Management of Shared Fish Stocks

Edited by

A.I.L. Payne, C.M. O’Brien and S.I. Rogers
Centre for Environment, Fisheries and Aquaculture Science (CEFAS)
Lowestoft Laboratory, Pakefield Road, Lowestoft, Suffolk
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Foreword

During 2002, the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) celebrated its centenary of fisheries research at Lowestoft. As one of several events celebrating that centenary, CEFAS hosted a forward-looking international symposium entitled “International Approaches to Management of Shared Stocks – Problems and Future Directions” in July 2002. Personal invitations resulted in the attendance of some 80 scientists, policy-makers and managers from more than 20 countries, covering many of the world’s main fishing areas and a variety of resources. Presentations were both verbal and poster, and four keynote speakers (Doug Butterworth, South Africa; Kevern Cochrane, FAO, Italy; Geoff Kirkwood, UK; and John Pope, UK) led presentations and discussion on four interwoven themes:

- The consequences and management of unregulated/unreported catches
- Competition
- External drivers and resource behaviour
- Ecosystems and migration.

The 20 papers that form the bulk of this volume are the peer-reviewed result of some of the presentations, including the four keynotes, and the order of publication is the same as the four themes listed above; the interwoven nature of the themes is clear from the content of the papers. The two discussion papers that follow the 20 scientific papers were not peer-reviewed, but the content was collated by rapporteurs and the co-chairs (the keynote speakers) from the discussions.

CEFAS management, the various sponsors, the editors, the event organisers, the CEFAS Publications and Graphics Team, the indexer, the authors, the reviewers, the rapporteurs, the participants, the four keynote speakers and Blackwell are all acknowledged for their valued support for and input into what we hope will become a useful part of the reference literature on this crucial fisheries management topic. We hope that you, the reader, will find as much of value from this volume as we did in bringing it to publication.

Andrew I.L. Payne (Symposium Chair)
Sarah Rollo (Symposium Organiser)
July 2003


Front row: Charlotte Mogensen, Akaki Kcmakhidze, Sarah Rollo, Evgeny Romanov, Laurence Kell, Andrew Payne, Matthew Dunn, John Barton, Eugene Sabourenkov, David Agnew, Ewen Bell, Mary Brown, Georgi Daskalov.

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Deterring IUU Fishing

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ABSTRACT: Illegal, unreported and unregulated (IUU) fishing is a problem that has been around since the first attempts at fishery management. However, it has deservedly been given high prominence in recent years as more and more instruments designed to manage fisheries on the high seas have come into force. The International Plan of Action on IUU fishing (IPOA-IUU), developed by FAO within the framework of its Code of Conduct for Responsible Fisheries, is a major step forward. The aim of this paper is review progress in implementing some of the measures outlined in the IPOA and to discuss future prospects for eliminating IUU fishing. The paper begins by examining the incentives to fish illegally and relating the various measures in the IPOA to how they decrease particular incentive factors and increase disincentive factors. Three of the measures are then discussed in more detail. The first is the means available to a State to prevent illegal fishing in waters over which it has jurisdiction. The second relates to measures that can be taken against flag of convenience vessels. The third covers imposition of trade-related measures, increasingly being pursued by Regional Fisheries Management Organizations, especially ICCAT and CCAMLR. The paper concludes with suggestions for further actions to deter and prevent IUU fishing.

INTRODUCTION

As an activity, illegal, unreported and unregulated (IUU) fishing has been with us since fisheries management first started. As an acronym, however, it is much younger. First used informally during the early 1990s by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)¹ in relation to Southern Ocean fishing, it began life as "IU" (illegal and unreported). Formal use of the term IUU can be found in the report of the Commission’s XVIth Meeting in 1997 and in a letter to the Food and Agriculture Organization of the United Nations (FAO) that same year, in which the nature and seriousness of these problem were described². IUU fishing is now commonly understood to refer to fishing activities that are inconsistent with or in contravention of the management or conservation measures in force for a particular fishery.

There are a number of international instruments that contain provisions that are of relevance to the control of IUU fishing. These include the 1982 United Nations Law of the Sea Convention\(^3\) (the 1982 Agreement), the 1993 FAO Compliance Agreement, the 1995 United Nations Straddling Stocks Agreement\(^4\) (the 1995 Agreement), and the 1995 FAO Code of Conduct for Responsible Fisheries (see Edeson, 1966). However, none of these was set up to deal directly with IUU fishing.

Concern over the growth of IUU fishing worldwide increased rapidly during the late 1990s. In early 1999, the need to prevent, deter and eliminate IUU fishing was addressed by the FAO Committee on Fisheries (COFI; FAO, 1999) and shortly afterwards the FAO announced its intention to develop a global plan of action to deal effectively with all forms of IUU fishing. In early 2000, the Government of Chile in cooperation with the FAO convened an International Conference on Monitoring, Control and Fishing Surveillance\(^5\). This was followed by a Government of Australia/FAO Expert Consultation in Sydney in May 2000\(^6\), which started the process of elaboration of an International Plan of Action (IPOA) on IUU fishing. Following two further Technical Consultations, the IPOA was adopted by COFI in March 2001 (FAO, 2001). The IPOA is a voluntary agreement, and it has been elaborated within the overall framework of the FAO Code of Conduct for Responsible Fishing.

IUU fishing is defined in paragraph 3 of the IPOA as follows:

"IllegaI fishing refers to activities:
(1) conducted by national or foreign vessels in waters under the jurisdiction of a State, without the permission of that State, or in contravention of its laws and regulations;
(2) conducted by vessels flying the flag of States that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the States are bound, or relevant provisions of the applicable international law; or
(3) in violation of national laws or international obligations, including those undertaken by co-operating States to a relevant regional fisheries management organization.

Unreported fishing refers to fishing activities:
(1) which have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or
(2) undertaken in the area of competence of a relevant regional fisheries management organization which have not been reported or have been misreported, in contravention of the reporting procedures of that organization.

---


Unregulated fishing refers to fishing activities:

1. in the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or

2. in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law.

Not all unregulated fishing is necessarily conducted in contravention of applicable international law. This is because many high seas waters and/or fisheries are still unregulated by regional fishery management organisations (RFMOs). Examples of these include the orange roughy/alfonsino fishery in the southern Indian Ocean, and the toothfish fishery on the northern Patagonian shelf edge. The IPOA specifically acknowledges this exception (paragraph 3.4), but we consider it as another dimension to the IUU problem. While there is no doubt that the orange roughy/alfonsino fishery is currently legitimately unregulated, it certainly should become regulated, and the negotiations for the South-West Indian Ocean Convention address this concern. With the entry into force (in December 2001) of the 1995 UN Straddling Stocks Agreement, it has been argued that there are no areas of high seas fishing that may be considered legitimately unregulated in terms of States obligations under that Agreement and Part VII of the 1982 Agreement. However, this appears to be an area of international law about which there remain differences of opinion (see, for example, Freestone & Makuch, 1996), and we will leave further comment on this issue to those more qualified to make it.

The main body of the IPOA outlines a lengthy series of measures designed to prevent, deter and eliminate IUU fishing. These are grouped under the headings: all State responsibilities, Flag State responsibilities, Coastal State measures, Port State measures, internationally agreed market-related measures, and regional fisheries management organizations.

In this paper we first examine the factors influencing the incentives for IUU fishing and place the various measures proposed in the IPOA in the context of how they are likely to decrease the incentives and increase the disincentives. We then discuss in more detail enforcement measures, actions against open register or flag of convenience IUU fishing and trade-related measures, which are three areas in which progress in deterring IUU fishing seems to be being made at present. We conclude by briefly discussing some other possible measures that may be brought to bear. We do not attempt, in this paper, to quantify the extent of IUU fishing worldwide. Nor do we discuss in detail the specifics of particular control measures. In relation to IUU fishing for Patagonian toothfish, such an assessment is provided by Sabourenkov and Miller (2003) in a separate paper to this Symposium.

INCENTIVES AND DISINCENTIVES FOR IUU FISHING

It is already clear that there is no single measure that, if taken, would immediately eliminate IUU fishing. Consequently, before attempting to evaluate ways in which IUU fishing
might be deterred, it is valuable first to identify the incentives for IUU fishing. The extent to which possible measures may succeed will almost certainly depend on how much they act to reduce the incentives and enhance the disincentives.

The reasons that vessels are engaged in IUU fishing are solely economic, if we ignore the possibility that some vessel owners and crew may simply prefer to fish illegally. This also immediately implies that vessel owners will prefer to engage their vessels legally in regulated fisheries rather than in IUU fishing, as long as the opportunity to do so exists and legal fishing is sufficiently profitable. However, for a substantial and increasing number of vessels, the conditions of this proviso are not met. As estimated by FAO (2000), almost 70% of the world’s fisheries are either fully exploited, overexploited, or in various stages of recovery from overexploitation. Management responses to this have led in many cases to substantially reduced allowable catches, and at last action is also being taken to reduce the overcapacity that exists in most of the world’s major fishing fleets. In the absence of heavily subsidized decommissioning schemes, and with ageing vessels being replaced in regulated fleets by (heavily subsidized) newer and more efficient vessels, it is inevitable that owners of vessels unable to maintain past levels of profits will look for other options.

In previous eras, pressures such as these led to vessels looking offshore for new fishing opportunities. For example, the establishment of Exclusive Economic Zones (EEZs) led to many distant water fleets being excluded from fisheries in waters of coastal state jurisdiction, and the response was the development of then-unregulated fisheries on the high seas. This legitimate avenue is now no longer open to many such vessels, because most of these resources are now regulated by RFMOs and many are also subject to substantial levels of exploitation. There are therefore now strong incentives to engage in unregulated fishing by transferring vessels to the fishing vessel registers of open register States, thereby becoming what is otherwise known as Flag of Convenience (FOC) vessels, or to engage in illegal fishing.

The overall economic incentives underlying the rise in illegal and unregulated fishing are therefore clear. To progress further, however, it is useful to consider the incentives (and disincentives) a little more closely. We do this by examining the factors affecting the simple profit and loss equation for IUU fishing:

\[
\text{Profit from IUU fishing} = \text{Benefit from IUU fishing} - \text{Cost of IUU fishing}
\]

The benefit, obviously, arises from the sale of the catch. If access to markets is unrestricted, the future benefits for IUU fishing look rosy. While the demand for marine fish products continues to rise steadily, overall supply has been at best static for a number of years and, given the state of the world’s marine fish stocks, it is unlikely to increase much above current levels in the near future. Buoyant and increasing fish prices are therefore to be expected. The key to reducing the incentive for IUU fishing arising from the benefits available, equally obviously, is to restrict access to markets for IUU-caught fish.

In the case of illegal trading in over-quota catches taken in many regulated fisheries (so-called “black fish”), many of the fish are put into a bulk market, where they are relatively easily disguised as other fish products. Other factors aside, the prices obtained for these fish are probably sufficiently low that they alone would discourage entry into such fisheries solely as an IUU vessel. Almost all such fishing is probably done by otherwise legitimate fishers, though the boundary between what is effectively opportunistic IUU fishing and specialist IUU fishing may be blurred. The benefits available from
engaging in IUU fishing are greater if the fish taken are of high value – for example sashimi-grade tunas or Patagonian toothfish. The problem with black fish can really only be tackled by better or different fisheries management and enforcement, such that the incentive for misreporting is removed. While this approach should also be used for high value IUU fishing, in this case probably the most effective approach is to curb access to the market through introduction of trade-related measures, as we discuss later.

The costs faced by IUU vessels are also familiar. These include those costs faced by all fishing vessels – the cost of the vessel (capital cost plus depreciation), running costs (for vessel and crew) and costs associated with steaming to and from fishing grounds and transhipment points. To these are added the costs specifically associated with IUU fishing activities, including the direct costs potentially resulting from being apprehended and fined for illegal fishing and the indirect costs of needing to find a State willing to have the IUU fishing vessel on its register.

Compared with the average vessel legitimately engaged in regulated fisheries, the costs of IUU vessels are relatively low. Most of the IUU fleet (and especially those vessels engaged in illegal fishing) are old vessels no longer capable of competing with the modern fleets operating in regulated fisheries. The number of such vessels available is increased and to some extent their purchase costs are further decreased by the continued practice of some countries to provide subsidies for building new and more efficient fishing vessels. Clearly, effective decommissioning schemes for vessels retiring from regulated fleets and a cessation of subsidies for building new vessels would assist in curbing the supply of potential IUU vessels.

Because of the generally poor conditions on IUU fishing vessels and the potential risks associated with being arrested for illegal fishing, it might be expected that crew costs would be higher on IUU vessels than others. While this may be true to some extent for skilled fishing masters, our industrial sources suggest ordinary crew costs if anything are lower. This results on the one hand from shrinking opportunities for both officers and crew in legitimate fisheries, and on the other hand from an apparently ready supply of low-cost labour from some developing countries. Another factor reducing costs for IUU fishing is that rarely are standard international safety practices followed; maintenance of safety and employment rights on IUU vessels is of extremely low priority. Finally, because the pay of the fishing crew is usually linked to the sale of the catch, a crew on an IUU vessel will always have an incentive to fish beyond the limits of safety to bring as much catch as possible aboard. One potentially powerful means of addressing these issues contained in the IPOA is for States to take measures to ensure that nationals subject to their jurisdiction do not support or engage in IUU fishing. Though the basis for such measures is well founded in the 1982 Convention (Article 94), this idea does not appear to have found its way into many international fisheries management agreements, and enforcement of such provisions by individual countries may prove legally rather difficult.

While the marginal cost of occasionally taking and processing over-quota fish in regulated fisheries is minimal (provided this is undetected), full-time IUU vessels face an additional burden arising from the fact that many of the fishing grounds effectively available for IUU fishing are remote. This imposes higher costs associated with steaming to and from the fishing grounds and also higher costs for transhipment and/or port visits. The remoteness of some IUU fishing grounds and the high steaming costs to get there also mean that it is unprofitable for IUU vessels to undertake only short fishing campaigns on those grounds. The necessity to spend sufficient time on these grounds
(often enough time to fill the hold) in turn increases the chances of being detected, a point to which we will return in the discussion.

Clearly, any actions that further restrict opportunities for landing IUU-caught fish, or even just for entering ports for re-supply, will act as a strong disincentive for IUU fishing. The IPOA outlines a number of measures to be taken by Port States against IUU fishing vessels. These include strengthened inspection procedures and measures to restrict or prevent access to their ports by IUU vessels.

The last category of costs comprises those specifically associated with IUU fishing. The first of these relates to flags and authorizations to fish. Whereas some IUU vessels apparently operate without flags or authorizations to fish from any State, most operate under the flags of open register states, which exercise little or no control over the activities of vessels to which they have issued authorizations. The IPOA proposes a series of measures to be taken by Flag States to discourage IUU fishing, and RFMOs are also active in this area, as we discuss in a later section. For present purposes, it is sufficient to note that to the extent that these measures are successful, they will act as disincentives in a similar manner to the Port State measures mentioned above.

Finally, where IUU vessels are actually fishing illegally, they then risk apprehension and subsequent penalties if apprehended. Currently, these risks are only faced by vessels fishing illegally in Coastal State EEZs or on designated straddling stocks. Obviously, in order to be apprehended, a system for detection of illegal fishing must be in place, as must a system for subsequent arrest and prosecution upon detection. The often-high cost of this must be borne by the Coastal State, though any fines imposed may be offset against this cost. The potential cost borne by an illegal fishing vessel is equal to the risk of being detected and arrested, multiplied by the likely fine imposed for illegal fishing. In practice, what matters in terms of deterring illegal fishing is not the actual risk of being detected, but the risk as it is perceived by the illegal fisher. We outline briefly optimal policies for enforcement and deterrence of illegal fishing by a coastal state in the next section.

In this overview, we have reviewed the various factors affecting the benefits associated with IUU fishing and the costs associated with it. For each factor, we have briefly identified how possible measures to deter IUU fishing, such as those listed in the IPOA, can decrease the benefits or increase the costs. As noted at the start of this section, it is unlikely that any one measure alone can serve to eliminate IUU fishing. Rather, the most productive approach will be to use a battery of measures, each designed to act incrementally to tip the balance between benefits and costs to a state where IUU fishing is no longer viable. We now examine three of these measures in more detail.

**ACTIVITIES BY COASTAL STATES: CONTROLLING IUU FISHING IN EEZS**

One area about which there is no dispute over the legal powers for a State to enforce regulations against IUU fishing is within its 200 nautical mile EEZ. That IUU fishing remains a problem in some EEZs is usually a problem of ineffective enforcement. This may not be so much a problem of a lack of will, but a lack of effective ability to do so in the face of difficult problems. Especially from the perspective of a developing coastal or small island State, EEZs are large, the areas they protect are often remote, and the costs of patrolling can be high.

Depending on the state of development of its domestic fishing industry, a coastal State may wish to reserve all licensed fishing for its own vessels, or it may wish to earn revenue just by licensing foreign fishing vessels to fish in its EEZ, or it may seek some
combination of the two. The types of incentives for a coastal State to manage sustainably and responsibly may vary with the biological characteristics of the fish stocks found in its EEZ, but regardless of these, strong incentives still remain. If the stock(s) are solely or largely confined to the EEZ, then the incentives are strong, because if the stock(s) become overexploited, either through mismanagement or illegal fishing, recovery of the stock and the related income flows and employment opportunities may take a long time. However, if the available stock(s) are seasonal visitors from a highly migratory species, and management actions by the State within its EEZ are unlikely to affect stock status very much either way, vital potential revenue will still be foregone if unlicensed vessels can fish with impunity for these species in the zone.

For initial simplicity, let us suppose that the coastal State is solely interested in licensing foreign fishing vessels. Under what circumstances is it worthwhile for a vessel to undertake IUU fishing within the EEZ, rather than legal licensed fishing? Of prime importance, the expected marginal return from fishing in the EEZ at that time must exceed the expected marginal return from fishing in alternative places. Obviously, the greater the difference between marginal returns from fishing inside or outside the EEZ, the greater is the incentive to fish illegally within the EEZ.

If there is an incentive for IUU fishing, then in the absence of any deterrent measures by the state, it will occur. What can the state do about this? First, of course, it can legislate to make it illegal to fish in its zone without a licence issued by the State, for which it will normally charge a fee. However, it must back this up by a system of monitoring and surveillance of fishing activities within the EEZ and imposition of penalties for vessels detected fishing illegally. Monitoring, surveillance and prosecutions cost money, sometimes substantial amounts, which must be offset against licence fees charged, assuming that alternative sources of revenue to fund these activities are not available.

Why should a fisher opt to purchase a licence for fishing legally inside the State’s EEZ, rather than fishing illegally inside the EEZ, or fishing legally outside the State’s EEZ? Clearly, it will be worthwhile for the fisher to purchase a licence if the expected benefit of licensed fishing in the EEZ is both greater than zero and in excess of the expected benefit of fishing illegally inside the EEZ (or fishing legally outside the EEZ). The expected marginal benefit of licensed fishing within the EEZ is equal to the difference between the expected benefit of fishing inside the EEZ and that of fishing outside the EEZ, less the cost of the licence fee. The expected benefit of fishing illegally inside the EEZ is equal to the difference in expected benefits of fishing inside and outside the EEZ (as for licensed fishing), less the expected cost of being detected and fined for illegal fishing. This latter cost is simply the product of the probability of being detected and the expected fine if detected, prosecuted and convicted.

Even from this very simple analysis, there are two obvious immediate conclusions. If the expected benefit of fishing inside the EEZ compared with outside the EEZ is low, then any licence fee charged that is likely to go anywhere near covering surveillance and prosecution costs may be greater than that expected benefit. If so, then no licences will be taken up, but equally there will be little incentive for illegal fishing. On the other hand, if the expected benefit of fishing within the EEZ is high relative to that available in alternative fishing grounds, then the potential for damage from illegal fishing is high, but potentially so also are the opportunities for the coastal State to earn revenue from licensing fishing, even allowing for surveillance and prosecution costs.
To proceed further, it is useful to define some terms and turn to some diagrams. Let MR be the expected marginal benefit for a fishing vessel to fish within the EEZ, L be the licence fee charged for fishing within the EEZ, and E(F) be the expected fine for a vessel detected and successfully prosecuted for illegal fishing in the EEZ. The expected fine is the product of the actual fine F and the probability of being detected, Q.

For the fisher, the decision rules are a function of the three variables (Figure 1). If \( L \leq MR \) and \( L < E(F) \), then the fisher will opt to fish in the EEZ with a licence. This region is the lower triangle in Figure 1. If \( E(F) \leq MR \) and \( E(F) < L \), then the fisher will opt to fish illegally without a licence in the EEZ. This region is the upper triangle in Figure 1. If \( L = E(F) \leq MR \), then a risk-neutral fisher will be indifferent between fishing legally or illegally within the EEZ. Obviously, if \( L > MR \) or \( E(F) > MR \) then the fisher will not wish to fish within the EEZ at all.

![Diagram](image)

**Fig. 1** Decision rules for fishing in an EEZ: fisher’s perspective. MR is the marginal revenue associated with fishing inside the EEZ instead of alternative fishing areas outside the EEZ.

To examine the decision rules from the point of view of the coastal State, we also need to define \( S \) as the per-vessel surveillance (for simplicity we ignore prosecution costs). The decision rules for the State are illustrated in Figure 2. These are nearly the mirror image of those for the fisher. However, now the boundary between the regions for licensing or not licensing is not the line \( L = E(F) < MR \), but rather the line \( L = E(F) - S \). This is because the (possibly unscrupulous) State will make more net revenue from detecting and prosecuting illegal fishing if \( L < E(F) - S \) than it would from the licence fee.

The two sets of decision rules are merged in Figure 3. Inspecting this figure, it is clear that there is only one area of agreement between the State and the fisher. This area lies between the two lines \( L = E(F) < MR \) and \( L = E(F) - S < MR \) and it coincides with fishers wanting licences and the State also wishing to issue licences.

From Figure 3, it is also clear that, for the State, the theoretically optimal licence fee would be fractionally below the marginal revenue, MR, and similarly the optimal expected fine would be just fractionally below the optimal licence fee.
Fig. 2 Decision rules for fishing in an EEZ: State's perspective. MR is the marginal revenue associated with fishing inside the EEZ instead of alternative fishing areas outside the EEZ. S is the per-vessel cost of surveillance.

Fig. 3 Decision rules for fishing in an EEZ: combined fisher and State perspectives. MR is the marginal revenue associated with fishing inside the EEZ instead of alternative fishing areas outside the EEZ. S is the per-vessel cost of surveillance. The hatched area indicates the region where both fisher and State rules coincide.

In practice, of course, such a policy on the part of the State would not be particularly sensible, because the expected marginal benefit to the fisher for fishing in the EEZ would be very small, and it may therefore not be considered worth fishing in the EEZ at all. This would then leave the State with no revenue. Another important factor is that while the licence fee is fixed and known, being detected fishing illegally is a chance event. It is therefore quite likely that the fisher will be risk prone, rather than risk neutral. In such circumstances, a similar analysis shows that the optimal levels of licence fees and expected fines are lower than those in the risk-neutral case, the extent of the reduction depending on the degree of risk-proneness of the fisher.
To complete this simple analysis, it is necessary to deconstruct the expected fine into its two components, the actual fine and the probability of detection, with the latter varying with the amount spent on surveillance. It is immediately obvious that the higher the fine, the lower need be the detection probability and therefore surveillance expenditure. It seems reasonable to assume that the probability of detection is an increasing function of surveillance expenditure, and that the rate of increase in detection probability with surveillance expenditure decreases with increasing surveillance expenditure. When this is combined with the previous analysis, MRAG (1993) showed that the relationship between net revenue to the State from detecting and fining illegally fishing vessels as a function of surveillance costs has the form of the curve shown in Figure 4, and from that they derived optimal licence fees, maximum fines and surveillance expenditures as a function of the various parameters.

![Fig. 4 Relationship between net revenue to State from fishing and surveillance expenditure.](image-url)

The analysis described above assumed simply that the State wished to licence a single fleet of identical foreign fishing vessels to fish in its EEZ. Fortunately, as MRAG (1993) showed, this analysis is easily extended to cover the case where there are several different fleets of foreign vessels wishing to fish in the EEZ, and also the case where there is a conservation constraint on the maximum levels of fishing effort to be allowed, either because there is a domestic fleet to protect, or because of the potential for the stock to be overexploited. The analysis is more complicated and the results and optimal policies differ in detail, but the principles of the optimal policy remain the same. For a fishery in which the marginal benefit for fishing in the EEZ is high, the optimal policy is:

1. Set the licence fee at as high a proportion of the potential marginal revenue as the fishers will bear.
2. Set the fine at as high a value as can be levied (often equal to the value of the vessel, plus gear and catch.
3. Allocate appropriate levels of surveillance expenditure commensurate with the levels of the licence fees and fines.
An attractive feature of this policy is that it accords directly with intuition, at least in hindsight, and it is easily explained. In at least one fundamental respect, however, it differs from conventional practice, in that the licence fees are set as a proportion of the potential marginal revenue from fishing in the EEZ, rather than as a proportion (e.g. 5%) of the gross value of catch taken within the zone. This latter commonly applied policy has the virtue of being simple to calculate and implement, but again in hindsight it is obviously inferior.

The policy also works in practice, having been applied to the extent possible to the licensing of foreign fishing vessels in the fishing zones around the Falkland Islands, South Georgia and the British Indian Ocean Territory. A similar approach, at least in terms of setting levels of fines for illegal fishing, has also been used successfully by France in its Antarctic Territories. The experience of application of this policy in British Indian Ocean Territory waters also illustrated another important point: it is the fisher’s perception of the risk of being caught fishing illegally that matters, rather than the true risk. For some time after the policy was implemented, foreign fishing fleets that had previously fished freely in these waters were understandably unhappy at suddenly being required to take up licences and pay licence fees, so for a while they didn’t. However, the subsequent arrest and heavy fines imposed on two vessels detected fishing illegally suddenly led to a rush of applications for licences, as the risk of unlicensed fishing was proved to be real, rather than theoretical.

The theoretical analyses (see also Hart, 1997) and practical experience suggests that, where the incentive for illegal fishing is high, the policies described above should act as a powerful deterrent. Put another way, where the legal jurisdiction is such that IUU fishing is in clear violation of pertinent State laws or regulations and can be prosecuted as such, then the approach described above seems adequate to control IUU fishing.

There is, however, one potential caveat to this encouraging conclusion. The optimal policy with respect to fines for illegal fishing is that they should be set as high as possible, which usually means that they are set at the value of the vessel plus gear and catch held on board. If the vessel arrested is a large European or US purse-seiner, then the deterrent effect of such a fine is massive. However, as noted earlier, some specialist IUU fleets tend to consist of old relatively inexpensive vessels. In such cases, experience has shown that their owners may simply abandon the vessel on arrest. Even so, it is doubtful that the vessel owners would simply ignore the possibility of arrest when deciding where to send their vessels to fish illegally, so the deterrent effect of the policy in this case would simply be diminished to some extent, rather than eliminated.

The legal certainty needed for application of the policies described above appears to be present only in coastal State EEZs and certain straddling stocks. Unfortunately, on the high seas, the certainty diminishes. Indeed, the IPOA notes that some activities that would nominally fall under the general umbrella of IUU fishing may not be in violation of any international law. To deter IUU fishing in such areas, other policies are needed, several of which are discussed in the following sections.

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7 Note, however, that taking account of avoidance behaviour by fishers can also be important (see Charles et al., 1999).
8 For example, the Belizian flagged vessel “Grand Prince” was arrested in December 2000 by France, which imposed a €1.7M fine, later reduced to a €206 149 fine on a ruling of the International Tribunal of the Law of the Sea. The company refused to pay this to obtain release of the vessel so it was sunk off La Reunion in April 2002. “Francia hunde el <Grand Prince>, apresado por faenar sin licencia.” La Voz de Galicia, 13 Abril, 2002.
FLAG OF CONVENIENCE VESSELS

As noted earlier, the IPOA proposes a range of measures designed to curtail the numbers and activities of IUU fishing vessels that have been re-flagged to open register States that do not exercise full control and responsibility over the vessels, as required by the Compliance Agreement and the FAO Code of Conduct for Responsible Fisheries. These include actions to be taken by Flag States, and potential actions to be taken by all States against their nationals who engage in IUU fishing. If these measures are taken up by all concerned States, then the problems posed by FOC vessels should be resolved. However, taking extraterritorial action against nationals is something many States are reluctant to do, and so far open register States do not appear to have been pushed into action on the basis of existing instruments alone. There are, however, encouraging signs that additional pressure from other directions may be having some effect.

The activities of FOC fishing vessels have been at the top of the agenda of many delegations to RFMO meetings in recent years, especially those concerned with the management of tuna stocks. Most of these have identified conservation problems for one or more tuna or tuna-like species within their jurisdiction and they have adopted management and conservation regimes, with corresponding Action Plans, aimed at restoring overexploited stocks to optimal levels and ensuring appropriate levels of fishing capacity. However, implementation of these measures and Action Plans has been greatly complicated by the operations of fishing vessels flying flags of States that are not Contracting Parties or Co-operating Non-Contracting Parties or Entities. The problem is not just that the fishing by these vessels is unregulated and often also unreported; in addition, Contracting or Co-operating Parties are understandably reluctant to curb fishing by their vessels if the Conservation Measures requiring that are completely ignored by FOC vessels.

The International Commission for the Conservation of Atlantic Tunas (ICCAT) has been at the forefront of moves to take action against countries deemed to have been acting in ways that undermine its conservation and management measures. In 1994, a Bluefin Tuna Action Plan was adopted by ICCAT that linked information gathered by the Bluefin Tuna Statistical Document Programme$^9$ with Contracting Party compliance and non-Contracting Party cooperation with ICCAT's conservation and management regime. Having identified in 1995 that Belize, Honduras and Panama had vessels that were fishing in a manner that diminished the effectiveness of ICCAT's conservation measures. ICCAT subsequently (1996) prohibited imports by its Members of bluefin tuna products from these three countries (effective from 1997 for Belize and Honduras and 1998 for Panama). This was successful in the case of Panama, which became a contracting party in 1998. Similar sanctions were extended to cover bigeye tuna taken by vessels flagged by Belize, Cambodia, Honduras, Equatorial Guinea and St Vincent and the Grenadines in 2000. Once again, this move seems to have been effective, and in 2001 (but still to come into force) ICCAT lifted the import ban on bigeye tuna from St Vincent and the Grenadines and the bluefin tuna ban from Honduras.

Other tuna Commissions have now introduced statistical document programmes modelled on the ICCAT programme. The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) has introduced a southern bluefin tuna statistical document programme (effective from 2000) and the Indian Ocean Tuna Commission (IOTC) has

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$^9$ ICCAT resolutions 92-1 and 92-3, implemented in 1993.
introduced a bigeye tuna statistical document programme (effective from July 2002). CCSBT has, like ICCAT, adopted a plan of action targeted at IUU fishing that will allow the prohibition of imports of southern bluefin tuna from non-members who allow their vessels to undermine conservation measures. It is likely that the IOTC statistical document scheme will, in time, lead to similar actions.

There are also now new moves within the EU to make progress on the FOC/IUU issue. Following written questions about FOC vessels in the European Parliament in early 2001, the EU has now promulgated a regulation that prohibits the use of subsidies ("structural assistance") to assist the transferring of EU vessels to registers of FOC countries.10

One difficulty with the FOC/IUU issue has always been that of transparently identifying the vessels and States involved. Not all fishing vessels flying flags of FOC States are engaged in IUU fishing, and the actions of States and the behaviour of individual vessels change over time. Thus, developing reliable lists of offending vessels and States is fraught with difficulties. The EU has neatly circumvented this problem by making no reference to FOC or IUU at all. Rather, it relies on RFMOs to identify States acting to undermine their conservation measures by licensing fishing vessels, and then taking actions against those identified States.

This approach has naturally been followed by a drive to get RFMOs to adopt mechanisms to identify lists of vessels and flag states that are not complying with their regulations. In 2001, CCAMLR engaged in discussion of a possible list of vessels engaged in IUU fishing that would be required for the EU to act against them11. Prior to that, in 2000 CCAMLR adopted a resolution (13/XIX, later replaced by Conservation Measure 10-07 (2002)) against the re-flagging of vessels with a history of IUU fishing by Contracting Parties. Such a measure may not seem immediately necessary, until one recalls that many companies operating IUU vessels also operate legitimate vessels, and may wish to use these vessels as cover for their illegal activities. At its October 2002 meeting, CCAMLR brought in two important Conservation Measures regarding lists of vessels engaged in IUU fishing12, and although both are "black" lists (CCAMLR chose not to create a "white" list other than its already existing list of vessels licensed by Members to fish in the Convention Area), they could be used by the EU legislation.

10 Regulation 2792/1999 laying down detailed rules and arrangements regarding Community structural assistance in the fisheries sector was amended by Regulation 179/2002 of 28 January 2002 as shown in italics below:

3. The permanent cessation of vessels' fishing activities may be achieved by:
   (a) the scrapping of the vessel;
   (b) permanent transfer of the vessel to a third country, including in the framework of a joint enterprise within the meaning of Article 8, after agreement by the competent authorities of the country concerned, provided all the following criteria are met:
      (iii) if the third country to which the vessel is to be transferred is not a Contracting or Cooperating Party to relevant regional fisheries organisations, that country has not been identified by such organisations as one which permits fishing in a manner which jeopardises the effectiveness of international conservation measures. The Commission shall publish a list of the countries concerned on a regular basis in the C Series of the Official Journal of the European Communities.

11 Paragraph 5.19 of the 2001 CCAMLR report states: "The Commission endorsed the advice ... on IUU fishing in the Convention Area ... and decided that: ... a list of Flags of Convenience should be compiled and maintained by the Secretariat together with a consistent process for identifying such flags".

ICCAT has for some time been concerned about the activities of IUU vessels, particularly as most of them have crew from ICCAT Contracting Parties and there is considerable evidence of laundering of IUU catch either through links with legitimate vessels or through forging documentation. In response to this concern, and following previous pressure from Japan (see Komatsu, 2001) and the EU, at its December 2002 meeting ICCAT enacted a series of resolutions that create both “white” and “black” lists of vessels. Any vessel not on the white list that fishes, transships or otherwise engages in unregulated fishing is placed, following a series of review procedures, on the black list, and there are a number of punitive measures that are activated once a vessel is on this list.

Ideally, the end result of actions such as those above being taken by RFMOs and the measures envisaged in the IPOA against Flag States will be that all Flag States will become Contracting Parties or Cooperating Non-Contracting Parties to all relevant RFMOs. It should be noted, however, that if this occurs it will not be entirely painless, especially in those RFMOs that already have in place conservation measures that limit the allowable catches for certain species or stocks, or that limit the capacity of the fleets. The pain will arise from the very difficult issues of allocation among the Parties, an issue that is discussed by Butterworth & Penney (2003) in another keynote paper to this Symposium. This issue is potentially even more difficult for the IOTC, in which many of the Contracting Parties are developing coastal or small island States. These States, many of which currently have only coastal artisanal fisheries for tuna and tuna-like species in the Indian Ocean, are understandably concerned that actions to rein back the current levels of industrial fishing (purse-seine and longline) should not jeopardize their legitimate ambitions to be able to participate in this fishery in the future. Further sharing of the already shrinking quotas with new open register State Parties is likely to exacerbate these concerns.

These developments, in terms of identifying and acting against States that, through action or inaction, allow vessels flying their flag to engage in IUU fishing, are very encouraging. The fact that ICCAT has been able to use its Statistical Document Scheme to bring effective punitive action against States flagging vessels engaged in undermining bluefin, bigeye and swordfish conservation measures, points the way to other organizations, such as CCAMLR, to do the same to protect its stocks. As IUU fleets are also highly mobile and can easily move between oceans, it is also vital that there is close

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**13** The preambular paragraphs in ICCAT Resolution 01-19 make these concerns very clear: "RECALLING that the Commission makes yearly reviews of various trade and sighting data and based on that information prepares a list of IUU fishing vessels, RECOGNIZING that since IUU fishing vessels change their names and flags frequently to evade the sanction measures against them and that the lists of IUU fishing vessels based on the past trade data are still useful but should not be the sole tool to eliminate the IUU fishing vessels; EXPRESSING GRAVE CONCERN that a significant amount of catches by the IUU fishing vessels are believed to be transferred under the names of duly licensed fishing vessels; BEING AWARE that the majority of crew onboard the IUU tuna longline vessels are residents of the Contracting Parties, Cooperative Non-Contracting Parties, Entities or Fishing Entities; STRESSING THE NEEDS for Chinese Taipei, Japan and Parties concerned to investigate the relation between licensed vessel owners and IUU fishing activities and take necessary actions to prevent licensed vessel owners from being engaged in and associated with IUU fishing activities."

**14** Recommendations 02-22, “Recommendation by ICCAT concerning the establishment of an ICCAT record of vessels over 24 meters authorized to operate in the Convention Area” and 02-23, “Recommendation by ICCAT to establish a list of vessels presumed to have carried out illegal, unreported and unregulated fishing activities in the ICCAT Convention Area”.

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cooperation amongst RFMOs, both in terms of developing lists of FOC/IUU vessels and in coordinating measures taken against them. It is also therefore also very encouraging that the Secretariats of the various RFMOs are maintaining close contact and consulting each other on these issues (FAO, 2002a).

The fishing industry itself is also showing increased concern about IUU fishing. As many of the best fishing masters are Spanish\textsuperscript{15}, both legitimate and IUU, the legitimate Spanish operators are becoming acutely embarrassed by their apparent association with IUU operations. They recognize that future access to international fishing agreements may well be jeopardized if Spanish nationals are involved in the IUU trade, even if Spanish flags are not. One manifestation of this concern is the move to convene a conference on deep-sea fishing in September 2003, which was initiated by the Spanish fishing industry, one of whose concerns is that IUU fishing is less easy to control on shelf/high seas stocks than in EEZ waters, so further undermining legitimate operators.

The actions described above by RFMOs and Contracting or Cooperating Parties to them are clearly forerunners to the wider trade-related measures outlined in the IPOA. Progress on that front is described in the next section.

TRADE-RELATED MEASURES

The IPOA identifies “internationally agreed market-related measures” (trade-related measures) as suitable mechanisms for combating IUU fishing. Such measures have, of course, been tried in a number of ways over the past 20 years.

The earliest and most well known attempt at using trade-related measures to force responsible fishing was the USA/Mexico Tuna-Dolphin case (see Schoenbaum, 1997). Very briefly, in the 1980s the USA became concerned about the large numbers of dolphins being killed during purse-seining operations for tuna. In 1990/91, the USA implemented tuna import embargoes on Mexico, Venezuela, Ecuador, Panama and Vanuatu, because it judged that the tuna fleets from these States did not meet its standards for dolphin protection during fishing operations. Mexico challenged this ban under GATT/WTO rules. In a similar case, the Shrimp–Turtle dispute, the USA banned imports from countries that did not require their vessels to use Turtle Exclusion Devices (TEDs) on their shrimp fishing gear (Schoenbaum, 1997).

The WTO panel ruled that both import bans were inconsistent with GATT rules, and should be removed. Schoenbaum (1997) states “WTO/GATT panels analyse Article XX(g) in terms of four requirements:

(1) that the policy of the measures for which the provision is invoked falls within the range of policies relating to the conservation of exhaustible natural resources;
(2) that the measures for which the exception is being invoked – that is, the particular trade measures inconsistent with the General Agreement – are related to the conservation of exhaustible natural resources;
(3) that the measures for which the exception are being invoked are made effective in conjunction with restrictions on domestic production or consumption; and

\textsuperscript{15} For instance, the captain and two officers on board the Russian flagged "Lena", intercepted and boarded by crew from the Australian Naval Vessel HMAS Canberra on 6 February 2002 after being sighted illegally fishing around Heard Island were Spanish nationals (Fisheries Information Service, 11 June 2002). See also “En el Índico se han apresado 37 pesqueros en seis años”, La Voz de Galicia, 9 February 2003.
that the measures are applied in conformity with the requirements of the introductory clause of Article XX”.

The reasons given by the panel in the Tuna–Dolphin case were that the USA could not embargo imports of tuna products from Mexico simply because of the method of production, and that imported products must be treated no less favourably than domestic products. A further dissatisfaction of the panel was that the USA had not demonstrated that it had exhausted all other avenues for protection of dolphins, specifically international agreements (Schoenbaum, 1997). In the Shrimp–Turtle case, the USA was requiring that counties wishing to export shrimp to it had adopted a regulatory scheme essentially the same as their own, including using TEDs comparable in effectiveness to their own as used in the Gulf of Mexico, without considering whether individual vessels were using TEDs (IUCN, 1999).

These two cases indicate that, in disputes of this kind, the WTO is primarily concerned that trade measures should be non-discriminatory, should have been approached transparently in the context of an attempted multilateral resolution, and should be clearly directed at and connected to the policy of conservation of the resource in question. This is echoed now in paragraph 66 of the IPOA: “Trade-related measures should be adopted and implemented in accordance with international law, including principles, rights and obligations established in WTO Agreements, and implemented in a fair, transparent and non-discriminatory manner. ...[and] .. only used in exceptional circumstances, where other measures have proven unsuccessful to prevent, deter and eliminate IUU fishing”.

The earliest successful trade-related measure aimed at curbing IUU fishing was that adopted by ICCAT for Atlantic bluefin tuna, as described earlier. The Bluefin Tuna Action Plan was used to prohibit imports from non-members whose vessels diminish the effectiveness of ICCAT conservation measures. In 1996, this was extended to allow the prohibition of imports from ICCAT Members who exceed their catch limits. In this context, it should be noted that a statistical document scheme is not an essential precursor to the imposition of trade measures; sufficient information may already exist to provide evidence of undermining conservation measures. Thus, ICCAT maintains a Swordfish Action Plan, which together with its resolution 96–14 can be used to prohibit imports of swordfish from Member or non-Members. Also, ICCAT Resolution 98–18 is aimed at catches of tuna by large-scale longline vessels, and has been used to prohibit the importation of bigeye tuna from one ICCAT Member and four non-Members (FAO, 2002b). This is in the (then) absence of specific Statistical Document Schemes for these species.

There is only one trade-related scheme aimed at curbing IUU fishing that has been implemented for fish that are not tuna or billfish, and that is the CCAMLR scheme. This is described in detail by Sabourenkov & Miller (2003). It goes beyond the trade documentation schemes described for tuna, in that individual catches must be certified (Agnew, 2000). The difference between this scheme and the tuna schemes led the FAO Expert Consultation of Regional Fishery Management Bodies to define the CCAMLR catch certification scheme for toothfish as an amalgam of a catch certification programme (in which the fish are certified at point of harvesting or landing) and a trade documentation programme (in which documents are issued only for products that enter international trade) – FAO (2002a). The tuna schemes are trade documentation programmes. A further difference is that the trade document schemes simply identify the trade quantities, whereas

16 ICCAT Resolution 96–14.