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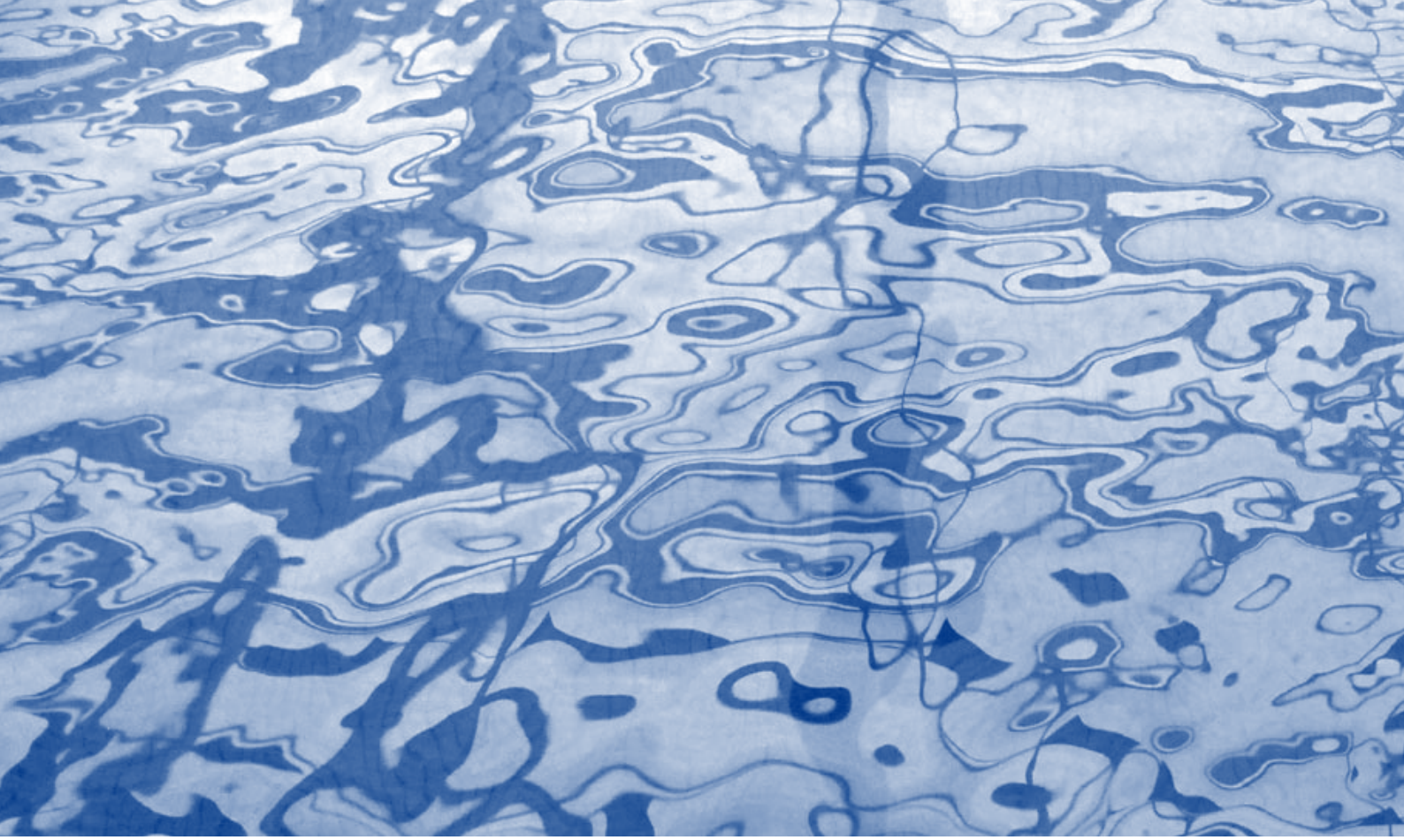

Allocation as a management tool

Necessary but not sufficient: Allocation of allowable catch as a management tool in shared fisheries[1]

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1 The views expressed in this paper are those of the author and are not representative views of the Ministry of Fisheries, nor should they be construed as policy positions of the New Zealand Government.

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Abstract

As competition over access increases between commercial and non-commercial users of fisheries resources, existing approaches to providing that access come under pressure. In the context of New Zealand's individual transferable quota based commercial regime, a seemingly obvious first base in inter-sectoral allocation is the division of the total allowable catch among the sectors. However, gaining agreement to a set of criteria that would deliver reasonable certainty over how individual fisheries would be handled has not yet been achieved. This paper argues that the focus on a single instrument in providing access to resources (dividing the total allowable catch) does not sufficiently acknowledge either the range of values pursued in the non-commercial sector, or the restrictions on the conversion of value that define the sector. In bringing the non-commercial sectors into a management system intended to maximise net social benefit from the use of fisheries resources, a finer-grained approach is required, using a mix of management tools that can be combined to address both large scale issues of access, and more localised issues of value enhancement and inter-sectoral conflict. The paper explores scenarios for how such combinations of instruments might address management of shared fisheries in New Zealand.

Introduction

Inshore fisheries resources around the world are subject to increasing utilisation pressure, and competition between commercial and non-commercial fishers for allocation and access to those resources can be intense. The general problem of sharing the fish between these sectors is complicated by the fact that, although all fishers want to catch fish, the values they gain from doing so are often very different. Current management mechanisms for shared fisheries in New Zealand are struggling to provide well for these disparate values, with almost exclusive attention being focused on dividing the "available catch" between sectors. Although the regime contains elements that can cater to some extent to examples of the key sources of value, they remain largely unused – bound by difficult criteria and policy strictures.

In considering the reform and elaboration of the management framework to reduce conflict between sectors by improving the way value is obtained from fisheries by all stakeholders, it is important to clarify and understand the nature of different values sought from fishing. Whatever means are eventually used to address the issues inherent in managing for best value, acknowledgement of the qualitative nature of those values must precede the development of the management tools.

This paper will explore two aspects of value obtained from fishing by non-commercial fishers and contrast these with competing commercial values. The first is the value held for fish size and catch rate that, given the standard stock size yield relationship for many species, tends to produce a conflict of interest with the commercial objective of maximising yield. The second aspect of value for non-commercial fishers is the importance of time and place, and the linked matter of preferred species. Many non-commercial fishers have limited mobility in terms of where they fish and are further constrained by the time available and timing possible for their fishing. The need to derive utility directly from the fishing experience and from consumption of catch makes these matters and the species that are available of critical importance to the value that non-commercial fishers derive from their pursuit.

The discussion of these issues leads to linkages with elements of the current management framework for shared fisheries, and directions for potential changes to that framework are briefly explored. But first, the key elements of the New Zealand fisheries management framework are outlined.

The New Zealand framework

The point of departure for this discussion is the current New Zealand fisheries management system that comprises a commercial regime of individual transferable quota (ITQ) for almost all species, and a regulated non-commercial sector. The commercial regime is dominated by the quota management system (QMS): a proportional ITQ based regime. A fixed total quantity of tradable quota shares is held by individuals and firms for each fish stock. A total available commercial catch (TACC) applies to each stock and this may be varied annually by a decision of the Minister of Fisheries. TACCs are set in advance of the start of the fishing year, at which point each ITQ shareholder's annual catch entitlement (ACE) for the coming year is determined and issued. ACE is the currency used by fishers during the year to cover catch, and can be freely traded independently of the long-term ITQ.

Allocation of stocks between commercial and non-commercial sectors is achieved by division of an overall total allowable catch (TAC) of which the TACC is a subset. The TAC is itself set on the basis of the biological state of the stock in respect of the statutory objective to manage stock biomass at or above the level that will produce maximum sustainable yield (MSY). This setting is classified as a "sustainability measure" under the act and this implies that this biomass level (Bmsy) is primarily an environmental bottom line. In setting the TACC, the Minister of Fisheries must have regard to the TAC and allow for Maori customary and recreational non-commercial interests (see section 21 of the act). This is the primary tool in the regime for allocation of catch.

Non-commercial fishing is divided under the Fisheries Act 1996 (the act) into "recreational" and "Maori customary" components. The statutory and regulatory provisions for Maori customary fishing apply to non-commercial fishing activities for traditional customary purposes, including providing food for hui (meetings on communal ground) and tangi (funerals), and for other customary purposes as defined by local traditions. Non-commercial fishing

by Maori for other reasons falls under the general recreational regulated open access regime. However, provision for and management of Maori customary fishing is more complex than just an allowance from the TAC, and includes non-commercial fishing areas (mätaitai) managed by local Maori and other measures provided by regulations, and non-exclusive statutory management areas (taiapure) where local Maori can recommend management conditions that are implemented by the government. These provisions are discussed in detail in another paper (Bess, R. this volume).

General non-commercial fishing is subject to a set of recreational fishing regulations. These can prescribe a range of measures such as minimum fish size and bag limits, gear and method restrictions, and area and season closures. A key point of difference between this regime and those for the other two sets of stakeholders is the lack of any direct connection between stakeholders and the system of management. Commercial stakeholders have quantified rights and obligations and are registered along with these rights in the management system. Customary interests have management powers (issuing permits, management of areas) and some specific obligations associated with those responsibilities, along with special rights to take fish that differentiate them from other non-commercial fishers. Remaining non-commercial fishers, the so-called "recreational" sector, remain largely undifferentiated by the management system in terms of the broad range of activities carried out and values they seek. They are not registered or licensed, do not report catch, and have little input into management decision-making outside of general public consultation processes.

Rights and conflicts

As a result of the lack of connection of recreational fishers into the management system, some sector leaders feel alienated and hostile toward the management system and the ministry, and information on catch and participation is difficult to derive and expensive to collect. However, it is the sum of provisions in the framework for each sector that establishes the scope of potential claims to rights of participation in the management system and benefits from the use of resources. Hence the recreational right is weakly supported by statute law. The other key source of rights to access to fisheries is the doctrines of the English Common Law. This provides the basis for the common access right of all to fish in the sea in New Zealand, but is limited by the governments' right to regulate the population through statute law. Without links in the statutes to more specific classes of individuals, or a more specific set of protections of non-commercial non-customary access to a share of resources, the interests of this sector remain vulnerable to continued erosion in relation to the positions of commercial and customary fishers, both of which have been significantly strengthened and elaborated over the last two decades.

The allocation of shared stocks is currently highly contentious. For example, the introduction of kahawai to the QMS in 2004, and the consequent allocation of recreational allowance and commercial TACC has provoked legal challenges from both commercial and non-commercial fishers over the fairness of the split. The fishery is iconic to non-commercials, being the most common inshore pelagic of good size, with traditionally good availability from the shore in harbours and river mouths, and particularly in summer when it schools up in coastal bays. A traditionally important food source, kahawai is also a prized sport fish, putting up a spirited fight on a line, and is sought out by enthusiastic salt-water fly fishers. Commercially it is a low value bulk fishery that supports the tuna purse seine fleet in the off-season.

Value conflict: Stock size management objectives

The kahawai example illustrates one aspect of value conflict in allocation of the TAC between commercial and non-commercial fishers. The values sought by commercial and non-commercial fishers are not the same. Commercial fishers are interested in maximising profits, and, given secure and durable rights, maximising the net present value of these assets. Non-commercial fishers (and those commercial interests servicing this group) hold a range of values for their pursuits, which are themselves diverse.

What we can say is that in general non-commercial fishers place higher value on catch rates and fish size, whereas commercial fishers are more concerned with maximisation of total catch weight and minimisation of catching costs. For commercial fishers there is a potentially complex set of factors to balance such as market preferences and price differentials; fish quality and harvest costs; seasonality; catch mix; availability of quota; local processing or market infrastructure; an so on. In the kahawai example the viability of a specialised fleet for fishing a different high value species may be dependent on access to the fishery in the off season. However, as the fish is used largely for industrial purposes, individual fish characteristics such as size grade are much less important than total catch. As this fishery is merely providing employment for a fleet that might otherwise be tied up, the opportunity costs of capital are low and this lowers effective catching costs, pushing incentives, even for a single operator, to harvest closer to MSY.

To understand the conflict inherent here we need to refer to the theory that lies behind the MSY reference point and why it is often prescribed as a management objective. The well-known "Schaefer Curve" or surplus production model is based on a standard biological model of the growth of a population. The basic theory predicts that in a natural situation with no fishing, a fish stock will be in equilibrium with its environment of space, food, predators and so on, with natural mortality balanced by recruitment and growth. That is, the biomass remains constant over time at a level determined by available resources and competition. If fishing is introduced, this will remove biomass from the population and environmental resources will become available to new recruits and other fish in the population for growth. The population reacts to fishing by taking up these resources and increasing its biomass again towards the equilibrium point. If fishing effort is kept up at a constant level, the biomass will come to a new equilibrium point where it is replacing the biomass removed by fishing each year, but this equilibrium point will be at a total biomass level that is lower than that achieved without fishing. If fishing effort is increased and then held constant at the higher level, the biomass of the population will be further reduced. Up to a certain level of effort, the sustainable catch or surplus production produced by the growth reaction of the stock will keep increasing with effort as the biomass is reduced. That effort level is the point of maximum sustained

yield (MSY). Increasing effort beyond that point will result in decreasing yield due to one or both of two factors: recruitment may be limited by removal of breeding adults or disruption of reproduction dynamics; and the population may be reduced to individuals that are generally smaller than the size at which they grow the fastest.

The reduction in fish size in a population being subject to fishing effort is caused by the greater probability over time of older fish being removed from the population, because they have been subject to the risk of being caught for longer. Thus as fishing continues, the age structure of the population changes to become younger on average, with fish being harvested once their maximum growth rate is behind them, making way for the next generation. At the biomass that produces MSY (Bmsy), average fish size is therefore smaller and the biomass is typically in the vicinity of 25-35% of the unfished biomass (B_0).

Both of these side effects of commercial fishing for maximum sustained yield are of great significance to non-commercial values. As either a supplement to household food supplies or as leisure activity (or both), non-commercial fishing is generally constrained as to place and time available. Therefore catch rate is important to whether any fish are caught in the time available, and size of fish caught is critical to the value obtained – both as food and as satisfaction for the fisher in respect of the task. A stock at Bmsy with 25% of its original biomass may contain say 40% of the number of fish it would have at B_0. All other things equal the non-commercial participant in the fishery now has only 40% of the B_0 probability of catching a fish, and that fish is likely to be young and therefore small.

In the kahawai fishery for example, instead of being predictable daily events as they were before significant commercial fishing, summer schooling "boil-ups" have become much less frequent in many places. It makes sense that if the fish are behaving in the same way and forming similar sized schools, there will be much fewer events at any one site. Anecdotal reports suggest that there may be a clumping effect too – that is, the fewer schools are not evenly distributed around the coast, but some years it will be just like the old days in a few spots but elsewhere there are none to be seen. The next season they may be distributed differently. This leads to a diverse range of hypotheses about what is really going with the state of the stocks. It also means that for an iconic species many non-commercial fishers may have only one good season in three or four.

Thus as a management objective for a stock, Bmsy does not intrinsically appeal to non-commercial fishers. Individuals would much rather the stock was at B_0, but this is not possible for any significant level of extractions. So if the non-commercial fishery is popular, some level of fish down is required to produce a sustainable yield. In some highly contested fisheries, the optimal

management objective may remain quite close to Bmsy if demand in terms of numbers of non-commercial fishers is so high that the value of everyone having the chance to take a fish home (of whatever size) outweighs the extra value that might be obtained by fewer catches of bigger fish. The key point is, however, that in shared fisheries, Bmsy as a management objective is prima facie a preference for commercial fishing over non-commercial.

Management tools: Stock size management objectives

The primary management tool for managing stock size in the New Zealand framework is the setting of TACs. This is achieved by decision of the Minister of Fisheries on advice produced by the ministry after consultation with stakeholders. Under the Fisheries Act 1996, the minister must set a TAC that moves the stock toward a point at or above Bmsy, but by the current ministry interpretation of the act, the minister is constrained to the sole objective of Bmsy unless this threatens the sustainability of associated or dependent stocks (generally by-catch stocks in trawl fisheries). Thus the management system currently is not adapted well to consider management of stocks above Bmsy to provide better for non-commercial values.

However, during 2005 the then Minister of Fisheries took the arguments to heart and brought the idea of managing shared stocks above Bmsy into his political party's (Labour) platform for the October national election from which a new minority Labour led coalition government emerged. The potential for the use of this policy is thus now on the table even if some clarification of the statutes may be required for its systematic implementation.

Of course, systematic implementation requires more than recognition of a principle. In the case of deciding on a specific stock management objective that is to contribute to the overall objective for management of maximising the value New Zealanders obtain from the sustainable use of fisheries resources and protection of the aquatic environment, things get complicated very quickly. Apart from the issue of the value trade-offs between stock size and yield both within the non-commercial sector and with the commercial fishery, once a TAC is chosen it must then be shared between the sectors. The split ratio will interact with the specific stock size decision in determining the total value achieved. This implies a modelling exercise, a fair bit of information on values from both sectors, and a framework for their comparison. Given the current very poor information even on catch and participation rates in the non-commercial sector, this optimisation problem is not likely to be solved with precision any time soon for many New Zealand fisheries.

What then can we do about this problem? There are several lines that might be followed. If the above value analysis is accepted even at the level of a guide to suitable direction for policy, the question of where important

shared stocks are in relation to Bmsy is one that deserves focused attention. This might imply improved research efforts in some cases and may also drive some consideration of how such research should be funded. However, for some important New Zealand shared fisheries (e.g. snapper) stock sizes are relatively well known. Where such stocks are known to be below Bmsy, the analysis here should be causing concern. In general, for stocks below Bmsy the minister is obliged to set a TAC that will bring the stock back to that point, but the rate at which this is done is not specified. Rapid rebuild implies bigger cuts to the TAC. History shows this path is not commonly taken, and the strength of commercial statutory rights undoubtedly contributes to this outcome.

The value analysis suggests that fast rebuild should be preferred in highly contested shared fisheries, as total value is depressed not only by reduced productivity, but by reductions in size and catch rate for non-commercial fishers. Rebuild times of as much as 25 years have been set in such cases so as not to financially impact commercial fishers in the short term, but realistically this merely perpetuates the problem and denies a whole generation of non-commercial fishers even the basic environmental bottom line protection intended by the act.

It seems then that first base in dealing with this issue in shared fisheries is to be as certain as is possible that stocks are at or above Bmsy in the first instance, and where they are not, to rebuild them to that level in a reasonable timeframe. This could be dealt with easily in the act by a schedule of significant shared stocks, and a new rule setting a minimum rebuild time for these fisheries in the event they are fished down below Bmsy. Further acknowledgement could be made of non-commercial values in some fisheries by setting stock management objectives significantly higher than Bmsy. Given the abundance catch rate relationship, some consideration might also be given to adjusting allocation ratios during rebuilds.

Value conflict: Utility from experience and consumption

As noted, for non-commercial fishers:

- access is often constrained by time and costs to sites close to home;
- limited time for fishing means that catch rates are important;
- value and satisfaction are more closely related to size of fish than number of fish caught or total weight; and
- the particular characteristics of species are important in terms of both the fishing experience and the cultural and consumption experience.

In one sense the difference in how value may be derived is inherent the distinction between commercial and non-commercial fishers. Commercial

fishers derive a common currency for material values (money) from their work that may be freely exchanged for goods and services that might provide individual utility in a huge variety of ways, and this may be deferred in time or transferred to another place.

The non-commercial fisher on the other hand is pursuing utility directly through the activity of fishing and associated experiences and through direct consumption or gifting of any fish caught (as constrained by law). This binds the access to utility to time, place, and culture: hence the importance to utility levels (value) of the specifics of the experience (species, size catch rates, location etc). It also reduces the flexibility of non-commercial fishers to adapt their behaviour when competition for resources increases. When specific access opportunities are removed or values compromised, there may be no viable substitute. The difference is amplified if the non-commercial fishing is undertaken close to home and primarily for food. Although some fishers are very mobile (e.g. big game and sport fishers) perhaps the majority in most cases are not, and getting something out of fishing means getting something out of it at the local beach, wharf, rocks or close inshore in a small boat.

Management tools: Utility from experience and consumption

Again this aspect of value links to the size and catch rate issue explored above and therefore to what the stock management objective is, but it also draws attention to potential for spatial management tools. The QMS is based on large stock areas that divide the entire Exclusive Economic Zone (EEZ) into from one to ten quota management areas (QMAs) for each species. This scale is set to approximate the distribution of individual fish stocks (where enough information is available) with the primary management instrument being the setting of the TAC. This approach is proving inadequate in a range of inshore stocks where such issues as distinct "sub-stocks" and local depletion problems have arisen.

As discussed in the introduction, local area based management has been developed for the Maori customary fishing sector, and this has arguably only been necessary because the large scale management system has failed to protect non-commercial values at the local level. Maori have been able to achieve the development of these areas due to the obligations created for the government by the Treaty of Waitangi and the fisheries settlement signed in 1992. The general non-commercial sector has not had such leverage (or cohesion) and thus attention, despite suffering from similar impacts and problems. It would make some sense then to follow these developments up with attention both to the broader issues of spatial control of bulk fishing methods within the QMAs and the potential for separate and local management of areas of inshore fisheries highly valued by non-commercial

fishers. As with the Maori customary management areas, the availability of such tools is likely to encourage non-commercial interests to get more involved in management because their local values are at stake.

Of course commercial interests in the inshore are legitimate considerations too, and this sector cannot be expected to welcome restrictions on where they might fish any more than they are likely to applaud large TAC cuts to promote faster stock recovery. Important commercial shellfisheries such as rock lobster and paua (abalone) are completely dependent on access to coastlines. Therefore bulk fishing method exclusion zones may be a more practical option for broader areas, in combination with more localised management areas with rules developed and negotiated by local interests. Some problems are the not solely the product of impacts of activity of one or other sector, but may arise from concentration of both commercial and non-commercial fishing. Appropriate management will need to be worked out with the help of all parties, but attention of stakeholders may well be brought into focus through the use of tool with a geographic focus commensurate with the problems at hand.

Conclusion

New Zealand's fisheries management system has attempted for twenty years to deal with the problem of allocation of value between sectors by setting TACs based on MSY targets for large geographical areas, and splitting this available catch between commercial and non-commercial sectors. This arguably has given scant attention to the nature of non-customary non-commercial values, nor provided for these values through management actions.

As discussed in this paper, the consideration of the nature of one aspect of non-commercial values – preference for fish size and catch rate – leads to the conclusion that in important shared fisheries more attention should be paid to, at least, achieving in good time and maintaining the current statutory stock management objective of Bmsy. Changes to the framework to ensure this may be as simple as a new schedule listing applicable stocks, along with an associated requirement of a maximum estimated rebuild time for depleted stocks of the order of ten years. Where stock damage may be attributed to a particular sector, some allowance could be made for this in the allocation of a reduced TAC during rebuild.

Where stocks are particularly important to the non-commercial sector, provision for the stock management objective to be set above Bmsy could be considered. As discussed, treating this as an optimisation problem could get complex and is likely to require more information than is available. However, as a heuristic, the consideration of the nature of the value trade-offs involved could guide prudent decision-making to a better approximation of best value than is currently being achieved.

The use of spatial management tools to recognise the importance of location to the value generated by non-commercial fishing has been recognised in New Zealand for the customary Maori sector, but not yet for the "recreational" fisheries. Stakeholders in this group are diverse in their activities, backgrounds, and the values they gain from fishing. Perhaps policy needs to further differentiate interests within the non-commercial sector to

better design tools that address the spatial component of value. Or perhaps the inclusion of a general process in the framework to enable groups to develop management proposals to protect their own sets of local values, will encourage more stakeholders to self nominate to participate in management activity.

The first step in providing a framework for the maximisation of value from fisheries must be to recognise the nature of the values being sought. The QMS provides a good basis for maximisation of value for commercial fisheries – here the key values sought have long been recognised. Thinking through the values sought by other sectors should lead us toward arrangements that increase value to them. Security gained through the availability of mechanisms that can protect key values can only improve the chances of stakeholders from all sectors feeling confident enough to work together in facing the broader challenges of sustainability for our shared fisheries.