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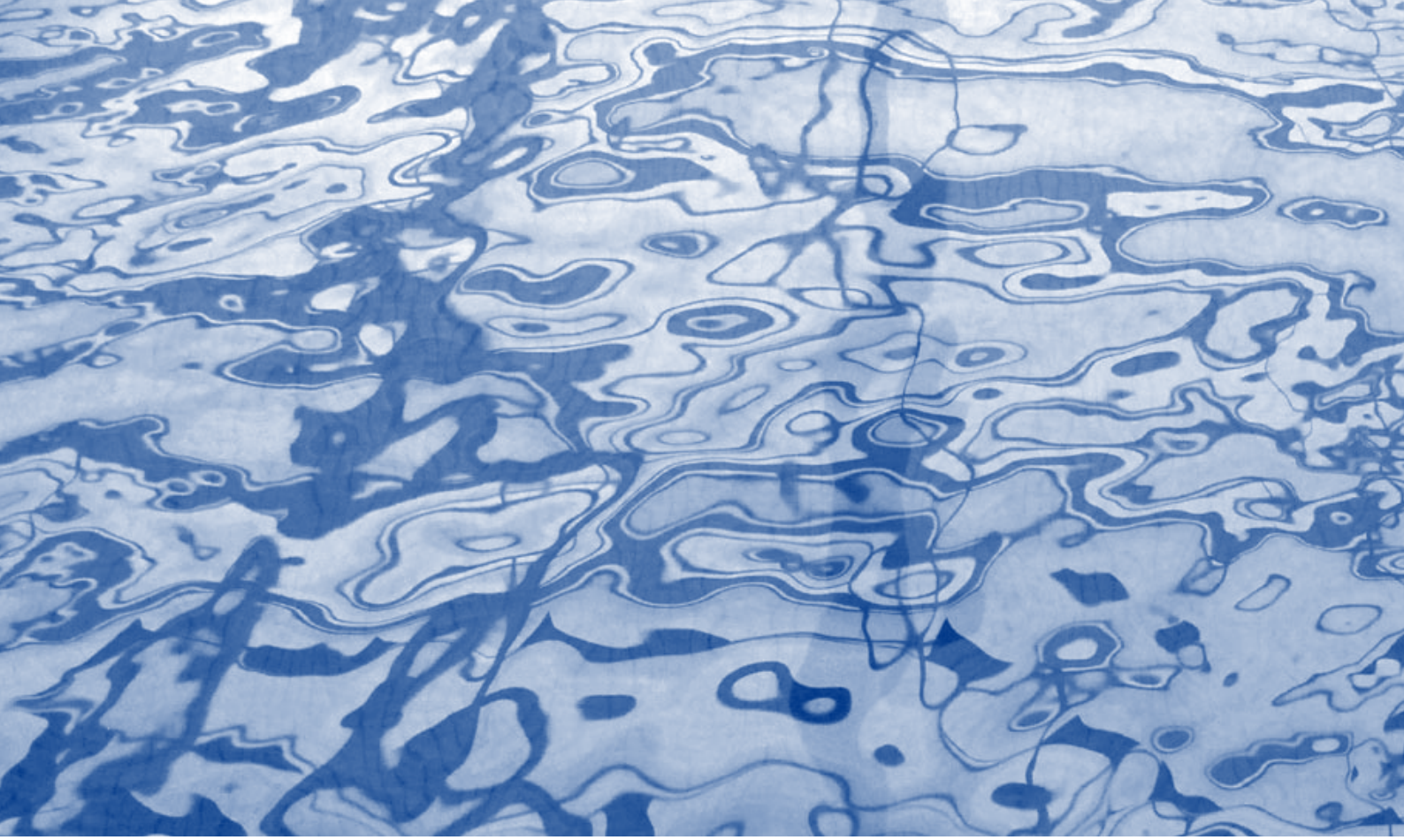

Adjustment schemes in Western Australia

The use of fisheries adjustment schemes to achieve shifts in resource allocations in estuaries and embayments in Western Australia

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Abstract

Since 1988, a series of voluntary fisheries adjustment schemes have focused on estuarine and embayment fisheries, in areas of population growth and coastal development in Western Australia where recreational and commercial fishers compete for the limited fish resources available. The underlying assumption is that reductions in commercial catch increase the available recreational catch. The open-ended nature of recreational fisheries can mean any benefits are absorbed by this sector, but with little apparent benefit to the individual fisher. However, the opportunity-cost of not having permanent effort reduction programs needs to be considered. Significant reductions in the number of commercial licences and catches have occurred in Western Australian fisheries where schemes have been introduced, increasing the potential catches for the recreational sector. Quantifying the extent of resource shifts is difficult because of the lack of empirical recreational catch data. Perception issues can dominate the resource sharing debate. Should priority be given to measuring resource shifts, or should the scarce resources available be dedicated to achieving further effort reductions? A new initiative, integrated fisheries management, will allocate explicit catch shares in certain fisheries over the next decade. However, the benefits of targeted schemes as an adjunct to achieve implicit resource reallocation over time cannot be understated.

Acknowledgements

The authors thank Rae Burrows and Rachel Jenner for their assistance in the production of this paper.

Introduction

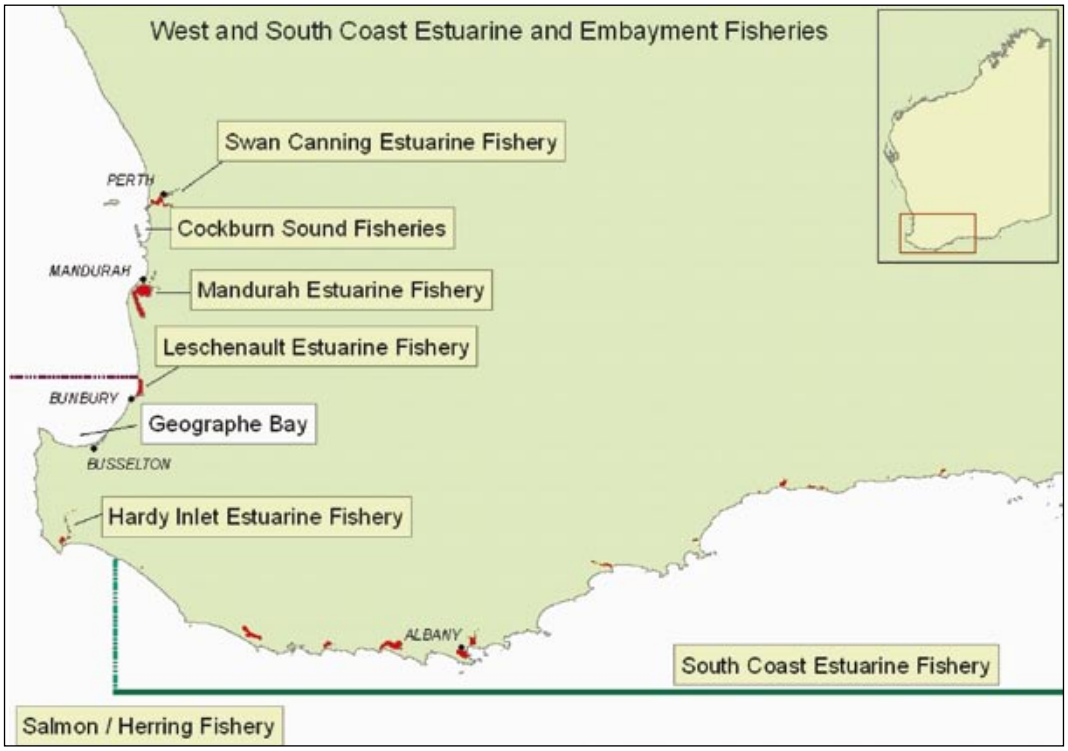
The temperate waters of Western Australia support only small stocks of fish by world standards. In the absence of major river systems enriching the continental shelf, no major upwellings and with the warm Leeuwin Current running south from nutrient poor tropical waters, nutrients to support major fish stocks are absent. The river systems that do exist are low volume, intermittent and form only small (and often barred) estuaries. The nature of the coastline provides limited protection from the prevailing fetch of the Indian Ocean, except where sheltered by an extensive offshore limestone reef system, and there are only a limited number of embayments and natural harbours. This feature of Western Australia's marine ecology was recognised early in the management of its fish stocks with the then Superintendent of Fisheries saying in 1953:

> "…I do not for a moment suggest that Western Australia's fishery resources are unlimited. In ……contradistinction to other parts of the world, nature was somewhat niggardly when she endowed our fisheries. We certainly have many species of fish, but we have a smallish number of individuals of each species and these could possibly, without proper management, in the long run become depleted. It is essential therefore that we take very good care of what we have." (Fraser 1953; p 19)

This recognition resulted in the early introduction of very conservative commercial fisheries management regimes in Western Australia (Brayford & Lyon 1995). This included the adoption of limited entry as a major underpinning of commercial fisheries management (from the 1960s), especially in the major western rock lobster (*Panulirus cygnus*) fishery and the bigger prawn (shrimp) fisheries. Restricted entry regimes with limited transferability were also introduced into the major estuarine and embayment (finfish and crab) fisheries at the same time (Millington 1998).

The major commercial estuarine and embayment fisheries in Western Australia are located in the southern half of the state, from Perth to the south coast. These include the Cockburn Sound fisheries, and the Swan Canning, Mandurah, Leschenault, Hardy and South Coast Estuarine fisheries (Figure 1). These are primarily net fisheries that target a range of estuarine species such as bream (*Acanthropagrus butcheri*), pink snapper (*Pagrus auratus*), mullet (Mugilidae) and crabs (*Portunus pelagicus*). In addition, there are several beach seine fisheries in the embayments targeting Australian salmon (*Arripis truttaceus*), Australian herring (*A. georgianus*), and whitebait (*Hyperlophus vittatus*). Recreational fishing occurs in a relatively unfettered manner on almost all these species in the same waters as the commercial fisheries. These are mostly undertaken through angling from shore or small boats, with a limited amount of (attended) recreational gill netting

Figure 1. Southwestern and southern estuarine and embayment fisheries of Western Australia.



Causes of conflict

The limited resource and environmental pressures

Extensive shallow seagrasses in embayments in Western Australia supplement the estuaries in providing nursery grounds for a wide range of species, including those of interest to commercial and recreational fishers. Many adults are seasonally available as they move inshore to breed and can give a false impression of abundance but the abundance of these species is limited. Furthermore, although the embayments are currently in good ecological condition, both estuaries and embayments are under stress from development pressures, eutrophication and reduced flushing caused by withdrawals of freshwater upstream. In addition, recruitment of many species is affected by the Leeuwin Current, which in turn is driven by El Niño-La Niña oceanographic effects.

The demographic pressures

Commercial fishers in the estuaries and embayments of Western Australia are often 3rd or 4th generation fishers. Historically they lived in small coastal towns and communities, with relatively poor transport. Conflict with recreational fishers has been intermittent over the last century, and was reported as early as the 1904 Annual Report of Chief Inspector of Fisheries (Gale 1905; p 4). However these conflicts were, until the late 1970s, at relatively low levels, surfacing primarily at peak holiday times and often solved by small, local, spatial and temporal closures for commercial fishers.

Over 80% of the Western Australia's population lives within 30km of the coast (WAPC 2003), predominantly in the southwest. Population growth in the southwest over the last three decades has been significant, including the development of many recreational boat ramps and marinas. Recreational boat ownership is large, with 68,493 power boats registered in a population of 1.925 million (in 2001), the vast majority of whom live in the Perth metropolitan region, the southwest and the south. Ownership of recreational boats is very

high (average 3.6%), and even higher in the non-metropolitan regions (up to 4.5% in the southwest). Recent population growth has been matched by an increasing participation rate in recreational fishing. Recreational fishers have been between 30 and 35% of the population over the last seven years (Department of Fisheries 2005a; p 125). The median number of fishing days is about 10, with the majority fishing about 5 days. The southwest and south of the state are key areas for recreational fishers. There is significant overlap between areas favoured by recreational fishers and the commercial estuarine and embayment fisheries.

Resource exploitation pressures

A variety of measures have constrained commercial fishing effort, including limited entry, a personalised licensing system, and, historically, a restriction of transfer of such licences to family members. These macro measures have been reinforced by gear limitation (size of boats, net mesh size and length), temporal restrictions (seasonal, weekend and day fishing closures) and area closures. These measures have had a range of drivers, including effort limitation, breeding stock protection and, in some cases, spatial and temporal separation from the mostly seasonal and/or weekend recreational fishing community. Whilst recreational licensing regimes for certain high value species have been in place for decades, no general marine or estuarine angling licence is required. There is no political will to introduce such a licence (eg Labor Party 2004). While there have been progressive limitations to gill and haul netting, and there are stringent and comprehensive possession, bag and size limits in place, there is effectively no cap on recreational fishing effort. The commercial fishing sector has a wider range of available species than the recreational anglers, due to the types of permitted fishing gear (gillnets etc). There are inevitably overlaps between sectors on key species, predominantly pink snapper, black bream, Australian salmon and herring.

The perception issues

The resource sharing debate is dominated by the perception that commercial fishing reduces the availability of fish for the recreational sector, but there is often little evidence to support these perceptions. For example, there has been a tendency for the recreational sector to blame commercial fishing for a lack of Australian salmon caught by recreational fishers. However, as indicated above, recruitment and availability of salmon are predominately driven by environmental factors, such as water temperature and strength of the Leeuwin Current. Stock sustainability is not a concern but conflicts continue to occur through the perceived lack of fish. Perception issues amongst the recreational fishing community about commercial fishing in estuaries and estuaries and embayments fall into three categories:

- Firstly, 'fishing is not like it was'. This is an implicit recognition that as fishing pressure has increased the average size of fish caught has decreased. This is expected as unexploited populations are increasingly targeted, although the abundance of smaller individuals may rise.

- Secondly, this depletion phenomenon is in most instances attributed to commercial fishers, rather than the rising number of recreational fishers.

- Thirdly, there is competition for space. Most estuaries are small and commercial fishing activity, if carried out during the day, is starkly evident. There are also safety and aesthetic issues for the commercial beach fishers as they use four-wheel drive vehicles to haul dinghies along increasingly crowded beaches.

Relative value of the activities

Commercial fishers consider they have an historic right to continued access to the estuarine and embayment fisheries, although their common law right of access has been progressively fettered by statute law over the last 150 years (Department of Fisheries 2005b). The recreational position is that, given the low commercial value of species in estuaries and embayments, commercial exploitation is not the best economic or social return for the resource; the best return to the community can be achieved through shifting the available catch to recreational fishers, e.g. in the salmon/herring fisheries.

The industry adjustment processes

In 1983, government froze the entry of any further commercial fishing boats into the Western Australian fishing fleet. This effectively stopped further entry into those remaining (lower value) commercial fisheries for which limited entry regimes were not explicitly in place especially in estuarine and embayment fisheries. This measure effectively capped numbers in the inshore fisheries of the state. Although not explicitly aimed at resource sharing, the aim of government was to curtail future conflict between the inshore commercial fishing sector and the recreational sector. Government held discussions in 1985/86 with commercial fishing representatives. This became known as the "Mandurah Working Group". The group recognised that excess capacity in the fishing industry was raising concerns about the financial viability of fishing operations and impacts on fish stocks. The group found that "these difficulties are manifested by an excessive number of boats in small unmanaged fisheries causing local conflicts and fears for the continued viability of those stocks" (FINS 1986 p12). This included the estuarine and embayment fisheries. The peak industry body wrote to the Minister for Fisheries (FINS 1986) proposing that the number of boats (fishing units) in open access fisheries be reduced to:

- distribute the catch over fewer fishing units to increase the viability of the remaining fishing units;
- reduce the number of fishing units to prevent the release of latent fishing effort in the fishing fleets; and
- reduce the competition for the fish stocks to relieve the (fishing) pressure on the fish stocks being targeted and benefit all user groups, including the recreational sector.

The group proposed a licence buyback scheme, together with a greater level of management, through essentially introducing limited entry fisheries. The group believed that, if these measures were accepted, the benefits would flow to the whole community, reduce conflicts within and between user groups, and reduce pressure on government to resolve these conflicts. The group

recommended that the cost of the licence buyback scheme be shared equally between the commercial fishing industry and the community, and proposed a levy per fishing unit that would be matched by Government funding as the community component. These views were generally accepted by the government and the Fisheries Adjustment Schemes Act 1987 (FAS Act) was introduced. This act had the capacity to raise levies from the commercial fishing industry. The Fisheries Adjustment General Scheme (general scheme), which was established under the act, raised an annual levy that was matched by government on dollar for dollar basis, and resulted in a 118 fishing licences being surrendered; 64 were in south-western estuarine fisheries. The group recommended that the licence buyback be reviewed after five years. The peak industry body withdrew support for the industry levy, and hence the matching government contribution, in 1998 as it considered that the general scheme had achieved its objectives. The general scheme ceased in 1999.

Over the period 1986 to mid-1996, the general scheme withdrew a total of 187 inshore fishing authorisations, resulting in an overall reduction of about 10% of the commercial fishing fleet, with the current fleet now about 1350 boats. This was the underpinning of subsequent adjustment processes explicitly focussed on reallocation of fish resources. It succeeded in removing much latent effort in the inshore and estuarine sector. Given the age structure of the fishers, coupled with the restricted nature of transferability, it also provided a social 'safety net' or exit package for those wishing to cease fishing at relatively modest cost to the taxpayer and industry.

Application of the FAS Act

The Fisheries Adjustment Scheme Act provides the mechanism for structural adjustment through the payment of compensation for the surrender of commercial fishing authorisations. The act provides for both voluntary and compulsory schemes, and sets the requirements for consideration of a when a fishery. When considering a voluntary scheme, the act requires the Minister for Fisheries to establish a cross sectoral committee to provide advice firstly on whether there are grounds to consider establishing a scheme, and secondly to provide advice in respect to offers made to surrender fishing authorisations to a scheme. It is normal practice to have recreational and commercial fishing representatives, a delegate from the Department of Fisheries and an independent chair on the committees. The committee provides advice on the value of authorisations being offered to a scheme. The decision to establish a scheme, and the ability to accept offers or make counter offers, rests with the minister. The act provides options to have compulsory schemes or industry funded schemes, but these are not discussed in the present paper.

Voluntary schemes with a reallocation objective have not normally been applied to high value fisheries, as the compensation costs would be significant.

These fisheries already have comprehensive management structures in place, catches are more predictable, and the fisheries are mainly cost recovered. High value fisheries where there is a significant recreational fishing component are currently the prime focus of the state's integrated fisheries management initiative, which is described elsewhere (Rogers 2006).

Schemes focussed on resource reallocation

In 1996-97, government announced that funding would be available over four years for voluntary schemes to accelerate the reduction in numbers in key commercial fisheries – primarily the estuarine and embayment fisheries where there were resource sharing conflicts. This funding initiative was launched in tandem with a process of mediation designed to obtain management outcomes to complement or supplement voluntary adjustment processes (Wright *et al.* 2000). Priority fisheries were determined by the minister after consultation with the peak commercial and recreational fishing bodies, and upon receipt of advice from the committees established for this purpose under the act. Schemes were then established in a priority order. The schemes specifically targeted commercial fisheries in areas of increasing population growth in the southwest where the community expectation is that there will be fish available for recreational fishing. The presence of commercial fisheries (for whatever reason) conflicts with the expectations of the general population in terms of recreational enjoyment. The use of schemes and payment of compensation was designed achieve a broader community objective. For the period 1987–1997 the number of fishing units been reduced by 41% in the five estuarine fisheries (i.e. Swan Canning, Mandurah, Leschenault Inlet, Hardy Inlet and South Coast estuarine fisheries). This was due to natural attrition and licence buyback through the general scheme (Pearn & Cappelutti 1999). Voluntary schemes resulting from the $8 million initiative saw a further reduction of 24 units (28%) from January to October 1998. Since that time, a further 33% of the remaining fishing units have been reduced leaving a total of 39 fishing units in these fisheries. Following the initial initiative, government has continued to provide fisheries adjustment funding through annual budget allocations.

Experience in the application of schemes

As is evidenced, Western Australia has a long history of running fisheries adjustment schemes, first through the general scheme, and then through a series of targeted schemes. Most have incorporated an aim to reduce intersectoral conflicts through permanent reductions in the number of commercial fishing units operating in these fisheries. The general scheme was the first voluntary scheme operated in Western Australia. It was established when there was already a market for the goodwill value of transferable

licences. Initially the general scheme acted as a market follower, rather than a price setter. This changed over the life of the general scheme to a situation where prices offered through the scheme would set benchmark prices. In other words, as the market price for licences fluctuated (often quickly) prices offered by the scheme were more stable, and provided the 'fall back position' to fishers.

The licence valuation techniques used by the committees for schemes have been refined over time. In most cases, the minister makes offer prices based on a Net Present Value calculation of the annual return for the average licence in the fishery. This in general equated to about twice the average gross annual landed value. The minister will usually offer only one price for each round of a scheme. Certain general trends can be recognised in the administration of schemes:

- Latent effort. Most first rounds of a scheme remove latent effort, *i.e.* fishers who were seeking to retire from a fishery, through a combination of local social pressures, low economic returns, age/health related matters, and are seeking some 'remuneration' to realise the goodwill value of fishing licences.

- Expectations about the value of a licence. A price based on the average catch value is not attractive for active fishers at the higher end of a fishery, especially if there is a lot of latent effort in the fishery. As latent effort is removed permanently through a scheme the remaining fishers will seek increased prices for the surrender of licences in subsequent rounds because they generally generate income greater than the average and can lead these fishers to feel their licences are undervalued. However, for reasons of equity, common practice is for the minister to make standard offers to all fishers regardless of catch history. Making value judgements on the individual returns for each fisher is difficult, especially when the public purse is being used.

- Wholesale removal of fisheries. In one instance an entire fishery has been bought out in the first round, eg in the Leschenault Inlet Estuarine Fishery. Here, through escalating community pressure and declining environmental quality, there was a sound economic case for the fishers to decide to exit the fishery *en bloc*.

- Influence of public policy. A government objective of reducing the number of units in a fishery can have a direct bearing on the value of licences. In these instances consideration needs to be given to offering a premium on licence valuations, given schemes are voluntary and fishers are not required to either make or accept any offers. This can create a situation where a scheme needs to compete in the market place to attract offers, while taking care not to drive the market upward. Alternatively,

schemes can provide realism into fishers' expectations of the goodwill value of their licences. There is often a misconception that the public purse is bottomless. The value offered for a licence can relate to the priority given, ultimately by government, to reducing conflict levels or the resource reallocation objectives given to a fishery, especially when considered against available funds for fisheries adjustment purposes. This is true when the impetus for a scheme comes from the commercial fishers themselves as a consequence of failing markets, poor catches or increasing competition from recreational fishers.

- Relation to management objectives. In providing advice on schemes, committees need to be aware of management arrangements for the fishery and proposed management changes after finalisation of a scheme. The committees also have to consider the potential for other commercial fishers to "take up" the benefits of a scheme and effectively replace those fishers that have exited under a scheme, as well as their ability to shift effort to other fisheries where multiple licences are held. Similarly, committees must to consider the potential for schemes to "follow" fishers through a succession of schemes as multiple licences are progressively surrendered. It is better to adopt a position of not accepting the piecemeal surrender of licences at the outset. The complete removal of fishing units, with the appropriate compensation, should be the preferred option.

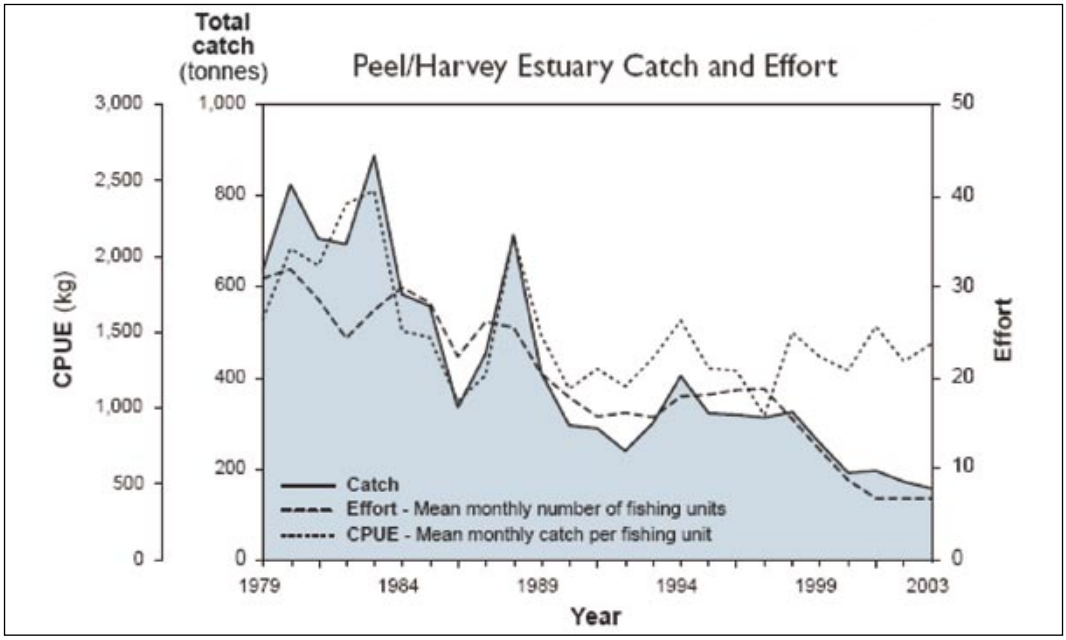
Outcomes

Significant reductions in fisher numbers have occurred in Western Australia's estuarine and embayment fisheries, with corresponding reductions in commercial catch, such as the Mandurah Estuarine Fishery (Figure 2). However, it is often not possible to measure a resource shift arising from these schemes. Average catches may increase in the commercial fishing sector because of environmental factors, variations in stock recruitment that may (or may not) be identified by research, economic factors, changes in markets, periodic shifts in fishing effort or the vagaries of weather. The greatest impact of schemes has been where the number of licences withdrawn has reduced commercial fishing numbers to very low levels. Where the remaining commercial fishers have been unable to improve technology or to significantly increase fishing days, there has been a real potential resource shift to the recreational sector. Unfortunately, not all the former commercial share will be available because of the declining ecological status of many of Western Australia's estuaries.

Whilst there is *prima facie* case for increased availability of catch for the recreational sector, quantifying the extent of any resource reallocation is difficult because of the lack of recreational catch data. This has raised questions of the value of adjustment and perceptions that remaining commercial fishers

are the primary beneficiaries (Stagles 2005). Alternatively, the open-ended nature of recreational fisheries can mean any benefits are quickly absorbed into this sector, with little discernable benefit to the individual fisher. This is compounded by a small percentage of "top end" anglers who characteristically take the bulk of available recreational catch through a combination of skill and persistence. These fishers are the immediate beneficiary of reallocation mechanisms (Kearney 2002; p 150). The recreational sector and government are now seeking material benefits (spatial or demonstrable) as an objective or consequence of schemes, largely because the recreational fishing community cannot discern any tangible benefits of previous schemes. These include the introduction of further recreational fishing only areas.

Figure 2. Annual catch, effort and catch per unit effort (CPUE) for the Mandurah (Peel/Harvey) Estuarine Fishery 1978-2003



Unforeseen consequences

A key to success in fisheries management is the quality and quantity of biological and catches data available to provide contemporary stock assessments. These are also indicative of the general health of a marine environment. As commercial fishers are required to provide catch returns and are in dialogue with research and management officers, they provide the hard data and anecdotal evidence that management decisions are often based on. The Department of Fisheries relies considerably on compulsory catch and effort returns as a tool in determining fish stock status. Some of these datasets stretch back to the mid 1940s. The incremental reductions in commercial fishing unit numbers, whilst worrying in terms of reducing the sampling base,

has still seen a stream of data available. More serious to research has been the total removal of commercial fisheries, e.g. the Leschenault Inlet Estuarine Fishery. Anecdotal evidence is that recreational catches have not improved (at least not to the extent that the common perception of commercial fishers taking all the catch would suggest). However, in the absence of commercial catch data, the department cannot respond to requests for contemporary stock assessments. While recreational surveys are planned, they are, in comparison with commercial fishing data, expensive, time consuming, and periodic. Thus the sudden removal of commercial fishers can mean a source of catch data (often long term data sets) is lost, and can lead to a situation of having:

- no replacement data available for fish stock analysis and assessments;
- no replacement data systems in place to ensure continuity of data; and/or
- data sets that are not calibrated to ensure integrity of data for making management decisions for both commercial and recreational fisheries.

The government has therefore had to provide budget allocations for recreational fish surveys to compensate for a declining commercial database. It is also investigating instituting recreational angler logbook programs, as well as a range of surrogates for measuring fish abundance.

Discussion

There is a paradox of allocation in Western Australia. The state currently has an integrated fisheries management initiative to initially target allocation issues in high value species, such as abalone and western rock lobster. There are known participation rates and an abundance of supporting data in these fisheries, making allocations easier. In contrast, the estuarine and embayment fisheries with a low economic value, valued lifestyle components and higher levels of conflict, through either competition for the available fish resources, perceptions of inequity or the physical presence of commercial fishing activities, are where allocation decisions are being made with cruder tools and less data.

Voluntary schemes are a means to shift resource share with the assumption that reductions in commercial fishing provide a corresponding increase in the available recreational catch. The voluntary nature of these schemes mean an outcome (at least in the short term) can be uncertain, but history shows they are effective in the longer term in achieving permanent reductions in commercial fishing effort. In Western Australia, a long-term program of operating schemes has enabled significant reductions in the number of commercial fishing units.

Significantly reducing these commercial fisheries reduces catch data available for research purposes. This must be addressed, given the recreational sector will continue to demand contemporary stock assessments, particularly if catch rates decline. In Western Australia, given the now relatively low level of commercial fishing effort in these fisheries, and their likely low percentage take of the total catch, the issue is becoming whether there is public benefit in further effort reductions, or whether the funds would be better spent in gathering higher quality data on recreational fishing effort and stock status. Quantifying the success or extent of resource reallocations as a consequence of schemes remains problematical. Has there been an increase in the availability of fish stocks for recreational fishers in the estuaries and embayments since schemes commenced? Has there been an increase in

the number of recreational fishers in these waters? And, has there been an increase in recreational catches as a consequence of schemes? There is no definitive answer. The ability to prove that a change in resource reallocation has occurred as a result of a scheme is difficult because of the lack of recreational catch data to coincide with the available commercial catch data, especially because the schemes may first absorb latent effort. The lack of apparent success in resource reallocation can cause the recreational fishing sector to seek tangible benefits from future schemes or management measures. However, there is benefit in undertaking resource reallocations through maintaining effort levels of existing commercial fishers and the removal of real and potential effort through schemes. With the value of hindsight, reducing commercial fishing effort through schemes is a preliminary process, in place until the more fundamental issues of resource reallocation can be addressed. Alternatively, an objective may be to reduce a commercial fishery to a particular level, which is seen as a suitable compromise between the sectors. These debates, seeking co-operative management arrangements between the commercial and recreational sectors, have not been widespread in Western Australia. This view is reinforced when a progressive historical view of schemes is taken. The objective of the general scheme was to provide the mechanism to generally reduce commercial licences across a broad spectrum of fisheries. This progressed to a series of targeted schemes, with no specific allocation objectives other than to reduce the number of fishing units in key fisheries. This led to schemes where there is a clear political objective for a particular fishery, such as phasing out the commercial fishery. It is anticipated that there will be further schemes with specific resource reallocation objectives, which will presumably form part of the broader integrated fisheries management debate.

The opportunity cost of not having operated schemes needs to be taken into account in any consideration of the impact of schemes in Western Australia. While it is not appropriate to provide specific prices there is empirical evidence that the cost variation between similar licences surrendered under the general scheme when compared to more recent targeted schemes is significant –usually an order of magnitude. Having to now commence the resource reallocation process in Western Australia would be cost prohibitive. Voluntary schemes are not a new panacea to fisheries management or resource reallocation but in Western Australia the demonstration of persistence, patience and foresight is showing tangible results.

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