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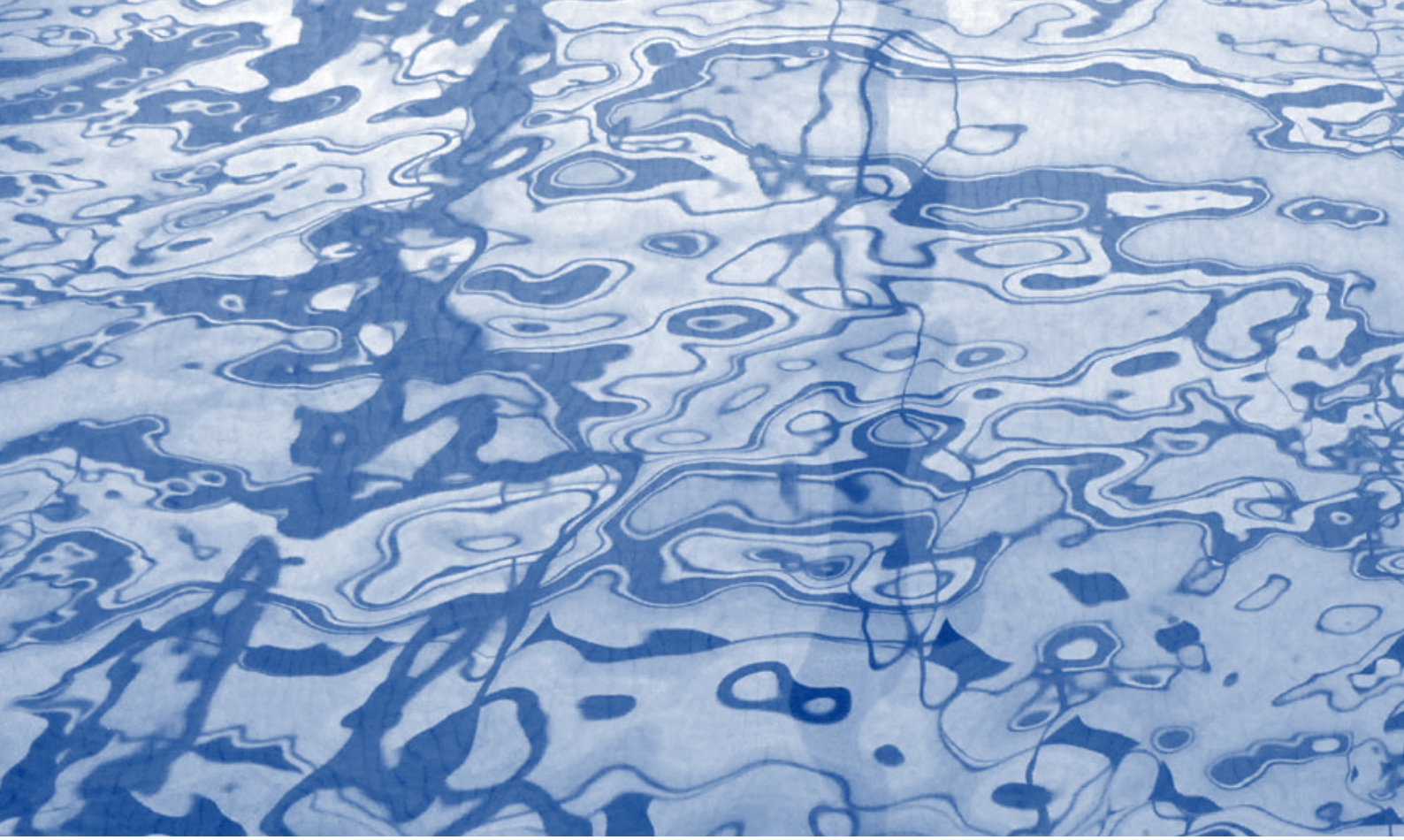

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Abstract

Resource sharing in Australia's Commonwealth fisheries constitutes a unique blend of cross-jurisdictional and cross-sectoral issues. Resource sharing arrangements are currently being developed for the Eastern Tuna and Billfish Fishery (ETBF), which involves five management jurisdictions. The ETBF includes migratory stocks and covers waters adjacent to the nation's largest capital cities and our fastest growing marine tourism and recreational fishing industries. In 2004, the Australian Government developed a framework for making resource sharing decisions in Commonwealth fisheries, consisting of: a set of guiding principles; a consultation process; and a Memorandum of Understanding (MOU) between the Australian Government and the states/ Northern Territory (NT). This framework has been applied in the Western Tuna and Billfish Fishery (WTBF) and is currently being applied in the ETBF. An important lesson that has arisen from the Australian Government's resource sharing process is the need for timely and targeted data on which to base sound resource sharing decisions. This is of particular importance for the recreational fishing sector where, in some jurisdictions, data collection has been ad hoc and the sector now faces difficulties in supporting claims to their share of the resource. This paper reviews the Australian Government's experience in developing resource sharing options and identifies key processes and data types that would contribute to more robust resource sharing decisions in the future.

The australian government's resource sharing process

Resource sharing in Commonwealth fisheries refers to arrangements that allow different fisheries sectors, in particular the commercial and recreational sectors, to share access to fish stocks. In 2001, informal negotiations began between commercial and recreational fishers towards the development of resource sharing arrangements in the WTBF. Concurrently, the Australian Government recognised the need for recreational fishing to become an integral part of Commonwealth fisheries management and subsequently co-hosted a workshop with RecFish Australia (the Coolangatta Workshop) in 2002 to discuss how this involvement should proceed.

In the Commonwealth Fisheries Policy Review: Looking to the Future in 2003, the Australian Government committed to developing a framework for resource sharing in Commonwealth fisheries. The framework consists of:

- the Australian Government's Resource Sharing Principles for Commonwealth Fisheries, which build on the principles of the Coolangatta workshop;
- the Australian Government's Consultative Process for Resource Sharing in Commonwealth Fisheries; and
- a Resource Sharing Memorandum of Understanding (MOU) between the Australian Government and the states/ NT for the state/NT management of any non-commercial component of resource sharing arrangements.

The framework was developed in consultation with stakeholders and other governments. The principles and process were noted by all governments through the Natural Resource Management Ministerial Council (NRMMC) and the MOU was agreed and signed at the December 2004 NRMMC meeting.

In applying this framework, the Government aims to develop arrangements that will contribute to the long-term sustainability of Commonwealth fisheries and reduce conflict between sectors by ensuring equitable access to

fisheries resources. The Department of Agriculture, Fisheries and Forestry acted as facilitator to discussions between stakeholders in the WTBF and the ETBF in 2003 and 2004. Stakeholders were unable to reach agreement on appropriate and agreeable resource sharing arrangements in either the WTBF or the ETBF through this process. Therefore, in accordance with the Government's Consultative Process, an independent facilitator was appointed, in consultation with relevant stakeholder representatives, to work with stakeholders in the development of resource sharing options and a final recommendation in the WTBF and to develop options for resource sharing in the ETBF.

Resource sharing arrangements were announced for the WTBF on 13 October 2005. The Australian Fisheries Management Authority (AFMA) is currently working with the Department of Agriculture, Fisheries and Forestry to implement these arrangements. Consultation in the ETBF has commenced. Consultation in the northern tuna fisheries will commence in the near future.

ETBF MANAGEMENT ARRANGEMENTS

Commonwealth fisheries are jointly managed by the Australian Government (commercial sector) and states/NT (recreational and charter fishing). The ETBF extends from Cape York, Queensland, around Tasmania to the South Australian/Victorian border. Fishing occurs in both the Australian Fishing Zone and adjacent high seas. Major ports used by the fleet include Cairns, Mooloolaba, Coffs Harbour, various south coast New South Wales ports and Hobart.

THE COMMERCIAL SECTOR

The Australian Government Fisheries Management Act 1991 (the act) gives AFMA responsibility for the management of the commercial component of Commonwealth fisheries on behalf of the Australian Government and the general public. The commercial ETBF sector is currently managed through transitional arrangements under the ETBF Management Plan (the plan). Once the plan is fully implemented, management of the fishery will change from limited entry via a permit system, to a system of Statutory Fishing Rights (SFRs) administered through the allocation of effort units (representing a number of longline branchline clips and a number of minorlines that can be used per season in the fishery).

A total allowable commercial fishing effort will be determined by AFMA for the longline and minorline sectors for each fishing season. In determining this total allowable effort, AFMA must consider a number of matters, including the total estimated catch by the commercial, recreational, indigenous and any other users of the fishery, and any decision made by the minister or an intergovernmental ministerial council about resource sharing in the fishery. The aim for 2007 is to allow for up to 9.5 million hooks to be set in the fishery (7 million in the Australian Fishing Zone and up to 2.5 million outside). This will represent an approximate reduction of 20% in fishing effort in the Australian Fishing Zone.

The fishery is being structurally adjusted as part of the Australian Government's $220 million Sustainable Fisheries package. A major part of the package will be used to reduce the high level of fishing capacity in those fisheries that are subject to over-fishing, or at significant risk of over-fishing, such as the ETBF.

The recreational sector

The act specifically states that it does not apply to recreational fishing other than where the plans of management allow for the prohibition or regulation of recreational fishing (including charter fishing). In 2003, through the Commonwealth Fisheries Policy Review and following on from the 2002 Coolangatta Workshop, stakeholders raised the issue that state/NT fisheries agencies are also better placed to manage charter fishing, as it is more closely aligned with recreational fishing than commercial fishing. In 2004, amendments were made to the act to bring AFMA's responsibilities for charter fishing in line with those for recreational fishing. However, parts of the act still allow for the prohibition or regulation of recreational fishing (including charter fishing) through plans of management for Commonwealth fisheries. To date, these provisions have not been used.

As it stands, where the Australian Government has not established management arrangements for recreational fishing activities related to Commonwealth species, the states/NT may assume that responsibility through the development of appropriate legislation, as along as it is not inconsistent with Commonwealth law.

An outcome of the Commonwealth Fisheries Policy Review was a commitment by the Australian Government to establish an agreed regime where the states/NT would manage recreational fishing (including charter fishing) and the Commonwealth would maintain an overall stewardship role. To this end, a Resource Sharing Memorandum of Understanding (MOU) was developed between the Australian Government and the states/ NT for the state/NT management of any non-commercial component of resource sharing arrangements. The MOU was agreed and signed at the December 2004 Natural Resource Management Ministerial Council meeting.

The recreational sector, including charter fishing, is managed by four states in the ETBF – Queensland, New South Wales, Victoria and Tasmania. Each has its own management regime and reporting requirements. There are currently no arrangements in place in any of these four states to limit total recreational catch or effort.

The ETBF resource sharing process

The facilitated stakeholder consultation process commenced in the ETBF in June 2005. A Resource Sharing Steering Group was formed in August 2005, comprising representatives from sectoral groups with an interest in resource sharing arrangements in the ETBF. The purpose of the steering group is to work collaboratively with the facilitator and relevant government agencies to reach mutually acceptable resource sharing arrangements in the ETBF.

A Resource Sharing Technical Working Group was also established in late 2005, to provide technical and representative expertise for finer scale analysis of data and issues. The ETBF Technical Working Group is designed to work with the facilitator to develop preliminary options for resource sharing in the ETBF for consideration by the wider steering group.

The Department of Agriculture, Fisheries and Forestry also maintains a current Register of Interest to ensure stakeholders receive information on the progress of the resource sharing process.

Resource sharing options are being developed in the ETBF based on the understanding that final arrangements will:

- apply to the whole fishery as defined in Part 1 of Schedule 1 of the Australian Fisheries Management Authority's (AFMA) ETBF Management Plan;
- apply to all species listed on the primary species list in Schedule 2 of the ETBF Management Plan, except longtail tuna (which will be managed under specific arrangements as announced by the former Minister for Fisheries, Forestry and Conservation in 2004) and skipjack tuna (which is managed under the Skipjack Fishery); and
- require consideration of all methods used in the fishery (including longlining, purse seine, minor line and poling).

Complexities

Although resource sharing between sectors involves extensive consultation with relevant stakeholder groups, the underlying management complexities arise from having five jurisdictions managing the one fishery. It is anticipated that governments will be able to work together towards a cohesive and coordinated outcome for resource sharing through the development of consistent management arrangements, reasonable cost-sharing arrangements and appropriate information exchange procedures across jurisdictions.

Current management arrangements and data requirements do not allow for 'allocations' for non-commercial use to be either developed or managed in Commonwealth fisheries. More specifically, management arrangements for the recreational sector of the ETBF do not limit total catch by recreational fishers and there is insufficient data related to the actual recreational catch in the first place to establish an allocation even if it could be managed. Therefore, the Australian Government's resource sharing process focuses on establishing rights of access to a negotiated share of the resource for each sector, rather than negotiating a specific 'allocation' for each sector. The necessity to make a decision on resource sharing arrangements means that arrangements will be based on the best available information at the time with a view to reviewing them in five years in light of new information and any possible changes to the relevant management regimes.

Much of the government's resource sharing process is about incremental change and managing expectations. In developing resource sharing arrangements for Commonwealth fisheries, the Australia Government aims:

1. To avoid conflict between sectors by ensuring equitable access to Commonwealth fisheries resources;
2. To effectively manage the total extraction of fish resources from Commonwealth fisheries to contribute to their long-term sustainability; and
3. To engage the relevant sectors in the development of resource sharing arrangements and seek to develop mutually acceptable arrangements, where possible.

At the Coolangatta Workshop, a general definition for a 'recreational fishing right' was developed.

A recreational fishing right is a right of access to an allocation of fish in a fishery that can be utilised by recreational fishing methods.

While there is broad agreement that this definition has been accepted by parties to the workshop, there appears to be a wide variety of interpretations of this definition, which has led to differing stakeholder expectations

and confusion and frustration in the Australian Government's resource sharing process. The recreational fishing sector appears to have viewed the Australian Government's resource sharing process in the tuna fisheries as an initial allocation process. The commercial fishing sector, on the other hand, has viewed the resource sharing process as a re-allocation process. With these divergent interpretations clouding negotiations, mutually acceptable arrangements have not been possible. It will be important in future processes for the Australian Government to be clear about what can reasonably be achieved and its intentions so that stakeholder expectations are not raised beyond what can be delivered through existing management regimes and available data.

The Australian Government's resource sharing process comes under scrutiny from stakeholders who believe it is not well resourced in terms of investing funds into the kind of research they believe will better inform resource sharing decisions. While policy agencies are not equipped to carry our targeted research, there is some capacity for funding specific projects where the results are likely to have direct benefits in decision making processes. A good example of this, in the context of the ETBF, is a project being funded through the Australian Government's Fisheries Resources Research Fund and carried out by the Bureau of Rural Sciences, in collaboration with the NSW Government. The project will provide an analysis of interactions between domestic commercial longline and recreational gamefish fisheries taking or tagging striped marlin off NSW.

The future of resource sharing

Data requirements

Until management arrangements for Australia's Commonwealth fisheries are established whereby specific allocations can be determined and adequately managed, the Australian Government's resource sharing process will provide a mechanism to establish shared access arrangements for all relevant sectors, rather than specific sectoral 'allocations'. However, if management arrangements were in place to allow specific allocations, then the following priority listing of data requirements have been identified by the authors as providing a basis for sound resource sharing decisions and fisheries likely to undergo resource sharing negotiations in the future, should work towards collecting this information in preparation.

The information used in making resource sharing decisions can be broadly categorised into social, economic and biological considerations. A key question in looking at the available information is the extent to which the activities of one sector affect another sector. The distribution and level of fishing activities and the species' biology determine the level of interaction between sectors. Interaction will decline with distance between sectors, decreased fishing effort and for species with high movement, mortality and growth rates. Conversely, interactions will increase where sectors overlap, when fishing is intense and for slow-moving species with low productivity. Table 1 presents data and information requirements according to their relative costs and their importance in developing resource sharing arrangements. Following is a discussion of each element, which are considered in declining order of affordability and importance.

Table 1 Data and information used in developing resource sharing arrangements. Data and information are presented according to their approximate costs and their relative importance to the resource sharing process in the Eastern Tuna and Billfish Fishery (ETBF).

Importance[a]	Cost[b]			
	$5m	$1m	$0.5m	$0.1m
1		Stock assessment Recreational catch data	Social importance of recreational fishing Commercial catch data	Value of commercial catch
2	Fine-scale movement of fish	Species biology	Value of recreational catch Social importance of commercial fishing	Stakeholder representations
3	Broad-scale mixing and interactions with other fisheries	Fine-scale location of recreational activities	Fine-scale location of commercial activities Factors affecting catches	
4		Survival of released fish	Trends in activity	
5		Stock boundaries		

a 1 is the most important and 5 the least important.
b Approximate costs are presented for a single species, but note that there is likely to be cost-sharing for multiple species and that some costs may be "one-off" (e.g., stock boundaries) whereas others are ongoing, e.g., catch data.

Stock status

Reliable assessments of each species' status will indicate the total allowable catch by all sectors that should be allowed in relation to management reference points. Stock assessments dictate allowable levels and consequently the amount allocated to each sector. They may also inform more detailed management measures, e.g., closed areas and size limits. Stock assessment requires long time-series' of reliable catch and effort data combined with detailed information on the species' biology. The size (or age) and sex composition of catches are essential for many stock assessments. An understanding of variations in fishing power or "catchability" is also required for the interpretation of catch rates.

Catch value of the commercial and recreational sectors

Together with social and biological considerations, the commercial value of catches is a key criterion for allocating resource access. The gross value of production (GVP) is routinely estimated by Australian Bureau of Agricultural Resource Economics (ABARE) from surveys of Commonwealth managed

fisheries and by state fishery agencies. However, valuation of support industries, flow-on or "multiplier" effects and the separation of associated lifestyle activities is problematic.

To determine the appropriate allocation of resources between sectors that maximises the net value of the catch to society, a significant amount of information is required (Galeano et al. 2004). In general, a fish stock should be reallocated from the sector with the lower net marginal values to the sector with the higher net marginal values until the net marginal values are equal across both sectors (Galeano et al. 2004). While there is a general acknowledgement that there is a lack of adequate economic data on recreational fishing to underpin resource sharing decisions, there are management issues that need to be addressed before significant investment into such research would be supported. For example, the total removals from the fishery need to be controlled to the level that allows net benefits to be maximised. Collecting the data required to undertake such an analysis is likely to be prohibitively costly and unlikely to be justified in the absence of management controls to limit total effort or catch in Commonwealth fisheries for all sectors (Galeano et al. 2004).

Social importance to the commercial and recreational sectors

Examining social aspects associated with fishing is important when considering allocating resource access. Both commercial and recreational fishing activities provide valuable employment and income, either directly or in associated flow-on activities, particularly in coastal areas. They also provide a broad range of lifestyle and health benefits. However these contributions have tended to be seen differently and some contributions are more readily identified and easier to measure than others. Valuation of the experience tends to be highlighted for recreational activities whereas the importance of fishing to the viability of local communities is also emphasised for commercial sectors.

Views on how fisheries resources should be used and allocated between user groups are often polarised and can become clouded by emotion, making resource sharing decisions inherently difficult. At the same time the social system surrounding fishing affects how these decisions are experienced and managed by fishing communities and individuals. A process which allows for the range of different values associated with the resource use to be identified and valued can help to minimise tensions. This can present a challenge for resource managers in how to value the fishing experience for each sector.
The most common approach to putting a value on stakeholder aspirations is to look towards socio-economic studies. However, this approach is relatively new and there are few examples of this work in the fishing sector and a lack of suitable data to support such work. What studies have been undertaken generally focus on single species in limited areas. These studies are of limited use when making resource sharing decisions for multiple-species fisheries, which require taking a whole fishery approach to analysis and management

Fine-scale movement of fish
A detailed knowledge of movement patterns in relation to the fishing gears would provide empirical estimates of competition between sectors and the likely effectiveness of closures. Tracking studies provide detailed information on the horizontal and vertical distribution of fish in time and space. However, vulnerability to the fishing gear is another important consideration that needs to be addressed. For example, a fish might be present in a particular area, but might not be caught because it is not feeding.

Species biology
Knowledge of the species' biology provides a qualitative guide to the stock's ability to sustain exploitation and the likely levels of interaction. We would expect slow-growing, territorial grouper to be more vulnerable to fishing and to have greater interaction among sectors than fast-growing, highly migratory species like yellowfin tuna. Biological information that is used in stock assessment and for estimating fishery interactions includes age and growth, natural and fishing mortality, movement patterns and reproduction (size at maturity, fecundity, location and timing of spawning).

Stakeholder representatives
The negotiation of resource sharing arrangements requires the involvement of all stakeholder groups with an interest in the fishery. Some sectors may not have representative bodies, creating problems for an inclusive and representative consultation process. A stakeholder group that feels that they have not been consulted can undermine any arrangements that are developed.

Survival of released fish
There is considerable uncertainty regarding the survival rates of pelagic fish that are caught then released by both commercial and recreational (including charter) fishers. Quantitative estimates of survival rates would help in the assessment of the relative impacts of the different sectors. For example, the survival rates of black marlin released from longlines is not accurately known. Similarly, the survival rate of black marlin that are tagged and released by recreational anglers is uncertain. Consequently, management measures requiring the release of fish might be difficult to justify.

Fine-scale location of activities
Detailed information on the specific location of recreational and commercial fishing activities can be used to gauge the level of potential gear conflict between sectors. This can be used to develop management measures that separate sectors ("out of sight – out of mind"). Combined with information from tracking studies, it can be used to estimate and manage interaction; interaction will decline with increased distance between sectors, decreased fishing effort and increased movement, natural mortality and growth rates.

Factors affecting catches

In multi-species fisheries it may be possible to reduce the interactions for non-target species by imposing restrictions on fishing gear and practices or by introducing closed areas and season. A detailed understanding of factors affecting catches may be used to develop mitigation measures that reduce interactions. For example, analyses of logbook data in the later 1980s identified areas and months of high black marlin catches, which were subsequently closed to Japanese longliners. The use of live-bait by longliners is believed to elevate striped marlin catches and a ban on live-bait has been proposed as a way of reducing striped marlin catch rates. However, this type of approach needs to be balanced against the commercial efficiency of using live-bait to target other commercial species, such as yellowfin tuna.

Closures may also be linked to environmental conditions, such as sea surface temperatures and lunar phase. The need to control commercial fishing within the ETBF would be reduced if it was shown that environmental conditions, such as El Niño, largely determined the abundance and availability of pelagic fish in the ETBF. Remotely-sensed environmental data are cheap and easy to access.

Broad-scale mixing and interactions with other fisheries

There is uncertainty over the extent to which fishing activities in the wider Pacific Ocean affect catches in the ETBF. The imperative to control longlining within the ETBF would be reduced if it was shown that this sector's effect on recreational catches was insignificant compared to activities in the wider Pacific. Tagging programs and population genetics studies may provide information on mixing and interactions. Those data, together with fine-scale analyses of catch and effort data and oceanographic data can be used to estimate interactions and to find correlations in catches among fisheries.

Trends in activity

Knowledge of historical trends in fishing activities may provide a guide to future developments that will need to be accommodated in resource sharing arrangements. Longline fisheries in Australia, for example, show boom-and-bust patterns related to the discovery of new resources, foreign exchange rates and operating costs (e.g., fuel and bait). Recreational fishing, by contrast, has steadily grown with increasing population size and leisure time. Information on historical trends may be derived from long time-series of logbook or survey data and from published and unpublished literature.

Stock boundaries

Ideally, independent fish populations can be defined and managed as a unit. For many highly migratory species, however, only one individual

needs to move between populations in a generation to maintain genetic heterogeneity. The effectiveness of controls on one part of the stock may be eroded by uncontrolled activities on the remainder of the stock. At the other end of the spectrum, less mobile species may form multiple populations or "stocks" within a management area. Those different stocks may vary in their biological characteristics and population status; they will require different management and there may be different levels of interaction among sectors.

Conclusions

Different sectors have different objectives in using fisheries resources. By equating these objectives to a level of the virgin biomass, managers can balance the negotiation range limits for resource sharing purposes. In theory, managing the stocks to a specific biomass level to meet all stakeholder objectives would negate the need for further resource sharing arrangements, such as spatial and temporal arrangements. In reality, however, a large part of developing resource sharing arrangements involves managing the perceptions of the various stakeholders. Often this means that decisions are weighted towards the government objective of avoiding conflict rather than managing the total extraction of fish.

Resource sharing in Commonwealth fisheries is inherently more difficult than in fisheries managed by single jurisdictions, as Commonwealth fisheries are managed by at least two, and up to five, different jurisdictions each with their own priorities and stakeholder interests to represent. The political jousting that often occurs between management jurisdictions underpins the complex negotiations between stakeholders, who hold inherently different aspirations. Resource sharing in theory is as simple as slicing up the pie; however, in reality it is a bit more like trying to slice a bowl full of marbles.

References

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