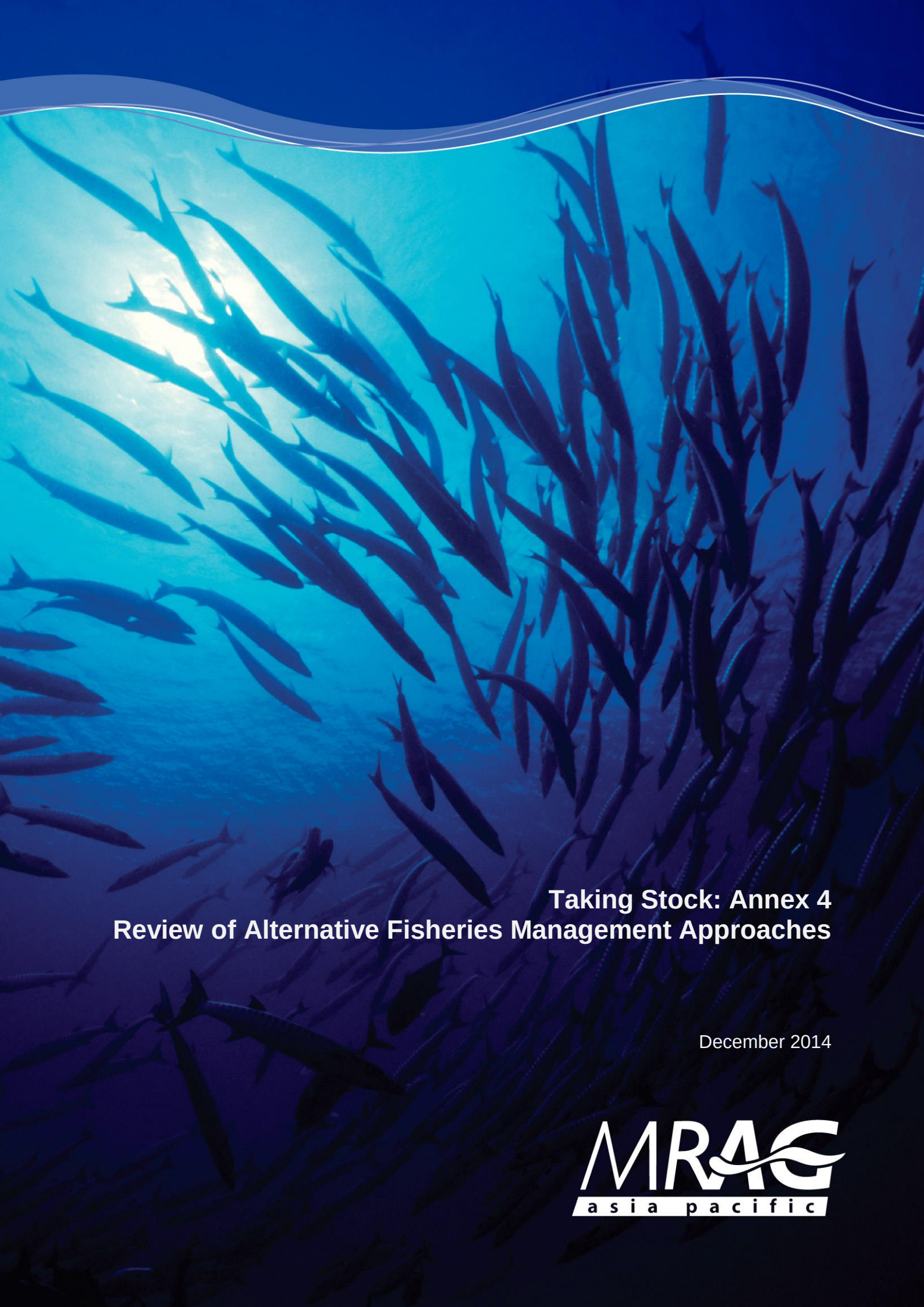

Taking Stock: Annex 4
Review of Alternative Fisheries Management Approaches

December 2014

MRAG asia pacific

Contents

Introduction

On 6th March 2014, the Queensland Minister for Agriculture, Fisheries and Forestry, the Hon. John McVeigh announced "a wide-ranging review of fisheries management in Queensland to deliver a better system for the state's commercial and recreational fishers". The intent of the review is "to modernise the way our Queensland fisheries are managed, to ensure the future of the resource and the community benefits of commercial and recreational fishing in Queensland".

Part of the Terms of Reference for the review is to undertake a review of fisheries management approaches used in different jurisdictions both in Australia and internationally, with a view to identifying 'best practices' that might be applied in Queensland. This report satisfies that requirement. The purpose of the report is to inform future consideration of alternative options to address the challenges faced by fisheries management in Queensland, as well as to assist the deliberations of the Fisheries Review Committee.

Arrangements in five jurisdictions were reviewed: New Zealand, Western Australia, the United States (with comparisons to the European Union), the Australian Commonwealth and Norway. Each jurisdiction was reviewed against a consistent 'template' of information requirements to ensure comparability of results (Annex 1). The approach of reviewing multiple jurisdictions recognises that no one jurisdiction is likely to apply what could be considered 'best practice' across the board. Put simply, some jurisdictions do some things well, while others do other things well.

Ultimately, one of the main purposes of this exercise was to identify a suite of 'best practice' characteristics that apply to well-managed fisheries irrespective of jurisdiction. These provide a valuable guide as to desirable traits in any future system of fisheries management for Queensland and are outlined in the final synthesis chapter.

This report is broadly structured in two parts. Following this introduction, case studies of each of the jurisdictions reviewed are presented. Key points from each of the case studies in the context of the review, and in particular in the context of the fisheries management challenges faced by Queensland, are summarised at the beginning of each jurisdiction. Following the case studies, a series of 'best practices' that are common to well-managed fisheries and effective fisheries management systems have been identified.

Case Studies

New Zealand

Key Points

- The Purpose of the Fisheries Act 1996 makes clear that the fisheries regime is to provide for utilisation. This Purpose clearly distinguishes it from New Zealand's marine protection legislation. Fisheries can be closed under the Fisheries Act, but only as a means of supporting better future utilisation.
- Objectives relating to use and benefit are more consistent with the concept of MEY than the internationally recognised MSY. The translation of Statutory Purpose into Harvest Strategy Standards in NZ is probably too rigid.
- It is important for a fisheries regime to have a clear purpose and consistent principles. Legacy arrangements inconsistent with the purpose and principles need to be dismantled rather than retained 'just in case' as in NZ.
- The definition of a fishery management unit is crucial. This definition should be primarily ecological but the case of NZ shows that management units made up from combinations of 10 FMAs can be quite practical. Queensland could consider the creation of management units based upon a similar number of defined spatial 'blocks'. Fisheries rights defined by harvesting technology should be avoided if possible.
- The New Zealand experience is that output controls are much more effective than input controls at managing the level of removals from fisheries in real time. Effective output controls allow the deletion of a host of input controls that stymie innovation and are costly to administer. Fisheries still require input controls, but these are best designed by right holders.
- It is important not to 'over-manage' fisheries. New Zealand has more species/stocks in the QMS than need the protection of that framework and the resourcing of fisheries that really require active management is thereby diluted.
- Where fisheries are shared, sectoral shares should be specific (quantified as a % of a TAC). Ultimately, these respective shares should be constraining on all parties – not just commercial fishers. Shared fisheries benefits imply shared fisheries responsibilities. (Maori accepted quota as a Settlement but endorsed the QMS with all its attendant powers to constrain quota for sustainability reasons).
- If sectoral shares are defined, rights in those shares must be durable and fungible (exchangeable) even if trade between sectors is not permitted initially. Even when rights are fungible, the control mechanisms and compliance regimes applying to sectors can be very different. Recreational licensing is currently politically inconceivable in NZ but this does not preclude the current recreational allowance becoming a collective quantitative right under the TAC.
- Once right holders in a fishery have been defined, a fishery becomes a club good (rather than a public good). This should change the role of the Government and the responsibility of taxpayers in fisheries management. A weakness of the NZ regime is the absence of robust legal structures for right holders in 'clubs' to take on responsibilities formerly carried by the state.

- Cost recovery should be a transitional state applying during the move from a public good open access fishery to closed fishery with defined right holders. This transition accompanies a process of devolution of responsibilities that should have defined timeframe.
- A government cannot pursue a 'rights-based' approach to fisheries management while retaining a 'command and control' approach. The Government in New Zealand has vacillated between these two approaches even though all of the successes have occurred under the former.
- Allocation is the hardest aspect of fisheries management (which is why it is avoided). Allocation on the basis of customary/ historical use has been used successfully in NZ, but only when implemented quickly and comprehensively. Once understood as a policy or 'the norm', catch history will be gamed by prospective claimants.
- It is far easier to allocate rights before a fishery is over-exploited and rights allocation is accompanied by cuts to catch. Like everything else, fisheries management problems are best addressed early. Foresight and initiative are not the primary hallmarks of regulatory regimes.
- Quota value is a valuable indicator of confidence about future fisheries value and the health of fisheries. It is also (in the case of New Zealand) a very large store of capital value that can be utilised to correct imbalances in fisheries management or necessary value chain re-engineering in any future situations where such confidence proved to be un warranted. Fisheries resources can be, and should be, a real economic asset.

Introduction

There is an assumption that something called a national fisheries management regime must necessarily be intellectually coherent and consistent; that the various aspects of a particular regime would spring from a consistent set of principles resulting in a mutually supportive suite of systems and processes. This assumption does not apply to the New Zealand fisheries management regime. It comprises various historical management paradigms that have been tried, abandoned, but not then deleted. The nucleus of the regime is the Quota Management System (QMS) introduced in 1986 and significantly modified in 1990. However, the integration of this nucleus with other parts of the regime, including pre-existing regulatory processes and the management of recreational fishing has never been satisfactorily achieved.

The New Zealand fisheries management regime is therefore something of a hodge-podge, or more optimistically, a 'work in progress'. This is by no means unique and identifying the ideal (or even a viable) process for migrating from such a confused and layered legacy is an interesting challenge in itself. Accordingly, the brief description below is deliberatively selective. Rather than describing all aspects of the New Zealand regime it concentrates upon aspects that are considered to be most relevant to the Queensland Review of Fisheries Approaches, either for possible emulation (with suitable modifications) or for explicit avoidance.

Background

The New Zealand Exclusive Economic Zone (EEZ) is large but mostly deep and unproductive.

- NZ marine fisheries waters (Exclusive Economic Zone and territorial sea): 4.4m km2. This is the fourth largest EEZ in the world.

- NZ coastline: 15,134 km. This is the ninth longest coastline in the world.

Commercial Fishing

Approximately 10,000 people are dependent upon commercial fishing, fish processing and aquaculture for employment. Seafood is New Zealand's fifth largest export earner but is perceived by Government as having poor growth prospects because supply is limited by sustainability considerations, environmental closures and expansion of recreational fishing demand. Essentially, it is regarded as a constrained commodity sector that has already captured most cost reduction opportunities. This attitude is reflected in the level of resourcing committed to the development of the fisheries regime.

- Species commercially fished: 130
- There are 638 individual area Total Allowable Commercial Catch's (TACCs) for 100 species or species groupings
- For the 2014 fishing year all TACCs sum to a total of 656,618 tonnes
- Total landed catch (as at December 2013): 412,346 tonnes
- Total seafood harvest (including aquaculture): 600,000 tonnes
- Direct subsidies: Nil

In 2013, approximately 90% of New Zealand seafood harvest was exported (291,302 tonnes with a value of NZ$1.52b).[1]

Top 10 Export Species (2013)	**Top 10 Export Markets (2013)**
1. NZ$250m Rock lobster	1. NZ$416m China
2. NZ$187m Hoki	2. NZ$276m Australia
3. NZ$151 Mussels	3. NZ$163m USA
4. NZ$65m Tuna	4. NZ$118m Japan
5. NZ$63m Squid	5. NZ$58m Hong Kong
6. NZ$62m Salmon	6. NZ$42m South Korea
7. NZ$57m Jack mackerel	7. NZ$33m Spain
8. NZ$53m Ling	8. NZ$32m France
9. NZ$36m Paua	9. NZ$31m Germany
10. NZ$34m Orange roughy	10. NZ$29m Thailand

Top 5 companies

1. Sanford Ltd (publicly listed on the NZ stock exchange)
2. Aotearoa Fisheries Ltd (100% Maori owned – all tribes)
3. Sealord Ltd (50:50 joint venture between Aotearoa Fisheries limited and Nippon Suisan)
4. Talley's Fisheries Ltd (privately owned)
5. Ngai Tahu Fisheries Settlement Ltd (Maori owned – one tribe)

[1] Value is estimated Free on Board (FOB).

The major asset of the New Zealand commercial fisheries sector is Individual Transferable Quota (ITQ). Statistics New Zealand valued all ITQ in 2009 at $4 billion[2] and also noted that:

Between the 1996 and 2009 September years:

- *The asset value of the commercial fish resource increased by 47 percent, from $2.7 billion to $4.0 billion.*
- *Hoki had the highest average value of all species, at an average of $662 million.*
- *The number of species covered by the QMS increased from 26 to 96.*
- *In 2009, the top 20 species of fish contributed 91 percent of the value of New Zealand's commercial fish resource.*
- *The asset value for the original 26 QMS species increased 18 percent while the total allowable commercial catch (TACC) for these species reduced by 41 percent[3].*

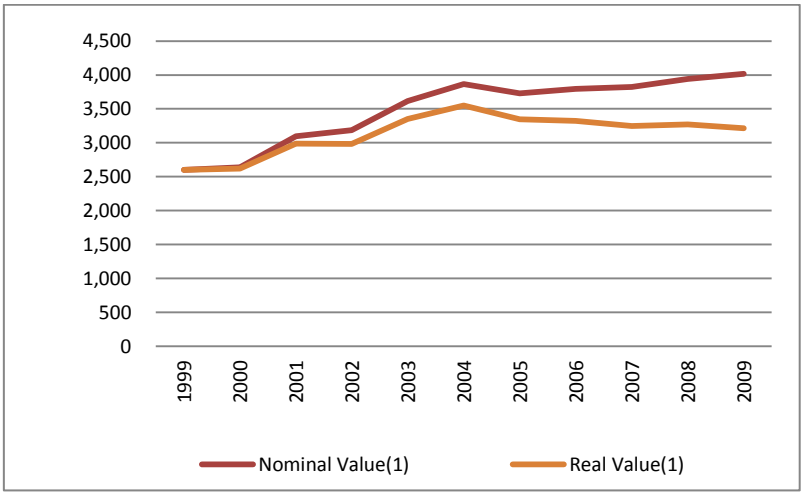

Figure 1: Nominal versus Real Quota Value ($m) 1999 to 2009[4]

ITQ value represents the present value of expected commercial fisheries rents in quota fisheries as determined within a competitive market. Those fisheries rents are over and above all costs incurred in the management of the fishery and the operation of the fishery value chain. These costs include 'normal' returns on all capital invested in those activities. The present value calculation incorporates expected profitability by fishery adjusted for the perceived levels of environmental and commercial risk attributed to that stock. Annual revenues from the sale of Annual Catch Entitlement (ACE) are approximately $400m, therefore the multiple on quota earnings is roughly 10x and quota values are an important objective indicator of confidence in the New Zealand fisheries regime and seafood sector value chains.

[2] Statistics New Zealand (2010), *Fish Monetary Stock Account 1996-2009*. Wellington: Statistics New Zealand. Quota values have not changed significantly between 2009 and 2014.
[3] Ibid.
[4] Source, Statistics New Zealand

Recreational Fishing

New Zealand has a very liberal recreational fishing regime. Marine recreational fishers do not require a licence and are not obliged to provide information on catch. The primary management measures are bag and size limits. Bag limits are very large. E.g.:

- Rock lobster (6 per day)
- Abalone (10 per day)
- Most finfish species (20 per day)
- Most shellfish species (150 per day)

When setting catch limits in quota fisheries, the Minister is obliged to make an allowance for recreational and customary fishing between the Total Allowable Catch (TAC) and the Total Allowable Commercial Catch (TACC). This recreational allowance is based upon estimates of recreational catch derived from surveys. This is an expensive estimation technique with an unavoidably small sample size that gives notably poor results in fisheries that are geographically extensive such as abalone and rock lobster. Since 2012, recreational charter vessels are obliged to report catches, but no use is made of this data as yet.

The Ministry of Fisheries estimated total recreational catch to be in the order of 25,000 tonnes per annum in 2007/08 and estimated participation to be 19.5% of the total New Zealand population.[5] Recreational fishers note that 25,000 tonnes is a small percentage of total harvest in the EEZ, but this neglects the point that recreational catch comprises predominantly high value inshore species. The largest inshore commercial enterprise is Moana Pacific Fisheries Limited (a subsidiary of AFL). Moana Pacific catches and processes approximately 9,000 tonnes of fish per year. In 2004/05 it was estimated that 3,415 tonnes out of total kahawai landings of 7,612 tonnes were caught by recreational fishers[6] and it is likely that around 50% of the snapper fishery on Auckland's east coast (SNA1) is caught by recreational fishers. Commercial fishing of the blue cod fishery inside the Marlborough Sounds is prohibited.

According to a Colmar Brunton survey from 2007:

- Only one quarter of all New Zealanders fished recreationally more than once in the past 12 months
- 25% have never fished recreationally in New Zealand
- 6 out of 10 recreational fishers report that they are satisfied with their catch
- 65% of New Zealanders think that both recreational and commercial fishers should be required to catch less if there is not enough fish to meet demand
- More than half (56%) of the recreational fishers agree (with the above)
- 85% of New Zealanders think that up to 10 fish per recreational fisher is a reasonable daily allowance and 85% of recreational fishers agree (the current limit is 20 for most finfish)

[5] Sport and Recreation Profile: Fishing, SPARC 2007/08 Active NZ Survey 2009.
[6] www.TeAra.govt.nz/en/recreational-sea-fishing

- 64% of New Zealanders think that it is reasonable to require recreational fishers to record their catch and more than half (55%) of the recreational fishers agree.

Customary Fishing

Approximately 15% of the New Zealand population of 4.2 million are Maori (meaning a descendent of a New Zealand Maori). All are theoretically eligible to undertake non-commercial customary fishing under the terms of the Customary Fishing Regulations.[7] In addition to these harvesting rights, the legislation provides for two separate types of Maori fishing reserves to be established (mataitai and taiapure). The Ministry of Primary Industries summarizes current customary fishing as:

- Tangata Tiaki appointed (South Island) 142
- Tangata Kaitiaki appointed (North Island) 307
- Temporary closures (s186) 6
- Taiapure local fisheries 10
- Mataitai reserves 8
- Customary take provided for within the TAC 4,813 tonnes[8]

In practice, a relatively low proportion of Maori engage in customary fishing under the direction of (and subject to a permit issued by) a kaitiaki (a local Maori representative) appointed by the Crown under these regulations. Customary fishing is not subject to size or bag limits other than those imposed locally by the kaitiaki. Many Maori can satisfy their day to day fishing objectives under the recreational fishing rules without the need to obtain a customary fishing permit which tend to be used to supply seafood for larger community events such as meetings (hui) or funerals (tangi).

All stocks now have a provision under the TAC for customary fishing. As with recreational fishing, this provision can be zero and is not binding. Unlike recreational fishing, customary provisions (where they are made) are often well above actual take. Also, compared to recreational fishing customary fishing is very small and stable. In addition to these general policies, in 2009, the Ministry of Fisheries (now the Ministry of Primary Industries) set itself the target of negotiating up to 70 individual iwi protocols with tribes or subtribes to "*clarify the way that the Ministry will assist iwi to be able to exercise their non-commercial fishing rights…*"[9] This target has not been met and neither is it clear that the Ministry is equipped to meet the ongoing obligations set out in these protocols.

Legislation, Policy and Decision Making Framework

Although New Zealand had a system of elected provincial governments between 1852 and 1876, fisheries governance and legislation have always been conducted at the national level. The first piece of fisheries legislation was the Oyster Fisheries Act 1866 and the first comprehensive fisheries legislation was the Fish Protection Act 1877. Early legislation was notable for its concern for conservation of fisheries to be achieved through permitting, licensing and regulating commercial fisheries. All enactments relating to fishing were consolidated in the Fisheries Act 1908 which established a comprehensive set or regulatory powers within the territorial sea (3 miles), an

[7] Fisheries (Kaimoana Customary Fishing) Regulations 1998 and Fisheries (South Island Customary Fishing) Regulations 1999.
[8] www.fish.govt.nz/en-nz/Fisheries
[9] *Delivering on Obligations to Maori: Proposed Design for Ministry Services to 2014*. Ministry of Fisheries, November 2009

associated Ministerial post (the Minister of Marine) and an attendant bureaucracy (the Marine Department).

For the first 60 years of the 20th century, the New Zealand industry was small, heavily regulated and domestic. Exports were discouraged and customary interests were recognised in statute but ignored in practice. Foreign exploitation of fishing grounds beyond 3 miles led to the establishment of an exclusive fishing zone between 3 and 12 miles in 1965 and the confirmation of a 12 mile territorial sea and 200 mile exclusive economic zone in 1977 (confirmed under UNCLOS in 1982). This jurisdictional expansion was associated with incentives to expand and 'New Zealandise' the commercial exploitation of fisheries in the EEZ.

The first major review of the 1908 fisheries legislation occurred in 1983 and imposed an overlay of regional fisheries management plans intended to discipline the application of the very extensive regulatory powers already existing. Regional offices of the Ministry of Agriculture and Fisheries were established to prepare these plans and to give effect to 'bundles' of regulations under them. However, this cumbersome process of central planning and regulation was overtaken by events in 1986 when a major amendment to the Fisheries Act 1983 introduced the Quota Management System (QMS) in order to conserve 29 major commercial fisheries that had quickly moved from under to over-exploited under the combination of the contemporary regulatory regime and policies intended to expand the fishing industry.

The QMS was regarded by officials as a powerful regulatory tool but Maori saw it as a conflicting with, and undermining, customary fishing property rights guaranteed by the Treaty of Waitangi and specifically protected under 15 subsequent fisheries statutes and amendments. Maori obtained a High Court injunction in 1987 against the further expansion of the QMS and the Government opted to enter into a process of negotiation with Maori rather than proceed to a substantive Court hearing on the nature and extent of Maori fishing rights. An interim agreement was legislated in 1989 and a full and final agreement was legislated as the Maori Fisheries Act 2004.

As part of the Settlement, Maori endorsed the QMS in 1992 as "*a lawful and appropriate regime for the management of commercial fishing in New Zealand*". A Task Force appointed by the Minister of Fisheries in 1991 also reported in 1992 that:

- "*The QMS, which is the main device for managing New Zealand's fisheries is a suitable foundation for the development of a consistent and comprehensive fisheries management regime.*
- *The principles of the QMS do not appear fundamentally at odds with the Treaty of Waitangi. Indeed there appears to be scope to adapt the QMS as a means of providing effective recognition of Maori fishing rights secured by the Treaty.*
- *The QMS is consistent with sound environmental management. Management systems which incorporate individual tradable harvesting rights in defined fisheries do not preclude sensitivity towards wider ecosystem effects of fishing activity.*

- *A fisheries management regime based around the QMS is capable of protecting the rights of recreational fishers, including a guaranteed continued right to engage in recreational fishing at minimal cost"*[10]

These separate endorsements of the QMS were influential in the drafting of the Fisheries Act 1996, which was the first New Zealand fisheries statute to contain a Purpose section:

The purpose of this Act is to provide for the utilisation of fisheries resources while ensuring sustainability.

*In this Act **"Ensuring Sustainability"** means –*

a) *Maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and*
b) *Avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment*

***"Utilisation"** means conserving, using, enhancing and developing fisheries resources to enable people to provide for their social, economic, and cultural well-being.*[11]

The Act also contained some defined **environmental principles** and **information principles** that all decision makers under the legislation must take into account. Although the 1996 Act contemplated the QMS as the preferred management regime, the Ministry continued to make extensive use of alternative management arrangements retained by the Act resulting in a dual regime of fisheries inside and outside of the QMS. The statutory preference to be given to the QMS was confirmed in the High Court in 2002.[12] Unfortunately this judgement arguably tipped the Ministry from using the QMS too little to using it too much.

Allocation and Harvest Control Mechanisms

New Zealand currently has 100 species (or species groupings) subject to the QMS. These species are divided into 638 separate stocks. Each stock is managed independently to help ensure the sustainable utilisation of that fishery. Each stock has a geographic boundary or Quota Management Area QMA).

Scale

QMAs for a species are determined on introduction of that species into the QMS. QMAs are based on a combination of biological and administrative factors at the time of introduction. The starting point for determining QMA boundaries for each species are the ten Fisheries Management Areas (FMAs) which define New Zealand's EEZ (Figure 2 below). While most species in the QMS are managed independently, sometimes groups of species are considered together for management purposes. These groups tend to be either groups of similar species:

- Caught together; or

[10] *Sustainable Fisheries Tiakina nga Taonga a Tangaroa*, Report of the Fisheries Task Force to the Minister of Fisheries on Review of Fisheries Legislation, April 1992, 73 pages.
[11] Fisheries Act 1996, section8 (1) and (2).
[12] Durie J, Kellian and others, Island Bay Fishing Co, Whitaker and others v Minister of Fisheries, Chief Executive MFish, Governor-General, and McKinnon and others CP281/01 and 40/22, 22July 2002, Wellington High Court.

- Where identification or differentiation by fishers is difficult.

Owing to the nature of fish populations some QMAs incorporate multiple FMAs while others cover only part of a single FMA.

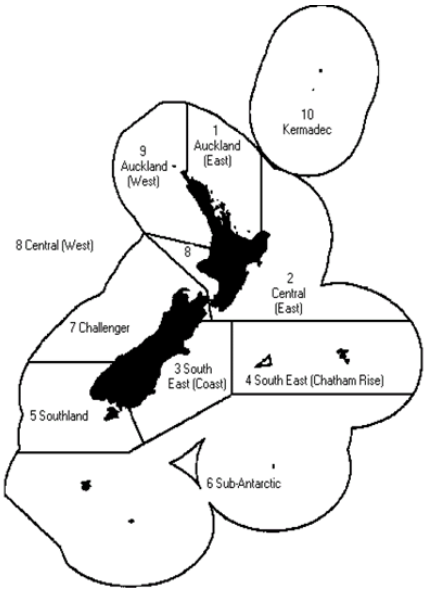

Figure 2: New Zealand Fisheries Management Areas

The fishing year for most fisheries is from 1 October to 30 September. However, the fishing year for rock lobster and southern blue whiting, as well as some other minor stocks, is from 1 April to 30 March. The fishing year for Lake Ellesmere eels is from 1 February to 31 January.

Harvest Control Mechanisms

The primary control measure to achieve the purpose of the Fisheries Act 1996 is to set a Total Allowable Catch (TAC) for each stock.

The Minister shall set a total allowable catch that-

(a) Maintains the stock at or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; or

(b) (b) enables the level of any stock whose current level is below that which can produce the maximum sustainable yield to be altered –

(i) In a way and at a rate that will result in the stock being restored to or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; and

(ii) *Within a period appropriate to the stock, having regard to the biological characteristics of the stock and any environmental conditions affecting the stock*.[13]

The default management objective for New Zealand fisheries has been Maximum Sustainable Yield (MSY) even though it is straightforward to construct an argument that Maximum Economic Yield (MEY) is likely to better satisfy the Purpose of the Fisheries Act 1996 in many instances. MEY is unpopular with Government because officials do not hold (and are not well qualified to analyse)

[13] Fisheries Act 1996, section 13 (2)

economic data on fisheries. No estimates of MSY have been available for many stocks, a problem compounded by the introduction of many small, low information stocks into the QMS. Furthermore, it is apparent that yields very close to MSY can be produced by a broad band of stock sizes in many New Zealand stocks.

In 2008, the Ministry of Fisheries produced a **Harvest Strategy Standard** and associated operational guidelines in response to a determination by the High Court that the Ministry's practices were not giving effect to section 13 (above).

The Harvest Strategy Standard consists of three core elements:

- *A specified target about which a fishery or stock should fluctuate;*
- *A soft limit that triggers a requirement for a formal, time-constrained rebuilding plan; and*
- *A hard limit below which fisheries should be considered for closure*.[14]

These concepts are illustrated below.

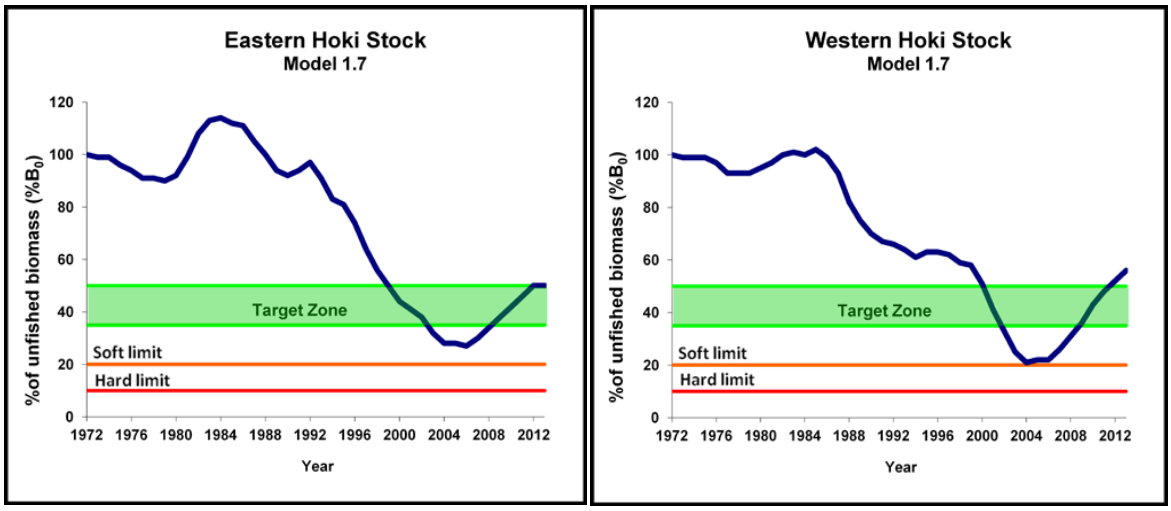

Figure 3: Harvest Strategy Standards Applied to the Hoki Fishery

The Requirement to set TACs is the primary driver of the fisheries management work program in the Ministry of Primary Industries. Stakeholders have the opportunity to participate in both scientific and management working groups and all participants agree that the quality of the process has been greatly enhanced by such participation.

[14] *Harvest Strategy Standard for New Zealand Fisheries*, Ministry of Fisheries – October 2008, page 7.

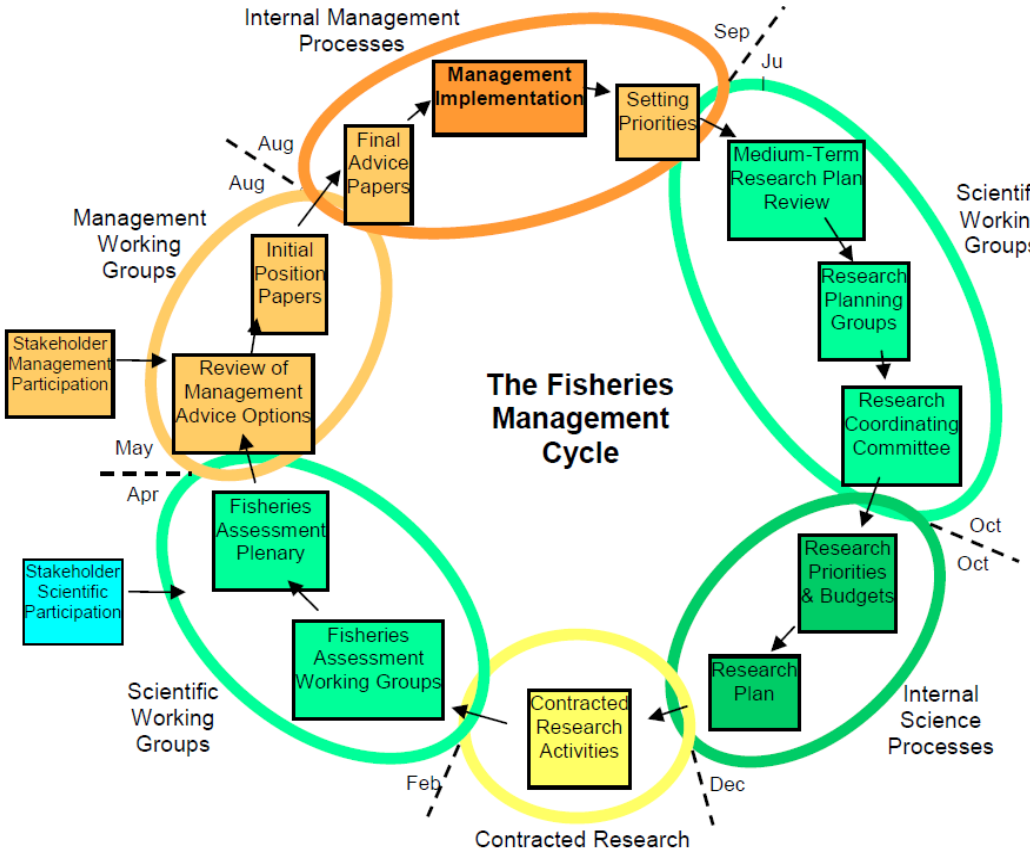

Figure 4: The Fisheries Management Cycle[15]

Allocation

Initially ITQ was allocated to licensed commercial fishers on the basis of their catch history calculated over three designated 'criteria years'. This provisional catch history was pro-rated down in many cases to fit within sustainable TACCs that were lower than historical catch levels in many cases. 10% of ITQ, thus allocated in the 29 initial QMS species was purchased by the Crown for allocation to Maori and when the injunction was lifted, 20% of ITQ in new stocks was set aside for allocation to Maori. This 10% or 20% of quota has now been allocated to organisations representing 57 tribes (iwi).

Where there is headroom between catch history plus the Maori 20% and the initial proposed TACC, the Government is entitled to tender quota rights. Allocations of quota in recent ITQ species have been determined by Maori allocation (20%) and tender (80%). ITQ ownership is subject to stock specific aggregation limits and general foreign ownership restrictions.

Information Collection and Analysis

The Fisheries (Registers) Regulations 2001 require the Ministry of Fisheries Chief Executive to keep the following public registers; quota, ACE, permits, fishing vessels, automatic location

[15] Review of the Fisheries Stock Assessment Process and the Ministry of Fisheries Sustainability Advice to the Minister of Fisheries, Robin Allen, Robert Buchanan, Peter Murray. 30 November 2007.

communicator, high seas permit, fish farmer and aquaculture agreement. These registers are operated by FishServe.[16]

Considerably more information is collected than analysed by the Government in New Zealand. The Ministry maintains a catch effort data base but little official use is made of this data. Several commercial fisheries with Commercial Service Organisations (CSOs) use Catch per Unit Effort (CPUE) data to set catch limits in their fisheries. CSO members have agreed **decision rules to shelve quota** based upon analysis of Catch per Unit Effort (CPUE). Essentially quota owners have set target catch rates for their fisheries (usually rates that correspond with those achieved in the past when the fishery was regarded as being in a very healthy condition biologically and commercially). Quota owners agree to shelve an agreed proportion of their quota until that CPUE target is reached. Shelving is achieved through a caveat on the quota administered by Fishserve.

These rules have proven to be very effective but this pragmatic approach to fisheries management does not supplant the formal TAC setting process above which effectively ignores 95% of all stocks in a year. It 'tolerates' voluntary actions that are more conservative than 'official' catch limits. The problems with these arrangements lie in their voluntary (and therefore fragile) nature. The benefits of abiding by the rule are socialised but the benefits of flouting the rule are all captured by free-rider. The more successful the rule, the greater the individual incentive to break it. It is a major weakness of the New Zealand QMS that quota owners have no default legal or regulatory structures that allow the effective enforcement of these voluntary collective agreements.

Management of Non-target Species

There are numerous stocks in the QMS that are by-catch species. These are subject to the same management objectives as target species (TACs to be set so as to generate a target stock size capable of producing MSY). Information about these stocks is generally poor and the TACCs based upon recorded catch history are often argued to be very conservative (low). The Ministry of fishery has adopted a policy that all commercial stocks should be managed under the QMS. 'Commercial stocks' in this context is simply defined as fish caught be commercial fishers, irrespective whether these fish are targeted or whether pressure on the species is sufficient to justify active management under the QMS. This has cluttered the QMS with stocks that arguably could remain safely as open access fisheries.

The QMS allows retrospective balancing of catch against Annual Catching Entitlement (ACE) on a monthly basis. Where balancing at month end has not been achieved, fishers are required to pay a deemed value to the Government (essentially a balancing bond that can be redeemed if ACE is obtained by the end of the fishing year). Deemed values are intended to provide an incentive to buy ACE by being set above market ACE prices. The Ministry is generally uncomfortable exercising the economic judgements required to finesse these important incentives.

Where TACCs are 'too low', or deemed values are 'too high', fishers have an incentive to discard catch if they do not think ACE can be obtained. Discarding of unprofitable catch is a long standing practice that, in many cases, was not taken into account in the setting of initial TACCs (because it had not been quantified). In these cases, TACCs therefore underestimated historical harvesting

[16] http://mpi.govt.nz/fisheries

mortality levels. Discarding rules in New Zealand are also inconsistent. Sometimes it is legal to discard catch below the minimum legal size, sometimes it is not. The reasons for the difference are often not obvious.

Compliance System

New Zealand operates a liberal commercial fishing licensing regime. The government does not seek to restrict the number (or identity) of people who wish to pursue commercial fishing as a career. That determination is largely left to the interplay of individual drive, aptitude and market forces and, in particular, to the ability of the fisher to meet their legal responsibilities:

Before becoming a commercial fisher in New Zealand, you need to be aware of how the Quota Management System works and your legal obligations under the Fisheries Act 1996. These are explained under the relevant information headings (Permit Holders, Vessel Operators, Quota Share Owners, ACE Owners and Licensed Fish Receivers).

To become a commercial fisher or to apply for a Fish Receivers License you first need to register as a FishServe client. To do this you need to complete a client application form. If you wish to register for online services or you wish to appoint an authorised person to conduct online services on your behalf, you need to complete an Application to Register for Online Services.

There is no fee to register as a client. After your application is processed you will be notified of your client number and you will be able to apply for a fishing permit or to register a fishing vessel and obtain some ACE or quota shares.[17]

The Ministry is reluctant to reveal its compliance priorities and these do not seem to follow the logical hierarchy that can be deduced from the QMS:

1. Fishing without authority
2. Misreporting catch by species, time, location and quantity (including discarding of caught fish)
3. Failure to balance catch with quota
4. Failure to pay deemed value or cost recovery invoices.

Rather, a substantial amount of compliance effort is directed at detecting and prosecuting breaches of input controls (regulations controlling mesh size, pot escapements etc.). The exact number of these regulations is in dispute but it is generally agreed to be in excess of 5,000. These controls comprise decades of largely unsuccessful attempts to restrain total harvest levels, a task that is now achieved effectively by the TACC.

The first two categories of offences above are generally condemned by legitimate quota owners and harvesters and, when observed, are often reported to the Ministry. The Ministry has good quality intelligence on any mis-behaviour occurring in these areas if it wishes to target those issues and receives support in the media from commercial fishing leaders in the event of successful prosecutions. Catch and landing data from fishers is cross-checked with licenced fish receiver (LFR) records. In addition, there are further cross checks available with export data from NZ Customs and tax data from the Inland Revenue Department.

[17] http://www.fishserve.co.nz

Stakeholder Participation

Specific consultation responsibilities of the Minister under the Fisheries Act 1996 are set out in section 12. In practice, these relate largely to the setting of sustainability measures and cost recovery. The formal research planning and fisheries assessment process illustrated in Figure 4 is very costly and requires a large commitment of skilled personnel. In 2013 only 7 stocks were reviewed and the maximum in recent years has been 15.

There are formal consultation opportunities around amount of cost recovery and the configuration of cost recovery levies. Many years' experience of this process have indicated a trivial difference between the initial cost recovery proposal of the Ministry and the cost recovery levy order eventually gazetted. Accordingly, the industry today approaches this with a sense of resignation and economy of effort. The merger of the Ministry of Fisheries into the Ministry of Primary Industries means that the cost recovery arrangement has become less transparent, particularly around the apportionment of overheads. The cost recovery regime has developed the character of a special task rather than a proper and transparent cost recovery regime.

There is a Ministerial Fishing Advisory Committee but it has not been convened since 30 January 2009.

Performance Review

There is no regular or formal process of performance review of the New Zealand Fisheries Regime.

Resourcing

There are approximately 450 people with fisheries related roles within the Ministry of Primary Industries. The total Government funding for the Ministry is approximately $100m and this funding level has been flat since 2009. Between 1998 and 2009, the Ministry went through a considerable expansion in personnel and budget (from $40m to $100m). This expansion coincided with a general expansion of the public sector under the Labour Government of Helen Clark. When cost recovery was introduced in 2004 (replacing the earlier resource rental regime) total Government expenditure on fisheries was approximately $70m and around half of this was recovered from Industry. The absolute level of cost recovery has remained constant, but as a share of the total MPI budget, it has shrunk to one third

Resource rentals had been consistently $20m to $21m per annum. Cost recovery has been consistently around $32m and conservation levies about 1.5m. Most cost recovery is for operational science and enforcement activities.

Table 1: Approximate Proposed Cost Recovery 2014[18]

2014	MPI ($m)	Cost Recovered ($m)
Enforcement	38.0	10.0
Operational Science	35.0	18.0
Fisheries Management	7.5	4.0
Policy	4.0	0.0

[18] Source: Seafood NZ

Other	15.5	0.0
Total	100.0	32.0

The actual levy order is more complicated than suggested by the simple table above.

Table 2: Cost Recovery Levy Order 2011[19]

Fisheries and Conservation Services	1 October 2011 Levy Order	1 October 2010 Levy Order
Approved output plan – total cost of fisheries services	**108.813**	**103.694**
Less reduction in the observer plan and fisheries research projects	(7.178)	(5.110)
Less Crown share	(65.455)	(64.054)
Less 2009/10 budgeted expenditure carried forward into 2010/11	(4.306)	
Plus adjustment for under recoveries for currently open research projects	1.565	
Gross MFish expenses recoverable from industry	**33.439**	**34.530**
% of fisheries services recoverable from industry	*31%*	*33%*
Less cost to be recovered by way of transaction fees and charges	(1.776)	(2.006)
Net MFish costs to be charged by cost recovery levies	**31.663**	**32.524**
Plus Conservation Services projects	2.208	2.272
Less Crown Share	(0.246)	(0.222)
Total recoverable from cost recovery levies	**33.625**	**34.574**
Less 1994-2002 net settlement credit applied	(0.032)	(0.108)
Less 2009/10 **net future credit over recovery** to be applied in 2011/12 and adjustment for 2008/09 (carried f/ward from previous years) and	(3.093)	(2.008)
Rounding necessary to determine the levy per quota share	(0.035)	(0.027)
Total to be collected from industry for fisheries services and conservation services	**30.465**	**32.431**

'Cost recovery' excludes approximately $6m per year in Fishserve user charges. Fishserve is owned and operated by the Fishing Industry.

Conclusions

In spite of the many problems and weaknesses of the New Zealand fisheries regime, it is undoubtedly one of the more successful arrangements in the world. In 2009 New Zealand's seafood industry was twice ranked the most sustainably managed fishery in the world. The first was the Worm/Hillborn research published in the journal Science in July 2009. The second was research published in Marine Policy in November 2009 which evaluated 53 countries and rated New Zealand best overall against 14 indicators of marine resource management.

The move from myriad input controls to a simple but powerful to a single brutally effective output control (TAC) means that catch in any New Zealand fishery can be quickly and effectively constrained

[19] Source: Ministry of Fisheries

if managers are of a mind to do so. The rights-based underpinnings of the QMS, also contain untapped potential to achieve durable resolutions of the inter-sectoral conflict and resource competition that bedevil fisheries management. As a Chair of the Treaty of Waitangi Fisheries Commission has stated: "*When we had the commons out there, you went out and the fish belonged to no one until they were caught. The whole model of the commons, from our point of view, was a device, driven by the majority culture, for preventing particular Treaty property rights being given effect to. It was thus a great irony when this country moved towards a model of property rights in fisheries under a quota management system. Although it was a model driven by a whole lot of notions, principally sustainability, it was very much centred on notions of property as far as the fishers themselves were concerned. Even though the quota management system was not invented, developed and conceived to give effect to Treaty rights it provided, conceptually the key to that historical resolution. In New Zealand history that may yet stand as its greatest triumph*"[20].

As well as providing the platform for the Maori Fisheries Settlement, the QMS also provides, conceptually the key to the resolution of conflicts between commercial fishing, non-commercial customary fishing, recreational fishing, aquaculture and other marine activities that require the exclusive occupation of space. That potential is to expand the allocation of well-defined rights and compatible rights to those sectors. Through the direct involvement of self-interested right holders in fisheries management, the QMS also provides, conceptually the key to the evolution of a dynamic and sophisticated approach to fisheries use and conservation. The fact that there is no political drive for such changes should not obscure the existence of this potential.

[20] O'Regan, Sir Tipene, FIA Conference Presentation (1996)

Western Australia

Key Points

- Western Australia is in a similar position to Queensland, with commercial fisheries for a diverse range of species and a large recreational sector that dominates catches of many inshore and estuarine species;
- WA has recently finished a similar legislative review, one of the main outcomes of which is to develop a new Act that provides for explicit allocation of sectoral shares amongst commercial and recreational fishers within an overarching aquatic resource management strategy. An allowance for a customary 'allocation' is included in the share 'reserved' for conservation and reproductive purposes. DoF uses an Integrated Fisheries Management framework, including the capacity to use an independent allocation committee, to determine inter-sectoral shares;
- WA's legislative framework is supported by a number of formal Government policies (Fisheries Policy, Harvest Strategy Policy, Aquatic Biodiversity Policy) which set out the Government's preferred approach on key issues
- WA's management of non-target species and ecosystem issues in informed by structured risk assessments. Risk assessments are used as a way to prioritise Departmental resource, management actions, monitoring and research.
- The state's largest and most valuable fishery – the western rock lobster fishery – has recently made the transition from input (pot limits) to output controls (ITQs) after many years of debate. Beach prices received in the early stages have been excellent, driven largely by more sophisticated marketing approaches based on product quality, not quantity. This has transformed the industry.
- WA has recently introduced a streamlined set of rules for recreational fishing which simplify individual and mixed species bag limits and have reportedly been well-received.
- Recreational licenses are required to fish from a powered boat, or to catch rock lobster, abalone, marron, freshwater fish in the south west, or use a net. Fees from recreational licenses totalled around $6.3m in 2012/13. All funds raised are spent on recreational fisheries.
- Compliance accounts for around half of the DoF budget. The compliance system is risk-based and supported by specialised units focused on intelligence gathering and information analysis.
- WA has recently moved away from 'cost recovery'-based commercial license fees to a system in which all fishers pay an access fee equivalent to 5.75% of the gross value of production. Commercial license fees totalled $16.2m in 2012/13.
- The system of stakeholder consultation is heavily focused on co-ordination through WAFIC and Recfishwest as the recognised peak bodies. To fund representation/consultation, WAFIC receives an amount equal to 0.5% of commercial fisheries GVP, while Recfishwest receive 15% of the total recreational license fees.
- The WA Government has recently committed $14.5m to provide for all of its commercial fisheries to be assessed against the Marine Stewardship Council standard.

Introduction

Western Australia manages a suite of commercial, recreational and customary fisheries that are in many ways similar to Queensland's. Commercial fisheries, managed pursuant to the Offshore Constitutional Settlement, exist for a diverse range of species, using multiple gear types and across different bioregions, while recreational fishing is a very popular pastime amongst Western

Australians such that the recreational sector dominates the harvest of many nearshore and estuarine species (Department of Fisheries 2012b).

Around 35 formally managed commercial fisheries exist within Western Australia, with production (including pearling and aquaculture) valued at around $385m in 2011/12 (Table 3). Production and value are dominated by the MSC certified Western Rock Lobster Fishery which accounts for around 75% of wild catch fisheries value and around 60% of the total fisheries value. Five 'interim' managed fisheries also exist (and are in the process of transitioning towards 'managed fishery' status) as well as a small number of 'open access' fisheries. In total, 1,337 Fishing Boat Licenses were issued in 2013, together with 2,276 commercial fishing licenses (DoF, 2013; Annex 1).

A key feature of the WA commercial fishery management structure is the relatively small number of licenses available in each managed fishery. Of the 35 managed fisheries, 24 have fewer than 20 licenses allocated and 13 have 10 or fewer. Only the WRLF (541) and the Kimberley Prawn Fishery (121) more than around 60 licenses.

Table 3: Western Australia's fisheries production between 2009-10 and 2011-12 (Source: DoF, 2013)

	2009/10 (e)		2010/11 (e)		2011/12 (e)	
	t	$m	t	$m	t	$m
Crustaceans	9,999	219	9,716	226.1	8,453	216
Molluscs	3,055	21	3,736	28.3	676	15.4
Fish	9,944	31	9,148	29.9	9,113	44
Other (a)	171	0.5	107	0.3	43	0.1
Pearling (b,c)	n/a	85	n/a	99.1	n/a	93.1
Aquaculture (d)	1,107	10	1,332	13.4	1,598	16.2
TOTAL PRODUCTION	24,276	367	24,288	397.1	19,883	384.8

Western Australia also has a large recreational fishing sector, with an estimated 740,000 people engaging in recreational fishing in 2012. This has increased from around 315,000 in 1989/90 (Lindner and McLeod 1991). The estimated participation rate of WA residents is generally above the national average, with around 32% of the population fishing recreationally in 2011/2012. Highest levels of recreational effort occur in inshore areas adjacent to the Perth metropolitan region, although effort is growing in regional areas consistent with the development of regional population centres.

Legislation, policy and decision making framework

The main piece of fisheries management legislation in WA is the *Fish Resources Management Act 1994,* the objectives of which are:

a) to develop and manage fisheries and aquaculture in a sustainable way; and
b) to share and conserve the State's fish and other aquatic resources and their habitats for the benefit of present and future generations."

The FRMA provides the high level framework and head of power to allow for the management of the State's fisheries, with detailed arrangements set out in the *Fish Resources Management Regulations* and other subsidiary legislation, such as commercial fishery management plans.

A number of other Acts are also in place to support management including:

- *Pearling Act 1990;*
- *Fisheries Adjustment Schemes Act 1987;*
- *Fishing and Related Industries Compensation (Marine Reserves) Act 1997; and Fishing Industry Promotion Training and Management Levy Act 1994*.

In 2010, the Minister for Fisheries directed the Department to investigate and scope the requirements for a new Act. A key outcome of the review was the need to establish a clear statutory basis for commercial and recreational fishing access rights as a component in improving overall fisheries management and improving security of resource access for all fisheries sectors.

To this end, a new *Aquatic Resources Management Act* (ARMA) has been drafted to replace the FRMA and is expected to be introduced to Parliament during 2015. Importantly the ARMA's proposed framework includes provision for a rights-based management approach for all fishing sectors in the context of aquatic resource management strategies and sectoral harvest plans. The objectives of the proposed ARMA are to: (a) ensure the ecological sustainability of the State's aquatic resources and aquatic ecosystems for the benefit of present and future generations; and (b) to ensure that the State's aquatic resources are managed, developed and used having regard to the economic, social and other benefits that the aquatic resources may provide.

In addition to the legislative framework, the Government has set out its fisheries and aquatic resource objectives in a *Western Australian Government Fisheries Policy Statement March 2012.* This policy provides high level guidance on the Government's preferred approaches to key resource management challenges including resource management, resource access and allocation, marine planning and governance and consultative structures. The Government has also recognised that more detailed policies are needed a number of other key policy areas and is currently finalising a number of complementary policy statements. These include:

- *Harvest Strategy Policy for the Aquatic Resources of Western Australia* (Draft) – this policy sets out the main requirements of an effective harvest strategy (target and limits reference points, harvest control rules, monitoring and review), as well as default targets across a range of scenarios. B_{MSY} is used a default stock sustainability objective, although the policy acknowledges that B_{MEY} is likely to be preferable for many commercial fisheries. 50% B_{MSY} is used as a default limit reference point. The HSP will be progressively applied to all relevant resources and fisheries in WA over a five year timeframe as part of the schedule for the development and/or review of each resource/fishery;

- *Aquatic Biodiversity Policy* – DoF is currently drafting an overarching Aquatic Biodiversity Policy that describes the Department's role, responsibilities and jurisdiction in the management of the State's aquatic biodiversity. The policy focuses on five key asset areas (retained fish species, non-retained fish species, Threatened, Endangered and Protected species, fish habitats and ecosystem processes – broadly in line with MSC Principle 2 indicators) and seven key threats imposed upon these asset areas (habitat loss, invasive pests, unsustainable harvest, external drivers, lack of information, governance and cumulative impacts).

Under the WA management structure, the Minister is the final decision maker on legislative changes and changes to management plans, while the CEO of DoF is able to sign off on administrative changes as well as to determine (or alter) the capacity of the fishery (i.e. the TACC or maximum effort level).

The Department's operations are guided by a *Strategic Plan 2009 - 2018* (Phase 3 2013 – 2015) which sets out explicit long term objectives in four main areas (Sustainability, Community Outcomes, Partnerships, Agency Management). The departmental structure is focused around three service delivery areas:

- **Fisheries management** - provides management, policy development, licensing and legislation related to the State's commercial and recreational fisheries, pearling, aquaculture, fish processing, the charter boat industry, customary fishing and protection of aquatic ecosystems.
- **Compliance and education** - provides Statewide fisheries compliance and community education, in accordance with the provisions of the Fish Resources Management Act 1994 and the Pearling Act 1990.
- **Research and monitoring** - provides timely, quality scientific knowledge and advice to support the conservation and sustainable use of the State's fish resources and aquatic ecosystems

The Department also provides a marine safety service in specified areas on behalf of the Department of Transport.

With the adoption of EBFM as a key guiding principle, much of the Department's activity (for example, EBFM risk assessments, compliance activity) is now based on six bioregions: North Coast, Gascoyne, West Coast, South Coast, Northern Inland and Southern Inland (Fletcher and Santoro, 2013).

Fisheries and aquatic resource management priorities are developed through FishPlan which provides a structured approach to planning and priority setting over a 5 year time horizon. FishPlan aligns with the Department's EBFM approach and overarching risk register. FishPlan encompasses and integrates assessment and monitoring (research), management (policy) and compliance activities undertaken across the Department.

Allocation and harvest control systems

Historically, WA's fish resources have largely been shared on an implicit basis, with no explicit setting of catch shares within an overall total allowable catch or corresponding total allowable effort. In more recent years, DoF has begun implementing an Integrated Fisheries Management (IFM) approach where the aggregate effects of all fishing sectors are taken into account. This involves the use of a framework in which decisions on optimum resource use (i.e. allocation and re-allocation of fish resources) are determined and implemented within a total sustainable catch for each fishery or fished stock.

The IFM initiative will generate explicit allocations and/or re-allocations to specific sectors using a formal and structured allocation process, facilitated via an independent body – the Integrated Fisheries Advisory Allocation Committee (IFAAC). This process has already been completed for western rock lobster, metropolitan abalone fisheries, and for the West Coast Demersal Scalefish

Fishery. Allocation processes for other fisheries are underway. The department's aim is to have formal share allocations determined in at least 25% of the State's fisheries by 2015, and the majority under formal share allocations within 10 years.

The IFM framework, including the need for explicit catch shares to strengthen access rights, will be further strengthened with the introduction of the proposed ARMA. In essence the IFM approach involves:

- setting the total allowable harvest level of each resource that allows for an ecologically sustainable level of fishing;
- allocation of explicit proportional catch shares for use by commercial, recreational and Customary sectors;
- continual monitoring of each sector's catch;
- managing each sector within its allocated catch share; and
- developing mechanisms to enable the reallocation of catch shares between sectors.

Management of recreational harvests

The default position in WA is that recreational fishing is an 'as of right' activity, managed through input (temporal and seasonal closures) and output (bag and size limits) controls, however a license is required for some activities including recreational fishing from a powered boat. License types and numbers issued in 2012/3 are outlined in Table

Table 4: Recreational fishing license types and numbers issued in 2012/3 (DoF, 2013)

License requirement	# in 2012/3
Recreational fishing from boat	134,116
Rock lobster	35,560
Abalone	15,658
Marron	10,797
Netting	15,522
Freshwater angling	9,721

WA has recently introduced a new, simplified system of bioregionally-based recreational fishing rules (on 1 February 2013). The new rules have improved consistency between the various bioregions and reduced the number of bag limit categories for finfish from 13 to four and the number of recreational fishing rule guides from four to one. Anecdotal information suggests the new rules are easier to understand and have been well-received amongst anglers.

It is worth noting the Department's 2012/13 Budget Papers set an explicit target for participation rate in recreational fisheries at 32% of the State's population.

Management of commercial harvests

All commercial fisheries in Western Australia fall under one of the following access arrangements-

1. **'open' access** - a Fishing Boat Licence (FBL), a licensed fishing boat and a commercial fishing licence is the minimum requirement to fish;
2. **restricted access** - an FBL with a permissive condition, or an exemption (i.e. developing fisheries), or a licence issued pursuant to the FRMR, or an exception to a prohibition notice made under section 43 is the minimum required to fish;

3. **interim managed fishery** - an interim managed fishery permit issued pursuant to an interim management plan (and generally entitlement) is the minimum requirement to fish; or
4. **managed fishery** - a managed fishery licence (and generally entitlement) issued pursuant to a management plan is the minimum requirement to fish.

Amongst the managed fisheries, a mixture of input and output controls are used ranging from limited entry alone (e.g. South West Salmon Managed Fishery) to ITQs (e.g rock lobster, abalone). It is worth noting that after many years of debate the WRLF has recently made the transition to a quota management system, and initial anecdotal feedback is the system is working well. Beach prices achieved in the early stages have been excellent, driven in part by a more sophisticated focus from operators on product quality and market opportunities, rather than quantity. Recent discussions with a number of operators in the fishery indicated that, having experienced the potential of the fishery under quota management, 'no-one' would go back to input controls.

Formal harvest strategies, with agreed target and limit reference points and pre-agreed harvest control rules, have been adopted for some of the key fisheries including the WRLF. The harvest strategy for the WRLF provides for harvest setting at Maximum Economic Yield (MEY - see Figure 5) and incorporates an explicit share (5%) of the TAC for the recreational sector (DoF, 2014).

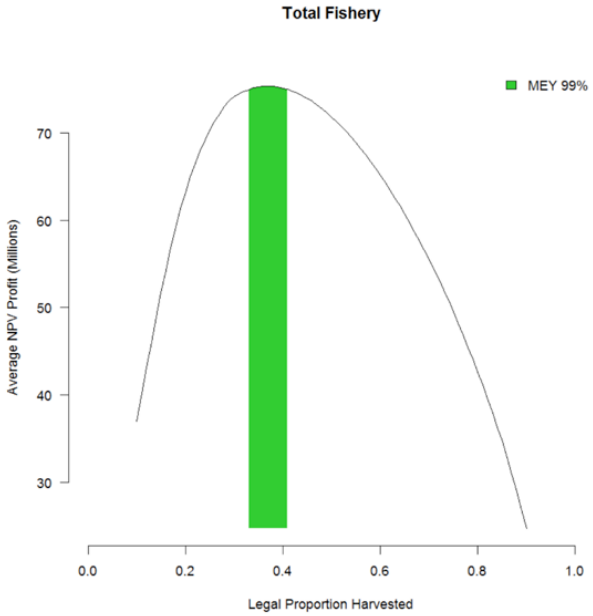

Figure 5: Example of MEY assessment showing the 'legal proportion harvested' range (green), based on a 12 month season and existing biological controls, which results in 99% of the maximum net present value (NPV) for the West Coast Rock Lobster Fishery over the next 5 years.

Monitoring, information collection and analysis

The main sources of information used to inform the WA management system include:

- Statutory catch and effort returns;
- Voluntary fisher information (commercial and recreational);
- Observer information
- Fishery independent research
- Information generated through compliance and enforcement activity.

These data are used to inform stock assessments, risk assessments and compliance plans, as well as monitor catches and fishing effort to evaluate performance against management objectives.

Monitoring of catch and effort in the commercial sector is primarily through compulsory catch and effort returns. Statutory catch returns can be fishery specific and can include returns submitted on a monthly basis, trip by trip, daily and upon landing. Compliance officers can inspect and validate reported catches upon landing and undertake processor inspections to validate the commercial fisher's reported weights (where applicable).

DoF has also operated fishery-independent observer programs to verify catch, effort and non-target species interactions previously, however the extent of the current program is unknown. DoF has also previously actively investigated potentially more cost effective alternatives to observers, including electronic monitoring (e.g. in the Demersal Gillnet Fishery; Evans and Molony, 2011).

Monitoring catch and effort in the recreational sector is primarily through periodic fishery-independent surveys. Three complementary methods are used: (i) off-site phone surveys encompassing an initial Screening Survey, a 12-month Phone-Diary Survey, followed by post-enumeration surveys; (ii) on-site boat-ramp surveys (including a state-wide Biological Survey and a Perth metropolitan Validation Survey); and (iii) a remote Camera Survey (Fletcher and Santoro, 2013). The Recreational Fishing from Boat Licence (RFBL) introduced in 2010 has provided a database of boat fishers across WA and is used to help structure recreational fishing surveys.

An annual survey of community perceptions is also undertaken by DoF to assess the satisfaction of the Western Australian community and recreational fishers. These results are used to monitor, evaluate and improve the effectiveness of Department's programs, activities and functions. From the survey results a 'satisfaction index' is generated, assessing fishers' satisfaction with their most recent fishing trip, as well as satisfaction with the Department's performance in managing fisheries.

Scientific research and assessments are undertaken by DoF staff, with regular external peer review. The results for each individual research project are made publicly available on the Department's website in the form of Fisheries Management Papers, Fisheries Research Reports and Fisheries Occasional Publications. Research, monitoring and assessment priorities are set out in the Department's Research, Monitoring, Assessment and Development Plan (RMAD Plan) which sets out associated research projects over a five year period. RMAD not only documents the research, monitoring and assessment activities being done directly by the Department, but covers any relevant activities being undertaken by other agencies and organisations that have been identified as being directly relevant to a particular fishery/sector/asset or issue.

In order to simplify the assessment of (potentially) over 3,000 finfish species, DoF undertakes assessments based on 'indicator' species from each suite of species for a given Bioregion. Indicator species are identified "based on their vulnerability to fishing and other considerations, such as whether they are target species in the major fisheries, the value to the community, economic value, recreational value and cultural value (Lenanton et al. 2006). It is these indicator species that are monitored; the status of these indicators is assumed to represent the status of the suite and therefore the resource (asset)" (DoF, 2011).

Surveys of the main seafood purchasers/processors are periodically undertaken to determine market values of product (except pearls).

Management of non-target species

DoF places considerable emphasis on the use of risk assessments in prioritising management, monitoring and research activities in relation to fishery impacts on non-target species and ecosystems.

With the adoption of EBFM, the Department has developed a bioregional risk based framework that takes into account the impacts of all aquatic resource use on species targeted by fishing, as well as non-target species and the environment, all of which are regarded as ecological assets (see 'component tree' of North Coast ecological assets in Figure 6). The risks associated with each individual ecological asset are examined separately using formal qualitative risk assessment (consequence x likelihood) or more-simple problem assessment processes, as detailed in Fletcher (2005) and Fletcher et al (2011) (Fletcher and Santoro, 2013).

Management and research activities are then targeted at the areas of highest risk, according to the framework outlined in Table 5.

Table 5: General risk categories and actions arising under WA's EBFM assessment approach. (Fletcher and Santoro, 2013)

Risk Category	Description
Negligible	Not an issue
Low	Acceptable; no specific control measures needed
Moderate	Acceptable; with current risk control measures in place (no new management required)
High	Not desirable; continue strong management actions OR new and/or further risk control measures to be introduced in near future
Significant	Unacceptable; major changes required to management in immediate future

DoF's advice is that the simple set of steps developed has enabled adoption of a fully regional, 'ecosystem based' approach in WA without material increases in funding.

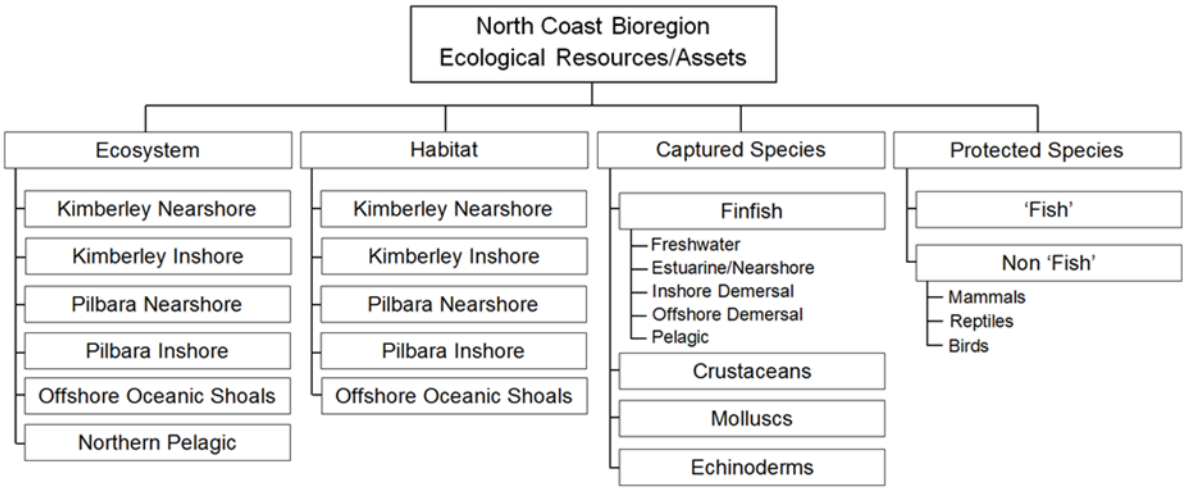

Figure 6: North Coast Bioregion component tree of ecological assets. (Source: Fletcher and Santoro, 2013)

DoF indicate that "the levels of knowledge needed for each of the issues only need to be appropriate to the risk and the level of precaution adopted by management. Implementing EBFM does not, therefore, automatically generate the need to collect more ecological, social or economic data or require the development of complex 'ecosystem' models, it only requires the consideration of each of these elements to determine which (if any) required direct management to achieve acceptable performance" (Fletcher and Santoro, 2013)

Compliance system

The Department operates a relatively sophisticated compliance program, with service delivery structured around Operational Compliance Plans (OCP) for key commercial and recreational fisheries in each of its compliance management areas. Each OCP is informed by regular compliance risk assessments that can include compliance, research and management staff, as well as licence holders and other stakeholders. The risk assessment process relies on a weight-of-evidence approach considering information available from specialist units, trends and issues identified by local staff and fisheries management priorities as per FishPlan.

VMS is used on some, but not all, licensed commercial vessels.

In addition to compliance staff based regionally, a number of units within the Department provide specialised support:

- the Serious Offences Unit (which undertakes major and covert operations);
- the Fisheries Intelligence Unit (which provides intelligence reports to support compliance programs);
- the Compliance Statistics Unit (which collects and analyses compliance data to identify trends);
- the Prosecutions Unit (which manages information related to infringements and offences);
- the Strategic Policy Section of the Regional Services Branch (which develops and implements strategic compliance policy and risk assessments, and oversees the operation of the Branch).

Four tiers of sanctions are available to deal with fisheries offences depending on the nature and severity of the offence: prosecutions, letter of warning, infringement notices and infringement warnings.

Stakeholder participation

The Western Australian Government's commitment to consultation with stakeholders is set out in the Western Australian Government's Fisheries Policy Statement of 2012. The broad consultation framework was developed following the outcome of a 2009 review of consultation arrangements between the fishing sector and Government, and is illustrated in Annex 2.

The review process resulted in-

- The replacement of Management Advisory Committees (MACs) with two key sources of advice: the Department as the key source of Government advice on fisheries management and the WAFIC and Recfishwest as the key sources of coordinated industry advice for the commercial and recreational sectors, respectively.
- Recognition of WAFIC as the peak body representing the commercial fishing sector (including pearling and aquaculture), with funding provided by Government to support WAFIC in this role.
- Recognition of Recfishwest as the peak body representing the recreational fishing sector, with funding provided by Government to support Recfishwest in this role.
- Establishment of an Aquatic Advisory Committee (AAC) to provide independent advice to the Minister or the Department on high-level strategic matters on matters referred to it by the Minister or CEO
- The establishment by the Minister (or Department) of tasked working groups to provide advice on specific fisheries or operational matters. Tasked working groups differ to MACs in that they are expertise based and operate on the basis of a written referral on a specific matter. Tasked working groups have been established in the past to provide advice on matters such as water access (lease) fees, strengthening of access rights in the fisheries legislation, development of a Government fisheries policy statement, and determining catch shares among sectors.
- Capacity for peak bodies to perform consultation functions on behalf of the Minister. In this regard, the Department has entered into a Service Level Agreement (SLA) with WAFIC for the provision of specified consultation services with the commercial sector.

DoF has formal Service Level Agreements (SLAs) with WAFIC and Recfishwest for the purposes of facilitating consultation. DoF's obligations under the WAFIC SLA include:

- providing annual funding equivalent to 0.5% of Western Australian commercial fishing gross value of product (based on a three year average) plus a pro rata amount equivalent to 10% of water access fees paid by aquaculture and pearling operators. Payments to WAFIC are made by 6 monthly instalments each year.
- working with WAFIC in a manner consistent with WAFIC's role as the peak body representing commercial fishing interests in Western Australia.

- engaging with WAFIC, sector bodies and commercial fishing interests according to WAFIC Operational Principles.

In return WAFIC must:

- Distribute proposed changes to management arrangements including the Minister's/Department's reasoning for the proposal/s and the information on which the proposal/s is based to all licence holders in the relevant fishery;
- Describe the method by which licence holders may put their views;
- Ensure that licence holders have a reasonable period in which to consider their position and respond; and
- Ensure that the decision maker is fully aware of the views being put forward, so the decision maker gives proper and genuine consideration to the views being put forward.

Similar roles and responsibilities exist with Recfishwest as the peak body for the recreational sector. Recfishwest is an incorporated association and receives 15% of the revenue raised from recreational fishing licence fees to advocate for, and represent, the recreational fishing sector.

WAFIC and Recfishwest, have direct input into the annual planning and priority setting process used to determine management, compliance, research and other priorities through FishPlan.

Tasked working groups and panels can be established by the Chief Executive Officer or the Minister for Fisheries to provide independent, expert advice relating to a range fisheries management matters. They are highly flexible, and are usually provided with a specified task, such as addressing resource access (e.g. closures and compensation) and allocation (e.g. IFM) or reviewing research, management or Government policy. The working groups work to a specific terms of reference within a particular timeframe.

The Department has a general practice of holding regular (often annual) 'management meetings' with licensees to discuss fishery research, management, compliance and specific issues affecting the fishery (e.g. marine park planning). These management meetings assist the decision making process at fishery specific level. WAFIC co-ordinates the commercial fishery annual management meetings under the SLA. The annual management meetings are widely recognised by the commercial licence holders as a mechanism for receiving the most up-to-date scientific advice on the status of the fishery, facilitating information exchange and for discussing new and ongoing management issues.

Performance Review

DoF's systems of performance review operate at different levels:

Fishery level

At the fishery level, performance is assessed and reported as part of the *Status Reports of the Fisheries and Aquatic Resources of Western Australia* (State of the Fisheries). For the main commercial fisheries/species, catches are assessed annually against a target catch or effort range which provides an indication of the success of management plans and regulatory activities in keeping fish catches at appropriate levels (including those in a recovery phase) (Fletcher and Santoro, 2013). If the catch or effort remains inside the acceptable range it is defined as having

acceptable performance. Where the annual catch or effort for a fishery falls outside of this range and the rise or fall cannot be adequately explained (e.g. environmentally-induced fluctuations in recruitment levels – like prawns, or low market prices reduce desired catch levels – e.g. pearl oysters), a management review or additional research to assess the underlying cause is generally required.

For quota-managed fisheries, the measure of success for the management arrangements is firstly that the majority of the Total Allowable Catch (TAC) is achieved, but additionally, that it has been possible to take this catch using an acceptable amount of fishing effort.

In addition, for each fishery (or suite of similar species), assessments are also made of:

- Breeding stock status (adequate/recovering/inadequate);
- Non-retained species impacts - bycatch species/protected species (according to the risk scale used in Table 5)
- Ecosystem impacts - food chain and habitat (according to the risk scale used in Table 5)
- Social effects (primarily looking at the distribution and quantity of jobs supported)
- Economic effects (primarily GVP assessments)
- External factors (e.g. MPA planning).

Bioregion/ecosystem level

Annual EBFM risk assessment outcomes for each bioregion in Western Australia are published in the annual State of the Fisheries report.

Department/governance

The Department's performance in the management of the State's fish resources is assessed annually as part of the Annual Reporting process against a framework of KPIs. KPIs are categorised into 'effectiveness' and 'efficiency' indicators (Table 6; Table 7)

Table 6: WA Department of Fisheries 'effectiveness' KPIs (DoF, 2013)

(Status key: ✔ = We are meeting our targets ✘ = Targets are not achieved – we are taking action)

Key effectiveness indicators	2010	2011	2012	2013 Target	2013 Actual	Variance	Status
KPI 1.1 Proportion of fish stocks identified as being at risk or vulnerable through exploitation (%)	17	6	6	< 9	3	6	✔
KPI 1.2 The proportion of fisheries where acceptable catches (or effort levels) are achieved (%)	90	94	100	88	97	9	✔
KPI 1.3 The percentage of fisheries or fished sectors where current catch shares are known and where catch share allocations are in process or in place (%)	65	61	59	78	76	2	✔
KPI 2.1 The gross value of State fisheries production ($m)	400	400	399	384	385	1	✔
KPI 3.1 The participation rate in recreational fisheries (%)	30	33	32	32	33	1	✔

Table 7: WA Department of Fisheries 'efficiency' KPIs (DoF, 2013)

(Status key: ✔ = We are meeting our targets ✘ = Targets are not achieved – we are taking action)

Key efficiency indicators	2010	2011	2012	2013 Target	2013 Actual	Variance	Status
Service 1: Fisheries Management – average cost per hour for management (excluding grants and fisheries adjustments) ($ per hour)	117	152	167	132	192	60	✘
Service 2: Compliance and Education – average cost per hour of compliance and education ($ per hour)	164	186	185	160	213	53	✘
Service 3: Research and Monitoring – average cost per hour of research and monitoring ($ per hour)	118	126	130	129	119	(10)	✔
Service 4: Marine Safety Safety – average cost per hour of the delivery of marine safety services ($ per hour)	143	134	115	117	184	67	✘

Resourcing

DoF's total revenue for the 2012/13 financial year totalled around $77.3m, of which consolidated revenue contributed $48.4m. The remaining funds were received through commercial license fees ($16.2m), recreational license fees ($6.2m) and grants and other income (e.g. FRDC, WAMSI) ($6.4m).

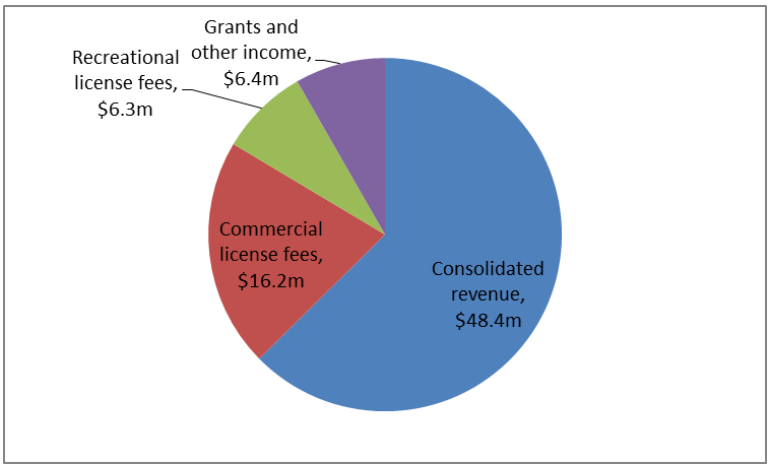

Figure 7: WA Department of Fisheries 2012/13 budget by revenue source (DoF, 2013)

Overall departmental expenditure totalled $88.4m, with around half spent on compliance and education (DoF, 2013). The department had 449 staff in 2012/3.

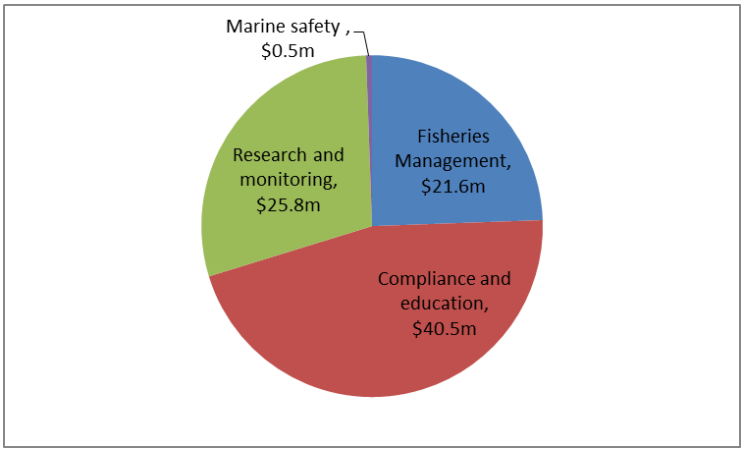

Figure 8: WA Department of Fisheries 2012/13 expenditure by service (DoF, 2013)

Each year about $19 million is spent on the management and improvement of recreational fisheries. Recreational fishers contribute about $6 million to this cost through licence fees, every cent of which is spent, by law, on recreational fishing. Fifteen per cent of licence revenue is provided to Recfishwest – the State's peak recreational fishing body – for professional representation of the sector and a further 20 per cent is set aside for new initiatives, such as artificial reefs. The State Government contributes the remaining $13 million to ensure the continuation of sustainable management of recreational fishing in Western Australia. In 2012/3 around $1.3 million was set aside to provide grant funding for initiatives, projects and research that directly benefit recreational fishing.

From 1 July 2010, all managed commercial fisheries were subject to a new funding model which replaced a cost recovery system. The new funding model aimed at improving flexibility for resourcing priority management needs, equity in how much licensees pay in access fees and greater certainty of funding and access rights (ref). This involves all managed commercial fisheries in WA paying an access fee equivalent to 5.75% of the gross value of production (GVP) of the respective fishery. As part of these arrangements, Government also agreed to contribute the equivalent of 0.5% of managed commercial fishery GVP to WAFIC, to support its role as the peak body, and the equivalent of 0.25% of GVP to the Fisheries Research and Development Corporation (FRDC).

The WA Government has recently set aside $14m to certify all of its commercial fisheries against the Marine Stewardship Council standard.

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Annex 1

License	#	License	#
Managed Fishery Licences	**1,277**	South West Salmon	6
Abalone	45	South West Trawl	13
Abrolhos Mid-West Trawl	10	Southern Demersal Gillnet and Demersal Longline	55
Broome Prawn	5	Specimen Shell	34
Cockburn Crab	12	Warnbro Crab	0
Cockburn Fish Net	1	West Coast Beach Bait Fish	1
Cockburn Line and Pot	13	West Coast Purse Seine	12
Cockburn Mussel	2	Windy Harbour/Augusta Rock Lobster	2
Esperance Rock Lobster	8	West Coast Rock Lobster	591
Exmouth Prawn	15	West Coast Deep Sea Crustacean	7
Gascoyne Demersal Scale Fish	47	**Interim Managed Fishery Licences**	**103**
Kimberley Gill Net and Barramundi	7	Pilbara Fish Trawl	10
Kimberley Prawn	121	Shark Bay Crab 5	
Mackerel	61	West Coast Demersal Gillnet and Demersal Long Line	17
Marine Aquarium Fish Corporate	1	West Coast Estuarine	12
Marine Aquarium Fish Individual	11	West Coast Demersal Scalefish	59
Nickol Bay Prawn	14	**Other licences**	**4,531**
Northern Demersal	15	Commercial Fishing Licence	2,276
Onslow Prawn	30	Fish Processing (land)	123
Pilbara Trap	6	Fish Processing (sea)	103
Shark Bay Beach Seine	11	Fishing Boat Licence	1,337
Shark Bay Prawn	18	Aquatic Eco Tour	2
Shark Bay Scallop	29	Fishing Tour Operators Licence	212
South Coast Estuarine	25	Restricted Fishing Tour	28
South Coast Purse Seine	31	Permit to Construct a Fish Processing Establishment	422
South Coast Salmon	18	Rock Lobster Pot Licence	28

Annex 2

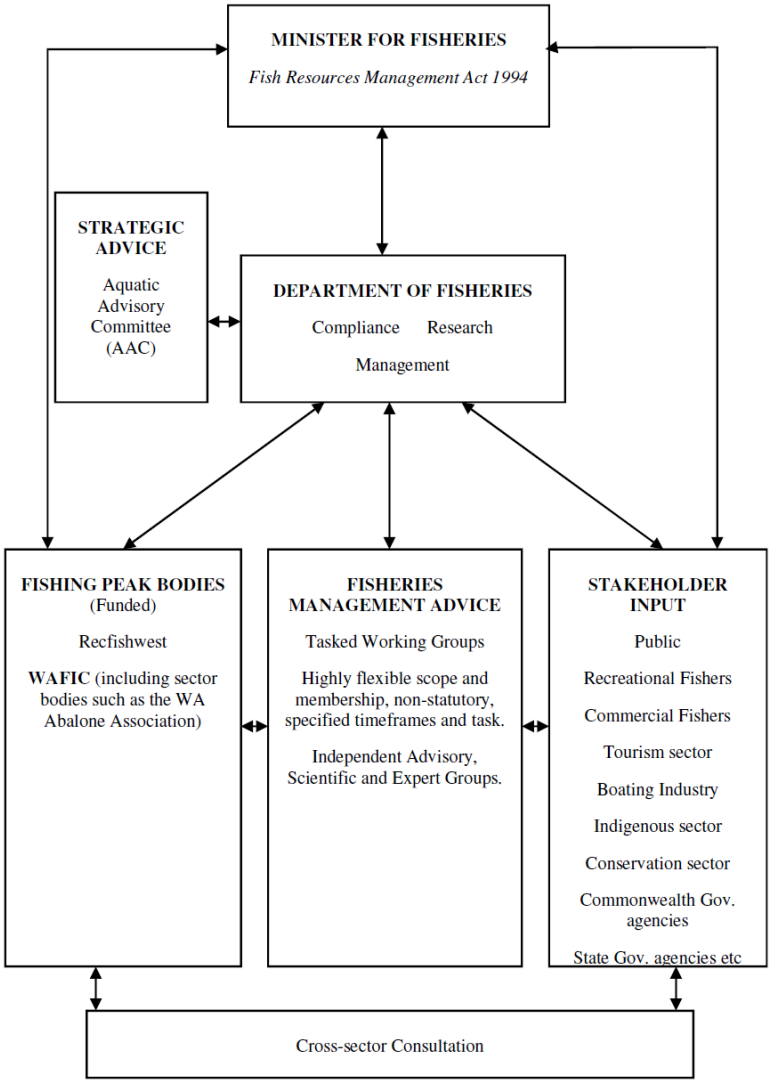

Figure 9: Department of Fisheries consultation framework.

United States

(with comparisons to European Union arrangements)

Key points

The key points from the US review are summarised as candidate 'best practices' that may have applicability in Queensland.

Legal mandate with well-defined roles and responsibilities- The USA Magnuson Steven Fishery Conservation and Management Act (MSFCMA) is a strong mandate to prevent overfishing and rebuild fisheries. It spells out the roles and responsibilities of Fishery Management Councils, Federal and state governments and scientists.

High level objectives, priorities, and guidelines for implementation- Preventing overfishing and rebuilding stocks is the top priority of the MSFCMA. Other National Standards describe other objectives. National Standard (NS) guidelines make NS operational.

Co-management by a partnership between government and stakeholders and checks and balances- Fishery Management Councils are a co-management partnership. National Standards and Secretarial review and approval of Fishery Management Plans assure Plans are in line with National policy and the law.

Rights based allocation of shares in fisheries- Rights based allocation reduces or eliminates perverse incentives to overcapitalize and creates positive incentives for conservation. The USA has a "Catch Shares Policy" which encourages rights based allocation.

Accounting for, and management of, both commercial and recreational fisheries- Fishery Management Plans apply to all types of fishing including recreational fishing. All sources of fishing mortality, including recreational and non-retained catches, are considered in stock assessments.

Arrangements to address inter-jurisdictional fisheries- Fishery management applies to stocks throughout their range. Inter-jurisdictional fishery commissions coordinate fishery management between states. For the Atlantic states, the possibility of a federally imposed moratorium is a strong incentive for cooperation

Fishery management harmonized with other applicable law and government policies- Fishery management needs to be consistent with other laws, such as laws to protect species and marine reserves. In the USA there are legally mandated processes for protection of species and there are arrangements and understandings about roles and responsibilities for protected areas.

A capable and trusted scientific enterprise with a balanced program of research, monitoring and assessment based advice- Research, monitoring and advice are the three legs of a stool when it comes to the scientific enterprise to support fishery management. There is a large long term investment in all three. There are well developed transparent processes for preparing and peer reviewing scientific advice.

Separation between the roles of scientists and managers- Scientists should give objective scientific advice and managers should use it to make management decisions. In the USA, this separation of roles is reinforced by the MSFCMA requirement that Fishery Management Councils adhere to scientific advice on overfishing.

Enforcement and Compliance monitoring- The USA has strong enforcement capability and a judiciary process that is swift for minor offenses and severe for serious offenses.

Resourcing of the entire fishery management system- There are long term commitments to the scientific enterprise, Fishery Management Councils, and Enforcement.

Performance measures and performance monitoring- There is annual reporting on performance relative to status of stocks. There are reviews of other aspects of performance. There is a rotating schedule of program reviews of the science enterprise.

Preface

This chapter reviews fishery management in the USA, and for perspective, it points out similarities and differences relative to fishery management by the European Union. Some sources of information are footnoted, but the review also draws heavily on the author's firsthand knowledge based on his experience as a senior official in the US Federal Agency responsible for fishery management, a member of one of the Fishery Management Councils that are partner with the Federal government, and chair of the Advisory Committee which advises the European Union on marine ecosystem issues including fishery management.

Obviously this review covers a huge swath across the global fishery management scene as US and EU fisheries are large and complex in terms of species, fishing method, scale of industry, governance regimes and culture. By necessity, the review focuses on the big picture, but it also highlights specific situations which may be particularly relevant to Queensland, Australia.

Candidates for best practice in fishery management are highlighted in a "box" at the beginning of the chapter. The highlights reference aspects of USA fishery management that potentially illustrate best practices. The box is intended to help the reader know what to look for in the review. Fishery management in the USA is generally well regarded. While there are many positive aspects of fishery management in the USA, as well as Europe, there are also ample examples overfished stocks, poor economic performance and controversial management actions. No place has a monopoly on fishery management "best practices." In general, fishery management is a work in progress and virtually all jurisdictions can learn from both the positive and negative experiences from other places.

Introduction

Fisheries have a long history in the USA. The first Europeans came to North America to fish. While there are still some regions of the US where fisheries are economic drivers (e.g., industrial fisheries off Alaska, small scale lobster fishing in Maine), for the most part, the fishing industry is a minor part of the large and diverse US economy. However, fisheries remain important culturally and the commercial fishing industry enjoys surprising "clout" with politicians. For example, collapse of a fishery that jeopardizes the livelihood of a few hundred fishers may result in Congress appropriating millions of dollars in disaster relieve, while at the same time, Congress barely reacts to thousands of

workers laid off when a factory shuts down. Some of the Congressional clout enjoyed by the commercial fishing industry has waned in recent years in part because of negative attention generated by environmentalists that point out past abuses (overfishing, Congressional interference with efforts to conserve and mange fisheries). In addition, as millions of marine recreational fishers have become better organized, their influence has increased, in direct competition with commercial fisheries in some areas of the country. The economic, social and political landscape of US fisheries is complicated and it continues to evolve.

The USA[21] was the third leading capture fishing nation in 2012 (the most recent year for which data is available) in terms of wild harvest behind China and Indonesia.[22]

The total U.S. commercial landings were 4.4 million metric tons valued at $5.1 billion in 2012. Edible finfish and shellfish account for about 82% of landings, with the rest being used for reduction and industrial purposes. The largest catches by volume were pollock, menhaden, and cod. In terms of value, crabs, scallops, shrimp were the leaders.

Figure 10 provides the volume of commercial landings in the United States for the past 50 years. Most notable is the nearly 30% jump in reported U.S. landings from the late 1980s to the mid-1990s. This jump primarily corresponds to replacement of foreign fishing off the USA by development of US fishing capacity, primarily off Alaska, following extension of jurisdiction to 200 miles.

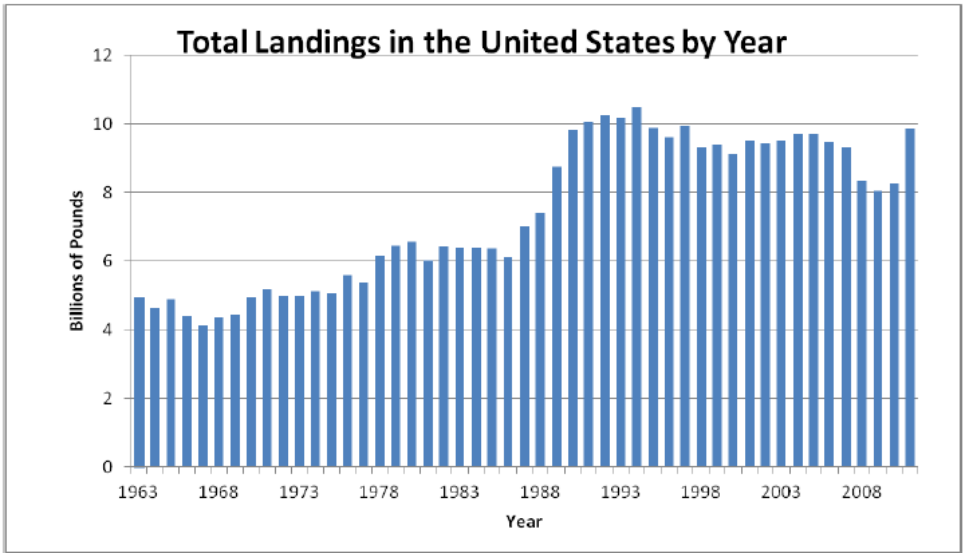

Figure 10: Total commercial landings in the US between 1963 and 2012.

The USA aquaculture industry produced about 277,000 metric tons in 2011 (the most recent year for which statistics were available) worth about $1.3 billion. Most of the production was in freshwater with catfish and crayfish leading in terms of both weight and value. Unlike the global trend of rapidly increasing aquaculture production, US aquaculture production has been relatively stable or slowly decreasing over the last decade.

[21] The source of statistical information about US fisheries is http://www.st.nmfs.noaa.gov/commercial-fisheries/fus/fus12/

[22] See ftp://ftp.fao.org/FI/STAT/summary/YB_Overview.pdf for information on global fishery production.

In 2012, U.S. consumers spent an estimated $82.6 billion for fishery products. The 2012 total includes $55.2 billion in expenditures at food service establishments (restaurants, carry-outs, caterers, etc.); $26.8 billion in retail sales for home consumption; and $570 million for industrial fish products. The USA is a major participant in international trade of fishery products. In 2012, it exported $27 billion and it imported $31 billion.

Marine recreational fisheries are also very important in terms of both economic impact and social value. In 2012, an estimated 9 million marine recreational anglers made an estimated 70 million fishing trips. They caught an estimated 92,000 metric tons although approximately two thirds of the fish caught were released alive. While recreational fisheries are minor in terms of weight caught compared to commercial fisheries, they catch the "lion's share" of some species in some regions. A 2011 study[23] of marine recreational fishing expenditures showed that marine anglers spent an estimated $4.4 billion on fishing trips and $19 billion on equipment related to fishing. Their expenditures supported an estimated 364 thousand jobs nationwide.

For comparison, the total production of fisheries of the twenty eight member countries of the European Union[24] is similar to the USA production. In 2011 (the most recent year for which data is available), total production was 6.1 million metric tons with 4.9 million metric tons from capture fisheries and 1.2 million metric tons from aquaculture. Spain (18% of the total) was the leading fishing country of the European Union, followed by Denmark (15%) and the United Kingdom (12%). The EU imports (19.2 billion Euros) far exceeded exports (4.2 billion Euros) in 2012.

Legislative, Policy and Decision Making Framework

Like Australia, fisheries in the USA are subject to management by jurisdictions at the level of local government (e.g., towns and cities), states, regional organizations, federal government and international fishery management bodies.[25] International Fishery Management Bodies are not considered in this review. The authority of local governments is usually limited to bivalve shellfish beds of inshore saltwater ponds. Typically there are minimum size limits, seasonal openings for fishing, permit requirements and "bag" or trip limits. There may also be closures for public health reasons. Fishery management by local government is not considered further in this review.

Fishery management by States: States manage marine fisheries in the waters extending three nautical miles from the coast, except for the states of Texas and Florida (on the west coast only) and the territory of Puerto Rico, which have jurisdiction out to nine nautical miles (granted by decree of the Supreme Court). For species that reside exclusively within the jurisdiction of a state, the state exercised management authority according to rules set by state law. Typically state law establishes a fishery commission to consider fishery management regulations. In some states, the commission has the authority to make fishery management decisions. In other states, the commission advises a government agency which has the authority to promulgate fishery management regulations. In a

[23] See http://www.st.nmfs.noaa.gov/economics/fisheries/recreational/angler-expenditures-economic-impacts/index

[24] For statistical information about European Union Fisheries, see http://ec.europa.eu/fisheries/documentation/publications/pcp_en.pdf

[25] For a description of marine jurisdictions recognized by the USA, see http://www.gc.noaa.gov/gcil_maritime.html#internal

few states, changes to fishery management regulations require new legislation. Fortunately, this approach is less common than it was because it has been recognized that legislative bodies cannot act fast enough to keep pace with changes in fisheries, and because the politics inherent in a legislative process is not conducive to good fishery management decision making.

For fisheries which migrate between state boundaries, states participate in Interstate Marine Fisheries Commissions. For fisheries that primarily occur in Federal waters (usually beyond 3 nautical miles from shore), states participate in a regionalized Federal fishery management process established by the Magnuson Stevens Fishery Conservation and Management Act (MSFCMA).[26]

Interstate Marine Fisheries Commissions: These Commissions were established by Interstate compacts, ratified by the states and approved by the U.S. Congress. There are Interstate Marine Fisheries Commissions for the states along the Atlantic, Gulf of Mexico and Pacific Coasts of the United States.[27]

The Interstate Commissions are a mechanism for states to coordinate and cooperate in data collection, preparation of scientific advice, management, and enforcement for fishery resources that migrate between states. Each Commission has as an Executive Director and about 15-20 staff. Funding is provided by grants from the member states and the Federal government.

Typically, the Commissions have a governing body with representatives of each of the member states and a representative of the Federal government. There are several subordinate bodies made up of Commission staff and state representatives (usually employees of state agencies) that prepare scientific reports and management plans. The Commissions do not have management authority. They agree on management plans to be adopted by the individual states. However, Commissions sometimes take direct responsibility for data collections (such as implementing surveys of recreational fisheries for the Gulf of Mexico) and assembling and managing data bases (commercial landings data for the Pacific coast including Alaska).

The Atlantic States Marine Fisheries Commission (ASMFC) is the oldest of the three Commissions (established in 1942) and it has the most extensive programs of the three. Its vision is:
"Sustainably Managing Atlantic Coastal Fisheries."

The 2014-2018 Strategic Plan of the ASMFC states "values" that guide the work of the Commission as follows:

- Effective stewardship of marine resources through strong partnerships
- Decisions based on sound science
- Long-term ecological sustainability
- Transparency and accountability in all actions
- Timely response to new information through adaptive management
- Balancing resource conservation with the economic success of coastal communities

[26] Senator Warren Magnuson is credited with drafting the legislation during the mid 1970s. Senator Ted Stevens is credited with major revisions to the Act in the 1990s which gave it teeth when it comes to ending overfishing and rebuilding overfished stocks.
[27] See the following web address for information on the three Interstate Marine Fishery Commissions: http://www.nmfs.noaa.gov/commissions.htm

- Efficient use of time and fiscal resources
- Work cooperatively with honesty, integrity, and fairness

One of the Strategic Plan goals of the Commission is to "**Rebuild, maintain, fairly allocate, and promote Atlantic coastal fisheries,"** but the plan lacks specificity with respect to the goal, such as targets for rebuilding, fishing mortality limits for maintaining a stock or criteria for fair allocation. In practice, fishery management plans of the Commission are generally consistent with National Standards and guidelines of the MSFCMA (discussed below).

The ASMFC is governed by three Commissioners from each of the 15 member states. From each state, there is a Commissioner from the fishery management agency of the state, a member of the legislator of the state, and a stakeholder. This composition of Commissioners balances the need for professional fishery management leadership, stakeholder involvement and a connection to the reality of the politics of fishery management. The Commissioners are responsible for overall governance of the Commission and its policy direction.

The more detailed fishery management planning process is conducted by 25 Boards made up of Commissioners or usually their appointees. Boards are responsible for preparation of management plans for a species of group of species in a fishery. Like the Commission itself, the Boards are also made up of professional fishery managers, stakeholders and legislative representatives. Each of the Boards is advised by a Technical Committee made up of scientists and an Advisory Panel made up of stakeholders.

Like the other Commissions, the ASMFC lacks authority to manage fisheries. It coordinates the preparation and adoption of management plans to be implemented by member states. This arrangement is similar to the arrangement for most international fishery management commissions (such as the Commission for Conservation of Southern Bluefin Tuna and the Commission Conservation of Antarctic Marine Living Resources) which agree on fishery management measures to be implemented by member countries. However, there is specific legislation that applies to fishery management plans of the ASMFC that gives it teeth (i.e., forces the individual states to adhere to the plans).

The Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA)[28] requires all Atlantic coast states that are included in a Commission fishery management plan to implement required conservation provisions of the Plan. If they do not, the Federal government is authorized to impose a moratorium for fishing in the noncompliant state's waters. This authority has only been used a few times, and when it has been used, the noncompliant state quickly came into compliance. The threat of a moratorium in state waters is enough to virtually guarantee compliance with even the most politically unpopular fishery management. The ASMFC states that recovery of Atlantic striped bass, black sea bass, bluefish scup, summer flounder, Spanish mackerel, and spiny dogfish stocks are all a result of tough management actions of the states and Federal government that were possible because of ACFCMA.

[28] The test of ACFCMA is available at: http://www.asmfc.org/uploads/file/ACFCMA.pdf

Federal Fishery Management- Magnuson Stevens Fishery Conservation and Management Act (MSFCMA)[29]: The Act was first voted into law by Congress in 1976 and it went into effect March 1, 1977. It established the United States two hundred mile limit (i.e., jurisdiction over all fisheries, and later all economic activity, within 200 miles of the coast). Chapter 2 of a recent report of the US National Research Council (NRC)[30] gives a good description of the USA federal fishery management under the MSFCMA. The description that follows draws heavily on the NRC report.

The MSFCMA has evolved through numerous amendments and precedent set by hundreds of legal decisions resulting from litigation over its implementation. The following table summarizes the three phases in the evolution of the Act.

Phases of the MSFCMA

Phases	Time Period	Important Elements
Americanization	1977-1995	• Extended jurisdiction to 200 miles
		• Created the objective as Optimum Yield (OY)
		• Required Fishery Management Plans (FMPs) in accordance with National Standards
		• Established co-management between eight Regional Fishery Management Councils and the federal government
		• Made provisions for foreign fishing to continue off the United States until fisheries were Americanized
Rebuilding	1996-2006	• Changed definition of OY to deem $F \geq F_{MSY}$ to be overfishing
		• Required overfished stocks to be rebuilt
		• Limited the rebuilding time to 10 years with exceptions
Accountability	2007-present	• Called for overfishing to end immediately
		• Required annual catch limits (ACLs)
		• Required accountability measures if ACLs are exceeded
		• Strengthened the role of Scientific and Statistical Committees (SSCs)

A pioneering aspect of the Act (indeed it was virtually unheard of in 1977) remains the backbone of Federal fishery management. It is the fishery management partnership between the Federal government, states and stakeholders embodied by a system of Regional Fishery Management Councils (FMCs).[31] While many aspects of the MSFCMA are controversial and subject to amendment proposals, no one seems to question that FMCs are permanent fixtures of USA federal fishery management. The jurisdiction of the eight FMCs is indicated in the figure below.

[29] The current text of the MSFCMA is available at: http://www.seafood.nmfs.noaa.gov/NOAAHandbook25/Magnuson_Stevenson_Act_2007.pdf

[30] The National Research Council report titled Evaluating the Effectiveness of Fish Stock Rebuilding Plans in the United States (2014) is available at: http://www.nap.edu/openbook.php?record_id=18488 Dr. Sissenwine was a member of the Committee that prepared the report and he was the primary author of Chapter 2.

[31] For a description of the Regional Fishery Management Councils system, see http://www.nmfs.noaa.gov/sfa/management/councils/

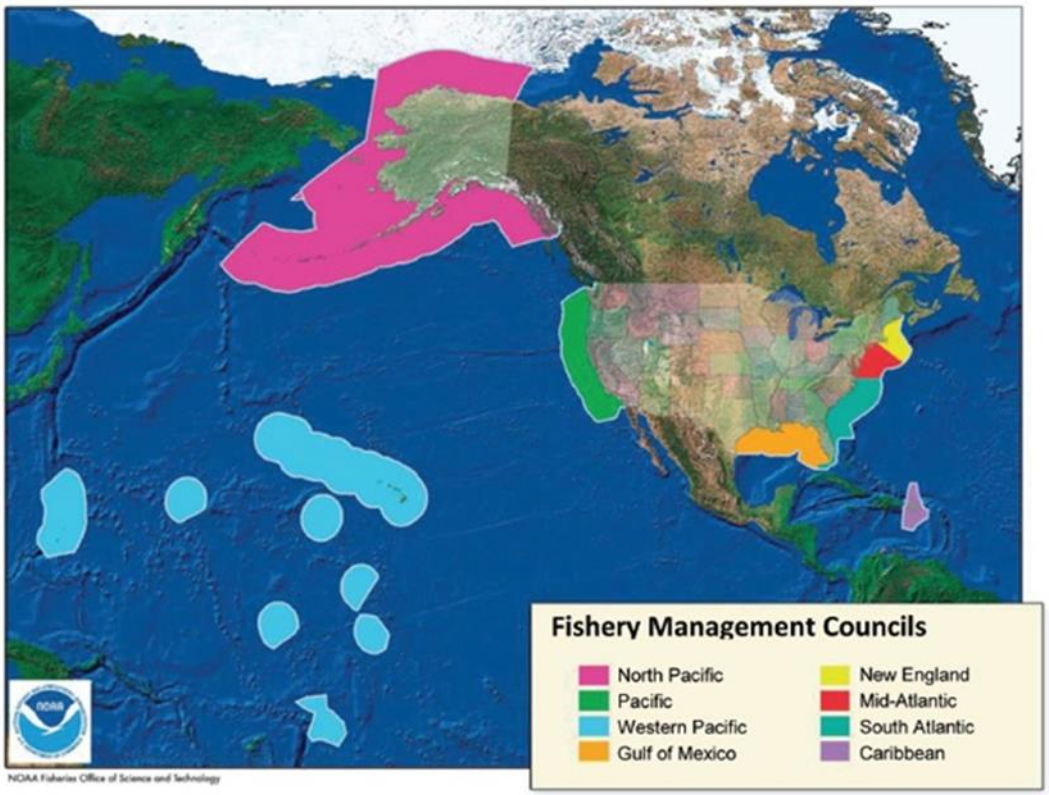

Figure 11: Fishery Management Council structure in the US.

It is noteworthy that the establishment of Regional Advisory Councils (RACs) of the European Union was heavily influenced by the USA regional fishery management council experience, although RACs have a much more limited role (as described later in this review).

Each of the Regional Fishery Management Councils is made up of around 20 members with representatives of coastal states of the region, stakeholders and an official of the Federal government. The stakeholders are nominated by the governors of the coastal states and appointed by the Secretary of Commerce (the Federal department with responsibility for implementing the MSFCMA). Stakeholders can be (and often are) commercial or recreational fishers or representative of commercial or recreational fishing organizations. There are also members that represent conservation interests, as well as a few independent scientists or academics (such as Dr. Sissenwine). Council members are required to attend comprehensive training sessions in the work of Fishery Management Councils.[32]

Some stakeholder members of FMC have conflicts of interest with respect to the fisheries under the jurisdiction of their Council. This is accepted as a necessary aspect of having true stakeholder involvement in decision making. However, there are strict requirements for all members to report on their finances, organizational involvement and other information that may be perceived as the basis of a conflict of interest. There are specific financial criteria for defining a conflict of interest in a specific fishery management decision, in which case, the member most announce their conflict of

[32] For the agenda of a three day training session in 2013 with links to training materials, see http://www.nmfs.noaa.gov/sfa/management/councils/training/2013/2013_council_training.html

interest and refrain from voting on the action.[33] There are critics of allowing people with a conflict of interest to serve on FMCs, but there are no signs that the law will be changed in this regard.[34] MSFCMA National Standards and the Federal approval process for Fishery Management Plans are safeguards against conflicts of interest. They are discussed below.

Fishery Management Councils[35] are responsible for

- Develop and amend Fishery Management Plans (FMPs)
- Convene committees and advisory panels and conduct public meetings
- Develop research priorities in conjunction with a Scientific and Statistical Committee
- Select fishery management options
- Set annual catch limits based on best available science
- Develop and implement rebuilding plans

All Fishery Management Council meetings, except those that deal with personnel management, are opened to the public. Public participation ranges from nil to as many as hundreds of people. Typically there are a few dozen. There is a public comment period during all meeting, typically on each agenda item. Many meetings are broadcast over the internet. Meetings are recorded and all discussions and decisions are extensively documents (e.g., word for word transcripts).

FMPs are comprehensive documents[36] that:

- Identify the fisheries subject to the Plan
- State management objectives
- Define reference points or criteria for determining the status of stocks
- Identify the type of measures (e.g., quotas, area closures, gear restrictions) that will be used to manage the fishery
- Define essential fish habitat (EFH), address the impact of the fishery on EFH and specify measures to protect EFH
- Establish rules on access to fishery resources (e.g., licensing, allocation of shares)
- Describe a process for specifying (e.g., actual amount of an annual quota) and updating management measures
- Specify data reporting requirements
- Address other aspects of fisheries management measures as deemed appropriate.

There are currently 46 Fishery Management Plans that cover about 500 stocks or fishery management units. These Plans are intended to take account of all source of fishing mortality including landings, discards, and incidental mortality caused by fishing (other than landings or

[33] For ethics rule that apply to members of Fishery Management Councils, including financial reporting and rules that apply to voting when there is a conflict of issue, see: http://www.nmfs.noaa.gov/sfa/reg_svcs/Councils/Training2011/Tab%20E%20-%20Conflict%20of%20Interest%20and%20Disclosure;%20Rules%20of%20Conduct/Handouts/Rules%20of%20Conduct%20for%20FMC%20Members.pdf

[34] For a review of the conflict of interest standard applied to fishery management council members and an analysis of the likelihood that fishery management decisions of the North Pacific Fishery Management Council are influenced by conflicts of interest, see http://marineconservationalliance.org/wp-content/uploads/2010/06/MCA_CI.pdf

[35] For a review of the role of Fishery Management Councils (FMCs) and how FMCs operate, see: http://www.nmfs.noaa.gov/sfa/CMS_DEV/Councils/Training2013/D_Council_Process.pdf

[36] Current Fishery Management Plans with all amendments can be seen at: http://www.nmfs.noaa.gov/sfa/reg_svcs/fmp/fmp_collection.htm

discards). They apply to both commercial and recreational fisheries. In fact, recreational fisheries account for more fishing mortality than commercial fisheries for several important fisheries (e.g., striped bass, summer flounder, red snapper, bluefish, and marlin).

FMPs are combined with Environmental Impact Statement (EIS) that analyses a range of alternatives which Fishery Management Councils must consider. EISs include an economic impact analysis and a social impact assessment of each alternative. In addition, FMPs are required to describe how the Plan complies with each of the MSFCMA National Standards (discussed below). Draft EIS are published for public comment and public hearing also held. The process of preparing a Fishery Management Plan or Plan Amendment takes at least a year (sometimes much longer). Since many fishery management regulations need to change annually (such as catch quotas), changes are may by shortcut processes referred to framework actions which still require extensive public comment which takes several months.

The FMC fishery management process is laborious and it requires considerable staff support. Council's typically have 10-20 staff members, and they draw on at least as much staff support from the Federal government. FMCs met about 4-8 times per year for 2 or 5 days per meeting. However, this is only the "tip of the iceberg." There are numerous meetings of:

- Subcommittees and working groups
- Plan Development Teams
- Scientific and Statistical Committees
- Advisory Panels

For example, it is common for the New England Fishery Management Council[37] to hold multiple meetings per week each involving a dozen or more people.

Non-government members of Fishery Management Councils are paid a stipend for their participation (it is currently about $460 USD per day) and their travel expenses are reimbursed. The budgets of FMCs are typically a few million US dollars depending on their workload. All of the funding is provided by a grant from the Federal government.

While Fishery Management Councils have broad latitude in the preparation of Fishery Management Plans, MSFCMA National Standards assure that FMPs are consistent with National policy goals. There are ten National Standards as follows:

National Standards

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery.
2. Conservation and management measures shall be based upon the best scientific information available.
3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

[37] For the New England Fishery Management Council meeting schedule, see http://www.nefmc.org/calendar/index.html

4. Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (a) fair and equitable to all such fishermen; (b) reasonably calculated to promote conservation; and (c) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
5. Conservation and management measures shall, where practicable, promote efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.
7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
8. Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.
9. Conservation and management measures shall, to the extent practicable, (a) minimize bycatch and (b) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
10. Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

While there is no priority assigned to the National Standards (NS) in the MSFCMA, the actual wording of the Standards makes it clear that NS 1 has the top priority. All of the other National Standards refer to considering, or taking into account, or practicality. NS 1 says that fishery management ... "shall prevent overfishing ..." There are no caveats. The top priority status of NS 1 has been upheld by several court rulings.

The definition of overfishing is implicit in the definition of Optimum Yield (OY):

> "(A) the amount of fish which will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery."

Part (B) of the definition implicitly means that a fishing mortality greater than F_{MSY} or greater than the fishing mortality that will allow an overfished stock to rebuild (F_{REB}) is overfishing. There is also an explicit definition of overfishing in the MSFCMA as follows:

> ''… rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis."

With respect to rebuilding overfished stocks, the MSFCMA says:

> ‘‘For a fishery that is overfished, any fishery management plan….shall— (A) specify a time period for ending overfishing and rebuilding the fishery that shall—
>
> i) *be as short as possible*, taking into account the status and biology of any overfished stocks of fish, …; and
>
> ii) *not exceed 10 years*, except in cases where the biology of the stock of fish, other environmental conditions … dictate otherwise;….”

Since there is always uncertainty about estimates of fishing mortality, in practice, a catch that has no more than a 50% probability of exceeding F_{MSY} or F_{REB} is considered the minimum standard for preventing overfishing.[38] The criteria of a 50% probability of exceeding F_{MSY} was established by legal precedent when a FMC set a catch limit that had only an 18% probability of preventing F from exceeding F_{MSY}. The U.S. Court of Appeals for the District of Columbia described a catch with only an 18% chance of preventing overfishing as only existing “in Superman Comics’ Bizarro world, where reality is turned upside down….”

In recent years, it has become more comment for fishery management to be designed so there is less than a 50% probability of overfishing using a method known as the P* method.[39] P* refers to the probability of overfishing and it is commonly at about 25%. While 25% is obviously more conservative or precautionary than 50%, there are insufficient analyses (such as Management Strategy Evaluation) to know what’s the right value of P* in terms of achieving goals and objectives. The way fishery management sets its risk tolerance in the face of scientific and management uncertainty should be more than a “feel good” exercise.

While the MSFCMA is a comprehensive legislation on fishery management and it establishes broad goals and priorities, more specificity is required to make it operational. Therefore, the Federal government has issued National Standard Guidelines[40] to assist the Fishery Management Councils in fulfilling requirements of the Act. National Standard 1 is the focus of the guidelines. It describes a framework for setting Annual Catch Limits (ACLs) and Annual Catch Targets (ACTs) which are lower than the Acceptable Biological Catch (ABC) to take account of management uncertainty. The ABC is set lower than the overfishing level of catch (OFL), which corresponds to F_{MSY}, to take account of scientific uncertainty. The following diagram illustrates the framework.

[38] The legal case is known as Natural Res. Def. Council, Inc. v. Daley, 209 F.3d 747, 754 (D.C. Cir. 2000.

[39] See Shertzer, K. W., M. H. Prager and E. H. Williams. 2010. Probabilistic approaches to setting acceptable biological catch and annual catch targets for multiple years: Reconciling methodology with National Standards Guidelines. *Marine and Coastal Fisheries* 2:451-458.

[40] National Standard Guidelines are available at: http://www.nmfs.noaa.gov/sfa/laws_policies/national_standards/index.html

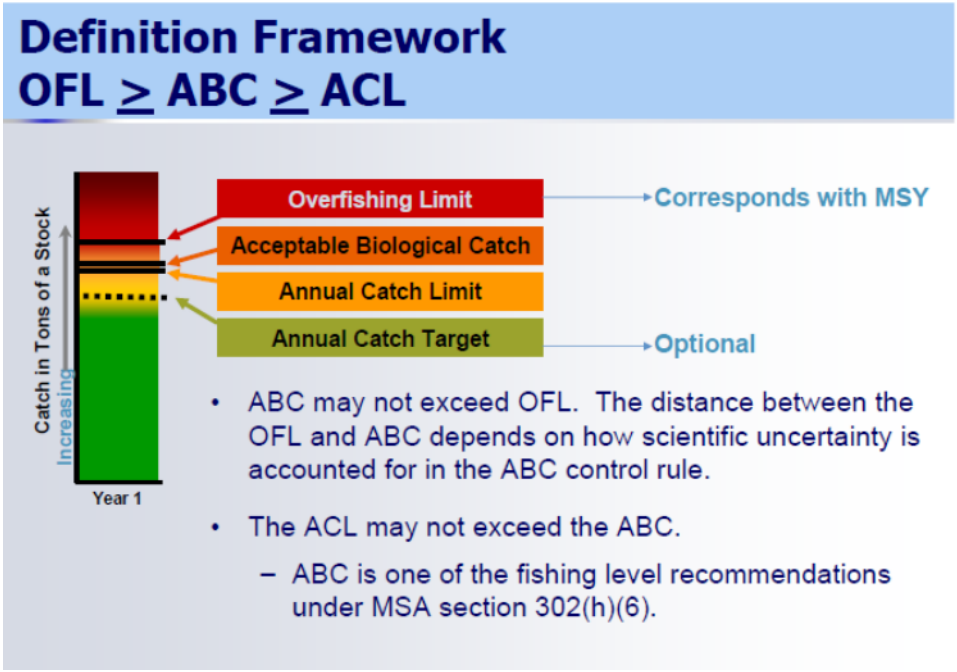

Figure 12: Framework of definitions for catch limits outlined in the National Standard Guidelines under the MSFCMA.

Annual Catch Targets are optional, but an Annual Catch Limit is required for all fisheries, usually for individual species and stocks. There may be input controls in addition to, but not instead of, ACLs. In addition, there must be Accountability Measures (AM) which spell out what actions will be taken if the ACL is exceeded. AM can be within year adjustments to the fishery (e.g., closed areas) that are made as the ACL is approached, or they can be applied in the next year such as quota paybacks (reducing the quota by the amount of the overage) or other measures to prevent future overages. AMs are a strong incentive to adhere to ACLs. However, they create a perverse feedback in a situation where the ACL is either too high because a stock assessment was too optimistic or too low because it was too pessimistic. In the former case, AMs are not applied and fishing mortality is allowed to be too high. In the latter case, fishing mortality is lower than necessary, and when an AM is applied, it is reduced further.

There are many other aspects of fishery management addressed in National Standard Guidelines.

The National Standards are one of the mechanisms that keep Fishery Management Plans in line with the goals and policies embodied in the MSFCMA. The participation of a senior official of the Federal government at FMC meetings as a Council member is another safeguard against a Council "going rouge!" (ignoring the law). The Council's are also advised by Federal lawyers that attend all meetings. The likelihood that a Fishery Management Plan that violates the MSFCMA will be challenged in a court of law is also a reason FMC members act responsibly.

The ultimate deterrent to a Council approving an FMP that is inconsistent with the law is the requirement for review and approval by the Secretary (an official nominated by the President and approved by Congress) of the Department of Commerce (which is responsible for fishery management in federal waters). This is an extensive review that considers consistency with each of the National Standards, any other applicable law, and legal precedent. The Secretary most either

approve or disapprove an FMP. He or she does not have the authority to modify the Plan. However, a "Secretarial Fishery Management Plan" may be put in place as an "emergency action" under limited circumstances, such as to prevent severe overfishing that jeopardizes the long term productivity of a fishery resource. Emergency actions have strict time limits. They are 90 day actions which can be renewed for a total duration up to one year. Secretarial Plans and emergency actions are infrequent, but they have been used as a threat to get a Fishery Management Council to comply with the law.

Other Applicable USA Law: Some of the other applicable laws considered in the Secretarial Review of a Fishery Management Plan are the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA) and the National Marine Sanctuary Act (NMSA). There are well defined (by law) consultation processes between fishery managers and Federal officials responsible for "protected species" (i.e., marine mammals and species listed as endangered or threatened). When fisheries interact with protected species, the consultations usually result in conditions that are included in fishery management regulations to reduce interactions. The conditions usually require a process for monitoring fisheries (e.g., a specific level of at sea observer coverage) and a level of estimated "takes" (e.g., entanglements in fishing gear or by-catch) that triggers further consultation and usually additional conditions and regulations.

The National Marine Sanctuary Act (NMSA) is the legal framework in the USA for a network of marine sanctuaries, or parks or Marine Protected Areas (these terms seem to be used interchangeably in the USA).[41] The following figure illustrates the current location of NMSA sanctuaries.

Figure 13: US National Marine Sanctuary System.

[41] For a description of the National Marine Sanctuaries, see: http://sanctuaries.noaa.gov/

There are currently 14 marine sanctuaries covering 435,000 km^2. The sanctuaries range in size from a few kilometres squared to 362,000 km^2 included in the Papahānaumokuākea Marine Sanctuary of the Northwest Hawaiian Islands.[42]

Unlike other applicable law, the rules of engagement between the Magnuson Stevens Fishery Conservation and Management Act and the National Marine Sanctuaries Act are not clear. Conceptually fishery management should be implemented under the authority of the MSFCMA, not the NMSA, but regulations that are aimed at protecting territory under the authority of a Marine Sanctuary, or to advance other Marine Sanctuary goals, should be carried out under the NMSA and they should apply to fishing in the Sanctuary. That is, a Marine Sanctuary should not have a regulation that prohibits fishing for the purpose of conserving a fishery resource over its range (inside and outside the Marine Sanctuary), but it could prohibit fishing within the Sanctuary to support a goal of creating a marine "wilderness area" (i.e., as close to pristine as practicable). In reality, cooperation between Fishery Management Councils and the Federal Agency responsible for fishery management and the National Marine Sanctuary program varies between FMCs and Sanctuaries.

Common Fisheries Policy of the European Union: The European Union adopted a Common Fisheries Policy (CFP) in 1982 and it has been amended (referred to as "reformed") approximately every ten years since. The most recent reform was adopted in December 13, 2013.[43] The CFP applies to commercial fishing only. Recreational fisheries may be regulated by some member countries. There is relatively little information on the importance of recreational fisheries although surveys of recreational fisheries are being planned. The CFP applies to all of the marine waters of the European Union including the Northeast Atlantic Ocean, North Sea, Baltic Sea, Mediterranean Sea and Black Sea as indicated in Figure 14:

Figure 14: CFP area.

The Common Fisheries Policy is a set of rules for managing European fishing fleets and for conserving fish stocks. Designed to manage a common resource, it gives all European fishing

[42] See: http://www.papahanaumokuakea.gov/
[43] The current Common Fishery Policy is available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:354:0022:0061:EN:PDF

fleets equal access to EU waters and fishing grounds and allows fishermen to compete fairly. The CFP aims to ensure that fishing and aquaculture are environmentally, economically and socially sustainable and that they provide a source of healthy food for EU citizens. While the European Commision Directorate General for Maritime Affairs (known as DG Marie)[44] has issued several policy aimed at sharpening goals and objectives of the CFP, such as a policy reducing fishing mortality to F_{MSY} by 2015[45], the 2013 Reform adopts MSY as a fishery management objective for the first time. It is to be achieved by 2015 if possible, and 2020 at the latest.

Another 2013 reform of the CFP is the introduction of a Landings Obligation[46] to be phased in by 2020. The obligation is to end discarding of fish at sea by creating an obligation to land the entire catch. Other countries (e.g., Norway) have similar regulations, although there effectiveness is unclear because of monitoring and enforcement challenges. Under some circumstances, but not all, requiring 100% electronic (by video) can be effective.

The 2013 reform of the CFP also changes rules about access to EU waters by vessels of member nations. In general, fishing vessels registered in the EU have equal access to all the EU waters and resources that are managed under the CFP. However, there are two temporary exceptions:[47]

- In the waters up to 12 nautical miles from the coasts of the EU countries access can be limited by the EU country to vessels and fisheries that traditionally fish in those waters from adjacent ports, to vessels identified under existing neighbourhood relations, and to vessels related to fisheries as listed in the CFP. These restrictions generally give preferred access to vessels that traditionally fish in those waters from the adjacent ports.
- In the waters up to 100 nautical miles from the coasts of Europe's outermost regions access can be restricted to vessels registered in the ports of these territories and to vessels that traditionally fish in those waters.

The exceptions expire by end 2022.

Effort limits are also formally adopted by the 2013 CFP reform. Fishing effort management is a combination of limitations to the fleet capacity and the amount of time that can be spent at sea. Often effort restrictions are applied in addition to the more generally used system of total allowable catches (TACs). Fishing effort restrictions[48] have been introduced in a number of situations (e.g., under multiannual plans for the management of a specific stock or group of stocks, and more generally, for specific areas). Management plans in the Mediterranean are sometimes centered around effort restrictions rather than TACs.

One aspect of fishery management under the Common Fishery Policy is that it is centralized with operational fishery management authority vested in the European Commission DG Marine in Brussels (a few hundred staff). Policy is the responsibility of a Council of Ministers (from each of the 28 member countries of the EU including several from landlocked countries without fisheries).

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[44] For more information on DG Marie, see: http://ec.europa.eu/maritimeaffairs/index_en.htm

[45] See Implementing sustainability in EU fisheries through maximum sustainable yield. Communication from the Commission to the Council and the European Parliament. COM (2006) 360 final at http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52006DC0360&from=EN

[46] For more details, see http://ec.europa.eu/fisheries/cfp/fishing_rules/discards/index_en.htm

[47] See: http://ec.europa.eu/fisheries/cfp/fishing_rules/access-to-waters/index_en.htm

[48] See: http://ec.europa.eu/fisheries/cfp/fishing_rules/fishing_effort/index_en.htm

Unfortunately, the boundary between policy and operations is blurred as the Council exercises the authority to adopted TACs each year, inspite of previously agreeing on Multiyear Fishery Management Plans that specify harvest control rules that should make setting TACs formulaic. What is referred to as "Christmas horsetrading between Ministers" (Council decisions are made in mid December just before taking a Christmas break) has been blamed many times for politically motivated fishery management decisions that violate fishery management advice, ultimately leading to overfishing. However, there is evidence that the situation has improved in recent years (discussed below).

While the CFP continues to centralized management (it has often been referred to as "top down" and "command and control"), it is evolving toward regionalization with greater stakeholder involvement. The previous Reform (in 2002) established Regional Advisory Councils (RACs)[49] as follows:

- Baltic Sea Advisory Council
- Long Distance Advisory Council
- Mediterranean Sea Advisory Council
- North Sea Advisory Council
- North-western waters Advisory Council
- Pelagic stocks Advisory Council
- South-western waters Advisory Council

RACs are composed of representatives of the fishing industry and other interest groups, such as representatives of environmental groups (with a 60%-40% allocation). However, while RACs were partially motivated by USA experience with Regional Fishery Management Councils, European Union Regional Advisory Councils are a far cry from a USA style co-management partnership between stakholders and government. RACs are advisory bodies only. They have limited staff (typically 2-3) such that they are limited in their ability to conduct analyses and prepare documents. Nevertheless, some RACs have taken the initiative to prepare multiyear Fishery Management Plans, but these Plans are much more limited in scope than USA FMPs. They primarily specify a Harvest Control Rule. While the European Commission DG Marie welcomes RAC proposed Fishery Management Plans, there are no guidelines on what constitutes an acceptable proposal. DG Marie and the Council of Ministers retain all authority and responsibility for fishery management.

RACs are funded by the European Commission. However, the level of funding (a few hundred thousand Euros per year) is small compared to funding of USA Fishery Management Councils.

The 2013 Reform of the CFP encourages an additional regional process[50] for fishery management planning that is likely to be more influential than RACs. The CFP foresees regionalisation to address multiannual plans, discard plans, establishment of fish stock recovery areas and measures necessary for compliance. Where regionalisation applies, EU countries with a direct management interest may agree to submit joint recommendations. The recommendations have to be compatible with the

[49] For more information about Regional Advisory Councils, see: http://ec.europa.eu/fisheries/partners/advisory-councils/index_en.htm

[50] For more information on regionalization, see: http://ec.europa.eu/fisheries/cfp/fishing_rules/regionalisation/index_en.htm

objectives of the CFP and they must be at least as stringent as measures under EU law. The EU countries have to consult the relevant RACs. If all these conditions are met, the Commission can then take steps to transform these joint recommendations into EU law. Since the countries involved in regional planning will also be represented in the decision making process of the Council of Ministers, regional plans developed according to this new provision of the CFP should have a high probabilty of being adopted.

Since the 2013 Reform of the CFP is less than a year old, a lot of the details for implementation of new provisions are still being developed.

While the decision making responsibility of the CFP remains centralized at the European Commission in Brussels, implementation is the responsibility of individual member countries of the EU. Member countries are responsible for allocating country shares of stock TACs to fishers within the country and they are responsible for scientific research, monitoring and enforcement. Most of the funding for implementing fishery management is provided by the member countries, but there are European Union funds that are distributed to member countries to assist in implementation. The relationship is similar to the relationship between USA Interjurisdictional Fishery Commissions and their member states.

Other applicable European Union Law: Like the USA, fishery management under the CFP must be consistent with other applicable law. There are two applicable laws that should be noted. They are Marine Strategy Framework Directive[51] and Natura 2000[52] of the European Union Habitat Directive.

Article 3 states the goal of the Marine Strategy Framework Directive (MSFD) as "The environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive" The MSFD specifies eleven descriptors of of Good Environmental Status (GES).[53] The Descriptors are:

1. Biodiversity is maintained
2. Non-indigenous species do not adversely alter the ecosystem
3. The population of commercial fish species is healthy
4. Elements of food webs ensure long-term abundance and reproduction
5. Eutrophication is minimised
6. The sea floor integrity ensures functioning of the ecosystem
7. Permanent alteration of hydrographical conditions does not adversely affect the ecosystem
8. Concentrations of contaminants give no effects
9. Contaminants in seafood are below safe levels
10. Marine litter does not cause harm
11. Introduction of energy (including underwater noise) does not adversely affect the ecosystem

[51] For more information on the Marine Strategy Framework Directive, see: http://ec.europa.eu/environment/marine/good-environmental-status/index_en.htm

[52] For more information on Natura 2000, see: http://ec.europa.eu/environment/nature/natura2000/index_en.htm

[53] For more information on Good Environmental Status indicators, see: http://ec.europa.eu/environment/nature/natura2000/index_en.htm

There are indicators for each descriptor and standards to determine if and when GES has been acheived. It is up to EU member countries to monitor the indicators and take action to adhere to GES standards. The MSFD was adopted in 2008 its implementation is still underway. The target for achieving GES for all eleven descriptors is 2020.

Obviously GES desriptor 3 on populations of commercial fish has implications for fisheries management. One of the issues has been agreement between fishery management status deternination criteria and GES indicators and standards. Through cooperation between fishery management agencies and environmental or conservation agencies at the European Commission and within EU countries, there seems to be agreement on MSY based criteria and standard.

Natura 2000 is an EUwide network of nature protection of both terristrial and marine areas. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. Establishing Natura 2000 sites is a mechanism for EU countries to working toward good environmental status under the Marine Strategy Framework Directive. Guidelines have been issued for establishing Natura 2000 sites in the marine environment.[54] However, member countries do not have the authority to manage fishing activity within sites although they can request the European Commission DG Marie to implement regulations under the CFP. Toward this end, Natura 2000 sites usually have stakeholder advisory processes which seek broad support for regulations within sites, including those that apply to fishing. In March 2013, the European Commission proposed legislation to create a common framework for maritime spatial planning and integrated coastal management.[55] Consultation on the proposal are ongoing. While the framework will result in broader planning than Natura 2000, it will not provide authority to manage fisheries other than the Common Fisheries Policy.

Allocation and Harvest Control Systems

Harvest control systems are used to limit fishing mortality to a desired level such that overfishing does not occur. Most USA marine fisheries use output controls referred to as annual catch limits (ACLs) or total allowable catches (TACs) as the primary harvest control system.

Prior to the 2007 reauthorization of the Magnuson Stevens Fishery Conservation and Management Act, some fisheries, in particular in New England and the Caribbean, were managed primarily with input controls instead of output controls. In New England, there were target TACs calculated to achieve a target fishing mortality. Limits on fishing effort (defined as days at sea, DAS), area and seasonal closures of large productive portions of fishing grounds, were adjusted annually to achieve the target TACs. There were also gear restrictions and minimum fish size limits. In the early years of this harvest control system, the New England Fishery Management Council often ignored scientific advice on DAS and areas to be closed, resulting in target TACs being exceed. However, by the early 2000s, scientific advice was conscientiously accepted and target TACs were rarely exceeded. The NEFMC preferred to use input controls instead of output controls because it believes that input controls are more robust to scientific uncertainty. They were probably right.

[54] The guidelines for establishing Natura 2000 sites is available at: http://ec.europa.eu/environment/nature/natura2000/marine/docs/marine_guidelines.pdf

[55] The proposal for a framework for marine spatial planning is available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0133:FIN:EN:PDF

In the case of the Caribbean Fishery Management Council (CFMC), the primary harvest control system was a system of closed areas, closed season, and gear restrictions. This input control based system was used because stock assessments upon which to base catch limits, corresponding to target levels of fishing mortality, are virtually non-existent. There was also very little capability to monitor catches and enforce catch limits. In this case, input controls were more robust to both scientific uncertainty and lack of monitoring and enforcement capability.

However, the failure of input controls to prevent overfishing in New England (during the period when advice was ignored) resulted in the Federal government and Congress losing patience with input controls and the MSFCMA was amended to require ACLs for virtually all fisheries with accountability measures as described earlier in this chapter. While the transition from input controls to output controls in New England was unpopular, it was relatively easy—science, monitoring and enforcement capabilities are among the best in the country. However, the transition in the Caribbean has probably been meaningless. Annual Catch Limits were set based on long term averages of highly uncertain catch records using a method that requires only catch data.[56] Monitoring of fisheries is such that it is unknown if there is compliance with ACLs. Without stock assessments, there is very little basis for assessing the performance of the harvest control system.

In addition of ACLs, input controls on fisheries are common. The purpose of input controls is usually to protect specific life stages of fish (e.g., juveniles or spawners) or habitat, or to reduce by-catch.

In general, MSFCMA Fishery Management Plans spell out the procedure used to specify ACLs. The procedures include what is known as an ABC control rule which describes how OFL is adjusted downward to account for scientific uncertainty. The ABC control rule may include a formula that relates fishing mortality to stock size (i.e., Harvest Control Rule or HCR). If a stock is below its minimum stock size threshold, it needs to be rebuilt to the stock size associated with MSY. In such cases, the FMP specifies F_{REB} which is expect to rebuild the stock within the required time period with an agreed probability of at least 50%. It is increasingly common for ABC control rules and Rebuilding Plans to be tested by Management Strategy Evaluation although it is also common for HCR and Rebuilding Plans to be ad hoc.

Annual Total Allowable Catches (TACs) are the primary type of control system for Northern European fisheries although there are also some input controls to supplement output controls. Effort regulations are primarily aimed at encouraging a reduction in fishing capacity. In southern Europe, such as the Mediterranean Sea, effort controls are a more common harvest control system. The rationale for effort controls for southern European fisheries is similar to the rationale for the Caribbean Sea—limited stock assessment, monitoring and enforcement capability (or perhaps motivation).

For Northern Europe where TACs are applied, it is common for TACs to be based on HCRs contained in multiannual Fishery Management Plans. These HCR relate fishing mortality to stock size and they may also have addition rules such as constraints on the amount of change in TAC from year to year (typically 15-25%). Management Strategy Evaluation is widely used to test Management Plans.

[56] As noted, even reliable catch data is problematic for fisheries of the Caribbean. However, a catch only method for calculating catch limits was used. The method is available at: http://www.afsc.noaa.gov/Publications/misc_pdf/ORCS_Report_SEFSC_Tech_Memo_616.pdf

While constraints on changes in TACs from year to year were initiated to satisfy the fishing industry's desire for a degree of stability, they have also served as a mechanism that helps separate signal from noise in stock assessment advice. In some cases, the noise has been reflected in major changes in stock assessments from year to year (rarely, but sometimes, as a result of errors), which could have un-necessarily damaged fisheries and the credibility of scientific advice if changes in TACs had not been constrained.

In terms of access to fisheries, access is controlled (e.g., limited licensing) for virtually all USA MSFCMA and EU CFP commercial fisheries. While USA fishery management includes catch quotas (i.e., a share of the ACL) on recreational fisheries as well as commercial fisheries, participation in recreational fisheries is rarely limited.

While limiting access to fisheries helps to prevent the tragedy of the commons[57] that results in overcapitalization of fisheries and dissipation of economic benefits (technically known as rent), the problem persists so long as participants in the fishery compete for as large a share of the fishery as they can get (i.e., known as the "race for the fish). Rights based allocation of a share of a fishery (Individual Transferrable Quotas is the most well-known approach), or catch share programs as they are referred to by the MSFCMA, are an effective way of combating the race. By dedicating a secure share of quota to individual fishers, fishing cooperatives, fishing communities, or other entities, fishers have an incentive to use their share efficiently and to add as much value as possible. This improves economic performance, crew safety and the quality of product available to consumers. There is also an incentive to accept some short term reductions in catch as an investment in higher cases in the long term

The first catch shares program under the authority of the MSFCMA was the mid-Atlantic surf clam and ocean quahog ITQ program which came into effect in 1990. This program was heavily influence by early stages of the New Zealand's introduction of ITQs as a National policy.[58] There are now fifteen Federal catch share programs as follows:

U.S. Catch Share Programs by Fishery Management Council

New England

- Northeast General Category Atlantic Sea Scallop IFQ, 2010
- Northeast Multispecies Sectors, 2010

Mid-Atlantic

- Mid-Atlantic Surfclam and Ocean Quahog ITQ, 1990
- Mid-Atlantic Golden Tilefish IFQ, 2009

South Atlantic

- South Atlantic Wreckfish ITQ, 1992**

[57] The idea of the tragedy of the commons was introduced by Garrett Hardin. 1968. The Tragedy of the Commons". *Science* **162** (3859): 1243–1248. 1968.

[58] Dr. Sissenwine, who was the National Marine Fisheries Service chief scientist, and Dr. Lee Anderson who was the chair of the Mid Atlantic Fishery Management Council, were also involved in implementation of New Zealand ITQs in the 1980s and they used their New Zealand experience to help guide the development of the first ITQ plan in the USA.

Gulf of Mexico

- Gulf of Mexico Red Snapper IFQ, 2007
- Gulf of Mexico Grouper-Tilefish IFQ, 2010

Pacific

- Pacific Coast Sablefish Permit Stacking, 2001
- Pacific Groundfish Trawl Rationalization, 2011

North Pacific

- Western Alaska Community Development Quota, 1992**
- Alaska Halibut and Sablefish IFQ, 1995
- American Fisheries Act (AFA) Pollock Cooperatives, 1999
- Bering Sea and Aleutian Islands Crab Rationalization Program, 2005
- Non-Pollock Trawl Catcher/Processor Groundfish Cooperatives (Amendment 80), 2008
- Central Gulf of Alaska Rockfish Cooperatives, 2012

The Federal government has a Policy that encourages catch share programs.[59] The performance of Catch Shares programs has been evaluated.[60] The evaluation concludes that catch share programs have been successful in having fishermen observe quota limits, improving overall economic benefits and efficiency, and ending the race to fish, thereby reducing pressure on fishermen to fish during unsafe conditions. Catch share programs have also been effective in reducing fishing capacity. However, catch share programs have had distributional consequences as the number of active vessels has been reduced.

While the number of catch share programs in the USA is growing, this cannot be attributed to the MSFCMA. In fact, catch share programs remain controversial, and this is reflected in the MSFCMA which creates hurdles for Fishery Management Councils to overcome if it is to develop a catch shares program. In fact, following the development of the first three ITQ programs in the early 1990s, Congress amended the MSFCMA to place a moratorium on additional ITQ plans. The moratorium has expired, but the Act now requires a referendum of all participants in a fishery that demonstrates support by a majority (sometimes a super majority of two thirds of participants) of participants for development of a catch shares plan. While participants are likely to benefit from a catch shares program, fear of the unknown and resistance to change make approval by a moratorium challenging. The USA is not an example to be followed when it comes to rights based allocation of shares in a fishery.

The Common Fisheries Policy of the European Union is silent ITQs and other approaches to rights based allocation. It is up to EU member countries to distribute their share of the Total Allowable catch to their fishers either as a common pool or as individual quota. Several, if not most, EU countries allocate their share of TACs to their fishers as ITQs. However, there is no formal transferability between fishers of different countries because of an EU policy that preserves "relative

[59] For the Catch Share policy, see: http://www.nmfs.noaa.gov/sfa/management/catch_shares/about/documents/noaa_cs_policy.pdf

[60] The evaluation of catch share programs is at: http://www.st.nmfs.noaa.gov/Assets/economics/catch-shares/documents/Catch_Shares_Report_FINAL.pdf

stability." This means that agreed country shares of TACs are maintained indefinitely. There is strong political resistance to changing country shares. Nevertheless, there are informal temporary transfers of quota between fishers of neighboring countries.

Information Collection and Analysis

Arguably, programs for information and analyses in support of fishery management are as good for the USA and EU as anywhere in the world. These programs are based on a foundation of long term research on marine ecosystems and fisheries (including the human dimension). Collectively, these programs are referred to in this review as the scientific enterprise.

In the USA, the scientific enterprise is primarily carried out by six Federal Fishery Science Centers which are composed of about 30 laboratories, 2000 staff (both employees and contract personnel), about ten oceanic (typically around 2000 GRT) fishery research vessels and several smaller coastal research vessels. The entire cost of the Federal enterprise is of the order of 500 million US dollars. Virtually all of the funding comes from direct appropriations from the Federal government. Dr. Sissenwine and Professor Brain Rothschild prepared a comprehensive review of the program in 2011. [61]

Figure 15: Oceanic fishery research vessel

The US scientific enterprise is too large and too complex to review in this document, but it is worth highlighting that it includes programs that can be categorized as:

- Long term mission oriented research[62]- This is research that is designed with application to the mission of managing fisheries (as well as other legally mandated missions such as protection of endangered species and marine mammals) as the goal. Ultimately it will serve as the foundation for advances in the other two categories of research (i.e., bullet points 2 and 3 below). The long term nature of the research is such that one can only speculate about how or when it will be applied. It includes research on ecological processes (such as processes that control recruitment), monitoring technology, and

[61] Sissenwine, M. and B. Rothschild. 2011. Building Capacity of the NMFS Science Enterprise. pp. 123 Submitted to US National Marine Fisheries Service

[62] Much of the research is on ecosystem processes. For more information on the research see: http://www.st.nmfs.noaa.gov/ecosystems/index

modelling methods for stock assessments and management strategy evaluation. However, it is not basic research which has the goal of increasing knowledge without regard to its ultimate application.

- Long term monitoring- This includes fishery independent and fishery depending monitoring.
  - Fishery Independent- Scientifically designed ecosystem surveys that collect data on fishery resource species and protected species (under the Endangered Species Act or the Marine Mammal Protection Act), including species, size and age composition, condition factors, and trophic connections (i.e., gut content). Data is also collected on primary production, zooplankton abundance, fish eggs and larvae, environmental conditions, environmental quality, climate change and habitat types. Surveys of fishery resources and ecosystems typically require about 2000 vessel days at sea with a scientific party of about 10, or 20,000 person sea days.
  - Fishery Dependent- This includes dockside monitoring of commercial landings, self reporting in logbooks (either paper or electronic) by fishers, at sea monitoring by observers or video, and satellite reporting of vessel position. The data includes landing port, quantity and value of landings, species, size and age composition, fishing effort and locations, fishing method and vessel characteristics, quantities discarded and condition of discards (e.g., live, injured, dead).[63] There are also ongoing (virtually continuous) recreational surveys[64] that estimate fishing effort by random phone surveys and estimate catch rates (per fishing trip) by intercepting anglers at sites where fishing takes place or sites where recreational vessels land. Surveys of economic activity related to commercial and recreational fisheries are also conducted on a rotating basis between fisheries and regions. An inventory of community profiles is also maintained.[65] Economic data and community profiles are used for analysis in Environmental Impact Statements and for calculation of net benefits (positive or negative) and the social impacts of management alternatives.
- Preparation of scientific advice- This includes processing and assembling fishery independent and fishery dependent data for use in stock assessment models. It also includes elaborate processes for engaging stakeholders (stock assessment meetings are virtually always open to observers), involving scientific representatives of stakeholders, documentation, peer review, presentation of results and participation in Fishery Management Council Plan Development Teams.

While it varies between regions, in general, funding for monitoring probably accounts for about half (50%) of the cost of the scientific enterprise. The remainder of the cost is about equally divide between research and advice preparation (about 25% each).[66]

[63] For information on commercial fishery statistics, see: http://www.st.nmfs.noaa.gov/commercial-fisheries/index

[64] For information on recreational fishing surveys, see: http://www.st.nmfs.noaa.gov/recreational-fisheries/index

[65] For information on economic data collection and community profiles, see: http://www.st.nmfs.noaa.gov/economics/index and http://www.st.nmfs.noaa.gov/humandimensions/index

[66] This funding breakdown is based on Dr. Sissenwine's firsthand knowledge when he was the Director of Scientific Programs up until 2005 and based on his review completed in 2011. The allocation of funds may

It is worth mentioning that the scientific enterprise described above has been relatively stable for a long period of time. Specific research topics change as scientific understanding evolves (i.e., the key questions and most promising approach), but a long term commitment to research has been important in maintaining expertise and a research culture. A research culture is important because it helps to attract quality scientists (even if they end up involved in monitoring or advice preparation) and it fosters scientific reasoning, scientific integrity and appreciation of peer review.

The most stable part of the scientific enterprise has been monitoring which should be the case since long time series of standardize observations are valuable. Ecosystem surveys of the Pacific coast (known as CalCOFI for California Cooperative Fisheries Investigation) began in the 1940s and they continue today, although at a scaled down level.[67] Autumn bottom trawl surveys of fish off the Northeastern USA began in 1963 and they have evolved into seasonal ecosystem surveys (sometimes as often as six times a year) which are ongoing.[68]

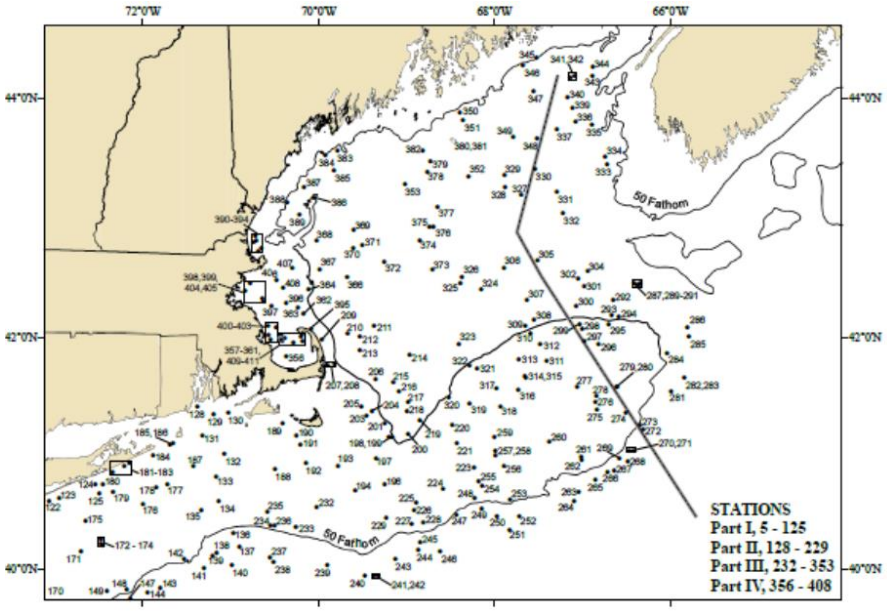

Figure 16: Randomly selected stations for a portion of the 2012 Northeast USA ecosystem survey

There is some long term fishery independent survey activity in all regions of the country.

Collection of fishery dependent data in a reasonably consistent and comprehensive manner began in some regions in the late 1800s. For most of the USA, there are reasonably reliable landings data since the 1950s or since the beginning of significant US fisheries (e.g., in the case of Alaska and Pacific Islands). Lack of reliable data for the Caribbean is the exception.

There was some data collected by at sea observers aboard fishing vessels as early as the 1950s off the Northeast USA, but consistent well designed programs with trained observers began in earnest in the 1980s. The programs have expanding substantially in terms of scope (fisheries observed) and

have changed, but the funding distribution given in this review is a sensible balance in Dr. Sissenwine's professional opinion.

[67] Information on CalCOFI is available at: http://www.calcofi.org/

[68] A description of ecosystem surveys off the Northeast USA is available at: http://www.nefsc.noaa.gov/femad/ecosurvey/mainpage/

sampling intensity over the last decade. There is a National Observer Program Office[69] that oversees at sea monitoring of forty seven fisheries by deploying about a thousand trained observers for a total of about 77,000 days at sea. Sampling designs are based on a minimum standard of a coefficient of variation of 30%. There are annual reports issued by the National Observer Program.[70]

Routine stock assessments to advise fishery management have been conducted in some regions of the country (particularly the Northeast) since the late 1960s (pre-dating USA extended jurisdiction to 200 miles). They were conducted under the auspice of the International Commission for Northwest Atlantic Fisheries (ICNAF) which was the management authority for international fisheries off the NE USA prior to the 200 mile limit. Under ICNAF working groups of diverse scientists (with different nationalities and scientific backgrounds) assembled data, applied stock assessment models and debated the results. The output from stock assessment working groups was reviewed and debated by a higher level (organizationally) committee that was responsible for fishery management advice.

Processes for conducting stock assessments and preparing scientific advice to support the MSFCMA have evolved substantially since the ICNAF era, but some of the important characteristics remain:

- Working groups with broad participation that perform stock assessments. Since participants have different backgrounds (sometime competing affiliations), working groups meetings are places of debate about methods and conclusions, while implicitly provides critical peer review.
- A higher level process with responsibility for additional peer and formulation of scientific advice.

There are regional differences in the specific process used around the USA. Some of them are known as the "SAW/SARC" process in the Northeast,[71] "SEDAR" in the Southeast[72] and STAR for the Pacific coast.[73] There is a stock assessment toolbox[74] maintained by the Federal government to support stock assessments and preparation of advice. It is a professionally programmed set of models and methods (with a high standard of documentation, testing, user interfaces and user specified outputs) for analysing data and conducting stock assessments. Not only should the toolbox make it easier to analyse data and conduct stock assessments, but it should result in greater consistency, repeatability and quality assurance.

In addition to the processes noted above, all Fishery Management Councils are required by the MSFCMA to have Scientific and Statistical Committees (SSCs). These Committees are made up of academic scientists, state scientists and federal scientists, and occasionally a scientist affiliated with a stakeholder organization (usually an environmental NGO). Members of SSCs participate in their own professional capacity, not as representatives of any organization or interest group. Depending

[69] Information on the US National Observer Program is available at: http://www.st.nmfs.noaa.gov/observer-home/index

[70] Annual reports are available at: http://www.st.nmfs.noaa.gov/observer-home/reports/nopannualreports/index

[71] The SAW/SARC process is described at: http://www.nefsc.noaa.gov/saw/

[72] SEDAR is described at: http://www.sefsc.noaa.gov/sedar/

[73] STAR panels are described at: http://www.pcouncil.org/groundfish/stock-assessments/terms-of-reference/

[74] The stock assessment toolbox is described at: http://nft.nefsc.noaa.gov/

on the region and FMC, the SSC may be a coordinating body for one of the processes mentioned above (e.g., The Pacific Fishery Management Council's SSC oversee the STAR process), another level of peer review or it may translate scientific advice from the process into a format that more directly serves the needs of FMC decision making. For examples, SSCs are responsible for translating stock assessment estimates of stock size, fishing mortality rate and MSY reference points into values of OFL and ABC (see the diagram above about National Standard 1 Guidelines).

The 2007 Amendment of the MSFCMA explicitly strengthen the role of science in the fishery management process and it made clear the difference in roles of scientists and managers by stating that a Fishery Management Council shall set:

> **"...annual catch limits for each of its managed fisheries that may not exceed the fishing level recommendations of its scientific and statistical committee …"**

This provision makes clear that scientists are responsible for scientific advice and managers must follow the advice when it comes to overfishing and rebuilding fisheries.

One thing that has changed substantially since the ICNAF era of stock assessment working groups and committees is transparency. Stakeholder are involved in the stock assessment process is all regions of the USA, and most meetings are open to observers. There is a high degree of documentation available before, during and after meetings. Results are presented to fishery managers and other stakeholders.

The scientific activities discussed above are primarily carried out by Federal scientists. However there is significant scientific activity carried out by the fishing industry in cooperation with Federal and academic scientists. This activity is referred to as "cooperative research."[75] Some of the cost of cooperative research is paid by the Federal government with funds that have been specifically appropriate for this purpose. The motivation seems to be three fold:

1. Gather more data,
2. Improve cooperation and fishing industry trust of scientific advice, and
3. Provide financial assistance to the fishing industry.

Another source of funding is "research set asides" (RSAs). RSAs are amounts of the acceptable biological catch (ABC) that is set assign to pay for research. The RSA is catch that would have been allocated to the fishery otherwise. In this sense, the fishery is paying for some of the cooperative research. Undoubtedly there are some other financial contributions to cooperative research, and there are occasional grants from Environmental Non-Governmental Organizations (ENGOs). In total, funding for cooperative research is tens of millions of US dollars.

There is also funding of research that supports fishery management by Federal Agencies that support academic research. The most significant source of fisheries related funding for academics is the National Sea Grant Program.[76]

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[75] For more information on cooperative research see: http://www.st.nmfs.noaa.gov/cooperative-research/index

[76] For more information on the Sea Grant Program, see: http://seagrant.noaa.gov/

The scientific enterprise that support the Common Fisheries Policy of the European Union is comparable to the USA in terms of scope, length of time series of data, balance between long term research, monitoring and preparation of advice, research vessel support and magnitude in terms of the number of scientists and cost. Unlike the centralized management under the CFP, the scientific enterprise is dispersed among all of the coastal member countries with programs that range from a few dozen scientists to more than 500. This international scientific effort is coordinated by the International Council for Exploration of the Sea,[77] which is an intergovernmental treaty organization that advises the European Commission (as well as Norway, Iceland, Russia, Faroe Islands, and Greenland).

The ICES advisory process has an even longer history than in the USA. A recent paper by Lassen, Kelly and Sissenwine (2014)[78] describes it. The current process is represented by the diagram below.

The ICES advisory process has an even longer history than in the USA. A recent paper by Lassen, Kelly and Sissenwine (2014)[79] describes it. The current process is represented in Figure 17.

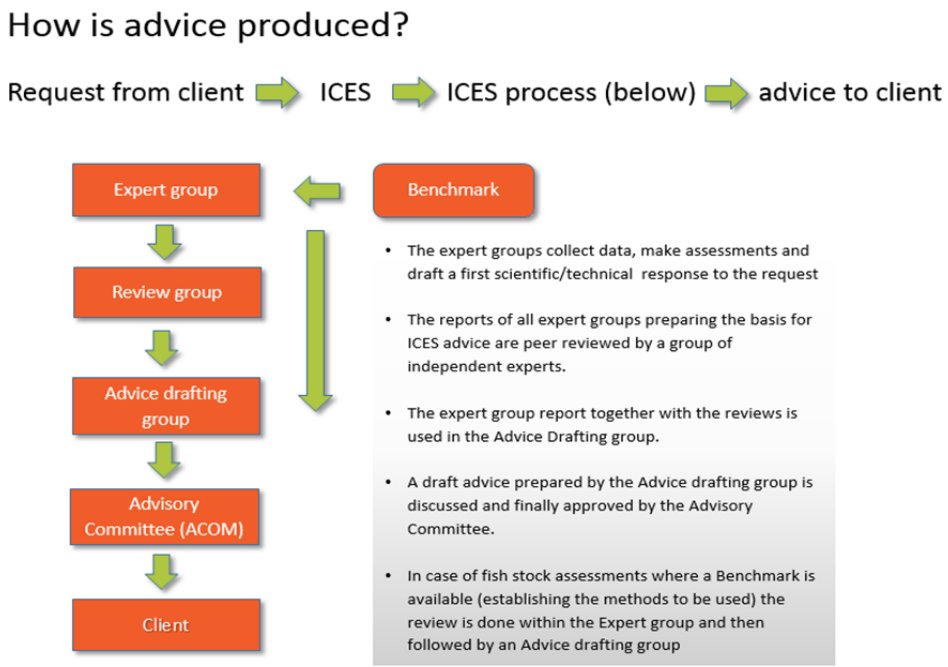


Figure 17: ICES advisory process.

All of the advisory processes of the USA and Europe have heavy workloads with the desire for advice typically outstripping the resources to provide it. In 2009, when Dr. Sissenwine was responsible for

[77] For a wealth of information about marine science in Europe that is relevant to fisheries management, visit the website of the International Council for Exploration of the Sea at: www.ICES.dk

[78] See: Lassen, H., C. Kelly and M. Sissenwine. 2014. ICES advisory framework 1977–2012: from F_{max} to precautionary approach and beyond. ICES Journal of Marine Science. 71(2): 166–172.

[79] See: Lassen, H., C. Kelly and M. Sissenwine. 2014. ICES advisory framework 1977–2012: from F_{max} to precautionary approach and beyond. ICES Journal of Marine Science. 71(2): 166–172.

the ICES Advisory Process as chair of the Advisory Committee, he summarized the workload as follows:

- 67 Expert Groups
- About 40 Review Groups and Advice Drafting Groups
- 413 meeting days
- 1510 participants (some participants attend multiple meetings)
- 5720 person days in meetings
- About 24 person years in meetings
- **Cost of about 10 million Euros**

The cost estimate is solely for the time participating in meetings, not the research, data collection, meeting preparation time, and meeting follow-up (presentations). The costs outside of meetings far exceed meeting costs (by one or two orders of magnitude). To help cope with the workload, all of the processes for preparing advice in the USA and Europe have steering groups (either informal or formal) made up of scientific leaders and leaders of the fishery management process. These steering groups set priorities, schedule work and prepare terms of reference (ToRs) for meetings (i.e., ToRs are a clear statement of the products the meeting is expected to produce).

One aspect of European processes for stock assessments and preparation of advice that has not evolved much relative to the USA and most of the world, is transparency. While there is excellent documentation, most meeting of the Advisory Process are not open to observers, and the only participants in the process are appointed by governments. There are few academic scientists or any other scientist that are not government employees.

Management of non-target species

In the USA, management of non-target species and ecosystem impacts have a high priority. The legal and policy mandates that assure this priority are the scope of fishery management in the USA, National Standard 9 and Essential Fish Habitat provisions of MSFCMA, Marine Mammal Protection Act, and Endangered Species Act. Each of these mandates is briefly discussed below.

- ***Scope of fishery management:*** US Federal fishery management applies to virtually all species taken by fisheries whether targeted or not, whether retained or discard. Thus there are assessments and management measures to prevent overfishing and rebuild overfished stocks for even minor components of fisheries. There is a provision in the National Standard 1 Guidelines for ecosystem components that do not have to be managed under certain restrictive circumstances, but this provision is not used very often (because it is so restrictive).
- ***National Standard 9 of the MSFCMA:*** This National Standard says to the extent practicable, fishery management should (a) minimize by-catch and (b) to the extent by-catch cannot be avoided, minimize the mortality of such by-catch. While there isn't a criteria for determining what's practicable when it comes to minimizing by-catch and discards, NS 9 is considered in the Secretarial review and approval process for Fishery Management Plans. Perhaps the most significant impact of NS 9 has been the priority given to at sea monitoring (by trained observers) so that the amount and species composition of discards can be quantified and taken into account in stock assessments and management.

- ***Essential Fish Habitat (EFH):*** The MSFCMA defines EFH as those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. In reality this make virtually all habitat essential to some species some of the time. The Act requires Fishery Management Plans to describe and identify essential fish habitat and to minimize, to the extent practicable, adverse effects on such habitat caused by fishing. There are also provision of the Act that allow Fishery Management Councils to intervene on behalf of fisheries if non-fishing actions (e.g., oil and gas exploration, dredging) adversely affect EFH. To comply with the Act, most Fishery Management Councils have Plans that identify EFH and measures to protect it (e.g., closed areas, gear restrictions). For example, the New England Fishery Management Council has prepared a draft Essential Fish Habitat Plan that is hundreds of pages long (5 volumes with 7 appendices).[80] A series of public hearings on the document is underway. Since the proposed actions will restrict fishing on some valuable fishing grounds, it is controversial.
- ***Marine Mammal Protection Act:*** The MMPA requires all fisheries to be categorized according to the frequencies of interactions. It also defines strategic marine mammal populations in terms of their status relative to the Optimal Sustainable Population size (OSP). They are strategic if there population size is lower than OSP. Fisheries that have significant interactions with strategic species of marine mammals require a Take Reduction Plan (TRP) which specifies conditions that most be incorporated in fishery management plans. One of the conditions usually specifies the amount of at sea monitoring that is required in order to estimate takes of strategic species of marine mammals. If the number of takes exceeds the Potential Biological Removal (PBR) of the species, additional conditions to reduce interactions are usually issued although there is the potential for the fishery to be closed.[81]
- ***Endangered Species Act:*** The Endangered Species Act (ESA) requires that fishery managers consult with Federal officials responsible for implementation of the ESA on all fisheries that interact with endangered or threatened species. These consultations produce a document known as a biological opinion, which specifies conditions that must be included in a Fishery Management Plan in order for the fishery to be allowed to operate. There is also an Incidental Take Statement (ITS) which indicates the number of ESA animals that is expected to be taken (presumably an amount that will not jeopardize the species) if there is compliance with the conditions. If the number of animals in the ITS is exceeded, another consultation and Biological Opinion is triggered.[82]

Information on marine mammals and ESA listed species is collected during ecosystem surveys described earlier in this review and by species specific research and monitoring programs. For marine mammals, there are substantial ongoing programs of ship and aircraft line transect surveys for pelagic species. There are also beach counts of seals and sea lions, as well as for endangered or threaten species of sea turtles.

[80] The draft EFH amendment is available at: http://www.nefmc.org/habitat/index.html

[81] For more information on the provisions of the Marine Mammal Protection Act that apply to fisheries, see: http://www.nmfs.noaa.gov/pr/interactions/mmap/

[82] For more information on the Endangered Species Act and Biological Opinions, see: http://www.nmfs.noaa.gov/pr/laws/esa/

In Europe, processes for protection of marine mammals and endangered and threaten species is not well developed as in the USA. It is unclear how significant interactions between these species and fisheries are in European waters.

With respect to habitat, there is concern in Europe about the effects of deepwater fisheries on fragile coldwater coral and sponge habitats. The Northeast Atlantic Fisheries Commission (NEAFC) has agreed to large area closures to protect vulnerable habitat. [83]

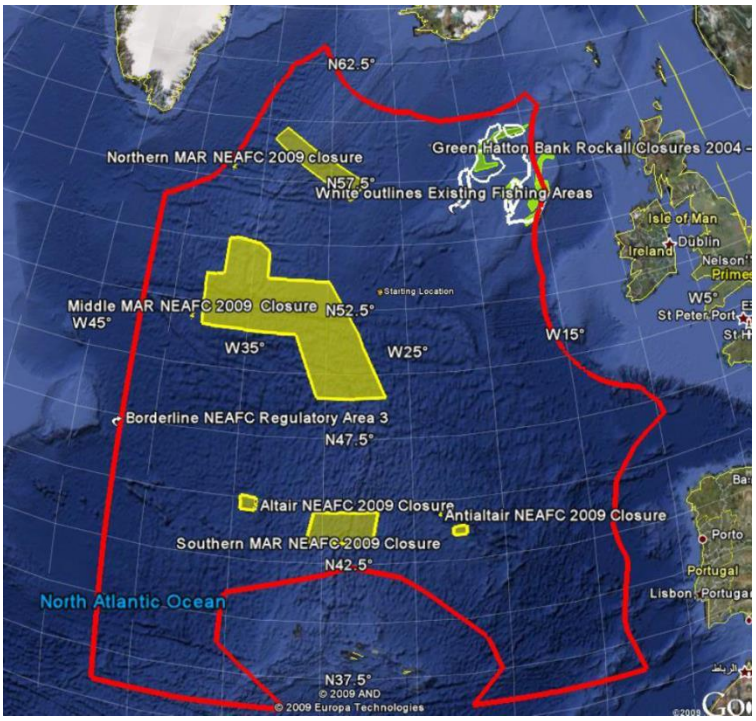


Figure 18: NEAFC high seas closures to protect vulnerable marine ecosystems.

Compliance system

The USA has strong compliance capability and so does Northern Europe. While it is unfair to judge the compliance capability of Southern Europe in general, it is widely known that enforcement and accurate reporting of catches from the Mediterranean Sea is a problem.

In the USA, the Federal Agency responsible for Fishery Management has a National law enforcement program with personnel and assets distributed regionally. [84] The program includes uniformed officers that patrol fishing ports, investigators that are highly trained in forensic accounting and other techniques, Coast Guard vessels that conduct at sea compliance monitoring and enforcement, enforcement attorneys and administrative law judges. Officers and investigators are highly trained include training at the Federal Bureau of Investigation's (FBI) training facility.

[83] For more information on NEAFC closures, see: http://www.neafc.org/managing_fisheries/vmec

[84] For more information on the National Office for Enforcement, see: http://www.nmfs.noaa.gov/ole/index.html

The total number of Federal fishery officers and investigators is a few hundred. This enforcement capability is supported by cooperative enforcement agreements[85] with states that drawn on a large force of state conservation officers and enforcement agents.

Most prosecutions are for civil violations resulting in fines or forfeiture of catch. There is a published policy on setting penalties for civil violations[86] under most circumstances. Typical fines for a first offence are $5000 USD. There is also some discretion to issue warnings or be lenient when violations are accidental or a result of a misunderstanding. More serious violations (usually fraud and conspire involving several violations over an extended period of time) are prosecuted as criminal violations. There have been a few convictions that have resulted in prison sentences.

One of the important technologies used for law enforcement is satellite electronic monitoring of fishing vessel position (Vessel Monitoring System, VMS) which is required on a large proportion of vessels capable of multiday fishing trips and increasingly on all vessels. In addition, as Federal law enforcement agents, investigators and the Coast Guard have access to some highly sophisticated confidential technologies used by the Department of Homeland Security.

It is hard to estimate the cost of fisheries enforcement in the USA because a large portion of the cost is for Coast Guard patrol vessels that are performing multiple missions in addition to fisheries enforcement (e.g., drug interdiction, anti-terrorism). Most of the cost is paid by funds appropriate by Congress. There is one source of funds that comes from the fishery. There is an "Asset Forfeiture Fund" that sets aside funds for enforcement uses that result from selling forfeited landings and from civil fines. However, the existence of such a fund creates the potential for a conflict of interest and potential abuse. This problem was raised in an audit conducted by the Department of Commerce's Office of the Inspector General (IG) which raised enough concern to prompt the IG to criticize the fund in testimony given at a Congressional Hearing.[87] As a result the IG audit, improvements have been made in the management of the Asset Forfeiture Fund and in law enforcement procedures in general.[88]

The European Union also has a substantial law enforcement capability except that it is up to the individual countries to enforce regulations, not the European Commission (EC) itself. However, the EC DG Marie sets policy for enforcement at the EU level and it sets "ground rules" for enforcement by member countries.[89] The EC also monitors enforcement by individual member countries and it can take legal action against them if they do not enforce Common Fishery Policy regulations. In a high profile decision by the European Court of Justice, France was fined tens of millions of Euros for

[85] For more information on cooperative enforcement agreements, see: http://www.nmfs.noaa.gov/ole/about/our_programs/cooperative.html

[86] The policy for setting penalties for civil violations is available at: http://www.gc.noaa.gov/documents/enforcement/draft-penalty-policy.pdf

[87] The testimony of the Inspector General is available at: http://www.oig.doc.gov/OIGPublications/OIG-11-028-T.pdf

[88] For up to date information on the reform of the Department of Law enforcement following Inspector General's report of problems, see: http://www.gc.noaa.gov/documents/enforcement/draft-penalty-policy.pdf

[89] See: http://ec.europa.eu/fisheries/cfp/control/index_en.htm

not enforcing blue fin tuna quotas in the Mediterranean Sea. This precedent was, in part, the impetus, for modernizing EU enforcement. [90]

Stakeholder participation

Little more be said about stakeholder participation in USA fishery Management. The Fishery Management Council system set up under the MSFCMA is perhaps the longest standing and most comprehensive co-management system of stakeholders and several jurisdictions of government that exists anywhere. Stakeholders also have a role in inter-jurisdictional management between states and in scientific processes for preparing advice on fishery management.

In the European Union, the role of stakeholders is not as strong as in the USA, but the establishment of Regional Advisory Committees and the creation of a framework for regionalization under the most recent reform of the Common Fisheries Policy are steps in the right direction.

Performance Review

The highest level of performance review in the USA is the regular review and amendment (about every 5 years) of the Magnuson Stevens Fishery Conservation Act. Substantial changes have been made in an effort to fix perceived weaknesses.

At the other end of the spectrum of performance review, the Federal government reports almost continuously on performance relative to the highest priority objectives of the MSFCMA- preventing overfishing and rebuilding overfished stocks.[91] In 2013, the report indicates that of 300 assessed stocks, 17% are overfished and 9% are undergoing overfishing. The status of USA fisheries has steadily improved over the most recent decade. Since 2000, the USA has tracked performance of 227 stocks that account for 90% of landings with a Fish Stock Sustainability Index (FSSI). The index gives credit for a stock assessment that is deemed sufficient to determine stock status and addition credit for stocks that are not overfished and when overfishing is not occurring. The FSSI is given in Figure 19:

[90] For the EC regulation that modernizes enforcement, see: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:343:0001:0050:EN:PDF

[91] For quarterly reviews of the status of USA fisheries, see: http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/

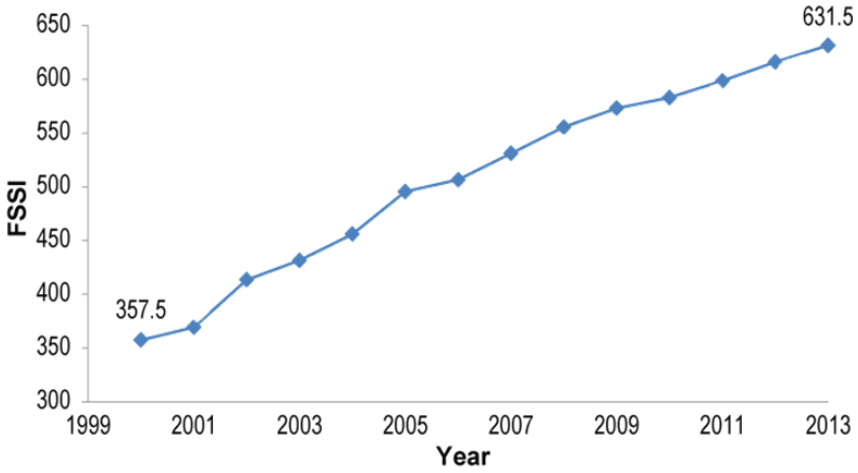


Figure 19: Fish stock sustainability index (higher is better).

In between the extremes of review of the law and stock status, there are routine reviews of:

- National Standard Guidelines- The Federal Government announced its intention to review and revised the National Standard Guidelines and it solicited proposals for change. The process of revising the Guidelines is ongoing.
- Fishery Management Plans- FMPs are reviewed routinely. If they do not satisfy the requirement to prevent overfishing and rebuild fisheries, the Federal government notifies the FMC that the FMP must be amended (usually within one year) to correct problems.
- Scientific Advice- As described earlier, there is several levels of review of scientific advice.
- Scientific Programs- The Federal government agency that is responsible for fishery management has a long term plan for rotating science program reviews.[92] For example, data collection programs (fishery dependent and fishery independent) were reviewed in 2013.[93] Stock assessments and processes to prepare scientific advice are being reviewed in 2014.
- Other types of program reviews- An example is the review of Catch Shares mention (and footnoted) earlier in this document. Another example is the review of MSFCMA rebuilding plans conducted by the US National Research Council of the National Academies of Sciences.[94] The report indicates a substantial portion of stocks fishery managers' take credit for rebuilding were actually not overfished. They were rebuilt as a resulted of re-assessing the stocks, not fishery management. The implication is that there are also some stocks in need of rebuilding that have incorrectly been classified as not overfished. The results of this review are receiving a lot of attention in current discussions about amendment of the MSFCMA and revision of the National Standard Guidelines.

[92] A description of the plan for science program reviews is given at: http://www.st.nmfs.noaa.gov/science-program-review/index

[93] For program review reports, see: http://www.st.nmfs.noaa.gov/science-program-review/program-review-reports/index

[94] The report is available at: http://www.nap.edu/openbook.php?record_id=18488

The European Union has similar reviews of performance to the USA. The Common Fishery Policy is schedule for reform every ten years. The reform process is initiated by reviews of performance and comment and debate on proposed changes.

In terms of review of outcomes, the European Commission reports on the status of fisheries relative to overfishing based on assessments by the International Commission for Exploration of the Sea[95] and from other sources of information. The most recent results are as follows:

- The fish stock data for the Mediterranean show a dismal picture: 96% or more of the Mediterranean bottom-living fish are overfished, and for the middle-water stocks like sardine and anchovy the figure is 71% or more. For the Black Sea, all bottom-living fish and 33% of pelagic stocks are overfished.
- For the Northeast Atlantic area, and that includes the Baltic and North Seas, overfishing has fallen from 86% (30 stocks overfished out of 35 assessed) in 2009 to 41% (19 out of 46 stocks) in 2014.

Overfishing is defined relative to F_{MSY}. It is noteworthy that the decline in the proportion of overfished stocks of the Northeast Atlantic area coincides with ICES beginning to give advice in terms of F_{MSY} instead of the previous framework for advice which condoned high fishing mortality rates.[96]

Resourcing

The budget of the USA Federal Agency that is responsible for fisheries management approaches a billion USD. A substantial portion of the budget fulfils other mandates (e.g., Marine Mammal Protection Act, and Endangered Species Act), but the most expensive mandate is fishery management, and the science enterprise in support of fishery management is the most expensive cost of fishery management. Other costs, like support for Fishery Management Councils (probably about $25 million USD annually) and enforcement, are substantial. The cost of fishery management in the USA is several percent (perhaps around 5%) of the ex-vessel value of commercial landings. However, the ex-vessel value of landings underestimates benefit to the Nation from fisheries. For example it ignores the health benefits of fish, multiplier effects in the economy, value of recreational fishing and cultural values.

Most of the cost of fishery management in the USA is born by taxpayers through Congressional appropriations. User fees are minor, and such fees only cover administrative costs of issuing permits. The fishing industry pays observers for a few fisheries (primarily the factory trawler ground fish fishery off Alaska), but most of the cost of observer programs is paid by the Federal government. Some costs of cooperative research are paid by the fishing industry (either directly or through research set asides from the allowable catch). There have also been industry funded buybacks of excess fishing capacity, usually with government guaranteed loans. These contributions are important and they are financially significant from the perspective of the fishing industry, but they are minor overall.

[95] For a report on the status of EU fisheries, see: http://europa.eu/rapid/press-release_IP-14-724_en.htm

[96] For a review of the evolution in ICES frameworks for giving advice, see: Lassen, H., C. Kelly and M. Sissenwine. 2014. ICES advisory framework 1977–2012: from F_{max} to precautionary approach and beyond. ICES Journal of Marine Science. 71(2): 166–172.

The cost of fishery management in the European Union is probably comparable to the USA, but these costs are distributed between the European Commission and member countries. Arrangements for funding (e.g., appropriated funds, user fees) varies between countries.

Australian Commonwealth-managed Fisheries (AFMA)

Key points

Policy, Legislation and Decision making

- AFMA is a statutory Authority or a Commission that operates under an independent Chair and Board. Although part of the Public Service it is designed to remove the Minister from day to day fisheries management.
- The "Securing Our Fishing Future" package drove improvement to AFMA processes and progressive management arrangements for Australia's Commonwealth fisheries.
- The Minister is ultimately responsible but most decision making is delegated to the Chair and Board of the Authority and the CEO. DAFF has an ongoing role in policy and international and regional engagement.
- AFMA has a strong policy setting largely though the 2005 Ministerial Direction to AFMA and the 2012 review further strengthened and enshrined the 2005 Directions.
- The legislation and supporting regulations enshrine both rights and responsibilities for participants in the industry.
- HSP and ERM processes are well understood and have been influential in improving the understanding of the status of Australian fish stocks and has allowed AFMA to deal with bycatch species and impacts on the broader environment.

Management plans, Allocation, Harvest Strategies, Recreational and Customary Fishing

- The combination of FMPs, Harvest Strategies and clear allocation arrangements works well in AFMA and should be considered best practice.
- The implementation of these practices has led to the recovery of a number of important Commonwealth fisheries.
- The use of the Tier approach in the SESSF is a sound approach to the management of multi-species fisheries and assists with dealing with by-catch considerations.
- Once established a Fisheries Management Plan is a statutory document and can only be changed if the changes are approved by the Minister following consultation with industry. Again there are processes to follow and principles to be applied if changes are to be considered.
- AFMA has been asked to consider recreational fishing interests and allocations as part of their fisheries management plans.

Information Collection and Analysis

- AFMA's adoption of electronic monitoring systems is logical and will position the agency well in the future for information collection and analysis in a cost effective manner.
- Observer coverage is important for the checking of data accuracy and information on by-catch interaction. AFMA licences are issued on the clear understanding that all operators can be requested to accept observers at any point in time.

Management of non-target species

- AFMA has a well described and advanced system of assessing and progressively managing by-catch in Commonwealth managed fisheries that could be used as a model in any Australian agency.

Compliance

- AFMA has a strong well planned risk based approach to compliance.
- The use of industry briefing before the start of new seasons in some fisheries is a good initiative.
- AFMA utilizes a number of approaches including VMS, catch monitoring, port monitoring, comparison of vessel performance and surveillance to inform approaches to compliance.
- Good compliance in fisheries can lead to developments in co-management, which can reduce the burden of cost and reduce the reliance on compliance.
- AFMA's approach has and continues to improve compliance in the Commonwealth fishery.

Stakeholder Participation

- Stakeholder participation is one of the strengths of the AFMA model. The MACs and RAGs are well resourced and are managed under independent chairs.
- One potential weakness in the model is the lack of a Fisheries Policy Council or a more formal consultative way to regularly review policy.
- The structure of the peak industry based organization is well respected and effective.

Performance review

- AFMA legislation and performance is the subject of regular review. The AFMA legislation and regulation is updated annually and sometime bi-annually in consultation with DAFF and the Minister and through a formal process.

Resourcing

- The AFMA Cost Recovery process is well documented, transparent and well understood. Industry is consulted through the MAC process on cost although this does not include compliance planning or funding. The government pays the cost of non-industry attributed costs.

The AFMA Model

The AFMA model of fisheries management has now been in place for some 20 years and support for it from industry and government have allowed it to mature and develop over this period. This support has not always been positive but what has been strongly supported has been the participatory approach allowing industry to advise the decision making in decision making and the "hands off" from day to day decision making that appeal to Federal Ministers.

This AFMA model while not perfect for all situations and jurisdictions contains many of the elements essential to "good fisheries management practices". This system struggled for recognition in its early years and it wasn't until it was given real teeth and direction following the Commonwealth fisheries statement "Securing or Fishing Future" by Minister MacDonald in 2006 that the management system began to strengthen and show its real merit as a process.

Generally AMFA is responsible for the management and stewardship of Australia's fisheries resource's outside of the 3 nm Coastal waters. The fisheries inside these waters are managed by the States. However, under the Offshore Constitutional Settlement arrangements have been developed

that see the states assume jurisdiction for species well into the 200 nm and for the Commonwealth to manage species throughout their range and therefore into the 3nm zone.

Most of the AFMA managed fisheries are larger industrial type fisheries, fished by bigger boats and by companies and as such the structure of the fishery is quite different to what might be encountered in Queensland and as such some of the practices and structures adopted that make AFMA successful may not apply. However there are many aspects of AFMA management that are sound and innovative and in this fishery would be considered best practice. These include:

- the Ministerial Direction the MAC arrangements
- quota allocation and management,
- Harvest Strategy Policy,
- Co-management,
- risk assessed compliance approaches,
- the consideration of the ecosystem impact of fisheries management,
- the research and assessment investment in fish stocks to better inform management decision and,
- The use of electronic and internet based management systems, e-logs, Gofish, e-licencing.

Evolutionary process

Prior to this current model entering into force in 1992 and the Commonwealth fisheries were managed by the Australian Fisheries Service which was part of the Department of Agriculture and with the Minister for that portfolio responsible for the day to day decision making.

Following the 1989 review of the Australian Fisheries Service the Commonwealth issued a policy statement on Commonwealth fisheries, “New Directions for Commonwealth Fisheries in the 1990”. These policy documents lead to the creation of today’s fisheries management system and importantly changed a number of key processes to ensure accountability, flexibility, direction and improved structure.

The creation of this modern Commonwealth fisheries system included:

1. The Minister is responsible for policy and legislation and for limited decisions under the Fisheries Management and Fisheries Administration Acts. However, the new approach removed the Minister from day to day decision making and these functions were delegated to the Chair and Board of the Authority (AFMA) and the CEO of the new agency.
2. AFMA was created as a technical agency with responsibility to implement policy, deliver on the objectives in the Fisheries Management act (FMA), report and manage in line with the Fisheries Administration Act (FAA), in a cost efficient way manage fisheries, and develop reporting, monitoring and compliance services.
3. As AFMA was originally created as a Statutory Authority outside of the public service DAFF was retained to develop policy, provide advice to the Minister and to represent Australia in international fisheries negotiations. This role in the management of migratory fish stocks with regional partners often overlaps with AFMA implementing the agreed management arrangements from the Regional Commissions under its legislation. With pelagic Commonwealth species like Southern Blue Fin and Yellow fin tuna and the marlin’s there is

also an interaction on recreational catch by state based anglers with the state administrations over jurisdiction.

While AFMA performed reasonably in the first 12 years, continued overfishing of Commonwealth fish stocks continued to plague the government. It was evident that AFMA had licenced too many vessels to fish in the fishery and the decision making framework was incapable of adjusting for sustainability.

In 2005 the government announced "Securing Australia Fishing Future". This was the most influential package of measures that effectively "secured" the future of Australia's Commonwealth fisheries and set a framework for the efficient and sustainable Commonwealth fishing industry that we have today.

The key component of this package was a strong Ministerial Direction to AFMA that set the policy framework for the future management of the Commonwealth fisheries and the sustainability limits to which stocks could be fished. This one document was the missing link in the Commonwealth management system and it provided the guidance and direction to change both industry and AFMA and to allow the management system to be effective in the sustainable management of these fish stocks.

Today the major Commonwealth fisheries are managed under Fisheries Management Plans and thirteen (13) of these fisheries have Harvest Strategy Polices and all are assessed using the tiered Ecological Risk Management (ERM) framework.

The AFMA controlled portion of the Australian fishery is estimated to be worth some $308 million in 2012 down from $320 mill in 2011. The annual cost of management is in the order of $40 million. The AFMA structure and policy for fisheries provides long term "bankable" rights to industry in terms of quota and vessel licences and the fishery return a long term sustainable benefit to the Australian public in terms of consistent catch volumes, employment in regional centres, and safe Australian seafood.

AFMA manages the following fisheries:

- Antarctic
- Bass Strait Central Zone Scallop
- Christmas Island and Cocos (Keeling) Islands
- Coral Sea
- Eastern Tuna and Billfish
- High Seas Permits
- Norfolk Island
- North West Slope Trawl
- Northern Prawn
- Skipjack Tuna
- Small Pelagic
- Southern and Eastern Scalefish and Shark
- Southern Bluefin Tuna
- Southern Squid Jig
- South Tasman Rise
- Torres Strait
- Western Deepwater Trawl

- Western Tuna and Billfish

Legislation, policy and decision making framework

Policy

The key changes flowing from the 1989 Policy Statement created AFMA as a Statutory Authority responsible to the Minister for Agriculture and Fisheries, but under a CEO and a Chairman and an appointed Board and an independent Chair appointed by the Minister. The Minister was removed the day to day decision making with decisions taken by the Board and the CEO after consultation with industry and stakeholders through a properly constituted consultative framework including Management Advisory Committees (MAC's) and Research Advisory Groups (RAGs).

As the Authority was jointly funded by industry and government, AFMA formally reports to Government as part of the DAFF portfolio. As AFMA was an independent Authority, DAFF as a Federal Agency retain the role of providing advice to the Minister on the performance of Commonwealth fisheries and AFMA, fisheries policy and policy changes, and a senior DAFF official was a formal member of the AFMA Board. DAFF also retained its role and responsibility to lead in regional and international fisheries negotiations and that is logical as it was deemed inappropriate for these to be led by a statutory authority.

Other policy changes included cost recovery implemented for costs that were a reflection of direct industry activities and the AFMA model as mentioned briefly above included the establishment of Management Advisory Committee's (MACs) and Research Advisory Groups (RAGs) to provide for balanced industry and stakeholder input in providing advice on issues to AFMA and the Board.

In 2002 the then government undertook a review of the Commonwealth Fisheries Policy which by association looked at AFMA's stewardship of the Commonwealth Fisheries. The report from this review was titled "Looking to the Future: The Commonwealth Fisheries Policy Review".

In 2005 following continued overfishing of Australia's fish stocks and ongoing industry and community concern, the Commonwealth announced a suite of measures "Securing Australia Fishing Future". As mentioned above the key elements in this package were the Ministerial Direction to AFMA, the requirement for the Commonwealth to develop and implement a Harvest Strategy Policy (HSP) and the implementation a $220 million industry buy back and support program to reduce the number of vessels and license holders active in the fishery leading to a restructure to a more profitable and sustainable industry.

Following concerns with the handling of the *MV Margiris* case in 2012, AFMA was again reviewed *"Review of Commonwealth Legislation, Policy and Management; Borthwick 2012"*. This review made a number of recommendations that have or are now being applied and they include:

- Giving clearer ministerial direction to AFMA by setting out an overarching fisheries management policy framework;
- Changing the objectives in the Fisheries Acts to reflect more equally the range of commercial and environmental (and other) issues to be addressed;
- Reaffirming the primacy of revamped Fisheries Management Plans as the main vehicle for public consultation, with greater analysis of options and consequences being brought out;

- Leveraging off the above measures to accredit the framework to develop fisheries management plans under the EPBC Act but with the capacity for the Fisheries Minister (in consultation with the Environment Minister) to seek independent advice, commission audits and ultimately to vary a plan (subject to specified provisions);
- Recognising recreational fishing; and
- Making Co-management more of a priority (*Executive Summary 2012*) .

The most important "policy direction" that changed AFMA and improved the sustainability of the Commonwealth fisheries is encapsulated in the Ministerial Direction issued to AFMA in 2005 (copy attached). What this Ministerial Direction did was provide an unequivocal set of instructions on how Australia's Commonwealth fisheries would be managed into the future. It includes instructions not to overfish fish stocks, to recover those that are, not to fish above MSY, to implement a strong science based approach to stock assessment, to implement Harvest Strategies in fisheries and to manage fisheries by output controls where ever possible. No other single policy statement or document has done so much to ensure the long term sustainability of Australia's Commonwealth fisheries and to set a platform for practical and modern fisheries management practices.

Legislation

The AFMA website provides a good overview of the legislative arrangement's in place for AFMA:

"The objectives, powers and functions of AFMA are defined by the legislation which established it and a range of legislation which it administers. AFMA's legislative basis represents the power invested in it by the Commonwealth Parliament to manage Australia's fishing future".

AFMA is established under the *Fisheries Administration Act 1991* . AFMA is invested with objectives, functions and powers under the *Fisheries Administration Act 1991* and the *Fisheries Management Act 1991*. These key pieces of legislation provide the fundamental statutory basis for AFMA operations.

Management plans for fisheries are established under the *Fisheries Management Act 1991*, and this Act also sets out the legislative basis for Statutory Fishing Rights (SFRs), licenses and permits.

The *Fisheries Management Act 1991* defines the Australian Fishing Zone (AFZ), provides for the majority of Commonwealth fisheries offences, underpins domestic and foreign compliance work and provides enforcement powers to protect Australia's Commonwealth fishery resources.

The *Fisheries Management Act 1991* also sets out the Australian government's priorities and responsibilities in relation to the pursuit of ecologically sustainable development. In addition to the above, AFMA is also responsible the administration of the *Torres Straits Fisheries Act* with DAFF and the Queensland Government for the administration of the Torres Straits fisheries under the Protected Zone Joint Authority.

The objectives established in the Fisheries Management Act are important to understand and are as follows:

(1) The following objectives must be pursued by the Minister in the administration of this Act and by AFMA in the performance of its functions:

(a) implementing efficient and cost-effective fisheries management on behalf of the Commonwealth; and
(b) ensuring that the exploitation of fisheries resources and the carrying on of any related activities are conducted in a manner consistent with the principles of ecologically sustainable development (which include the exercise of the precautionary principle), in particular the need to have regard to the impact of fishing activities on non-target species and the long term sustainability of the marine environment; and
(c) (c) maximising the net economic returns to the Australian community from the management of Australian fisheries; and
(d) ensuring accountability to the fishing industry and to the Australian community in AFMA's management of fisheries resources; and
(e) achieving government targets in relation to the recovery of the costs of AFMA.

(2) In addition to the objectives mentioned in subsection (1), or in section 78 of this Act, the Minister, AFMA and Joint Authorities are to have regard to the objectives of:

(a) ensuring, through proper conservation and management measures, that the living resources of the AFZ are not endangered by over-exploitation; and

(b) achieving the optimum utilisation of the living resources of the AFZ; and

(c) ensuring that conservation and management measures in the AFZ and the high seas implement Australia's obligations under international agreements that deal with fish stocks; and

(d) to the extent that Australia has obligations:

(i) under international law; or

(ii) under the Compliance Agreement or any other international agreement;

in relation to fishing activities by Australian-flagged boats on the high seas that are additional to the obligations referred to in paragraph (c)—ensuring that Australia implements those first-mentioned obligations; but must ensure, as far as practicable, that measures adopted in pursuit of those objectives must not be inconsistent with the preservation, conservation and protection of all species of whales.

These objectives are reasonably clear and easy to articulate. The FMA is also linked to the EPBC Act which requires the assessment of fisheries where product is destined for export There are a number of Regulations, Management Papers and fisheries specific regulations that help to explain and implement legislation and policy.

Decision Making Processes

At the highest level, the Minister for Agriculture Fisheries and Forestry remains ultimately responsible to parliament for the performance of Australia's fisheries and for the performance of

AFMA as a Commission and its Board. The Minister is responsible for the policy direction for the Commission and the policy setting for the performance of the fisheries.

DAFF is responsible for briefing the Minister on Fisheries issues and highlighting issues with AFMA if appropriate. DAFF have a responsibility for developing supporting policy and legislation and for regional and international engagement. Those powers that cannot be delegated by the Minister, apply to the approval and amendment of Fisheries Management Plans, decisions on Joint Authority arrangements with States and territories and the approval of annual budgets.

Decision making for most issues, however, is delegated by the Minister to the CEO and to the Chair and Board of the Commission. The major reason for this logical approach is that AFMA is principally a technical agency responsible for implementing policy, managing fisheries and compliance and monitoring and analysing data on fisheries catches and interactions. This approach is strongly supported by both government and industry as it avoids the Minister having to be involved in day to day management issues but at the same time allows industry formal input and influence on fisheries management decisions.

On 1 July 2008 AFMA was integrated into the Australian Public Service as a Commission, but under a model that retained the Board, Chair and decision making structure from the previous statutory authority model. The Board while retained however changed its nature and people with holdings in the fisheries could not hold board positions The changes were made to ensure that AFMA would implement government policy.

Under the FMA the Commission and the CEO have delegated decision making powers that are applied in accordance with government policy and the objectives of the FMA.

Decisions taken with regard to the harvest levels of fish stocks in fisheries are taken in accordance with the adopted HSP for those fisheries and following lengthy discussion by scientists following stock assessments. The management advice from this discussion is then considered by the MAC and formal advice is provided to AFMA and the Commission (Board) on the preferred management approach.

Other fisheries management decisions are arrived at it in a similar fashion with issues discussed in detail at the MAC with industry and other stakeholders and recommendations put to AFMA and the Commission for decision. Decisions on cost recovery are also taken in consultation with the MACs.

Regionalism

There is no policy on regionalism in AFMA either in policy or legislation. The general objectives and principles apply across all AFMA fisheries. The Joint Authority arrangements and the management of the Torres Strait species are all consistent with these general principles.

The use of MACs and RAGs has a regional element to it as they are constructed to represent fisheries from a specific area and in that sense could be considered “regional”.

Management Plans, Allocations and Harvest Control systems

Statutory Management Plans

All major Commonwealth fisheries are managed under approved Fishery Management Plans (FMPs). FMPs are established under Section 17 of the FMA and approved by the Minster under Section 18. Section 17 details the process in consulting and developing a FMP and provides guidelines as to its content. However, importantly a FMP allocates rights in a fishery and these become legal and tradable rights. FMPs are established for individual fisheries e.g. NPF, Small Pelagic fisheries, Southern Shark and as such they are managed on a regional basis throughout the range of the species. Generally when rights are allocated it is as part of establishing a HSP and developing and implementing FMPs. For small scale or developing fisheries AFMA may decide not to have a full FMP and manage the fishery through consultation with industry and in such cases fisheries permits are allocated.

A FMP should be consistent with Section 17 (6):

(6) Without limiting the operation of subsection (5), a plan of management for a fishery may:

(a) determine the method or methods by which the fishing capacity of the fishery or a part of the fishery is to be measured, which may be or include, but are not limited to, a method based on a particular area, a particular species or type or a particular quantity of fish, a particular kind, size or quantity of fishing equipment, a particular number of boats, a particular period of fishing, or any combination of the above; and

(aa) determine, or provide for AFMA to determine, the fishing capacity, measured by that method or those methods, permitted for the fishery or a part of the fishery in respect of a particular period or periods; and

(b) provide for the management of the fishery by means of a system of statutory fishing rights, and other fishing concessions; and

(c) contain a description of the fishery by reference to area, fish species, fishing methods to be employed or any other matter; and

(d) subject to section 28, formulate procedures to be followed for selecting persons to whom fishing concessions are to be granted including, in the case of fishing rights:

(i) the holding of an auction; or

(ii) the calling of tenders; and

(e) specify the kind and quantity of equipment that may be used in the fishery; and

(f) specify the circumstances in which a statutory fishing right may authorise fishing by or from a foreign boat; and

(g) impose obligations on the holders of fishing concessions; and

(h) prohibit or regulate recreational fishing in the fishery; and

(i) prohibit or regulate fishing for scientific research purposes in the fishery.

Related to the Fisheries Management Plans and the harvest strategy approach was the Ministerial direction that instructed AFMA as follows:

1. *AFMA must also have regard to, participate in, or implement the following measures:*
   a) *Implement the long standing government policy of managing Commonwealth fisheries using output controls in the form of individual transferable quotas by 2010 unless there is a strong case that can be made to me, on a fishery by fishery basis, that this would not be cost effectives or would be otherwise detrimental;*

The use of ITQs which bestow ownership and consequential stewardship of a portion of the resource to an individual or a company, is an important element of the Commonwealth approach as it moves the fishery away from the more difficult to manage input controls and provides the individual with tradable rights that exist in perpetuity.

Harvest Strategy Policy

The Commonwealth developed a Harvest Strategy Policy (HSP) in 2007 for Commonwealth fisheries. This policy was reviewed in 2013. The 2013 review concluded:

"Overall the review found that harvest strategy policy is widely regarded as having been a very successful initiative for improving the management of Commonwealth fisheries and remains a strong foundation for Commonwealth fisheries management. The review also found that the policy and guidelines meet or exceed the standards of relevant international obligations and continue to represent best practice in most respects."

Information on the Commonwealth harvest Policy and good examples of Commonwealth harvest Strategy Frameworks for individual fisheries can be found in the following documents:

1. Commonwealth Fisheries Strategy: Policy and Guidelines August 2007;
2. Harvest Strategy Framework for the Southern and Eastern Scale-fish and Shark fishery (SESSF) (Version 1.2); and
3. ETBF Harvest Strategy Simplified.

The 2007 HSP incorporated the following principles:

The experience of good fisheries management indicates that, in general terms:

- *fisheries are more efficient, profitable, stable and sustainable, when stocks are larger than the stock size that produces the maximum sustainable yield[3](referred to as B_{MSY});*
- *future productivity is at greater risk when stocks are reduced to a level where the recruitment of young fish relative to the portion of the stock subject to fishing declines precipitously (referred to as 'recruitment failure');*
- *fisheries should be managed on a whole stock basis, and in a way that takes species life history into account;*
- *economic returns can be maximized and in general, overcapitalization avoided when fish stocks are maintained, on average, at a target adult biomass level equal to the maximum economic yield (B_{MEY});and*

- *if stock sizes fall below B_{MEY}, the associated increase in fishing costs is greater than the increase in fishing revenue, and as such is less efficient.*

In developing the policy it was agreed that the following rules would apply in the strategy:

Harvest strategies will seek to:

- *maintain fish stocks, on average, at a target biomass point (B_{TARG}) equal to the stock size required to produce maximum economic yield (B_{MEY})[7];*
- *ensure fish stocks will remain above a biomass level[8] where the risk to the stock is regarded as too high, that is B_{LIM} (or proxy)[9]; and*
- *ensure that the stock stays above the limit biomass level at least 90% of the time[8].*

For a stock below B_{LIM}, a stock rebuilding strategy will be developed to rebuild the stock to B_{TARG}. Once such a stock is above B_{LIM} it may be appropriate for targeted fishing to re-commence in-line with the stock rebuilding strategy and harvest strategy.

This Harvest Strategy Policy has been very successful in providing a clear direction to fishermen and managers as to how stocks were to be managed and what the allowable harvest levels were to be following the assessments. The framework was important in removing the "political" and at times uninformed debate about the status of the stocks. Initially industry was concerned that the policy would not work and that it would lead only to a continued reduction in catch.

Once this was proven to be incorrect and there were both increases and decreases based on the assessments and the application of the harvest control rules, the policy became widely accepted and that is reflected now in the conclusion of the 2013 review.

Harvest Strategies have now been applied to 13 AFMA managed fisheries. These are individual strategies that reflect the requirements of the fishery involved but are all consistent and in line with the Harvest Strategy Policy. In multi-species fisheries such as the SESSF it is recognised that it will not be possible to keep all species to the Target Reference Point (TRP) and that some species will be taken as by-catch and as such they have developed process to evaluate species by Tiers based on the scientific knowledge help for each species. This is a useful technique and Tier 1 species we have a lot of knowledge of and they are important to the fishery and as such the get more assessment and attention than say a Tier 4 species where we have limited knowledge of the species and a small amount of catch. The advantage of this process forces the RAG and MAC process to consider and categorise all species and when combined with the ERM approach (see below), becomes an important aspect of by-catch management as well as the management of target species.

The 2013 report of the performance of Australian fisheries shows considerable improvement. In this current report while it is difficult to focus specifically on Commonwealth stocks, it would appear from the table that only three (3) Commonwealth species Southern Bluefin, School shark and Bigeye are overfished. Two of these Southern Blue Fin and Bigeye are subject to catch and management through Regional Fisheries Management Organisations (RFMOs).

Allocation

Allocation policies in Commonwealth-managed fisheries are generally focused on the commercial sector, although recent reviews have highlighted the need to strengthen consideration of recreational catches. The 2012 Borthwick review specifically recommends that AFMA should consider recreational fisheries in allocations.

Allocation of fisheries concessions are the responsibility of AFMA under Section 7 of the FMA. Fisheries Management Paper No 7 provides advice and principles on how these allocations will be made. Allocations can be made as part of a Statutory Management Plan or as part of a Fisheries Permit. The AFMA website contains a summary of the process for allocating rights:

Establishment of well defined, divisible, secure and transferable fishing concessions are a major factor in the successful pursuit of AFMA's ESD, economic efficiency and cost-effective management objectives. However, it is recognised that continually changing the method of allocation of fishing concessions will weaken those concessions and make effective fisheries management difficult. Accordingly, the fishing concessions that exist in a fishery at the time that management arrangements are proposed to change, are the ones that will be taken into account under any allocation of concessions required by the move from one management regime to another.

It should also be recognised that there will be instances where, in pursuing AFMA's legislative objectives, it is not possible to achieve an equivalent translation of the fishing concession when changing from one management regime to another. Clearly, in these circumstances, it is not possible to design an allocation formula that will have absolutely no impact on the relative economic position of individual operators.

A body of legal case history in relation to allocation of fishing concessions has been established both in Australia and overseas which demonstrates that fishing concession allocations resulting in a significant and differential economic impact on individual operators (which cannot be balanced against fisheries management objectives) run the risk of being successfully challenged. From a legal and fisheries management perspective, AFMA will explicitly endeavour to minimise any adverse differential economic impacts on individual operators.

Therefore, AFMA's approach to allocation of fishing concessions is based on the premise that, in making any management changes, AFMA will ensure that:

1. *such changes are consistent with and support the pursuit of AFMA's legislative objectives; and*
2. *any differential economic impacts of allocations on individual fishing concession holders are minimised unless there are reasons, justifiable with respect to AFMA's legislative objectives, that dictate otherwise.*

This system of allocating concession is well understood within AFMA and the process involves establishing a panel led by a judge and including an industry representative without an interest in the fishery and an economist to recommend to the Commission the process for the allocation of the concessions in the selected fishery.

There is an established appeals process for license holders who feel that they have been disadvantaged by the proposed allocation. For allocations made under a FMP there is a Statutory Fishing Rights Appeals Panel (SFRAP) appointed by the Minster and if the holder is still unhappy they appeal to the Federal Court. For allocations under a Fisheries Permit the appeals are through the Administrative Appeal Tribunal (AAT) and then if unhappy to the Federal Court.

Recreational and Customary Rights

The 2012 review of the Commonwealth Fisheries policy (Borthwick 2012), recommended as follows:

"As noted previously, the Review considers that the fisheries Acts should give explicit acknowledgement to the need for AFMA to give consideration to the interests of recreational anglers. They contribute a lot to the economic and social life of our country, all the more so in regional areas."

The recommendation goes on to suggest that AFMA look at resource sharing arrangements as part of Fisheries Management Plans for each fishery. Resource sharing with recreational game and charter sectors is particularly important for AFMA for a number of reasons:

1. A number of key Tuna and billfish species are management through Regional Fisheries Management Organisations (RFMOs). One of these Southern Bluefin Tuna is managed by at RFMO under strict quota arrangements.
2. In fisheries such as the South East Trawl fishery a number of species such as flathead are targeted by recreational fishermen and are also part of the commercial allocation.
3. AFMA needs catch data from all sectors in order to conduct proper assessments of these species.

The licensing of recreational fishermen where appropriate or legislated is undertaken by the States, as is the boat licensing for Charter boats. For Southern Bluefin tuna and other species the States also have boat limits for the daily catch limits for individual species. As boats have increased in size and recreational fishermen have a greater range there will be more impact with commercial fishermen on both commercial and demersal species, and an example of this is that black marlin and longtail tuna in the Northern Territory are both recreational only species. As such developing sensible and enforceable resource sharing arrangements that include consideration of data provision and cost sharing would seem to be a sensible way to proceed.

Customary Fisheries

The AFMA Corporate Plan acknowledges that:

When developing and implementing fisheries management arrangements, AFMA works in partnership with stakeholders, including commercial fishing operators, indigenous people and communities, the prescribed peak industry body and sectoral associations, recreational/charter fishing representatives, researchers, environment/conservation organisations, other Australian Government Agencies and others who have an interest in how Australia's Commonwealth fisheries are managed.

AFMA is involved in the management of the Torres Straits fisheries under the Torres Straits Fisheries Act and is part of the Protect Zone Joint Authority arrangements. AFMA is also involved with Queensland and the NT is the administration of the Joint Authority for Gulf of Carpentaria fisheries. Outside of the Torres Strait fisheries, most of the fisheries with strong indigenous fisheries interest and engagement are state based and inshore fisheries. However, AFMA has a responsibility to consult with stakeholders who have an interest in any of the AFMA managed fisheries.

The Torres Strait consultation, allocation and management arrangements are well known to the Torres Strait Islanders, Queensland and the Commonwealth. These current arrangements leave open the question of potential improvement in management and the allocation of rights. The current decisions under the Native Title determinations and any proposed changes to management arrangements in the Torres Straits will impact this Review of Queensland Fisheries through the interaction between the Qld Fisheries Act, the Commonwealth Act, The Torres Straits Fisheries Act and the Native Title determinations will require careful and informed consideration.

Information collection and analysis

AFMAs main data collection comes from the following sources:

- Catch and effort logbooks
- Electronic monitoring
- Observers
- Compliance monitoring programs (VMS and catch disposal records)

Data collection is an integral part of fisheries management and underpins all science in these fisheries as it is used as the basis of stock assessments. The catch and effort logbooks and observer reports are collected and data entered into a data base in AFMA. This information is then provided to ABARES and CSIRO as service providers and to relevant regional fisheries management organisations for migratory fish stock assessments. AFMA is now converting to e-logs to provide more timely and accurate data and to reduce costs on industry.

AFMA also uses acoustic surveys (orange roughy) and genetic studies Southern Bluefin and orange roughy) to improve the accuracy of assessments and the understanding of these species.

The catch and effort logbooks are used by ABARES to provide government with the GVP of industry and to monitor the economic performance of the fisheries.

AFMA has an expectation that it will provide observer coverage at 8% of the trips in a fishery. Observer reports provide a check on the catch and effort log books and importantly check by-catch information. The move to electronic monitoring is a sound strategic move particularly for longline fisheries as it can provide 100% coverage in fisheries at a lower cost than physical observers.

Management of non-target species

The 2005, a Ministerial Direction called for AFMA to:

- Manage the broader environmental impacts of fishing, including protected species;

- Minimise the incentives for discarding by ensuring it is factored into the setting of total allowable catch (TAC) levels; and
- Enhance the monitoring of fishing activity, through increased use of vessel monitoring systems (VMS) with daily reporting, on-board cameras and improved observer coverage.

In early 2007, AFMA implemented a three (3) year By-catch and Discard Program.

The Ecological Risk Management (ERM) framework adopted by AFMA outlines a process for assessing and addressing the impacts that fisheries' activities have on five aspects of the marine ecosystem (AFMA website);

- *target species*
- *byproduct and discard species*
- *threatened, endangered and protected (TEP) species*
- *habitats; and*
- *communities.*

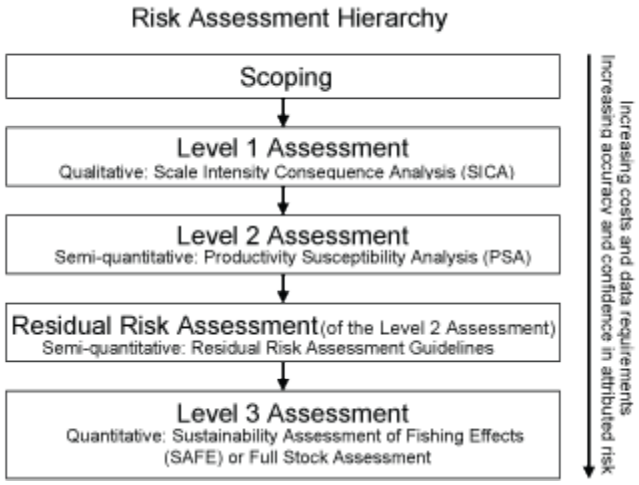
This By-catch and Discard Program involves the development of fishery specific workplans which focus on 'high risk' by-catch and threatened, endangered and protected species, identified though the Ecological Risk Assessment or (ERA) process. This process is described on the AFMA website as follows:

Fishery Risk Assessment Reports and Management Strategies

A progression of risk assessments have now been completed for all major Commonwealth-managed fisheries.

The risk assessments are applied hierarchically and are an efficient means of screening out low-risk activities and focusing increasing attention on those activities assessed as having a greater environmental impact on Australia's fisheries.

This hierarchical structure is detailed below.



Risk assessments have now been completed to at least the Residual Risk Assessment Level 2 for all major Commonwealth fisheries, with most having undergone further quantitative risk assessments.

The assessments under this ERM/ERA methodology have now been completed for all major Commonwealth-managed fisheries.

As part of this process and where justified, AFMA have developed specific closures to cope with the catch of endangered species including closing large areas for sea lions and seals and for gulper sharks. AFMA also mandates turtle excluder devices in the NPF, and bird lines in certain fisheries.

Information on interactions with by-catch and endangered species is collected as part of the logbook and observer reports collected for each fishery.

Compliance system

AFMA has a dedicated and well-resourced Compliance section that has moved away from what might be seen as "traditional" compliance approaches to adopt risk based assessments to underpin targeted compliance approaches that achieve real outcomes. This risk based approach includes analytical work on data holdings and the use of intelligent systems to identify risk. AFMA also retains a "boots on the ground" presence around the ports and at meetings as this can act as a deterrent, and is also involved in briefings with the industry prior to the start of new fishing seasons. An important AFMA innovation in some fisheries such as the Northern Prawn fishery is to publish the "rules" for each season prior to its start and this forms the basis for the pre-season briefing with industry and skippers.

As mentioned above the funding for these programs is not negotiated as part of the budget discussion with MACs but fishers understand that a good level of compliance will reduce the need for expensive surveillance and monitoring for their fishery. Good compliance can also lead to a move towards co-management which is seen by both industry and AFMA as a desirable outcome as it reduces the cost of managing the compliance in the fishery and provides incentive to industry to improve compliance and behaviour.

Inherent in AFMA more mature and targeted approach is not a "body count" of cases or individuals taken to court, but it does involve all cases being successfully prosecuted through attention to process and evidence and a move towards voluntary compliance that can assured by risk assessment programs and monitoring.

AFMA works with its State counterparts and relevant police agencies in pursuing compliance activities and works under the provision of the Privacy Act. However, AFMA has moved away from the old approach of having the State agencies contracted to undertake port based surveillance and monitoring activities that were contracted on a per activity basis and contributed little but to annoy industry.

All vessels fishing in the Australian fishing zone must have an operational VMS and must have copies of their licences on board the vessel. Each skipper must complete log books on daily catches and shots. This data is now entered daily on e-logs. Vessels must also carry observers as required.

The AFMA website provides a practical understanding of the domestic compliance processes which are included below. AFMA also has a broader international and EEZ based compliance program for IUU fishing and for activities in the sub-Antarctic however, these activities are not relevant for this review, although they do occur in the outer reaches of the GBRMPA and the TPZA.

Sanctions for noncompliance can include a range of penalties from fines, to suspension of rights to court imposed penalties.

Stakeholder participation

Stakeholder participation is one of the strengths of the AFMA approach and is a statutory responsibility for AFMA through the development of the FMPs, the MAC and RAG processes. The MAC process allows industry to have direct input to management advice and to interact with scientists and managers to debate current and strategic issues. The MAC and RAG process are widely supported in the Commonwealth sector. Coupled with this formal approach, the AFMA Board regularly conducts its business in fishing ports and this provides for a further level of industry input and discussion on issues of importance.

The 1991 Fisheries Management Act included a provision for a Fisheries Policy Council, however, this was never initiated and instead Ministers tended to rely on an annual meeting with industry to discuss current issues and for DAFF Fisheries Branch to develop policy in response to government interests and social pressure. It is debatable if this process ever really worked and that one of the gaps in the Commonwealth structure is an agreed process to review policy and to recommend changes on a regular basis.

AFMA also maintains an up to date website so it can both provide industry with web based tools but can communicate quickly with them on important issues. AFMA also publishes AFMA News on a regular basis.

The Commonwealth Fisheries Association is an industry funded organization, representative of the different industry sectors, that engages with government including AFMA and DAFF on broader management and environmental issues. This organization came to the fore following the demise of the previous national industry organization and its strength is that it is industry funded and led. This organization and relationship works well for both industry and government and is underpinned by sector specific industry organizations that also play an important role in developing the relationship between the parties an providing an entry point to discussion on important issues. Organizations such as the Australian Tuna Boat Owners Association (ATBOA) and the South East Trawl Fishing Industry Association (SETFIA) are good examples of these organizations.

Performance Review

AFMA is subject to normal federal government reporting process and is subject to an annual audit and appearance before Senate Estimates. All of the fisheries are reviewed and reported on annually under the ABARES publication “Status of Key Australian Fish Stocks”, which reports on any overfishing or recovery of stocks.

During its tenure AFMA has been the subject of three (3) policy reviews and all have added to or strengthened AFMA's mandate and management performance. AFMA has also been reviewed by the Australian National Audit office (ANAO).

The FMA is regularly updated to allow for changes in policy direction or to accommodate decisions taken in the RFMO's with respect to migratory fish stocks. Changes to the Act or regulations are discussed with industry and the drafted changes must pass through a formal government process before acclimation and entry into law.

Resourcing

One of the suggested 1989 changes was to introduce cost recover for those elements of fisheries management that are directly related to industry. This process was reviewed in 2002 following the Governments adoption of the 2002 Productivity Commission Review of Cost Recovery. This broader approach requires AFMA to have Cost Recovery Impact Statement to apportion costs and to allocate levies by fishery to Concession holders. The Cost Recovery Impact Statement (CRIS) for AFMA was negotiated under the Commonwealth rules for cost recovery for regulatory agencies and certified in 2004. This CRIS was reviewed and refined as appropriate within the guidelines in 2009. A budget is presented to the MAC each year and this is discussed and negotiated then advice on cost goes forward to the Board and Minister. One element that is no longer negotiable with industry is the compliance component of the budget (effective management requires effective resourcing).

The costs that are considered government related or community costs are born by government. The separation of these costs is explained in the Cost Recovery Impact Statement. The Commonwealth government has a well understood policy that it will not charge industry a resource rent.

The AFMA model operating as a small business agency in isolation of the economic benefits that accrues to large departments. AFMA provides all the services of a larger agency and this has inherent costs in terms of direct expense and in the quality of the product or service that it is able to provide. AFMA has been successful to date in maintaining its Canberra based agency by reducing costs and automating services where possible, however, the long-term future of this small business agency model in the Canberra environment will be subject to much debate as we move forward.

Annex A

2005 Ministerial Direction to AFMA

This is a reproduction of Senator the Hon. Ian Macdonald, Minister for Fisheries, Forestry and Conservation's letter to the Chair of the Australian Fisheries Management Authority on 16 December 2005, published in the Commonwealth of Australia Gazette, No. S234, Tuesday 20 December 2005.

Mr Tony Rundle

Chair

Australian Fisheries Management Authority

PO Box 7051

Canberra Business Centre

CANBERRA ACT 2610

Dear Mr Rundle

I refer to the management of Commonwealth fisheries and the need to improve their biological and economic status.

As I have indicated to you in previous correspondence, the Government is committed to taking decisive action during this term to put an end to overfishing, and to limit the risk of future overfishing.

The current trajectories for stock recovery in many fisheries are very long, indicating that a faster pace of recovery is necessary if fisheries are to return to sustainable and profitable circumstances in the medium term. I am satisfied that, because of the poor biological and economic status of a number of the fisheries, exceptional circumstances exist and it is necessary for me to direct the Australian Fisheries Management Authority (AFMA), under the authority of section 91 of the *Fisheries Administration Act 1991* (FAA), to ensure that AFMA's ongoing performance of its functions, and the exercise of its powers, do not conflict with Government policy.

As such, consistent with section 91 of the FAA, I am writing to direct AFMA as follows:

4. Noting the qualification in relation to internationally-managed fisheries in paragraph 2(a)(iv) below, AFMA must take immediate action in all Commonwealth fisheries to:
   a) cease overfishing and recover overfished stocks to levels that will ensure long term sustainability and productivity;
   b) avoid further species from becoming overfished in the short and long term; and
   c) manage the broader environmental impacts of fishing, including on threatened species or those otherwise protected under the *Environment Protection and Biodiversity Conservation Act 1999*.

5. AFMA must take a more strategic, science-based approach to setting total allowable catch and/or effort levels in Commonwealth fisheries, consistent with a world's best practice Commonwealth Harvest Strategy Policy that has the objectives of managing fish stocks sustainably and profitably, putting an end to overfishing, and ensuring that currently overfished stocks are rebuilt within reasonable timeframes, as set out below:
   a) Consistent with the United Nations Fish Stocks Agreement, and based on advice from CSIRO and other relevant scientists, the initial setting of the Commonwealth Harvest Strategy Policy, should be:
      i. in all Commonwealth fisheries the exploitation rate of target stocks in any fishing year will not exceed that giving the Maximum Sustainable Yield. The catch of target stocks in all Commonwealth fisheries will not exceed the Maximum Sustainable Yield in any fishing year unless otherwise consistent with a scientifically robust harvest strategy designed to achieve a sustainable target level and that does not result in overfishing or overfished stocks;
      ii. for the initial and default harvest strategy, reductions in exploitation rate and catch are to be implemented immediately when breeding stocks are assessed to have been reduced below 40% of pre-fished levels, and targeted fishing to cease when breeding stocks are assessed to have been reduced below 20% of pre-fished levels (known as '20/40' harvest strategy). Alternative harvest strategies may be developed in specific cases where they meet the sustainability objectives and do not result in overfishing or overfished stocks;
      iii. the harvest strategy must achieve the objective of avoiding overfishing and avoiding overfished stocks with at least 80% probability (where lack of knowledge about a fish stock precludes decision making with this level of certainty, decisions on catch/units should reflect the application of the precautionary principle); and
      iv. noting that for internationally-managed fisheries to which Australia is a party (such as the Southern Bluefin Tuna Fishery and the Heard Island and McDonald Islands Fishery) the relevant international agreement will prevail where it includes an acceptable scientific process for setting sustainable catch levels. In such fora, Australia will advocate its domestic policy settings as an example of best practice.
   b) Participate in an expert review of the policy referred to in paragraph 2(a) above which will report to me by 30 June 2006.
      - The expert-based review of the above initial settings for the Commonwealth Harvest Strategy Policy will determine if, and by how much, these settings should be amended to ensure that the objectives in relation to sustainability and profitability, overfishing and recovery of stocks are met within specified time limits.
      - The expectation is that for some species, the adoption of more conservative harvest strategies with higher stock size thresholds (e.g. '30/50' strategies, lower exploitation rates or a higher probability (e.g. 90-95%) of avoiding overfishing will be necessary to achieve these objectives.
      - The review will be led by the Department of Agriculture, Fisheries and Forestry (DAFF), will involve relevant bodies, and will be peer reviewed by international fisheries experts.
6. Noting that AFMA has released the Total Allowable Catch (TAC) levels for 2006 in the Southern and eastern Scalefish and Shark Fishery (SESSF) and projected TAC and Total Allowable Effort (TAE) levels for the SESSF and the Eastern Tuna and Billfish Fishery respectively for 2007, AFMA

must implement by 1 January 2007, harvest strategies consistent with the reviewed policy in paragraph 2(b) above for all Commonwealth fisheries:

- the projected TACs and TAEs for 2007 referred to above will be subject to verification under the reviewed policy in paragraph 2(b), however it is not expected that these will vary significantly from those already announced by AFMA;
- the TAC level for the Bass Strait Central Zone Scallop fishery should be set at zero for a minimum of three years from January 2006, (excluding official stock surveys).

7. AFMA must also have regard to, participate in, or implement the following measures:
   b) Implement the long standing government policy of managing Commonwealth fisheries using output controls in the form of individual transferable quotas by 2010 unless there is a strong case that can be made to me, on a fishery by fishery basis, that this would not be cost effectives or would be otherwise detrimental;
   c) In those fisheries where quota or effort-based Statutory Fishing Rights (SFRs) have been granted, conduct a cost-benefit analysis to determine whether boat permits and/or boat SFRs are an impediment to autonomous adjustment or are otherwise a barrier to efficient fisheries management and if this is the case, whether they could be phased out by 2010 while:
      i. Avoiding overcapitalisation;
      ii. Retaining the benefits of government funded structural adjustment;
      iii. Managing access to all retained species.
   d) Minimise the incentives for discarding by ensuring it is factored into the setting of total allowable catch levels;
   e) Manage the broader environmental impacts of fishing, including minimising the level of interactions with threatened or otherwise protected species;
   f) Enhance the monitoring of fishing activity, for example through increased use of vessel monitoring systems with daily reporting, on-board cameras, and observers;
   g) Establish a system of independent surveys for all major Commonwealth fisheries by 1 January 2007 to increase the transparency and integrity of catch and effort information;
   h) Identify and implement any required spatial closures in fisheries;
      - Ensure that where ongoing exclusion of fishing is proposed there is a coordinated approach with other relevant agencies to the identification of the Marine Protected Areas; and
   i) Strengthen the advice to the AFMA Board by engaging high-level expertise in economics and science to provide parallel advice to the AFMA Board in relation to key Board decisions.
8. AFMA must provide me with reports in May 2006, November 2006 and May 2007, outlining the following:
   a) how AFMA is implementing this direction (paragraphs 1-4 above);
   b) AFMA's progress in implementing the direction and expected timeframes for completing the direction; and
   c) any problems encountered with implementing the direction and the actions taken to resolve those problems.
9. From 2006 – 2010, AFMA will outline in its Annual report its progress in implementing this direction.

I will be monitoring AFMA's performance in implementing the direction in a number of ways. These will include, but are not limited to:

a) AFMA's reports to me in May 2006, November 2007 and May 2007;
b) ongoing briefing from my Department on the progress of the expert-based reviews;
c) the June 2006 report on the expert-based review of the Commonwealth Harvest Strategy Policy;
d) ongoing advice from BRS on the status of overfished stocks, particularly through its annual Fishery Status Reports;
e) ongoing advice from ABARE on the economic status of Commonwealth fisheries through the annual Fishery Survey Reports;
f) AFMA' Annual Reports;
g) the Department of the Environment and Heritage's strategic assessments of Commonwealth fisheries.

Recognising the poor economic conditions being experienced by many Commonwealth fisheries, the Government is implementing a substantial structural adjustment package to encourage the removal of excess fishing capacity. The assistance and cooperation of the AFMA Board in implementing this program, in conjunction with the measures outlined above, would be appreciated. I will be writing to you separately with details of the assistance package.

In accordance with section 91 of the FAA I will provide a notice setting out the particulars of this direction to be published in the Gazette and a copy of the notice to be laid before each House of the Parliament within fifteen days of publication in the Gazette. I note that there is also a requirement under the FAA for AFMA to include particulars of the direction and particulars of the impact of that direction on the operations of AFMA, in its next annual report.

I would welcome the opportunity to meet with you and the AFMA Board to discuss this direction and how AFMA plans to implement the measures outlined above.

Yours Sincerely

Ian Macdonald

Norway

Introduction

Norway has a total population of 4.88million spread over 385,252km^2. The GDP/capita is NOK 493,032 (approx. €65,934) with an unemployment rate of 3.5% (Statistics Norway, 2012).

Fishing is an industry of major economic and social importance to Norway. Fishing and fish farming represent 0.7 percent of the gross domestic product (GDP) in 2010, with 12 900 full-time equivalents employed in the sector[97]. In 2009, Norway ranked 11th in global capture fisheries production and the 7th in aquaculture production. It produced 3.5 million tonnes of seafood, about 25 percent coming from the aquaculture industry. Norway is the world's second largest exporter of fish and fish products by value. In 2012, seafood products were the second most important export item after oil and gas and accounted for around 6% of Norway's total exports.

Norway is the second most important fishing nation in Europe by total catch (Figure 20) – second only to Russia and more than twice the level of the next largest European producer of seafood (Spain).

The importance of fisheries is evident through its prominent role in high level political debate and decision-making. For example, maintaining sovereignty over fisheries management has been cited as one of the decisive factors in Norway's decision not to join the EU (OECD, no date).

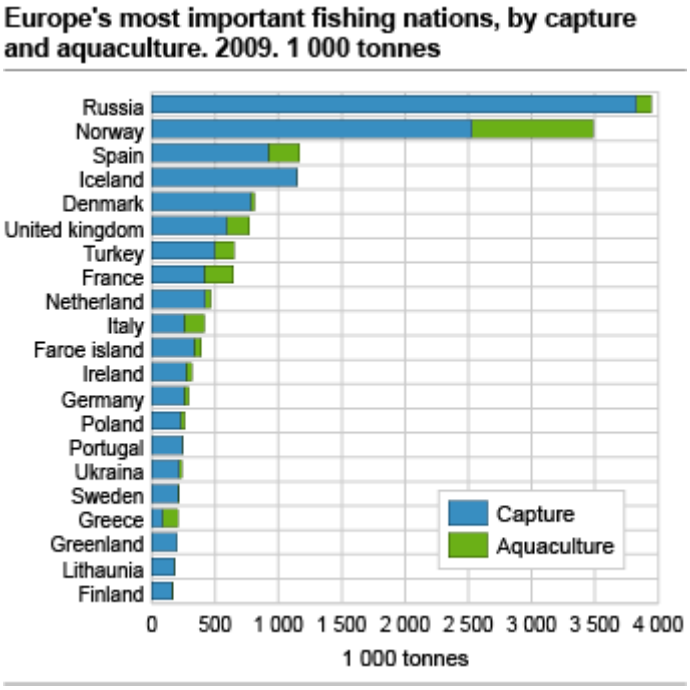


Figure 20: Europe's largest fishing nations in fish production (Statistics Norway, 2012).

The overall development of capture fisheries has resulted in the use of fewer and more efficient fishing boats. The number of fishermen has decreased steadily since the 1940s, from about 122 000

[97] http://www.fao.org/fishery/facp/NOR/en

to 12 800 in 2011. The number of registered vessels has also experienced a strong reduction, from about 13 000 to 6 250 during the period 2000 to 2011.

The main capture species include herring, cod, capelin, mackerel, saithe, blue whiting, and haddock. A number of additional species are caught in smaller quantities but have high commercial value. These include prawns, Greenland halibut and ling. Total catches from marine capture fisheries were almost 2.7 million tonnes in 2010, with the highest catches recorded being of the order of 3.4 million tonnes in 1977.

In 2010, the total number of people employed directly by fishing was 10,725 which equates to 0.2% of total population or 0.33% of those aged 15-64 (Statistics Norway, 2012). Despite this, there are many regions in the north of Norway which are highly dependent on fisheries as part of their livelihood which can be seen in **Error! Reference source not found.**.

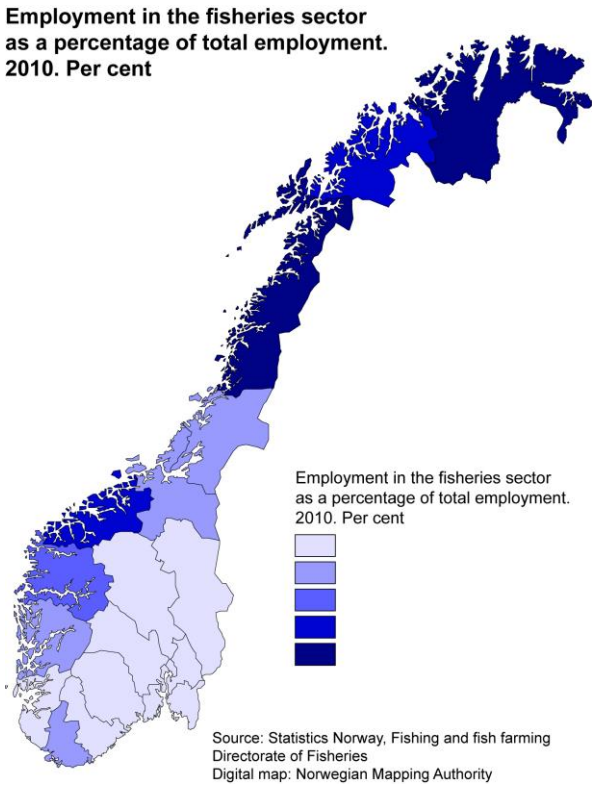


Figure 21: Norway's employment dependency on fishing by county – darker shades of blue indicating higher dependence on fishing as a source of employment (Statistics Norway, 2012).

Norway's marine fishery sector can roughly be divided into the coastal sector and the offshore sector. The coastal sector is dominated by small vessels manned by 1-5 persons, while the offshore sector consists of larger vessels with a crew of up to 20 persons or more.

Norway's fisheries industry and management underwent major reform in the mid-late 1980's. This included structural adjustment measures to reduce fleet size (and increase industry economic efficiency), as well as the introduction of vessel quota schemes and the introduction of a prohibition on discards to increase stock biomass to support improved profitability. These measures have been refined and amended over the last 20-30 years.

Legislation, policy and decision making framework

The *Living Marine Resources Act 2008* (LMRA) (Stortinget, 2008) provides the legal basis for Norwegian fisheries management. Responsibility for management of all Norwegian living ocean resources lies with the Ministry of Fisheries and Coastal Affairs (MOF) and the Directorate of Fisheries. Norway is not part of the European Union (EU), and is not subject to the Common Fisheries Policy (CFP).

The purpose of the *Living Marine Resources Act 2008* is:

"to ensure sustainable and economically profitable management of wild living marine resources and genetic material derived from them, and to promote employment and settlement in coastal communities."[98]

The Act is clear that "*wild living marine resources belong to Norwegian society as a whole*."
The Act provides that "*the Ministry shall evaluate which types of management measures are necessary to ensure sustainable management of wild living marine resources*" and in doing so should take into account:

(a) a precautionary approach, in accordance with international agreements and guidelines,
(b) an ecosystem approach that takes into account habitats and biodiversity,
(c) effective control of harvesting and other forms of utilisation of resources,
(d) appropriate allocation of resources, which among other things can help to ensure employment and maintain settlement in coastal communities,
(e) optimal utilisation of resources, adapted to marine value creation, markets and industries,
(f) ensuring that harvesting methods and the way gear is used take into account the need to reduce possible negative impacts on living marine resources,
(g) *ensuring that management measures help to maintain the material basis for Sami culture.*

Fisheries management is a central government function, undertaken by the Ministry of Fisheries and Coastal Affairs. The Ministry is responsible for drafting legislative documents and regulations for all of Norway's fisheries, aquaculture farms, seafood industry and ports and infrastructure. The Ministry is organised into three departments, including:

- Department of Aquaculture, Seafood and Markets
- Department of Research and Innovation
- Department of Marine Resources and Coastal Management

The portfolio of Department of Marine Resources and Coastal Management contains a wide range of topics, including quota negotiations and international fisheries agreements, IUU-fishing, coordination of area and environmental policies, regulation and access of fishing licences and permits, capacity adjustment schemes for the fishing fleet, petroleum matters, maritime safety and emergency preparedness system for acute pollution.

In addition, a number of agencies and institutions report to the Ministry (Figure 22).

[98] http://www.regjeringen.no/upload/FKD/Vedlegg/Diverse/2010/MarineResourcesAct.pdf

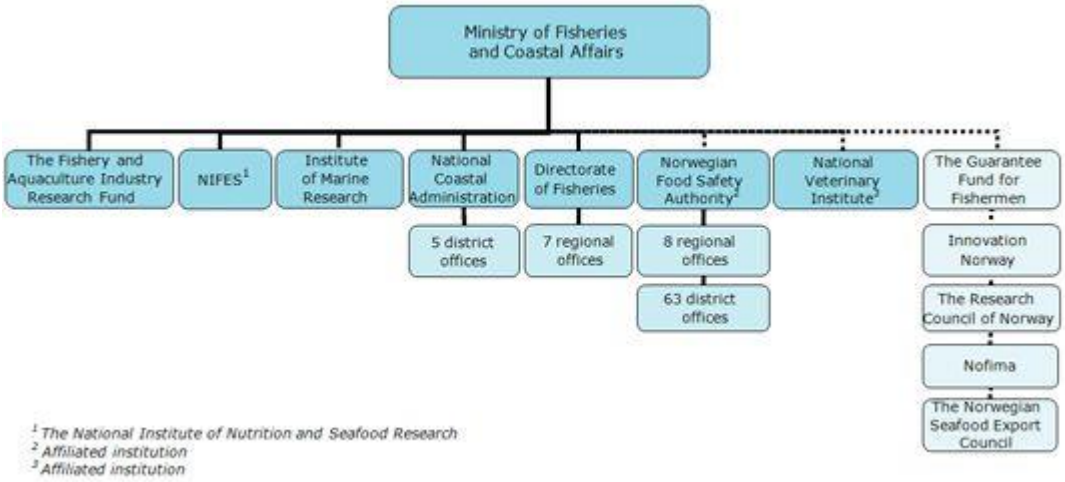


Figure 22: Ministry of Fisheries and Coastal Affairs subordinate agency structure.

The Directorate of Fisheries, with its main office in Bergen, acts as the Ministry's advisory and executive body in matters concerning fishing and the management of aquaculture. The Directorate of Fisheries' role is to provide professional input in the policy-making process by way of analyses, statistics and advice, by proposing and preparing legislature and regulative work and through regulation planning development. The Directorate also has an important role in managing and controlling fisheries, fish processing and aquaculture.

The Directorate is headed by the Director General of Fisheries, and has three main departments: Resource Management Department, Aquaculture and Coastal Department, and the Statistics Department. In addition, there is an Administrative Affairs Department, an IT Department, and a unit for Corporate Communications. In addition to the head office in Bergen, the Directorate of Fisheries in Bergen is organised in seven regions and more than 20 local offices.

The general 'regulatory chain' is outlined in Figure 23.

Figure 23: Regulatory Chain for Quota Decisions and Overall Fisheries Management Flow (Government of Norway, 2009).

Ninety percent of Norway's fisheries harvest stocks are shared with other nations. Consequently, international cooperation is a critical aspect of the Norwegian management regime. For the most important fish stocks, quota levels are set in cooperation with other countries, including Russia, Iceland, Faroe Islands and Greenland and the EU. For example, the Norway-Russia Joint Fisheries Commission was established in 1976 to negotiate and determine TACs for three stocks including north east arctic cod. For each of the stocks, the NRJFC have an agreement to share the stock based on explicit shares (e.g. 50-50 for the cod stock). This process occurs after the scientific advice is made available from ICES (Honneland, 2000 & Gezelius, 2006).

Figure 24: Norway's fishery zones.

At the local level, the Ministry may establish districts where the Directorate of Fisheries or a committee appointed by the Directorate of Fisheries may adopt local regulations on:

(a) sharing of sea areas and safe distances between different types of gear,
(b) placing and marking of gear,
(c) times for departure from port, etc.,
(d) duty to provide reports and catch reports to the Directorate of Fisheries as a condition for participating in harvesting in such areas.

Allocation and harvest control systems

The fundamental principle behind Norwegian management of living marine resources is that of sustainable harvest. The term 'sustainable' is generally defined as "a use or development that meets the needs of the present without compromising the ability of future generations to meet their own needs". In fisheries management, this can be interpreted as continuous harvesting of stocks in a viable condition. The aim of the Norwegian government is to have an ecosystem-based approach to fisheries management in order to secure a sustainable harvest of marine living resources. Today, nearly all stocks with commercial value are regulated through quotas and licensing.

The Participation Act of 1999 regulates who can fish for a living. A vessel may not be used for commercial fishing unless a commercial licence has been issued. Only Norwegian citizens and active fishermen can be issued a commercial licence. Participation is limited by annual permits (coastal fleet) and licences (ocean going fleet) in combination with individual vessel quotas (IVQ). The overall Norwegian fish quotas are allocated to different vessel groups and the quotas are then distributed amongst the vessels holding the necessary licences to participate in the groups. Licences and annual permits are not tradable, as they are issued to and associated with a given vessel. When vessels are traded, the licence and annual permit follow the vessel when permission has been granted – with certain restrictions - by the authorities.

At present, there is in place a system for quota consolidation in the fishing fleet called the Structural Quota System, which allows the fleet to consolidate quotas on fewer vessels. In this way the system facilitates increased vessel profitability. However, other considerations are also taken into account, including regional policies. A geographically dispersed fishing fleet must be maintained in order to support coastal communities and their cultural heritage. Some restrictions are therefore implemented, including maximum quotas, geographically limited markets, transactions only within vessel groups and mandatory scrapping.

The main principle of the Structural Quota System is that a vessel owner can buy another vessel and transfer the other vessel's quota (a structural quota) to his vessel. The vessel that hands over the structural quota must then be scrapped.

Little fisheries management existed prior to the mid-1970s (with the exception of decommissioning discussed below during the 1960s). It was not until Norway anticipated claiming their right to the 200nm exclusive economic zone (EEZ) (implemented by 1977) that Norwegian fisheries were beginning to be subject to management regulations. This led to the first setting of TAC for North East Arctic cod in 1975 (Hylen *et al*., 2008; Lockwood *et al*., 2010).

With the increasing realisation of problems resulting from overcapacity, a series of publicly-funded decommissioning schemes were initially implemented in both the offshore (including pelagic offshore vessels) and coastal fleets. These schemes were implemented in numerous blocks in the offshore fleet from 1960 until 1993 (MOF, 2008).

Identifying that capacity levels in the fishery still did not match the available resources, Norway decided that restructuring of the fleet needed to shift from a system relying on public finances to one which was privately funded (MOF, 2006; 2008)[99]. This prompted the introduction of rights-based management by allocating individual vessel quotas (IVQs). These were initially referred to as unit quotas (UQs, in the 1990s) and then developed into the structural quota system (SQS) in 2005. Importantly, under this system, the IVQs cannot be leased to different vessel owners, but when a vessel is purchased from a company by another owner, the quota can be fished by remaining vessels owned by that company. That is, consolidation of quota under SQS can only be achieved through the purchase of an entire vessel and its associated quota.

[99] The Norwegian Government noted "Fewer vessels and fishermen (were) inevitable... and subsidies only delayed the transition" Government of Norway (2009).

IVQs were allocated to licence holders (which have all been split in fleet size categories or groups) without a defined duration unless they were transferred. Once transferred, this allocation timeframe was initially five years and later increased to 10 and then 13 years through successive system developments. Timeframes were also dependent on the status of the vessel after purchase. For example, initially, IVQs' timeframes for cod trawlers were at 13 years if the vessel remained in the fleet and 18 years if the vessel was scrapped. However, by 2005, quota duration became indefinite given that previous timeframes were cited as inflexible to market measures, lacked long-term stability, and resulted in an overall failure to sufficiently reduce capacity.

A large coastal fleet is in operation in Norway and is important for local communities (OECD, no date). To protect the existing fleet structure, quotas cannot be purchased from outside the current quota groupings.

For the shared cod fishery, a cod TAC is determined for the entire fishery, a split between Norway and Russia is negotiated at the JNRFC, and the Norwegian portion is allocated amongst quota groups (i.e. including the offshore trawl fleet). To ensure the effectiveness of annual TACs, the JNRFC has endeavoured to set limits based largely on scientific advice from ICES. Additionally, the Commission uses an ICES assessed and approved harvest control rule (HCR) which states that fishing mortality must remain at a precautionary level (F_{pa} = 0.40) which is dynamic to the overall stock size and can only be adjusted annually by ±10% (ICES, 2010). Individual vessels (within a quota group) are then allocated a share of the applicable allowable catch based on their quota factor.

Concentration limits also apply within a quota group and this has been seen as a benefit to the performance of the SQS (Standal & Aarset, 2008). For example, in the cod trawl group there are a total of 90 quota factors. The fisheries regulations[100] state that a single company or owner cannot own more vessels than will equate to nine quota factors within the group (or 10%). However, the regulations also appear to allow for special types of ownership with regards to concentration[101]. MOF (2006) also indicates allowances can be made by the Ministry of Fisheries and Coastal Affairs.

Under the LMRA, the Ministry may prescribe that part of the national quota or part of the group quota for one or more vessel groups shall be delivered for processing at onshore facilities in particular districts (district quotas). The Ministry may adopt regulations on the allocation of district quotas and conditions for utilising them[102].

Under the LRMA, recreational anglers fishing from a vessel are permitted to use the following:

(a) handline, fishing rod and similar hand gear,
(b) one mechanised pole-line,
(c) drift nets with a total length of up to 210 metres,
(d) longlines with up to 300 hooks,
(e) up to 20 traps.

The Ministry may by regulations lay down restrictions on catch quantities, stricter restrictions on the gear that may be used, or prohibitions on harvesting in specified areas, if this is necessary for the purpose of resource management.

[100] Section 2-4 of Regulation No. 1157 of 13 October 2006
[101] Section 2-5 of Regulation No. 1157 of 13 October 2006
[102] http://www.regjeringen.no/upload/FKD/Vedlegg/Diverse/2010/MarineResourcesAct.pdf

Information collection and analysis

Different information metrics are collected through a range of means. Under the LMRA, all catches of fish are required to be landed, although the Ministry may grant exemptions is special circumstances. Sales associations are responsible for reporting landings figures. By acting as a trading arm between fishing vessel operators and primary markets, landings quantities and composition per vessel are accurately recorded. There is an incentive for sales associations to record all species size grades and quantities given catch under a certain market size or IUU is forfeited to the sales associations upon landing. From this, 80% of the value is kept by the Sales association and 20% provided to the vessel owner as compensation for storage capacity used.

Logbook data on effort is provided by industry. Electronic catch and position reporting is required by all vessels >15m.

Fishermen's sales organisations manage and coordinate the sale of the catch. These organisations are independent and based on direct membership of the fishermen and indirect membership through fisheries associations. There are six such organisations throughout Norway, including the Norwegian Raw Fish Organisation, which deals with fish, shellfish, molluscs and small whales landed in Norway between Nordmøre and Finnmark, and the organisation Norges Sildesalgslag, which deals with the sale of pelagic fish.

Each year, the abundance of several marine resources is mapped in scientific surveys, using echo sounders, trawling, abundance estimations of eggs and larvae, tagging, or just counting along transects when whales are estimated. The surveys are often joint investigations with participation from many countries, such as for instance the International Bottom Fish Surveys (IBTS) in the North Sea. The data from each vessel participating in the survey are combined to make a total estimate of a particular species in a specific area.

The Institute of Marine Research is responsible for monitoring the fish stocks and the other living marine resources in Norwegian and adjacent waters. From about 80 species exploited in Norwegian fisheries, scientific advice on approximately 20 species based on systematic stock monitoring, while advice on further 20 species is based on catch data. Many of the species have little commercial significance, but may none the less be important in the food chain and the ecosystem[103].

In addition to scientific advice, IMR also provide advice on technical measures via their research groups. For example, the Responsible Fish Capture Research Group is mandated to research and develop new fishing gear technologies to be implemented by Norwegian fishing vessels[104]. IMR also provides oceanographic advice which is used as a method to increase coast guard patrolling efficiency.

For most stocks of interest to Norway, assessments are made jointly with scientists from several countries under the aegis of the International Council for the Exploration of the Sea (ICES). Scientists

[103] http://www.fisheries.no/resource_management/Regulatory-measures/Resource_advisory_service/#.U-N98vmSxpU

[104] The research group has an operating budget of NOK26.5million (£2.85million). Once new gears are developed though, fishing vessels are required to invest in the gears without subsidies (O.A. Misund, pers. comm., 2010).

from the ICES member countries work together on the collected stock data in annual working groups. The calculation tools are mathematical models, the choice of model depending on the characteristics of the stock and what data are available. The Norwegian input to these models is generally based on both catch and cruise data.

The ICES Advisory Committee for Fishery Management (ACOM) use the results from the stock assessment working groups to formulate advice for the management of marine resources. An important element in the advice is the notion of Total Allowable Catch (TAC) of a given stock. Since 1998, ICES has defined precautionary-principle reference points and attempted to quantify these for most stocks. The reference-points embrace both degree of exploitation (fishing mortality) and the size of the stock.

On the basis of historical stock data and assumptions about the spawning stock and recruitment, attempts have been made to define a bottom limit for the spawning stock of each species (Blim). If the spawning stock falls under that limit, there is a high chance of poor recruitment.

In the same way, an upper limit for fishing mortality has been defined (Flim). If this limit is exceeded over a long period, there is a high probability that the stock will fall below Blim, to a level where poor recruitment can be expected.

Regular monitoring of catches is conducted through sales association data and at-sea inspections of vessels. The LRMA requires that the owner or user of a harvesting or transport vessel and the person that receives the catch shall complete a landing note with information on the catch. This applies regardless of whether the catch is transferred to a land-based facility, to another vessel or to storage in the sea. The owner or user of a harvesting or transport vessel and the first-hand purchaser of the catch shall complete a sales note with information on the catch.

The LRMA also provides powers to the Ministry to prescribe that any person that harvests, receives, transports, stores, processes or places on the market wild living marine resources shall have documentation and equipment that ensures control of the quantities received, transported, stored, processed, removed from the storage or production site or placed on the market.

These methods are important not only for catch data but also for Norway's real-time area closure system. Once an area is suspected of having ratios of juvenile to mature fish beyond a threshold level, that area (and a five-mile radial inclusion zone) is temporarily closed to fishing. Assessment fishing is then conducted by IMR using contracted fishing vessels to determine when the area is suitable to be re-opened – this also contributes to fishery-independent stock information.

Amongst a range of other marine environment issues, ICES provide initial advice on TACs for North Atlantic stocks based on information compiled from 200 institutes. This TAC advice is provided annually in the ICES Advice publication for over nine different stock regions (ICES, 2010b) which are taken into consideration by IMR.

A comprehensive cost and earnings statement by all fleet groups in Norway is published annually on the Directorate of Fisheries' website. This includes, crew remuneration, operating costs, fixed costs, current capital costs, quota values, multiple sources of revenue, vessel day effort, and numbers of vessels in the fleet group. These data are collected through sample means. Directorate of Fisheries

also collects detailed census information such as on vessel operators, number of licences by communities, and employment within fleets by communities.

The Ministry may require persons who engage in angling or recreational fishing to provide the authorities with information on their activities for statistical purposes. Similar requirements may also be made applicable to persons that own or operate facilities from which such activities are conducted.

Management of non-target species

In 1987, Norway first introduced a discard ban on cod and haddock. However, as the regime became more widely accepted, the list of banned discard species began to increase. Now legislation refers only to species which can be legally discarded given the ban's comprehensive scope (Fisheries Directorate, 2009 & Diamond & Beukers-Stewart, 2009). The ban is implemented and incentivised through a range of technical measures. For example, since 1994 trawlers have been required to employ bycatch reducing devices (BRDs). Also, minimum mesh sizes are implemented in fisheries where applicable. The 80/20% split in sales revenue (discussed above) of catch below a market size or outside quota holdings provides an important incentive to not discard.

Under the LMRA, the King may establish marine protected areas where harvesting and other forms of use of wild living marine resources is prohibited. Exemptions may be granted for harvesting activities and other forms of use that will not be in conflict with the purpose of protecting the area. It is also prohibited to harvest using trawls inside the territorial limit around the Norwegian mainland, except when trawling for kelp, shrimps or Norway lobster[105].

Compliance system

The LMRA places a strong emphasis on traceability in monitoring quota compliance, requiring that any person that harvests, receives, transports, stores or processes wild living marine resources or places them on the market shall be able to document the information needed to make it possible at all times to trace fish and other resources back to a catch registered on a landing or sales note.

Under the LMRA, officers of the Directorate of Fisheries are given access to shipping company offices and onshore facilities of companies that possess, transport, store, process or in other ways handle wild living marine resources for commercial purposes, and to places where relevant documents and information are kept. Officers are also given unimpeded and direct access to accounts and relevant documents, objects and information at the premises of all those mentioned in the first paragraph.

The coastguard undertakes at sea surveillance in Norway (Gezelius, 2006). Whilst an agency of Norway's Navy, the coast guard is responsible for onboard inspections of fishing vessels and surveillance of all at-sea fishing activities. The Norwegian coastguard is estimated to complete approximately 3000 inspections at sea annually meaning that each fishing vessel can expect to be inspected 3-4 times per year (Lockwood et al., 2010).

The coastguard has good knowledge of high-risk areas and vessels to which it can concentrate effort. However, assistance is also provided by IMR to inform the coastguard of shifts in water conditions

[105] http://www.regjeringen.no/upload/FKD/Vedlegg/Diverse/2010/MarineResourcesAct.pdf

and juvenile migratory patterns (P. Gullestad & O. Misund, pers. comm., 2010) – assisting in enforcing undersize catch restrictions. Interview responses in Honneland (2000) suggest that while some small level of discarding does still occur, most fishers appreciate that discarding can only be done in small amounts and not often without the likelihood of being caught. Furthermore, ICES (2012) noted that increased monitoring efforts since 2009 have substantially reduced discarding and IUU fishing in Norwegian waters to almost zero.

The sales associations in Norway are another one of the control measures for fisheries in Norway. The sales associations have been mandated to monitor fishing landings and levels of TAC utilisation. As fishers land their catch, they supply the sales associations with a sales note on the details of the transaction and then the vessel owners are paid at a later date by the sales association (Gezelius, 2006 & Gezelius, 2008). As a means of revenue for the associations, they are able to confiscate catch when it has been caught illegally (J Straume, pers. comm. 2010). The 80/20% split provides a two-sided incentive. Firstly, as a contribution to the Sales Associations' operating revenue, collecting 80% of the sales value from confiscated fish incentivises comprehensive inspection and compliance with reporting non-target and IUU catch. Secondly, the 20% of sales revenue made available to the fisher then acts as compensation for storing and landing fish which is not within their quota.

VMS and electronic record keeping is required for all vessels >15m.

Stakeholder participation

The Norwegian fisheries and aquaculture sector is characterized by powerful organizations representing private sector interests. There are approximately 20 such organizations[6]. In addition, there are six sales organizations, seven production organizations, and another 26 sector organizations for various purposes. The main organisations include:

- **Norwegian Seafood Federation -** The Norwegian Seafood Federation represents the majority of companies within the fisheries and aquaculture sectors. The Norwegian Seafood Federation (Fiskeri-og havbruksnæringens landsforening, FHL) represents the interests of approximately 500 member companies and 8 000 employees. FHL covers the entire value chain from fjord to dinner table in the fisheries and aquaculture sectors in Norway.
- **Norges Fiskarlag (The Norwegian Fishermen's Association) -** The Norwegian Fishermen's Association is both a union and a business association for Norwegian fishermen. Thus, the Association is both an employees' union, and an employer organization. The Association is also involved in tariff negotiations, and two sections (The Crew Section and the Boat Owner Section) represent the two parties in these negotiations.
- **The Norwegian Fishermen's Sales Organization -** Norges Råfisklag, known in English as the the Norwegian Fishermen's Sales Organisation, handles important aspects of the trade in seafood. Norges Råfisklag, together with five other fish Sales Organisations in Norway, also have an important national role according to resource control of fish stocks. The Organisation has approximately 60 employees. Norges Råfisklag is the fishermen's own sales organisation. The Organisation has a well-developed service system and offers fishermen and buyers a number of services directly related to trading, sales and settlements. Fishermen and buyers can make direct mutual agreements in regard to supply, catches can

be put out for auction on the Organisation's modern electronic auction system, or longer-term contracts can be made. A foundation for the whole system is the Organisation's business regulations, a market-based minimum price scheme and an effective settlement system that guarantees settlements for fishermen. The organisation was established in 1938.

The involvement of stakeholders in management decisions is achieved through the Advisory Meeting for Fisheries Regulations representing fishermen's associations, the fishing industries, trade unions, the Sami Parliament, local authorities, environmental organisations and other stakeholders. After the quotas have been negotiated with the relevant states, the Directorate of Fisheries makes a proposal regarding the regulations for the upcoming year. This proposal includes:

- when to start and stop the fishing
- technical regulations
- size of by-catch
- criteria's for participating in various fisheries

This is then presented to stakeholders in an open meeting held in late November or early December. A broad range of participants attend this open meeting – including representatives from the Norwegian Fishermen's Association, Federation of Norwegian Fishing Industries, the Norwegian Seamen's Union, The Norwegian Food and Allied Workers' Union, The Sami Parliament, environmental NGOs, the regional counties, as well as recreational fishermen.

After this meeting, the Directorate of Fisheries recommends next year's fisheries regulations to the Ministry of Fisheries and Coastal Affairs. The Ministry bases its final decision on outcomes from the quota negotiations with other states, discussions from the open meeting, the recommendation from the Directorate of Fisheries, as well as input from various fisheries industry organisations.

Under the Marine Resources Act, the Ministry may appoint a Council for Regulatory Advice that can give its opinion before regulations are made under this Act[106]. The Ministry may adopt regulations on the composition of the Council and its tasks. The Council shall include representatives of organisations for the parties that normally have an interest in such cases.

Performance Review

There a number of examples indicating Norway's fisheries management is under at least semi-regular review – albeit perhaps not systematic. For example, the original concept of vessel quotas was presented through a white paper in 1989 by a committee consisting of the Ministry of Fisheries, the Directorate of Fisheries, and the Norwegian Fishermen's Association (NFA). Then, a review conducted under Royal Decree in 2005 recommended that IVQs remain in place (with the removal of time-limited right allocation) and suggested widening their application to include fleets operating in the 11-15m quota group (MOF, 2006). Along with management authorities, this review considered opinions of various fishers associations, financial services associations, and wider seafood sector associations.

[106] http://www.regjeringen.no/upload/FKD/Vedlegg/Diverse/2010/MarineResourcesAct.pdf

The MSC public certification report[107] for the NE Cod fishery also highlights the reviews conducted at a fishery-specific level considering its transboundary nature with Russia. Furthermore, internal review of the stock assessments and harvest control rules are conducted by ICES.

Resourcing

Hannesson (2000) notes that management and enforcement of Norway's fisheries is almost exclusively publicly funded. It could be argued that the Sales Associations' self-generated revenue from confiscated catch constitutes a form of information collection financed by industry. Also, one of the driving factors of moving to a system of IVQs in the late 1980s was to eliminate public financing of a fleet restructure. However, importantly for the purpose of this review, there does not appear to be any "user pays" system in place or resource rents collected.

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Synthesis

At the highest level, the main message reinforced from the 'best practice' reviews is that fisheries management works best as a system of components that work together to achieve defined objectives. Although the pie could be cut a number of ways, we identified eight main components required in any 'good fisheries management system'. These are outlined in Box 1.

Box 1: Components of a 'good fisheries management system'

1. **Policy, legislation and effective decision making**
   Sets strategic direction and management objectives, provides powers to manage fisheries effectively, ensures decision making is timely and transparent

2. **Allocation and harvest control systems**
   Establishes how much can be harvested, who can harvest what, and that catches are maintained within shares

3. **Monitoring, information collection and analysis**
   Provides the information to manage fisheries the way we want them to be managed (right info, at right time, at right scale, in right level of detail)

4. **Management of non-target species**
   Ensures that fishing is not resulting in serious or irreversible impacts on wider environment

5. **Compliance**
   Ensures integrity of management arrangements by ensuring everyone plays by the rules

6. **Stakeholder participation**
   Allows stakeholders to participate in main components of management system – management, monitoring, compliance

7. **Performance review**
   Allows for performance of the management system to be reviewed over time and optimised to best achieve management objectives

8. **Resourcing**
   Ensures the management system is effectively funded/resourced, consistent with management objectives

The inter-connected nature of the eight components is outlined in the conceptual fisheries management system described in Figure 25. Put simply, each of the components is required for the system to work effectively. For example, there is little benefit in having a very good information collection and assessment system if the decision making system does not allow decisions to be made on the basis of that information in a timely, responsive and transparent manner. Similarly, there is little benefit in having a responsive and transparent decision making system if the monitoring and assessment information being fed into it is inaccurate or not relevant.

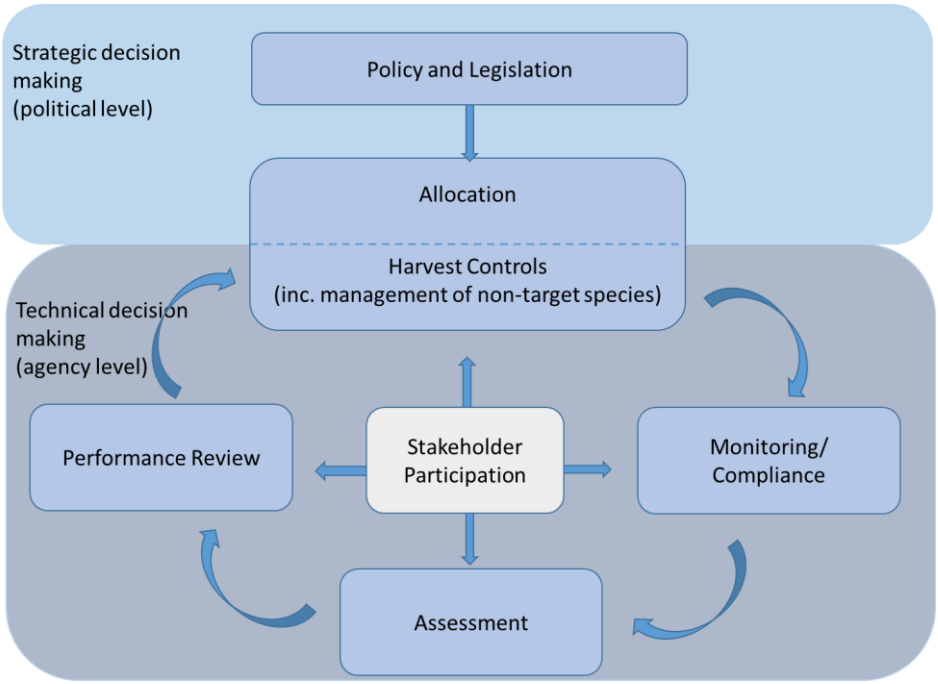

Figure 25: Conceptual fisheries management system with component parts working together to achieve defined goals and objectives.

Within each of the eight components, well-structured fisheries management systems tend to have a number of characteristics in common. The Review Team has summarised some of the main observations on 'well-managed' fisheries arising from the best practice review in Table 8 below. The list is not intended to be comprehensive, but has served as a useful benchmark against which to assess the performance of the existing Queensland fisheries management regime.

Table 8: Some characteristics common to well-managed fisheries.

Legislation, policy and decision making
• Well-managed fisheries operate within a clear policy framework which sets out objectives and provides clear operational 'rules of the game' to all stakeholders; • Well-managed fisheries operate within a clear legislative framework that provides the capacity to manage fisheries consistent with Government policies and community expectations; • Well-managed fisheries have a clear decision-making system capable of responding to new information in a timely manner;
Resource allocation and harvest controls
• In well-managed fisheries, the health of the stock and broader environment come first; • Well-managed fisheries have clear access rights, with explicit shares allocated amongst the different harvesting sectors within an total allowable limit on catch or effort; • Well-managed fisheries ensure that available harvesting entitlements are proportional to the biological/economic potential of the stock (i.e. they are not over-allocated, nor under-allocated); • Well-managed fisheries have systems capable of adjusting harvesting entitlements in line with fluctuations in the stock; • Well-managed fisheries directly manage catch where they can; • Well-managed fisheries minimise waste;
Non-target species and ecosystems
• Well-managed fisheries prioritise management, monitoring and research activity for non-target species and ecosystem impacts on the basis of risk;

Monitoring and assessment
• Well-managed fisheries have monitoring and assessment systems that deliver information in a timeframe, at a level of detail and at a scale that meets management objectives;
Stakeholder participation
• Well-managed fisheries have clear systems to allow for the participation of interested stakeholders in the main components of the management system (management, monitoring and assessment, compliance)
Compliance
• Well-managed fisheries have compliance systems that balance voluntary compliance and deterrence, and are informed by risk-assessment, intelligence and information analysis;
Performance review
• Well-managed fisheries have effective systems of performance review that allow ongoing evaluation of performance against management objectives and optimisation of the management regime;
Incentives
• Well-managed fisheries provide clear incentives for all stakeholders to do the right thing;
Resourcing
• Well-managed fisheries have systems of funding that allow for the achievement of management objectives.

Annex 1: 'Best practice' review template

Intro

- Intro to jurisdiction being reviewed (fisheries, volumes, values, contribution to economy)
- Any other specific points worth mentioning as context (e.g. focused on particular fisheries/management regions/components of the system)

Legislation, policy and decision making framework

(legislation provides higher level objectives and powers to take necessary actions to manage fisheries; policies provide clear guidance on operational objectives and targets; decision making processes need to facilitate the achievement of management objectives)

- Legislative objectives?
- Main overarching policies and operational objectives?
- What is the fisheries decision making process (e.g. institutional structure, which decisions taken by politicians, which delegated to technical people?)? Is it timely, participatory, dynamic, predictable, transparent?

Allocation and harvest control systems

(harvesting rights in the fishery should be clear within and between sectors; harvest control systems should serve to meet management objectives)

- Are systems are in place to allocate catch within shared stocks? (formal/informal? is there a process for transfer between sectors?)
- At what scale are fisheries managed/rights allocated and managed (stock level, state, national)?
- What systems/instruments are used to manage catches within the commercial sector? Recreational sector? Customary sector?
- What harvest strategies are used to achieve management targets (e.g. sophisticated, adaptive harvest strategies with reference points and pre-agreed control rules for commercially important stocks, etc)

Information collection and analysis

(information collection and analysis systems should deliver information at a scale, at a level of detail and in a timeframe required to meet management objectives)

- What information is collected about catches/effort in each sector? How is it collected? (fishery-dependent, fishery-independent, both)
- Stock assessments – what assessments are undertaken and how are they prioritised (e.g. Commonwealth Tier process), do they account for all sources of mortality?, peer-reviewed?
- What economic, social and community data are collected? How is it used? (e.g. impact assessments, MSE, MEY estimates?)

Management of non-target species

(fishing shouldn't result in serious or irreversible impacts on non-target species/ecosystems)

- What arrangements are in place to manage the impacts of fishing on non-target species and the wider ecosystem?
- How are these prioritised (e.g. AFMA/CSIRO ERA process; West Oz EBFM risk assessments, etc)?
- How is information on non-target species interactions collected?

Compliance system

(The compliance system should maintain the integrity of the management system)

- What are the main components of the compliance system (e.g. reporting requirements, VMS, patrols, sanctions, etc)?
- How are compliance activities prioritised? Are they random, or targeted based on intelligence/risk assessment/sophisticated information management, etc?
- What incentives are harvesters given for voluntary compliance (e.g. clear/understandable rules, etc)?
- What sanctions are applied?

Stakeholder participation

(effective management systems provide for the participation of interested stakeholders)

- What systems are in place to ensure stakeholders are engaged in the various components of management? E.g. MACs, RAGs, policy councils, etc

Performance Review

(management systems should be adaptive and capable of responding to new information)

- What systems for performance evaluation exist? (internal? external?)
- At what scale are reviews conducted? Fishery, whole management system?
- How often and what is the outcome? (e.g. changes to harvest strategy, management plan etc)

Resourcing

(effective management requires effective resourcing)

- How is management/information collection/compliance funded?
- Does the jurisdiction have a clear policy on resource rents?
- Are any roles undertaken by the industry?