

Cost recovery in fisheries management

The Australian experience

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Cost recovery has been a fundamental feature of the management of Australia's Commonwealth fisheries since the mid-1980s. The general philosophy of the current Commonwealth cost recovery model, introduced in 1994, is that the beneficiaries of government services should meet the costs of those services in accordance with the concept of user pays. As a result, the commercial industry pays for costs directly related to fishing activity while the government pays for activities that may benefit the broader community as well as the industry.

The purpose in this paper is to review the Australian experience with cost recovery. The total cost of managing Australia's Commonwealth fisheries averaged 7.2 per cent of the gross value of production between 1992-93 and 1998-99. Total costs have increased in recent years due to increased Commonwealth government expenditure on surveillance of Australia's Fishing Zone and higher administration costs of the Australian Fisheries Management Authority. The industry contribution to the costs of fisheries management averaged 34 per cent between 1992-93 and 1998-99. The degree of cost recovery varies significantly between individual fisheries as a result of differences in the attribution of the costs of management functions between industry and government.

Keywords: Management costs; cost recovery; fisheries management.

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Introduction

The subject of fisheries management costs and how they should be financed has received increasing attention over the past decade. The recovery from industry of a significant proportion of management costs is now accepted practice in Australia and New Zealand. In Iceland, cost recovery is a feature of the individual transferable quota (ITQ) system, and it has been introduced in some fisheries in Canada and the United States (Arnason, Hannesson and Schrank 2000, p. 234).

There are a number of reasons why cost recovery has become an increasingly important feature of fisheries management. First, and most obviously, fisheries management is not costless. Moreover, it is not necessarily the case that the costs of fisheries management are small relative to the assumed benefits. Arnason et al. (2000, p. 242) demonstrated that, for Newfoundland, Norway and Iceland at least, fisheries management costs are not trivial and can vary significantly. In Newfoundland, management costs varied between 15 and 26 per cent of the value of landings. In Norway, they dropped from 13 to 8 per cent between 1990 and 1996, while in Iceland, management costs have remained steady at around 3 per cent of the value of landings.

Second, cost recovery in fisheries management is a direct result of the increased application of the user pays concept in the provision of many government services. This push is driven by recognition of the potential for efficiencies that may be achieved by charging users for the services they consume. It is commonly argued that the fishing industry is the main beneficiary of management and hence should pay for the costs of that management (Haynes, Geen and Wilks 1986; ABARE 1991; Industry Commission 1992). This issue is also raised in the context of subsidies to the fishing industry (see, for example, Schrank and Keithly 1999).

Third, cost recovery has the potential to provide a link between the provision and the use of fisheries management services. As industry is confronted with an annual bill for management services, they have a strong incentive to demand efficiency and cost effectiveness in the provision of those services. The institutional structure of fisheries management will have an important influence on the strength of this link between management and industry. In principle, an institutional framework incorporating a co-management ethos is likely to generate greater industry involvement in (and acceptance of) management decisions.

The purpose in this paper is to review the cost recovery experience in Australia. This review is limited to a discussion of the cost recovery regime for fisheries under the jurisdiction of the Commonwealth government. In Australia, each state or territory manages fisheries resources from the low water mark to 3 nautical miles offshore, and the Commonwealth government manages fisheries from 3 nautical miles offshore to the 200 nautical mile limit of the Exclusive Economic Zone. While some states have implemented, or are implementing, cost recovery, the Commonwealth regime is the most well devel-

oped. In the next section, the development and implementation of the Commonwealth cost recovery policy is briefly described. The costs of management are then presented for the period 1992-93 to 1998-99. The extent of cost recovery over this period is presented in the following section, and a number of emerging policy issues are discussed.

Cost recovery policy for Commonwealth fisheries

Australia's Commonwealth fisheries are managed on a full cost recovery basis. In the current policy regime, this means that the commercial fishing industry pays for costs directly related to fishing activity, while the Commonwealth government pays for management activities that may benefit the broader community (as well as the industry) and that satisfy a range of specific community service obligations. The concept of cost recovery is identified as one of the objectives in the *Fisheries Management Act 1991*.

Cost recovery was first introduced into Commonwealth managed fisheries in 1985 as part of a governmentwide initiative to introduce user charges for government services. In 1988 an independent review of fisheries management arrangements recommended the establishment of a statutory body to manage Commonwealth fisheries (Peat Marwick Hungerfords 1988). Following this recommendation, the Australian Fisheries Management Authority (AFMA) was established in 1992. One of the major rationales underlying the establishment of AFMA was to increase the interaction between industry and government in fisheries management, while distancing the Minister for Primary Industries and Energy (then responsible for fisheries) and the bureaucracy from many day to day operational management decisions.

Before AFMA was established, a government inquiry was held into cost recovery arrangements for fisheries management (Industry Commission 1992). This inquiry was followed by the establishment of a taskforce to review cost recovery in AFMA managed fisheries (DPIE 1994). The framework developed by the taskforce was implemented in 1994, with changes to be phased in between 1994-95 and 1996-97. Before this point, AFMA and its predecessor (the Australian Fisheries Service) were required to collect 90 per cent (increasing to 100 per cent in 1994-95) of 'recoverable' management costs from the industry in Commonwealth fisheries. (Recoverable costs were defined as management costs related to domestic commercial fisheries and input into bilateral fisheries — that is, fisheries managed jointly by Australia and another country.)

Under the framework developed in DPIE (1994), and currently applied by AFMA, a two stage procedure is used to assess which costs are recoverable from the fishing industry and which should be borne by the government. In the first stage, it is determined whether the costs associated with each of AFMA functions is attributable to a specific user group (commercial fishers, foreign fishers, recreational fishers, and so on) or whether it is attributable to the community at large. In practice, an activity was considered to be attributable

to a specific user group if the answer to the following question was ‘yes’: Would the non-existence of a particular group eliminate the need for the AFMA activity in question?

In the second stage, AFMA activities that have been attributed to specific user groups are examined to determine whether costs should be recovered from the user groups. A number of factors are taken into account in determining whether costs are recoverable or non-recoverable:

- the extent of user group benefit from the activity;
- consistency with Commonwealth government cost recovery policy in other areas;
- the existence of extenuating socioeconomic considerations;
- the existence of government policy that affects the cost recoverability of a particular activity; and
- the cost effectiveness of recovering the costs of any particular activity.

The third of these criteria was included to capture policy considerations other than the user pays policy, such as protecting the traditional way of life Torres Strait Islanders (DPIE 1994, p. 8). The fourth criterion reflects the fact that there may have been policy decisions in the past that now influence the recoverability of a particular cost.

The attribution and degree of cost recovery for the range of functions carried out by AFMA is summarised in table 1. The costs associated with the management of domestic commercial fisheries are deemed to be fully recoverable from industry (although the costs associated with collapsed, exploratory or developmental fisheries may be only partially recoverable). The costs of surveillance and enforcement of domestic commercial fisheries are split equally between the government and industry, primarily because of the difficulty of establishing where an AFMA activity ceases to be surveillance and becomes enforcement (AFMA 1998a, p. 5).

Table 1: Summary of attribution and recoverability of AFMA costs

Function	Activity	Attribution	Cost recovery
Management of domestic commercial fisheries	Development and maintenance of management plans	Commercial fishers	Fully recoverable
	Management of collapsed, exploratory or developmental fisheries	Commercial fishers	Partially recoverable
Surveillance and enforcement	Domestic compliance program	Commercial fishers	Surveillance costs fully recoverable; enforcement costs not recoverable ^a

Continued ⇔

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Table 1: **Summary of attribution and recoverability of AFMA costs** *continued*

Function	Activity	Attribution	Cost recovery
	Surveillance and enforcement of illegal foreign fishing inside Australian Fishing Zone	Foreign fishers	Surveillance of unlicensed foreign fishers not recoverable Surveillance of licensed foreign fishers fully recoverable Enforcement of licensed and unlicensed foreign fishers not recoverable
Management input into fisheries under joint Commonwealth/state jurisdiction	Offshore constitutional settlement negotiations	Cwlth and state commercial and noncommercial fishers	Not recoverable
International forums	Participate in meetings of regional fisheries management organisations (such as CCSBT, IOTC)	General community	Not recoverable
Legislation and litigation	Developing fisheries legislation	Commercial and noncommercial fishers	Not recoverable
	Preparing legislative changes to management plans	Commercial and noncommercial fishers	Fully recoverable
	Litigation	Commercial and noncommercial fishers	Not recoverable
Development of research priorities	Setting priorities for research funds administered by AFMA and FRDC	Commercial and noncommercial fishers	Not recoverable
Bilateral fisheries	Management input into bilateral fisheries arrangements	Foreign fishers	Fully recoverable
Joint authorities	Commonwealth/state joint management of specific fisheries	Commercial and noncommercial fishers	Not recoverable
Recreational fisheries	Management activity related to recreational fishing	Noncommercial fishers	Not recoverable
Traditional fisheries	Management of traditional fishing by aboriginal and Torres Strait Islanders	Traditional fishers	Not recoverable

^a The costs of surveillance and enforcement are split equally between the Commonwealth government and industry.
Sources: DPIE (1994); AFMA (1998b).

Costs of Commonwealth fisheries management

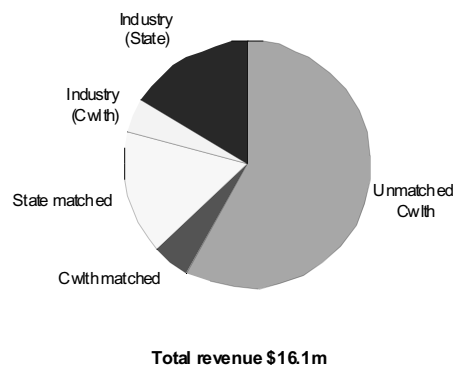
The costs of fisheries management include the costs associated with: formulation, dissemination and implementation of management policy and rules; biological and economic research; and enforcement of management rules (Arnason et al. 2000, p. 234). These are the basic activities that must be undertaken in the course of sound fisheries management. With respect to the management of Commonwealth fisheries, a number of agencies contribute to these activities. The extent to which the costs incurred by each agency is readily available varies significantly.

AFMA is the major agency involved in fisheries management at the Commonwealth level. As a statutory authority, its financial statements are audited and publicly available. AFMA also undertakes an extensive process of attributing full costs (including overheads) of its activities to individual fisheries or to the government as part of implementing the cost recovery policy (see AFMA 1998a,b for details). As a result, fairly comprehensive data are available on the costs of AFMA management (at least since the first full year of operation of the cost recovery policy in 1995-96).

Research activities on Commonwealth fisheries are carried out by a number of agencies. These include: the Fisheries Research and Development Corporation (FRDC); AFMA; CSIRO Marine Research; and ABARE and the Bureau of Rural Sciences (BRS) (the economic and scientific research agencies, respectively, attached to the Commonwealth Department of Agriculture, Fisheries and Forestry).

FRDC is the largest of these organisations and is responsible for planning, funding and managing research and development programs, and facilitating the dissemination, adoption and commercialisation of the research results. Around 25 per cent of the cost of fisheries research administered through the FRDC is paid for by industry through a levy based on the gross value of production of Commonwealth, state and territory fisheries. The Commonwealth government matches the industry contribution as well as providing further unmatched funding equal to 0.5 per cent of the gross value of fisheries production (figure 1). The funds are then directed toward research projects across all Commonwealth, state and territory fisheries, including aquaculture. As a result, it is difficult to determine precisely how much FRDC funded expenditure is directed at Commonwealth fisheries. A rough estimate (probably an underestimate) can be obtained by assuming that the industry and

Figure 1: Sources of FRDC funds, 1998-99



matching government contributions from Commonwealth fisheries are used to undertake research in those fisheries.

AFMA is also involved in fisheries research through the administration of the AFMA Research Fund. This fund is used to assist in the stock assessment of Commonwealth fisheries. Around \$1 million a year is provided by the Commonwealth government for the fund. Funding details for the fisheries related research undertaken by the other agencies (CSIRO Marine Research, ABARE and BRS) is more difficult to obtain. CSIRO Marine Research is a recipient of FRDC funding as well as providing its own (that is, Commonwealth government) funding for research activities, while ABARE and the BRS receive Commonwealth government funding for fisheries related research.

The Commonwealth government central bureaucracy is also involved in the development and implementation of management policy through the Fisheries and Aquaculture branch of the Department of Agriculture, Fisheries and Forestry. While this Branch does not get involved in the day to day operations of AFMA, they are responsible for maintaining an overview of Commonwealth fisheries management, monitoring the performance of AFMA and advising the Commonwealth government on broad fisheries policy issues. The costs of this component of Commonwealth fisheries management are not readily identifiable.

The costs of managing Commonwealth fisheries over the period 1996-97 to 1998-99 are detailed in table 2. In the table, data on the direct costs, overheads, research costs and indirect costs of AFMA activities are provided for the years for which they are available on a comparable basis. The FRDC research costs directly attributable to Commonwealth fisheries are also shown. (It was not possible to determine the proportion of the Commonwealth government's unmatched funding of FRDC that is attributable to Commonwealth fisheries). As noted above, costs associated with CSIRO Marine Research, ABARE, BRS and central bureaucracy are not included.

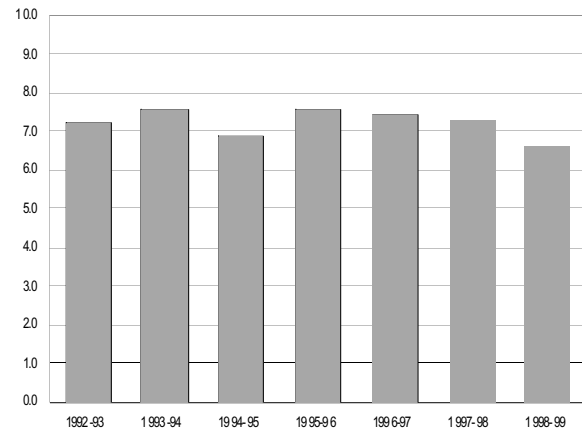
Table 2: Commonwealth fisheries management costs

	1996-97	1997-98	1998-99
	\$'000	\$'000	\$'000
Direct costs			
Salaries and on-costs	3 447	3 821	3 947
Consultants	a	783	752
Travel	652	739	877
Other administrative costs	1 003	552	703
Total	5 102	5 895	6 278
Overheads	4 064	4 611	4 636
Research			
Industry initiated research	1 009	1 751	1 040
AFMA Research Fund	1 000 e	1 140	1 105
Total	2 009	2 891	2 145
Indirect costs			
Management advisory committees	872	823	812
Logbook costs	1 068	969	1 124
Licensing	411	388	483
Surveillance/compliance	6 812	8 642	10 235
Total	9 163	10 823	12 654
Total AFMA costs	20 338	24 220	25 715
FRDC costs b	1 645	1 431	1 428
Total costs	21 983	25 651	27 143

a Included in other administrative costs. **b** Equal to the industry contribution to FRDC from Commonwealth fisheries plus the matching Commonwealth government contribution. **e** Estimate. Sources: AFMA (unpublished data); FRDC (1997, 1999).

The total cost of managing Commonwealth fisheries has risen from around \$21.9 million in 1996-97 to over \$27 million in 1998-99, an increase of 23 per cent over the period (in nominal terms). The major factor contributing to this increase was the cost of surveillance and enforcement, which increased by 50 per cent over the last three years. The Commonwealth government has devoted greater resources to the surveillance of Australia's EEZ in the Southern Ocean (particularly around Australia's external territories Heard Island, the McDonald Islands and Macquarie Island) and to the apprehension of foreign fishing vessels operating illegally in Australia's EEZ. Excluding the costs of surveillance and enforcement, total costs increased by around 11 per cent over the period.

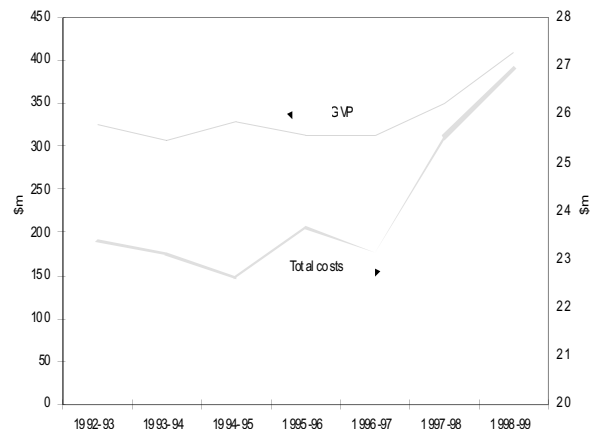
Figure 2: Commonwealth fisheries management costs as a percentage of GVP



Using the audited financial statements of AFMA and its predecessor (the Australian Fisheries Service), it is possible to determine the total expenditure on Commonwealth fisheries management as a proportion of the gross value of Commonwealth fisheries production (GVP) over a longer period, 1992-93 to 1998-99. (Reliable detailed costings are not available for the period prior to 1996-97.) The cost of Commonwealth fisheries management (including FRDC costs) has averaged 7.2 per cent of the gross value of production (GVP) over the period (figure 2). The ratio of costs to GVP has decreased steadily since 1995-96, due primarily to a increases in GVP (figure 3).

In examining trends in the various cost components, it is useful to aggregate the costs into the three basic management functions (Kaufman, Geen and Sen 1999, p. 176). These categories are: rule making activities (that is, fisheries management administration, consultants, overheads and management advisory committees); rule enforcing activities (logbook costs, licensing, surveillance and enforcement); and research. It is interesting to note that research costs declined as a share of total costs from 17 per cent in 1996-97 to 13 per cent in 1998-99. In contrast, the share of rule enforcing activities increased from 38 to 44 per cent of total costs over the period.

Figure 3: Total costs and GVP



Since the cost recovery policy has been in place, AFMA has also determined the management costs of individual Commonwealth fisheries. This is done as part of an open and transparent budgetary process ensuring that participants in the individual fisheries are aware of the costs of management in their fisheries. As part of the planning process, the individual fishery budgets are agreed by the various management advisory committees that are also responsible for determining how the costs are to be apportioned between individual fishers. Management costs for the major Commonwealth fisheries are available on a comparable basis for the period 1995-96 to 1998-99 (table 3). These costs exclude the AFMA Research Fund and FRDC costs, although the latter is approximately equal to 0.5 per cent of the GVP of individual fisheries. The fisheries are ranked in the table in order of GVP in 1998-99 — the northern prawn fishery being the most valuable (\$111 million) down to the Bass Strait scallop fishery (\$1.7 million).

The rapid increase in management costs as a percentage of GVP for the south east trawl and Bass Strait scallop fisheries is a result of both increased management costs and declining catches. Indeed, the Bass Strait scallop fishery was closed by AFMA for the 1999 season as a result of overfishing. In the case of the south east trawl fishery, there are considerable management problems in having both the south east trawl and nontrawl fisheries operating simultaneously. It has been recognised that the existing management units have not proved very effective in dealing with the problems of Australia's most diverse and complex fishery (BRS 2000, p. 139). Integration of the management costs of the two sectors of the south east fishery is likely to significantly reduce management costs.

In the case of the western and southern tuna fishery, the value of the fishery has increased by 680 per cent since 1995-96, to \$10.9 million in 1998-99, while management costs have declined considerably to around 2 per cent of the value of GVP. This highlights the fact

Table 3: Management costs of major Commonwealth fisheries ^a

Fishery	Management costs				Costs as proportion of GVP			
	1995-96	1996-97	1997-98	1998-99	1995-96	1996-97	1997-98	1998-99
	\$'000	\$'000	\$'000	\$'000	%	%	%	%
Northern prawn	1 026	985	1 021	1 196	0.9	0.9	0.9	1.1
South east trawl	2 801	1 966	2 805	2 518	5.6	4.0	3.8	4.3
Southern bluefin tuna	765	710	1 050	1 108	1.6	1.7	2.6	2.0
East coast tuna and billfish	779	679	736	964	3.7	1.9	2.3	1.7
Torres Strait prawn	2 360	1 045	1 824	1 247	8.4	4.1	5.3	3.5
Southern shark	1 045	862	1 009	1 286	6.2	4.8	8.6	8.3
Western and southern tuna	328	339	174	217	20.5	15.5	4.0	2.0
Great Australian Bight	86	72	107	109	1.7	1.3	1.8	1.8
South east nontrawl	262	470	785	767	8.1	10.4	20.5	20.4
Bass Strait scallop	317	319	412	485	2.3	4.0	5.9	28.4

^a Excludes ARF and FRDC research costs.
Source: AFMA (unpublished data).

that fisheries that are in the early stages of development or undergoing significant management problems may require a greater proportion of management costs as a percentage of their current value. In the case of developing fisheries, this implies that fisheries managers may need to be convinced that the expected resource rent from particular prospective fisheries will be sufficient to justify current management costs and that management effort can be cost effectively delivered. However, the pressure on managers to, in effect, 'pick winners' will be reduced under a cost recovery policy, in which fishers not only pay the costs of management but also have a role in decision making about the future commercial viability of fisheries. This incentive will depend, of course, on the degree to which adequate property rights to the resource are specified and at what stage they are allocated. As noted in Cox and Kemp (1999), there are strong efficiency grounds for allocating long term, well defined property rights relatively early in the development of new fisheries.

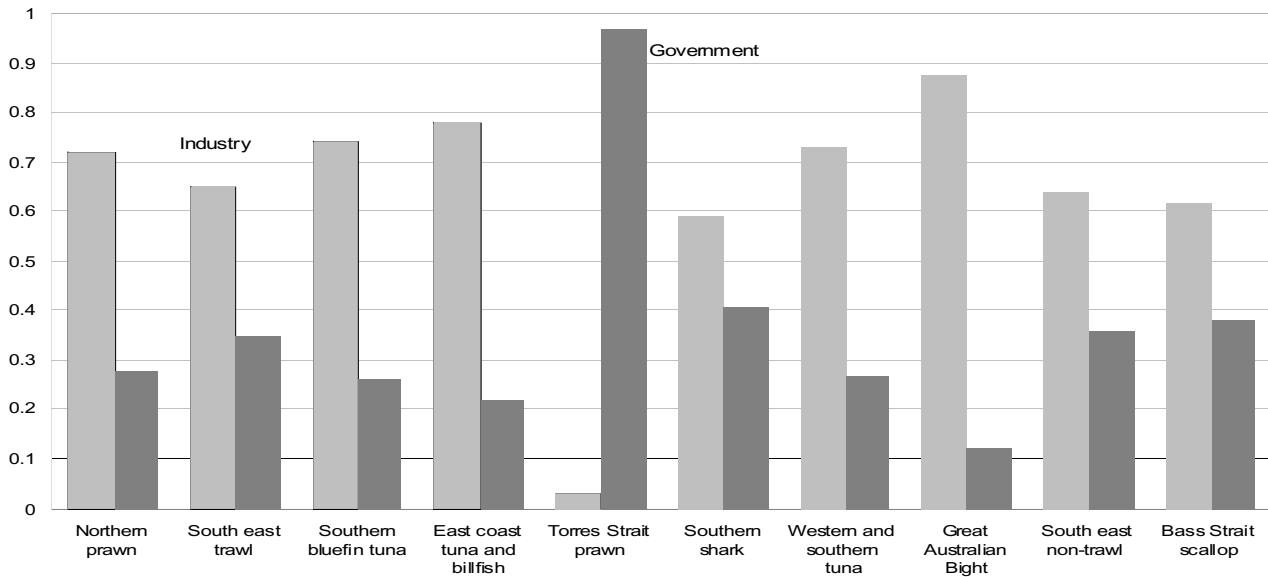
Cost recovery

Over the period 1992-93 to 1998-99, on average approximately 34 per cent of AFMA's management costs were recovered from industry. The total funding provided to AFMA fluctuated considerably over this period, largely as a result of variations in government funding. In 1996-97, in particular, significant reductions were made in Commonwealth government expenditure across the board. Interestingly, since the full introduction of the current cost recovery policy, the industry contribution has fallen from 34 per cent of total revenue in 1995-96 to 29 per cent in 1998-99.

Looking at the management costs of domestic commercial fisheries alone, the degree of cost recovery is somewhat higher, averaging 57 per cent between 1995-96 and 1998-99. This figure is derived from the model used to attribute costs between industry and government in individual fisheries and does not include costs that are not attributable to specific fisheries (for example, licensing, domestic and Southern Ocean surveillance, apprehension and prosecution of foreign fishing vessels and a proportion of the legal costs).

There is significant variation in the average industry cost contributions between fisheries over the period (figure 4). In the case of the Torres Strait fishery, management of the fishery is conducted jointly by the Commonwealth and Queensland governments under the Torres Strait Protected Zone Joint Authority. One of the major objectives of the authority is to maximise the opportunities for Torres Strait Islander participation in the fishery and to protect their traditional way of life (including subsistence fishing) (AFMA 1999, p. 149). Under the cost recovery policy, the costs of managing this fishery are borne largely by the government (see table 1). When the more 'purely commercial' fisheries are considered in isolation, the percentage of costs attributed to industry is considerably higher, at around 67 per cent.

Figure 4: Cost recovery in major fisheries Average 1992-93 to 1998-99

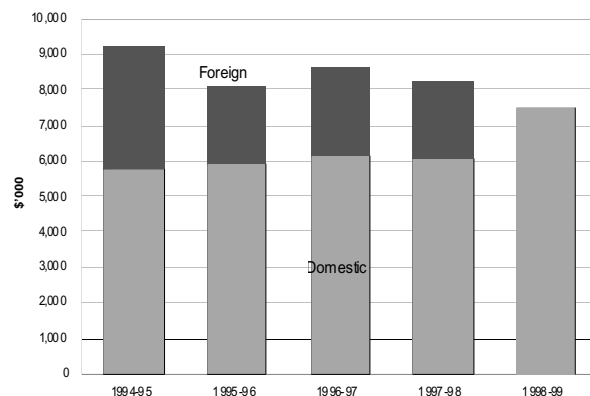


Over the period since 1994-95, costs have been recovered from both domestic commercial operators and foreign operators (figure 5). The latter group gains access to the Australian Fishing Zone under a variety of management arrangements, primarily bilateral access agreements with Japanese fishing vessels, and the costs of their operations are fully recoverable. In 1998-99, however, Japanese operators were excluded from the Australian Fishing Zone as part of the dispute over exploitation of southern bluefin tuna under the Convention for the Conservation of Southern Bluefin Tuna. As a result, there was no foreign sourced revenue in that year.

It is beyond the scope of this paper to determine whether the introduction of the cost recovery policy in Australia has resulted in improved efficiency in Commonwealth fisheries management. Such analysis would require a detailed examination of functions and outlays in order to determine whether efficiency gains have been achieved. However, some preliminary observations can be made on the basis of the data presented in this paper.

While an earlier review of the effects of AFMA's cost recovery by Kaufman and Geen (1997) was cautiously optimistic about the effects of the cost recovery policy, the data presented in this paper provide a more mixed picture. First, the cost of fisheries management has

Figure 5: Domestic and foreign contributions to AFMA revenue



increased steadily in recent years. A large part of the increase stems from increased surveillance effort by the Commonwealth government. However, increases in the direct costs and overheads of AFMA have also contributed. Staff and travel costs have increased by 15 per cent and 35 per cent, respectively, since 1996-97, while staff numbers have remained relatively steady. In addition, overhead costs have increased by around 14 per cent since 1995-96. It is worth noting, however, that the number of fisheries under management has increased from 22 to 26 over the period.

Second, the decline in the contributions to management costs from foreign fishers has not been matched by an increase in the contributions of the domestic industry. As a result, the extent of cost recovery has declined in recent years. While the increased government expenditure on surveillance and enforcement is a factor in this trend, it will be interesting to observe if domestic industry contributions continue to increase in future years.

Third, the institutional changes that accompanied the introduction of the cost recovery policy have been positive in facilitating increased industry involvement in decision making in fisheries management. While it is too early to determine the extent to which this increased involvement has been translated into more effective management, the changing institutional structure is more likely to facilitate such improvements. The structure of the management advisory committees in the major fisheries, with independent chairpersons, majority industry membership and one AFMA representative, and the increasing involvement of industry in stock assessment are indicative of a more open and transparent decision making process. In this context, it is worth noting that the cost of running the management advisory committees has declined steadily since 1996-97. In another positive sign, the (attributable) cost of managing the domestic fisheries has increased by only 9 per cent over the past four years.

Concluding comments

The cost recovery policy is well developed and integrated in the management of Australia's Commonwealth fisheries. The policy was implemented after extensive consultation and public inquiry over the concept and detailed analysis of an appropriate method of attributing and recovering costs. However, the policy was formulated in the policy environment of the early 1990s in which the major focus was on domestic fisheries management. Much of the institutional change that occurred with the establishment of AFMA and the introduction of the cost recovery policy was directed at improving the regulation of and decision making in the Commonwealth fisheries. Since then, however, the policy environment has changed in a number of important aspects.

First, there is an increasing emphasis at the Commonwealth level on ecosystem approaches to natural resource management. This is particularly the case for fisheries where there has been a discernible switch in policy focus from a narrow view of fisheries management to

one encompassing the broad range of ecosystem considerations under the heading of ecologically sustainable development (BRS 2000, p. 223). This switch is manifested in the increasing role of the Commonwealth government's environment department, Environment Australia, in marine resource management through the introduction of the National Oceans Policy in 1999. The Commonwealth Minister for the Environment has also announced that the current exemption of commercial native fish species from export regulation will cease in 2002. Further exports will only be allowed following the strategic assessment of fisheries against ecological sustainability guidelines. In addition, the new omnibus environmental protection legislation, the *Environment Protection and Biodiversity Conservation Act 1999*, requires that all Commonwealth managed fisheries undertake environmental impact assessment over the next few years.

There are a number of potential implications of such a switch in policy emphasis for the costs of fisheries management. In the first instance, it is likely to increase the cost of management as a greater array of functions will need to be undertaken in the course of day to day management. It is also likely to blur the process of attributing costs and may affect the ability of AFMA to cost effectively recover costs attributable to industry.

Second, following on from the broader policy focus, the question of what research should be undertaken in the course of fisheries/ecosystem management and who should pay for that research may become increasingly difficult to resolve satisfactorily. There are strong public good aspects to many of the ecosystem research questions. However, there may be difficulties in applying the necessary filters under the current cost recovery policy in determining the appropriate attribution of research costs.

Finally, the current cost recovery policy is likely to be challenged by the increasing desire by Australian companies to undertake high seas fishing. Under the United Nations Fish Stocks Agreement, Australia has a range of responsibilities as a flag state, particularly once a regional fisheries management organisation is established. In particular, the agreement requires that Australian flagged vessels provide information and data as necessary to support scientific assessment of the impact of fishing. Australia also has a range of compliance and enforcement responsibilities in relation to its flagged vessels. The extent to which the current cost recovery policy can be applied to Australian vessels fishing on the high seas has not been tested to date. Australian fishing companies may resist the extension of cost recovery to the high seas as it will be seen as an additional cost that their competitors from other countries may not be required to bear. This is likely to be a significant issue for policy makers in coming years.

Acknowledgments

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