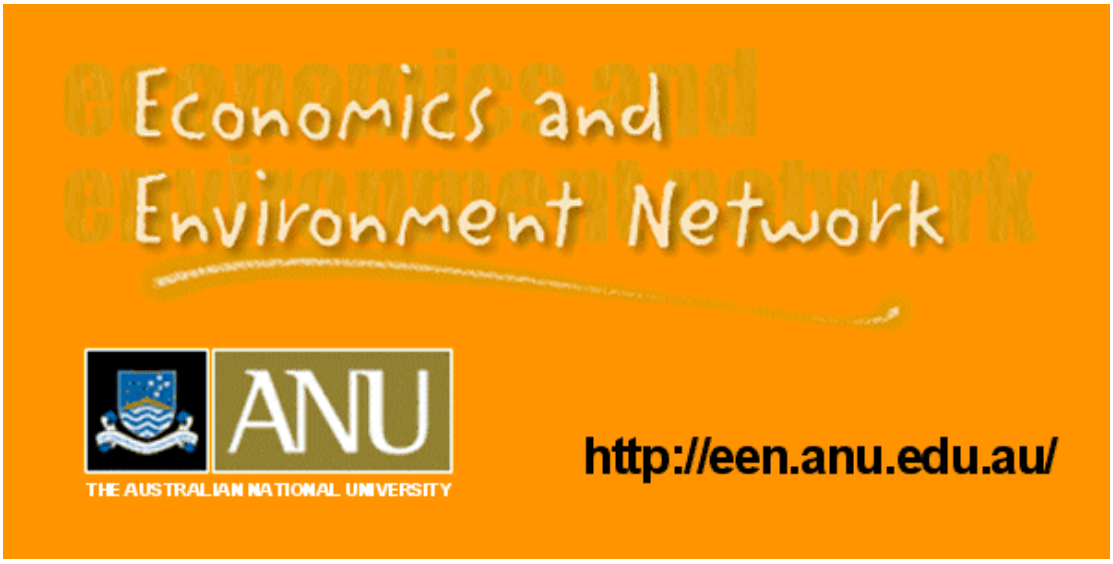

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Abstract

The paper reviews existing allocation mechanisms in the five tuna regional fisheries management organizations and shows that although they have adopted different approaches all have failed to prevent overcapacity and, for some stocks, overexploitation. As an alternative, it is proposed that each tuna regional fishing management organization establish total allowable catches by species and area, and then allocate non-transferable and permanent country shares (as a proportion of the total harvest) to member countries. Each country would be free to use or sell its annual allocation of fish that would be determined by the permanent country shares, but the sales could only be to fellow member countries. A two-tier allocation to countries of permanent shares of a total allowable catch, and then annual harvest allocations to vessels of member countries, offers the promise of mitigating, and possibly overcoming, the twin problems of overcapacity and overexploitation in the highly migratory and high seas tuna fisheries.

Key words: tuna, property rights, allocation
JEL codes: Q22, Q27

1. Introduction

Highly migratory fish stocks, such as tuna, are perhaps the last great frontier in terms of capture fisheries in which neither the countries nor fishers involved have sufficient incentives to invest in their conservation and management. These fish roam between the exclusive economic zones of coastal states and the high seas and are, thus, vulnerable to overexploitation in the absence of effective co-operation. Recognizing the need for a legal framework to support the sustainable management of tuna and other highly migratory species, many countries worked together to develop the United Nations Fish Stock Agreement (UNFSA) that entered into force in 2001. The UNFSA builds on the earlier UN Convention on the Law of the Sea (UNCLOS) and confirms the need for all countries to work with regional fishery management organizations (RFMOs) to manage highly migratory fish stocks. Indeed, it obliges both RFMO members and non-members that are parties to the UNFSA to abide by the conservation and management measures adopted by the relevant RFMOs in order to have access to the fisheries.[1]

As a means of supporting sustainable management, we examine a possible allocation mechanism that is of relevance to all five tuna and billfish RFMOs: the Inter-American Tropical Tuna Commission (IATTC), the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), the Western and Central Pacific Fisheries Commission (WCPFC) and the Indian Ocean Tuna Commission (IOTC).

An alternative to the existing approaches to allocation and management in these RFMOs is required given that the FAO estimates that 30 percent of the stocks of highly migratory tuna and tuna-like species are overexploited or depleted (Maguire et al. 2006). In particular, stocks of bigeye and yellowfin tuna appear to be overexploited in the Western and Central Pacific in the sense that in order to maintain stocks at a level capable of producing the maximum sustained yield (MSY) current fishing effort must be reduced (Langley and Hampton 2006). Moreover, if these stocks were managed to maximize economic yield (MEY) — the stock level that maximizes the discounted net returns from harvesting — current exploitation would be considered even more excessive (Kompas and Che 2006).

In section two, we briefly review some of the existing allocation mechanisms and challenges in existing tuna RFMOs. Section three describes the key economic issues and failures of allocation methods used to date. In section four, we present a framework for allocating fishing rights among members of RFMOs to mitigate overexploitation and overcapacity. In section five we present our concluding remarks.

2. Past and Current Allocation Practices of Tuna RFMOs

Allocation is the process of providing temporary or permanent access, use or presumptive rights to fish. The allocation can be implicit or explicit such as in the form of limits on the number of vessels, vessel days, overall capacity, or as a share of a total allowable catch (TAC). Many possible criteria can, and have, been used for allocation. The two most commonly used criteria are historical catches and consideration for coastal states access. Article 11 of the UNFSA lists several other possible criteria for consideration when determining how allocations might be provided to new members, including the status of the stocks and the current level of fishing effort. Our interpretation of this article is that gives RFMOs the right to prevent the allocation of fish to new entrants, but only if the stocks are fully exploited.

The five tuna RFMOs have adopted different allocation practices. The oldest RFMO, the IATTC, has established maximum national carrying capacities for the purse seine fleets of members based on the criteria of past catches, location of the catches and also landings of tuna. However, these national capacity limits were in effect only in 1999 and were followed, beginning in 2002, by a closed regional vessel register for the purse seine fleet and a limited purse seine fishing season. Despite the intention to keep total purse seine fleet carrying capacity at no more than 158,000 metric tonnes it had reached nearly 180,000 metric tons in 2002 (Hallman et al. 2006). For bigeye tuna, the IATTC has implemented country allocations of fish caught by longliners for 2004-2006.

The two tuna RFMOs that have been most pro-active in terms of country allocations of fish have been the ICCAT and the CCSBT. In both cases establishing the initial allocations and accommodating new entrants has been acrimonious. The 1983-1991 ICCAT allocations were ostensibly made according to the stock status, historical

catches, proximity to coastal states, the need to provide data for stock assessment, and also considerations for small and developing fisheries. Of all these factors, historical catch has been the major determinant in past national allocations. Unsurprisingly, coastal states and parties to the ICCAT without historically large catches argued for a change in the allocation formula — revisions that were instituted in 2001 following a series of allocation disputes in the 1990s.

The CCSBT established country allocations for Southern Bluefin Tuna (SBT) for its three original members (Australia, Japan and New Zealand) when the convention came into force in 1994. Shortly thereafter, following disputes over the size of the stocks and access, there was no uniformly agreed-to-country quotas until 2003 when allocations were given to the original parties, plus Korea and Taiwan, with a small amount set aside for non-cooperating parties to encourage countries outside of the convention to become cooperating parties. The discovery in 2006 that Japan had greatly exceeded its agreed-to-national-allocation over a number of years has made it clear that an appropriate and independent system of monitoring catches is required to ensure the integrity of country allocations. If an independent system of monitoring catches required to ensure the integrity of country allocations is not feasible, country allocations will be ineffective, and could lead to substantial underreporting of catch and related sustainability problems.

The WCPFC is the newest tuna RFMO, but it has important antecedents in the form of agreements undertaken by members of the Forum Fisheries Agency (FFA).[2] In recognition of the importance of allocation, it has established a commission to determine each TAC or total allowable effort within the convention area, and how to allocate it (Parris and Grafton 2006). Among the ten criteria for allocation are the status of stocks, historical catch, the needs and aspirations of small-island developing states in the Convention area, the needs of dependent coastal communities, and compliance. To address concerns in terms of overexploitation, the WCPFC has agreed to establish a vessel day scheme by the end of 2007 that is designed to limit total allowable effort in the purse seine fisheries (Miyake 2006).

Despite different approaches and practices, the tuna RFMOs have all been less than successful at limiting fishing effort (Joseph et al. 2006). Moreover, it appears that some

stocks (southern bluefin tuna, yellowfin tuna and bigeye in the Western and Central Pacific) are currently overexploited in the sense that current harvests exceed what is required to ensure that stocks are at a level able to generate a MSY. Problems of overcapacity in all tuna RFMOs have also prompted proposals to buyback vessels, fishing gear or vessel permits in order to decrease capacity and improve the net returns from fishing (Squires et al. 2006). Notwithstanding the difficulties of reaching unanimity or consensus among RFMO members, we present the key considerations for allocation mechanisms that are incentive compatible with sustainable fisheries management for both the countries and fishers involved in the tuna fisheries.

3. Economics of Fishing and Tuna RFMOs

The history of exploitation in domestic fisheries shows that, in the absence of appropriate incentives at either an individual or community level, sustainable fisheries outcomes will not be forthcoming. Input controlled fisheries with limits on the fishing seasons, vessels and/or gear even with fixed TACs often fail to prevent effort creep (Townsend 1990). Frequently this results in substitution to unregulated inputs (Squires 1987) that contributes to overcapacity and inefficiency (Kompas et al. 2004).

The key insight for transnational fisheries is that capacity limits, vessel day limits and even restricted vessel registries at best provide ‘stop gap’ measures to the ‘race to fish’. This ‘race’ arises from the motivation of fishers to develop and use unregulated fishing inputs when the regulated inputs provide a binding constraint on their ability to harvest fish. Thus, if RFMOs control the number of vessels allowed to fish, the average size of vessels will creep upwards, and if the number and hull size of vessels are capped then fishers will increase the use of other inputs to compete for the limited harvest.

Input substitution generates at least three undesirable effects: one, fishing effort creeps up with the use of faster, larger and more technically sophisticated fishing vessels and gear thereby increasing harvesting pressure on fish stocks, and is the reason why several tuna stocks are overexploited; two, fisheries regulations over time become overly complicated and difficult to enforce as more rules are promulgated to prevent further increases in fishing effort and; three, a switch to unregulated inputs often reduces technical efficiency that, in turn, lowers overall net returns.

In an attempt to stop one ‘tragedy of the commons’ regulators will, with the best of intentions, fail to stop an inexorable slide to an unsustainable and unprofitable tuna fishing industry. Fishers are always ‘one step ahead’ of the regulators in finding ways to overcome the rules attempting to curb increased fishing effort. As a result, for many tuna fisheries there is a large excess capacity relative to that required to harvest the average MSY (Reid et al. 2005). If the capacity were calculated relative to the MEY level, the excess capacity would be much larger, especially for longer-lived species such as bigeye (Kompas and Che 2006).

To resolve the tragedy of ‘too few fish and too many boats’, tuna RFMOs must change the incentives faced by fishers and the member countries. An approach that tries to change the incentives of individual fishers is to create durable and enforceable property rights to harvest a share of the TAC that is set at a level to ensure sustainable utilization. Individual harvesting shares have been variously called individual fishing quotas (IFQs), and also individual transferable quotas (ITQs), to emphasize that fishers are able to sell or lease their rights to others. Transferability confers an economic advantage as those fishers with higher net returns per unit of harvested fish are able to purchase rights from those with lower net returns, thereby increasing overall profitability (Grafton 1996). Such transfers provide an incentive for fishers to voluntarily exit from the industry, and also an autonomous adjustment process that helps to reduce the amount of excess vessels and gear employed in a fishery.

An important aspect of individual harvesting rights is that, provided that the TAC is a binding constraint such that fishers would catch more fish if the TAC were at a higher level, IFQs command a positive price. This price provides a conservation signal in the sense that holders of the rights can benefit from more sustainable fishing practices because higher future returns from fishing will be incorporated into the value of their asset holdings of IFQs. Harvesting rights that effectively control the overall catch of fishers also changes what fishers must do if they wish to catch more fish. Under input controls, a higher individual harvest requires greater fishing effort by an individual to out compete other fishers. By contrast, with enforceable and binding IFQs, fishers are obliged to buy or lease quota to increase their harvest. This changes the dynamic from catching as many fish as possible in a limited period of time under input controls, to one

of maximizing the net returns from a valuable property right by landing higher valued fish in a more valuable form (fresh versus frozen fish) and/or minimizing harvesting costs per unit of fish landed (Grafton et al. 2000; Hannesson 2004). In addition, with the 'race to fish' reduced quota holders can choose when to catch their harvest in ways that suit market demand, thus enhancing returns.

The overall experience of IFQs in different parts of the world has been positive, but not without problems. Successful IFQ management requires that TACs be set a sustainable levels, that disincentives be established for dumping of fish at sea and for catching species incidental to the fishery (such as dolphins, sea turtles or sea birds), and that there is adequate monitoring and enforcement so that those without IFQs are prevented from fishing, and those with the rights respect the rules. Where this has been successfully accomplished, IFQs have resulted in more sustainable and profitable fisheries (Grafton et al. 2006). The experience in countries using IFQs, such as in New Zealand, is also that 'self policing' by fishers becomes an important factor in enforcement strategies as fishers seek to protect their assets by reporting illegal fishing activities.

4. Country Allocations and Multilateral Governance

The relative success of IFQs suggests that if they were properly applied in the context of highly migratory and high seas fisheries they would offer a means to resolve overcapacity, promote more sustainable fishing practices, and prevent biological and economic overexploitation. Although IFQs are applied for some tuna, such as in Australia's domestic management of its harvests as part of the CCSBT, they have not yet been applied in an international context. The principal stumbling block to their introduction is the initial allocation of quota.

To be consistent with national law of some countries, and also the UNFSA, any initial allocation of harvesting rights would necessarily have to be to the sovereign members of RFMOs. Such allocations would be based on a number of criteria, such as past harvest levels and also the rights of coastal states and the needs of artisanal fishers and their communities. The precise formula or method of allocation, however, would need to be negotiated by RFMO members and would, no doubt, be subject to much debate.

The allocation of fish quotas as shares of an annual TAC to member countries already exists in both the CCSBT and the ICCAT. Transfers have also been made between member countries with the ICCAT approving between country transfers of annual quota. Although not yet implemented in tuna RFMOs, there appears to be no legal reason why any tuna RFMO cannot establish *permanent* country shares of its area-specific TACs. In fact, the UNFSA states that "In fulfilling their obligation to cooperate through subregional or regional fisheries management organizations or arrangements, States shall: … (b) agree, as appropriate, on participatory rights such as allocations of allowable catch or levels of fishing effort". However, it would require that the stock being fished is at a level such there is no 'surplus' fish beyond that allocated by the RFMO to its members. In cases where a surplus were available, set asides would be required for both existing members and potential new entrants. A key benefit of permanent country shares would be to avoid on-going conflicts over allocation. Moreover, it would encourage countries to become better custodians of tuna resources as they would be the principal beneficiaries of improved fisheries management.

Given that the country shares would be permanent, the country allocations as a share of the TAC would not be traded. However, the annual allocation which the permanent country share would generate could be traded across countries. There appears to be no legal barrier to the trade of annual allocations provided the relevant RFMO provided a waiver on behalf of all its members (Serdy in press). Annual allocations (based on permanent country shares) could also help overcome difficulties in negotiating the initial allocation of permanent country shares because they could act as 'side payments' (Munro and Van Houtte 2004) to entice acceptance of the initial allocation agreement by all RFMO members. For example, a distant water fishing nation may be prepared to accept a lower permanent share if it were agreed it would have the option to lease a set amount of annual quota for, say, the next 10 years. Such an approach, at a national level, has been allowed in New Zealand's fisheries where, since 2000, a separation between the IFQ and the Annual Catch Entitlement (ACE) permits the ACE to be separately traded from the IFQ. The use of seasonal allocations that sum to a RFMO-determined TAC also allows for flexibility in terms of management and the possibility of small underages and overages in terms of seasonal allocations. Such flexibility has

worked successfully with IFQs in national jurisdictions and accounts for seasonal and location-specific variations that might affect catches.

As noted above, the creation of durable and enforceable property rights for individual fishers to harvest a share of the TAC that is set at a level to ensure sustainable harvesting changes the incentives of individual fishers in a way that promotes sustainable fisheries. The creation of such property rights for the individual members of a RFMO has a similarly positive effect on the incentives of the individual member countries. Specifically, it increases their incentives to invest in the conservation and management of the fishery resources.

Each individual member of a tuna RFMOs would have the right to manage their annual allocations (based on their permanent country shares) in the way that best addresses its own fishery-specific characteristics and objectives provided is conforms to the harvesting and data reporting practices established by the RFMO. This would, for instance, allow some countries to introduce IFQs for their flagged vessels to increase the economic payoffs from fishing. Other countries could adopt different management or regulations provided that annual tuna catches were constrained to the amount of annual allocations they were allocated net of trades. Allowing for different approaches to management, but within overall controls of annual catches and codes of practice would encourage the diffusion of successful management and best practices among the members of tuna RFMOs. Thus would also eliminate the formidable challenge of developing a uniform management program that would be acceptable for all of the members of an RFMO.

Kaitala and Munro (1997) propose the establishment of charter members of RFMOs such that new members would only be allowed to harvest fish if a charter member relinquished a proportion of its share of a TAC, presumably with suitable financial compensation. A detailed explanation of how a system of country quotas could be developed is provided by Chand et al. (2003) for the Western and Central Pacific tuna fisheries. Chand et al. (2003) propose a two-tier allocation: first, fixed country shares of a TAC by area or zone and, second, countries then choose to use or trade their annual allocations among the fleets of fellow RFMO members. They recommend that a tuna RFMO commission would assist in monitoring and enforcement, arbitrate disputes,

promote co-operation and also determine the TACs for the relevant species by zone. Such a commission could be funded out of sales or trades of annual allocations, an auction of a small proportion of the TAC, or by a levy on total catch. Penalties for deliberately exceeding an annual allocation could include loss of annual allocations and, in extreme cases, reductions in permanent country shares.

A related, but different allocation approach has been proposed by Trondsen et al. (2006) for blue whiting. They argue for an auction of annual allocations of fish from all member countries to industry stakeholders. Part of the revenue from such an auction would be used to finance a multinational resource cooperative similar to the commission proposed by Chand et al. (2003). This cooperative would also be responsible for returning the remainder of the revenue to member countries based on where the fish were caught, and the country allocations.

The key insight of Chand et al. (2003) is that a two-tiered allocation of fish (to countries and then to individual vessels and fleets) would help prevent overexploitation. Moreover, if it were to promote the use of IFQs by some member countries, it offers the real prospect of increasing returns from harvesting tuna and promoting more sustainable fisheries management.

5. Concluding Remarks

The world's regional fisheries management organizations face an unenviable task of preventing overexploitation for highly migratory species; balancing the diverse and competing interests of distant water fishing nations and coastal states, and also their fleets; and reducing the problems of by-catch. The five tuna regional fishing management organizations have adopted different approaches to similar problems, but all have failed to prevent overcapacity and, for some stocks, overexploitation.

To overcome on-going concerns over sustainability, especially in terms of long-lived species such as bigeye, it is proposed that each tuna regional fishing management organization establish total allowable catches by species and area, and then allocate non-transferable and permanent country shares (as a proportion of the total harvest) to member countries. Each country would be free to use or sell its annual allocation of fish

that would be determined by the permanent country shares, but the sales could only be to fellow member countries. In this sense, fish in the form of annual country allocations could act as ‘side payments’ to entice all members to accept an allocation of permanent country shares. A small levy on the fish caught, or an auction of a small percentage of the TACs would permit the regional fishing management organization to help monitor and enforce the allocations at a country level, and also ensure individual vessels meet the required codes of practice.

Countries would be free to choose their own management regime for their annual allocations, provided they conform to the rules of the regional fishing management organization. This would allow, for example, some or all countries to introduce country-specific individual harvesting rights programs specifically designed to address the fishery characteristics and objectives of individual member countries. Overall, a two-tier allocation to countries of permanent shares of a total allowable catch, and then annual harvest allocations to vessels of member countries, offers the promise of mitigating, and possibly overcoming, the twin problems of overcapacity and overexploitation in the highly migratory and high seas tuna fisheries. The approach offers the real possibility of benefiting the countries and fishers involved in the tuna fisheries, those who consume tuna, and also those who wish to ensure sustainable fisheries and ecosystems.

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End Notes:

1. Article 116 of the UNCLOS states that “All States have the right for their nationals to engage in fishing on the high seas subject to: (a) their treaty obligations; (b) the rights and duties as well as the interests of coastal States provided for, inter alia, in article 63, paragraph 2, and articles 64 to 67; and (c) the provisions of this section”. Members of an RFMO and parties to the UNFSA are obliged to comply with the conservation and management measures adopted by an RFMO. However, because the compliance requirements for other states is less clear, the authority of an RFMO to prevent other states from fishing for tuna on the high seas without an allocation may need to be clarified and strengthened in order to ensure that the tuna RFMOs can enforce their conservation and management measures on all fishers and states that participate in the tuna fisheries on the high seas.

2. These agreements include the Palau Agreement that entered into force in 1995 and was designed to limit the number of distant water fishing nation purse seine vessels in the exclusive economic zones of signatory countries and adjacent high seas to a total of 205. The Federated States of Micronesia (FSM) arrangement for regional access is related to the Palau Agreement and is designed to promote ‘domestication’ of the of purse seine fleets to increase the economic benefits to the parties and imposes criteria for regional access to the parties’ EEZs to encourage greater employment, technology transfer and training of the coastal states (Ram-Bidesi, 2002).