics are lacking. There are several reasons for this, including the fact that some international organizations are not empowered nor funded to collect statistics themselves, but receive statistics from their member nations. Some of those nations, although they have tuna fleets, do not have the infrastructures or institutions capable of collecting adequate statistics. In other cases, some nations with tuna fisheries do not, or cannot, belong to international tuna organizations, and therefore do not provide statistics to those organizations. Still other nations fish in areas where there is no international organization and do not collect statistics of catch and effort, or, if they do collect them, do not make them available to the international community of scientists that has responsibility for such fisheries. No matter the reason, there is a need to improve the collection and availability of tuna statistics.

There is also a need to resolve a problem of species identification regarding bigeye and yellowfin tuna. Although it possible to clearly differentiate between the two species when individual specimens can be closely examined, it is difficult to differentiate between them when they are mixed in large quantities. There is and will be a strong need to develop rapid means of doing this. These problems of species identification, and of collection (including the protocols for collection) of catch statistical information are common throughout most of the tuna fisheries of the world. As we move into the 21st Century there is a need to develop new technology for collecting catch, effort, species composition, and size composition data in a more accurate and efficient manner. Much of the new technology associated with computers, digital imagery, lasers, *etc.*, should make it possible to collect accurate information on a nearly real-time basis. However, widespread cooperation among organizations and nations around the globe will be necessary if real progress is to be made.

In addition to these aforementioned scientific problems that will be with us through much of this century, there are several other pressing problems relating to rational management of tuna fisheries that must be resolved. These are discussed in the following section.

Management

Tunas have a tendency to associate with objects in the sea, dolphins, floating tree trunks, and many other types of drifting debris. Fishermen have developed fish-aggregating devices (FADs) to attract concentrations of tunas and thereby improve their fishing success. They catch large quantities of skipjack, yellowfin, and bigeye around FADs. Most of the tunas they capture are small. Catching tunas, particularly yellowfin and bigeye, at small sizes reduces the potential production from the population being exploited. In addition to the tunas, many other species of fish, turtles, and mammals associate with FADs. Much of this bycatch has no commercial value and is returned to the sea, most often dead. FAD fishing has increased tremendously since the late 1980s, and has accounted for increased catches of small yellowfin and bigeye, and much of the world catch of skipjack. There is much concern that this increased FAD fishing is reducing the abundance of large yellowfin and bigeye, causing growth overfishing, and adversely affecting the ecosystem to which the tunas belong. This has led to efforts to limit the amount of FAD fishing. Indeed, the first efforts to limit such fishing were voluntarily instituted by the industry itself. Since these first voluntary limitations, governments have set similar limitations through international tuna organizations. Though these limits reduce the catches of small yellowfin and bigeye, which are already heavily exploited, they also reduce the catch of skipjack, the primary species taken on FADs and a species that is not fully exploited in many areas where they are fished. These problems of FAD fishing are com-

mon to all areas of the world's oceans where purse-seine fishing is prosecuted, and they are growing as more vessels fish in this manner. Methods of fishing that allow fishermen to select the species they want, but not those that they don't want, should be developed. Most notably there is a need to develop a way to catch the skipjack associated with FADs, without capturing the small yellowfin, bigeye, and myriad of other bycatch species. This will be a major task for fishermen, scientists, and nations to deal with in the coming years.

In addition to the bycatch taken by the FAD fishery, there are also other problems of bycatch facing the tuna fisheries in the coming year. Probably the most notable bycatch problem has been that of dolphins taken in the yellowfin tuna fishery of the eastern Pacific Ocean. This was probably the leading environmental trade issue of the last century. Although the problem is mostly solved from the biological point of view, since mortality of dolphins caused by the fishery has been reduced to nearly zero, it continues to affect international trade in tuna. Similar problems are associated with other types of fisheries, particularly some of the longline fisheries that take endangered seabirds and turtles. There needs to be a "critical mass" of scientific and technical effort directed on a global scale to addressing these problems. If in the coming years solutions are not found, there will be further impacts on "free trade" in tuna and tuna products that will have serious economic and political impacts on governments and industry.

Many of the world's tuna fisheries are fully or overexploited. There are limits on the catches of northern bluefin tuna in the Atlantic Ocean and on southern bluefin globally. Closures to FAD fishing have been instituted in the Atlantic and eastern Pacific Oceans. There are limits on the catches of yellowfin and bigeye tunas in the eastern Pacific and efforts to limit their catches in other areas. The need for regulation is the result of increasing fishing effort from a large global fleet of vessels. In many of these controlled fisheries there is more fishing capacity than is necessary to take the allowable harvest. There is concern that, as excess capacity grows, the fishery will become less profitable for the harvesters and it will become more difficult for nations to reach agreement as to how to manage the fisheries. As a result, there have been efforts to limit fishing capacity and in fact the United Nations has called for such limitations in global fishing capacity. Two commissions, the IATTC and ICCAT, have taken steps to limit capacity, and are struggling with the development of criteria to allocate this capacity among participants and nations. Just how these criteria should be defined and applied is unclear, but they will almost certainly involve, *inter alia*, historic involvement in the fishery and adjacency to the resource. When capacity is allocated it follows that the catch is allocated to a degree as well. Some nations are interested in allocating catch, rather than fishing capacity. The same problems of allocation and of determining criteria for allocation of catch exist with respect to capacity. In the coming years the various international tuna organizations will have to find ways of dealing with these problems if they are to be successful in managing the resources for which they are responsible. Because the problems are similar in all areas, and excess capacity can flow from one area to another, successful limitations in capacity in one area cannot be achieved without considering the consequences in other areas.

In the past there have been several fisheries for which the available scientific information indicated heavy exploitation, but for which controls were not instituted because the scientific evidence was considered to be inconclusive. This has resulted in some of these fisheries being heavily overexploited. Because of concern over such situations, several international instruments have called on states to be more cautious when information is uncertain, unreliable or inadequate. They note that the absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures. Although adequate information is available to determine whether some tuna stocks are fully exploited or overexploited, there are others for which the data necessary for such a determination are lacking. In those cases nations are encouraged, indeed mandated, to take action to avert overexploitation, even if such action could eventually prove to be overly conservative. This "precautionary approach" will undoubtedly influence how tuna fisheries will be managed in the future, but just how it will be applied is uncertain. To ensure that the approach is instituted in an efficient and timely manner, it will be necessary to develop a set of standards and reference points for implementing management controls. Since the

problems are common among most fisheries and areas, it would be most efficient to develop such standards and reference points on a global basis.

Traditionally, the decision-making process regarding conservation measures in international bodies has been carried out with some degree of secrecy, with only governmental representatives and their scientific advisors involved in the process. With the expansion of non-governmental organizations from industry and the environmental and consumer communities, this "closed" process has come under criticism. Recently there has been a tendency for more openness to the decision-making process used to formulate and monitor tuna management measures. A number of international instruments have mandated that transparency become a part of the process of making management decisions. Whereas committees and fora for making these decisions have been the domain of government representatives, they are increasingly being joined by non-governmental organizations. Transparency will become even more the norm in the future.

In addition to transparency in the decision-making process, will be a need for openness in ensuring compliance with whatever regulations or controls may be implemented. New and better means of collecting data and monitoring the fisheries will be necessary to provide the information needed to ensure compliance with regulations and collect the scientific data necessary to make the management decisions that will be required in the future. Observers will become more common on high-seas fishing trips. They will collect information on catches, both retained and discarded, and other information on the vessels' activities, and this information will be used to assess potential overfishing problems and to monitor compliance with regulations. Much of the information collected will be transmitted to shore stations on a regular and frequent basis, so that real-time management decisions can be made. Vessels without observers may be required to carry electronic devices to monitor their positions and fishing activities, and this information would be transmitted via satellite to shore stations, where it would be used to monitor the effectiveness of management controls. These measures may be regarded as unwarranted intrusions into the privacy and freedom of fishers, but the ever-increasing pressure on the resources of the sea, the need to conserve them for the future, and the ever-increasing influence of non-governmental organizations, make them likely to be continued and increased.

The manner in which tuna fisheries are exploited, and the means for managing and conserving the world's tuna resources, are changing. Many fishing activities traditionally considered the "right" of individuals and nations will be regarded in a different light in years to come. The freedoms enjoyed in the past will be gradually replaced by controls and limitations as increasing demand is placed on the resources of the sea. This may be perceived as a step backward from the point of view of freedom to exploit, but should be seen as a step forward from the point of view of rational management of the resources and the fisheries for them.

INSTITUTIONAL ARRANGEMENTS

As they are now

There are currently four international tuna bodies, and a fifth will most likely be created in the near future. When the new one is created for the western Pacific, most of the areas in the world in which tunas are found will be covered by regional tuna bodies. The geographical areas of responsibility for the bodies vary. Some, such as the IOTC and ICCAT, cover oceans, the CCSBT's mandate applies to the southern bluefin tuna, wherever it occurs, and the IATTC is restricted to the eastern Pacific Ocean. Although still uncertain, the area of the new western Pacific body will cover much of the western and central Pacific, and possibly extend into the eastern Pacific, overlapping with the area of the IATTC.

Each of the bodies has responsibility for most of the tuna and billfish species that occur in its convention waters. The IATTC has responsibility for the baitfishes of the eastern Pacific that are used to harvest tunas and other types of fishes taken by tuna fishing vessels. The bycatch species are notably included in this classification. The IATTC also has some responsibilities for the marine mammals that are taken in association with tunas in the eastern Pacific Ocean.

All of the organizations have basically the same objective, which is to offer management advice to the member governments regarding the species under their jurisdiction. Just how the different bodies develop this advice differs among the organizations. The oldest of the bodies, the IATTC, employs a director and an independent staff of internationally-recruited scientists who are responsible for collecting and analyzing catch statistical data and other biological and environmental information on the tuna fisheries of the eastern Pacific. Based on these analyses, management advice is provided to the plenary body of the Commission. Recommendations for management are formulated by the Plenary, based on the advice received from the Director and his staff and transmitted to the governments.

The other tuna bodies do not employ independent staffs of scientists, but appoint secretariats to coordinate the activities of the commissions. In these other bodies the collection and analysis of catch statistical and biological information is the responsibility of national scientists who meet through committees to compare their analyses and make assessments of the various stocks. The results of their work, including stock assessment advice, are reported to the Plenary. In order to enhance data collection and analysis, ICCAT and the IOTC are moving in the direction of acquiring additional permanent scientific staff members. Concurrently, in the IATTC there is more participation of non-staff scientists in working groups and special scientific committees to review research results; however, nearly all data collection and analysis continues to be conducted by the permanent staff of the IATTC.

Although the format used to fulfill their respective obligations differs among the various bodies, the circumstances and problems in all of the bodies are quite similar, indeed almost identical.

The species covered by each body are nearly the same. Most of them are highly migratory, which requires that for any conservation action to be successful it must apply to all areas where the fish occur. This does not create much of a problem for ICCAT or the IOTC, although there may be some movement of fish between the Atlantic and Indian Oceans and the Indian and western Pacific Oceans. In the Pacific the potential problems are more complex, since movements between the west and east are more pronounced for many of the species. This means that there must be a great deal of cooperation and collaboration among the various bodies, particularly the IATTC and the new western Pacific organization.

Not only are the fish themselves highly migratory, but the vessels that hunt them are migratory too. They are capable of moving from the jurisdiction of one organization to that of another with great ease. It is not uncommon for a single vessel to move between oceans in a single year, or to move from the eastern boundary of one ocean to the western boundary of the same ocean several times in the same year. Therefore a management action taken by one regional body should not be taken without considering the consequences of that action on other fisheries and other bodies.

The tuna market is international. Tuna products move throughout this world market on a regular basis and with great ease. The price paid for raw tuna destined for canning, discounted for transportation costs, is nearly the same world-wide. An increase in catch in one area, or a reduction in another, perhaps due to the enactment of management measures, has a ripple effect throughout all areas and markets.

As mentioned in the earlier sections of this report, the problems facing tuna fisheries are similar in nearly all areas where tuna fisheries occur. The problems of FAD fishing (catches of unmarketable tunas and species other than tunas) are common to all purse-seine FAD fisheries. Obviously the solutions will be the same too. A growing fishing capacity and excess fishing effort is also common to most tuna fisheries. Solutions cannot be found while ignoring other areas and other fisheries. If vessel capacity or fishing effort is limited in one fishery, there is a tendency for the excess to migrate to other areas, creating or exacerbating similar problems there. The issues of allocation of fishing capacity or harvest, in face of limitations, are the same in nearly all fisheries; therefore the same difficulties would be encountered in the development of a set of criteria, and a format for implementation of such allocations, for any other area.

The problems of collecting catch and effort statistics are similar in nearly all fisheries. In fact, the same type of data is collected by different organizations as the same vessel passes through the areas of respon-

sibility of the respective organizations. A single vessel during a fishing year may be required to provide the same type of data, but in different formats, to several organizations in a single year as it moves among fishing areas.

The need for a broader approach

For all of these reasons, it has been my opinion for a long time that a single, global tuna body would make sense. That body could provide a focal point for coordination among nations in a number of respects. It seems redundant for each organization to maintain its own separate data base, group of technicians, and so forth, to monitor the activities of vessels as they move from area to area. It would be far more efficient to place responsibility for collecting catch and effort statistics and size composition information in one global body. Then a single cadre of technicians could collect the required statistical data from the fleets, no matter where they operated. Also, a single depository could be maintained where data would be readily accessible to scientists and governments. Management recommendations formulated under the auspices of a global body could be designed to minimize effects of regulatory actions in the area of one fishery, on fisheries in other areas. A global body would be in the best position to produce long-term solutions to the difficult problems of catch and capacity limitations. Some national fleets fish on two or three major fishing grounds during a single year, while other less mobile fleets are restricted to more regional patterns of exploitation. When making allocations, consideration would be given to whether any of the participant fleets fish in other areas, and this would be recognized in making such allocations.

There are numerous other reasons, in my opinion, why a global body would make sense, not the least of which would be that there would be cost savings because of an increase in efficiency. A major criticism expressed in opposition to formulating a global body is that it would be too large and too unwieldy. This does not appear to me to be an insurmountable problem. Mechanisms for dealing with some issues on a regional or species basis could be developed. If there were a propensity to move in the direction of a global body, the move would necessarily be slow and progress in steps. The first step would be to address the problems that will probably develop in the Pacific Ocean. As already mentioned the fleets in that ocean regularly travel between the western-central and eastern Pacific Oceans, and there is some mixing of fish of these two areas. For any management scheme to be effective, there would have to be a great deal of cooperation and coordination between the two bodies. Particularly complicating is the fact that the new organization is proposing boundaries for their Convention waters that overlap with the already established boundaries of the IATTC. Once the convention establishing the western Pacific organization enters into force and the Commission becomes operable, there will be a need to establish some sort of a permanent coordinating committee that harmonizes the work of the two organizations. Provision should be made in the respective conventions of the two organizations for the establishment, responsibilities, and functioning of the committee. It is my opinion that as the two organizations work together they will coalesce their responsibilities and eventually merge into a single organization. That tendency may continue toward the evolution of a global body.

The world is becoming increasingly "smaller," greater demands are made on our natural resources, and our management institutions must adjust to these changing conditions if they are to meet their responsibilities.