POTENTIAL REALLOCATION MECHANISMS FOR THE TRANSFER AND/OR ADJUSTMENT OF CATCH SHARES BETWEEN SECTORS WITH APPLICATION TO THE WESTERN AND SOUTH AUSTRALIAN ROCK LOBSTER FISHERIES

A discussion paper
by Chris Reid

FISHERIES MANAGEMENT PAPER NO. 238

This discussion paper has been prepared as part of the Fisheries Research and Development Corporation project 2007/050 'Developing Mechanisms for the Transfer and/or Adjustment of Rock Lobster Shares Between Sectors in Western Australia and South Australia'.

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OPPORTUNITY TO COMMENT

This paper was prepared by the Western Australian Department of Fisheries. It is designed to encourage public discussion of, and involvement in, the investigation and development of potential reallocation mechanisms for the transfer and/or adjustment of catch shares in fisheries where initial catch allocations have been made.

Comments about this discussion paper are sought from all stakeholders, including commercial and recreational industry members, relevant community interest groups, government agencies and interested members of the public.

Once the public comments received on this draft discussion paper have been considered, a final report will be presented to the Minister.

Although specific issues have been identified, your views are sought on any or all of the matters in the document of significance to you and/or your group.

To ensure your submission is as effective as possible, please:

- Make it clear and concise.
- List your points according to the topic sections and page numbers in this paper.
- Describe briefly each topic or issue you wish to discuss.
- State whether you agree or disagree with any or all of the information within each topic, or just what is of specific interest to you. Clearly state your reasons, particularly if you disagree, and give sources of information where possible.
- Suggest alternatives to address any issues that you disagree with.

Where and when to send your submission

The closing date for submissions is Friday 23 April 2010. Please send your submission before this date, along with your full name, address, and association details (if applicable) to:

Principal Management Officer (Socio Economics)

Department of Fisheries

3rd Floor, The Atrium

168 St George's Terrace

PERTH WA 6000

Or alternatively email your response to the address below:

Karenina.Mansell@fish.wa.gov.au

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1.0 INTRODUCTION

Issues relating to the allocation of fish resources between competing user groups are currently of particular relevance to the management of the Western and South Australian rock lobster fisheries with significant developments aimed at addressing these issues occurring recently in both fisheries.

In the South Australian rock lobster fishery initial allocations have been made to the commercial and recreational sectors and the Department of Primary Industries and Resource SA (PIRSA) has recently released a draft policy paper *Allocation of Fisheries Resources Between Fishing Sectors* for public consideration (PIRSA, 2009). The policy detailed in the paper is "… intended as guidance for the Fisheries Council and Advisory Committees in the development of management plans under the State's *Fisheries Management Act 2007* (*'the ACT'*), and as a source of information for members of fishing sectors and the wider community about the approach that will be taken in the administration of the Act" with regard to issues relating to the allocation of fisheries resources between fishing sectors. As part of this policy paper a mechanism allowing for future adjustments to initial allocations is outlined. As detailed later in this report this mechanism is essentially an administrative mechanism where reallocation decisions are made under periodic reviews.

In the western rock lobster fishery, initial allocations have been made to the commercial, recreational and Customary sectors (IFAAC 2007) with both the commercial and recreational sectors being explicitly managed to their allocated share of a fishery-wide target catch (Minister for Fisheries (2009a)) for the first time in the 2009/10 season. In addition consideration has been given to a number of issues relating to the implementation and management of sectoral allocations (IFAAC, 2009). However, no position has as yet been taken with regard to an appropriate approach to the development of a mechanism to allow for future adjustments to the initial allocations.

In regard to such a mechanism, IFAAC (2007) notes: "The implementation of a reallocation mechanism is integral to the IFM [Integrated Fisheries Management] process" and that IFM Government Policy (2004, paragraph 16) states that: "Priority will be given to investigating the potential development of market-based systems to achieve reallocations, along with due consideration of social equity considerations, …".

To allow for a greater understanding of potential allocation adjustment mechanisms and requirements for their implementation, Western Australia's Department of Fisheries is exploring potential mechanisms with reference to their application in the Western and South Australian rock lobster fisheries. This work is being conducted as part of the Fisheries Research and Development Corporation (FRDC) project 2007/050 *Developing Mechanisms for the Transfer and/or Adjustment of Rock Lobster Shares Between Sectors in Western Australia and South Australia*. This report documents the Department of Fisheries' initial exploration and findings in relation to potential inter-sectoral reallocation mechanisms.

2.0 MANAGEMENT AND SECTORAL ALLOCATIONS IN THE WESTERN AND SOUTH AUSTRALIAN ROCK LOBSTER FISHERIES

The fisheries of interest to this study are the fishery based on the western rock lobster (*Panulirus cygnus*) resource in waters off Western Australia and that based on the southern rock lobster (*Jasus edwardsii*) in waters off South Australia. These fisheries are referred to in this paper as the Western Rock Lobster Fishery and the South Australian Rock Lobster Fishery respectively.

2.1 Western Rock Lobster Fishery

2.1.1 The commercial fishery

Commercial fishing for western rock lobster is managed under *The West Coast Rock Lobster Managed Fishery Management Plan 1993* (in conjunction with the *Fish Resources Management Act 1994* and regulations).

The western rock lobster resource extends primarily over the continental shelf area off the west coast of WA between North West Cape and Augusta. North West Cape and Augusta are the respective northern and southern boundaries of the commercial fishery for western rock lobster– the West Coast Rock Lobster Managed Fishery (WCRLMF). The WCRLMF is the most valuable single species fishery in Australia, with the value of catch over the seasons 1999/2000 to 2008/09 ranging from around $220 to $390 million per season. During this time, season catch ranged from around 7,500 tonnes to just over 14,500 tonnes, averaging around 11,000 tonnes while average season prices varied from around a low of $19/kg to a high of around $34/kg.

To fish commercially in this fishery, a person must hold a WCRLMF Licence. The number of these licences has been limited since 1963, when licence numbers were frozen. The commercial fishery is divided into three zones – A, B and C as shown in Figure 1. Aside from limited entry the fishery is managed using input controls and, recently, a target catch level. The primary input controls are a limit on the total number of usable pots and available fishing days, which places an overall cap on effort.

Effort is unitised with the transferability provision being relatively liberal, allowing adjustment to the configuration of the fleet and individual operations in response to changing economic conditions. The number of units an operator holds and a unit value[1], which can vary by area and time, determines the number of pots that can be operated. This system of management is known as an Individually Transferable Effort (ITE) system. In effect, each unit represents a fixed percentage share of the total allowable effort in the fishery. Units are fully transferable and an active market for the lease and purchase of units operates.

Historically, the management regime has focused on setting effort levels aimed at delivering levels of target breeding stock and an agreed harvest rate, rather than restricting catch to a given level. Following the lowest puerulus settlement on record during the 2008/09 settlement period, management focus shifted to ensuring the protection of breeding stock and providing carry-over stock for future seasons.

This was done through the targeting of a specific catch level with severe reductions in pot numbers and on the number of available fishing days imposed, as well as other measures, before and during the

[1] The unit value describes the number of pots that can be fished for each unit held. For example, under a unit value of 0.5, a licenced commercial operator holding 100 units can fish 50 pots.

2008/09 fishing season. These restrictions were subsequently tightened before the commencement of the 2009/10 season in order to achieve a target catch of 5,500 tonnes (with lower and upper limits set at 4,950 and 6,050 tonnes respectively).

The severe reductions in pot numbers and on the number of available fishing days imposed can be seen through a comparison of restrictions in place for the 2007/08 season and for the 2009/10 season. With regard to available fishing days, during the 2007/08 season Zone A was open from 15 March to 30 June, Zone B from 15 November to 30 June, with a mid-season closure between 15 January and 10 February; and Zone C from 25 November to 30 June, with a three-day full moon closure in each month from February to June.

For the 2009/10 season, temporal restrictions include weekly three-day closures (Friday to Saturday) from 1 December until 14 January and from 15 March until 14 April and weekly two-day closures (Saturday and Sunday) for the remainder of the season in Zone B and C, while in Zone A weekly three-day closures are in place throughout the Zone A season. With regard to the unit value, for the 2007/08 season in Zones A and B, the unit value was set at 0.74 from the start of the season until April 1 when it increased to 0.82. For the 2009/10 season the unit value is set at 0.36 in Zone A and 0.40 in Zone B throughout their respective seasons. For Zone C, the unit value during the 2007/08 season was 0.82, but for the 2009/10 season it is set at 0.40.

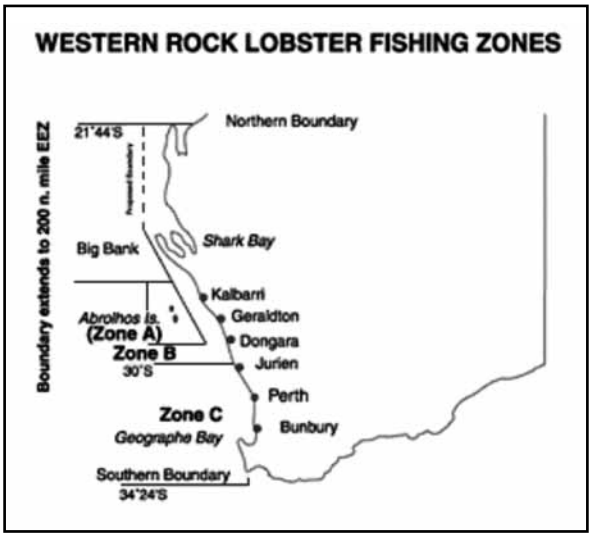

Figure 1. Western rock lobster fishing zones

2.1.2 The recreational fishery

Recreational fishing for rock lobster currently requires either a rock lobster Recreational Fishing Licence or an umbrella Recreational Fishing Licence permitting access to all licenced recreational fishing activity. From March 2010 umbrella licences will be abolished and a rock lobster Recreational Fishing licence will be required. There is no limit to the number of licences issued. Licences are issued for a 12-month period from the date of issue on application and payment of fee. The fee for a rock lobster licence is currently $44 and will fall to $40 from March 2010.

A total of 42,053 licences that permitted fishing for lobster (that is, both umbrella and rock lobster specific licences) were sold during some part of the 2005/06 season, with an estimated 21,000 (50 per cent) utilised for lobster fishing. Anyone other than holders of commercial fishing licences may apply for a recreational rock lobster licence.

Recreational fishers may use pots or dive for lobsters, except in the Abrolhos Islands (Zone A of the commercial fishery) where pots are the only permissible method. Other rules including, but not restricted to, restrictions on when fishing is allowed, minimum size regulations, bag, boat and possession limits, and a maximum of two pots per licence holder. As with the commercial fishery in response to the lowest puerulus settlement on record during 2008/09, settlement period restrictions in the recreational fishery were tightened before the 2008/09 season, with the bag limit being reduced from eight to six lobsters per licensee per day and the boat limit from 16 to 12 lobsters per boat per day.

The primary method used by recreational fishers to take western rock lobster is by pots, however, recreational divers take about a third of the recreational catch (IFAAC 2007). The majority of recreational rock lobster fishing is targeted to near-shore waters of less than 18 metres in depth. Charter boat operators provide a platform for recreational divers to take rock lobsters, although the take from dive charter boats is very small. The recreational catch across all zones over the period 2000/01 to 2007/08 is estimated to have been between 174 tonnes (in 2006/07) and 468 tonnes (in 2002/03) and represented between 2.0 and 4.2 per cent of the total fishery catch over this period. IFAAC (2007) noted that the difficulty in obtaining an accurate estimate of the recreational catch is the main issue with monitoring allocations.

During the 2009/10 season, the recreational fishery will be managed to a target catch for the first time. The target catch level for the 2009/10 has been set at 290 tonnes, with a range of 260 to 318 tonnes for the 2009/10 season (Minister of Fisheries 2009a).

2.1.3 The Customary fishery

Customary fishing is defined by the WA Department of Fisheries to be that where Aboriginal people are "taking marine resources for practices that reinforce cultural identity and tradition" whereas Aboriginal recreational fishing is defined as that where Aboriginal people are "exercising the same right as non-indigenous Australians to take fish, governed by the same laws and regulations" (IFAAC) (2007). In making allocation decisions IFAAC accepted "the view that a distinction can be drawn between Customary fishing and recreational fishing by Indigenous people; and that not all Indigenous recreational fishers are fishing for Customary purpose". The [then] Minister for Fisheries also emphasised this distinction in his final decision in relation to the IFAAC's recommendations.

As noted by IFAAC (2007) the National Native Title Tribunal (NNTT) suggested that Indigenous acceptance of what can be taken to be a narrow definition of what Customary fishing represents was contingent on other strategies being put in place to assist Indigenous people to take advantage of opportunities in the marine sector and noted that the appropriateness of such a definition was part of ongoing discussions and negotiations at a national and state level.

IFAAC (2007) also noted "the [then] Minister for Fisheries' view that there should be an allocation for Customary fishing and that Customary fishing access rights should be given priority over all other fishing access." Subsequently, in response to recommendations made by IFAAC in relation to allocations of the [Perth] Metropolitan Roe's Abalone resource, the current Minister for Fisheries noted that while the customary fishing sector should be granted an allocation that this should not be a priority allocation (Minister for Fisheries, 2009b).

2.1.4 Sectoral allocations

In 2002, the Western Australian Integrated Fisheries Management Review Committee (established by Western Australia's Minister for Fisheries) recommended a strategy to integrate

the management and sustainable use of fish resources. The Committee's report (known colloquially as the "Toohey Report" after the Committee's Chairman Justice Toohey) proposed an alternative management framework and a set of guiding principles for allocating fish stocks to ensure optimal benefits are realised for the WA community. These principles were largely adopted by the WA Government in the establishment of a Government Policy on Integrated Fisheries Management (IFM).

The "Guiding principle for management" under the IFM policy of particular importance to this study is principle (viii) which states that "Allocation decisions should aim to achieve the optimal benefit to the Western Australian community from the use of fish stocks and take account of economic, social, cultural and environmental factors. Realistically, this will take time to achieve and the implementation of these objectives is likely to be incremental over time."

Initial allocations

Under the WA Government's IFM Policy, IFAAC was established in 2004 to make recommendations to the Minister for Fisheries on allocations. The IFAAC made its final recommendations on the allocation of the western rock lobster resource to the Minister in 2006. The main outcomes of interest to this project are the Ministerially-approved recommendations that:

- the allocations should be over the total area of the West Coast Rock Lobster Managed Fishery;
- a reallocation mechanism be developed and ready for implementation for the western rock lobster resource by 2009/10;
- the customary fishing allocation should be one tonne. IFAAC adopted the approach of specifying an allocation as a quantity rather than as a proportion where a sector's allocation was less than 0.1 per cent of the catch;
- the recreational and commercial sector's allocation should be made on the predicted proportional catch shares in 2009/10 and the allocation is 5 and 95 per cent respectively; and
- IFAAC develop a decision rules framework for managing western rock lobster sectoral allocations. (Minister for Fisheries, 2008)

Implementation of sectoral allocations

In response to a request from the Minister of Fisheries, a paper has been prepared by IFAAC (2009) outlining a framework to allow for the implementation of western rock lobster sectoral allocations. The framework outlined seeks to ensure that each sector is managed such that its catch does not exceed its allocation over time while ensuring that the opportunity to take its allocation is provided.

In effect this involves the setting of an annual fishery-wide target catch or total allowable catch (TAC), which, based on this TAC and sectoral allocations (which are expressed in percentages of the total allowable catch), annual allowable sectoral catch levels are determined.[2] Thus, an annual catch level is determined for each sector, and each sector is managed under a target catch set at this level to ensure that its catch does not exceed its allocation over time while ensuring that the opportunity to take its allocation is provided.

[2] As noted in the IFAAC (2009) paper "Although the reference is to each year this does not preclude other time periods being selected – the principle remains the same."

In this paper, the commercial sector annual catch allocation is referred to as the total allowable commercial catch (TACC), while the recreational sector annual catch allocation is referred to as the total allowable recreational catch (TARC). Thus, the sectors are managed under a target catch level - that is, the TACC for the commercial sector and the TARC for the recreational sector. Between seasons, each sector's catch 'outcome' is assessed against its target catch and, if required, the sector's management regime is adjusted to ensure that its future catch reflects its allocation.[3]

Where input controls are used in a commercial fishery, actual catch will vary around the target catch level it is designed to achieve as recognised by the setting of lower and upper bounds for the 2009/10 season target catch. Similarly, under current management arrangements in the recreational sector actual catches are likely to vary around any target catch level that the sector is being managed under. In regard to this, IFAAC noted "IFM does not and cannot require absolute precision in hindsight, but merely requires that proportional allocations be respected when setting out sector catch levels for each forthcoming year. It is important to realise that the IFM process does not expect to manage the sectors' catches in a particular year to the targets but will monitor the catches and over time progressively endeavour to manage them to the sustainable total harvest level and to the allocated proportions. Such a strategy is determined by the delay in getting catch information, particularly for the recreational sector, although the process could move towards more real-time with improved reporting and/or management processes for the sectors are developed."

It is also worth noting that the WA Government Policy on Integrated Fisheries Management (1 October 2004) includes Paragraph 18 that states: "The Government is committed to introducing more effective management across all fisheries. The implementation of more effective sectoral management in which the catch of a sector can be contained is an essential first step in the introduction of a new integrated management system within which allocation issues may be addressed. In the interim, each sector will continue to be managed responsibly within current catch ranges and should the catch of a sector alter disproportionately to that of other sectors, the Minister will take appropriate management action to address this."

The management of the commercial and recreational sectors to their allocated catch shares will be implemented during the 2009/10 season. For 2009/10, the commercial sector's target catch level is set at 5,500 tonnes, with a range of 4,950 to 6,050 tonnes, and the recreational sector's target catch level set at 290 tonnes, with a range of 260 to 318 tonnes (Minister for Fisheries 2009a).

2.2 South Australian Southern Rock Lobster Fishery

The information provided in this section is drawn from documents on the Fisheries Division, Primary Industries and Resources South Australia website (outernode.pir.sa.gov.au/fisheries/home), particularly the management plans for the two South Australian rock lobster fisheries (Sloan and Crosthwaite 2007a and 2007b) and the Draft Discussion Paper, *Allocation of Fisheries Resources Between Fishing Sectors* (PIRSA 2009).

[3] As noted in the IFAAC (2009) paper, "*Decision rules need to take into account the limitations of knowledge relating to the fishery and although they are subject to sustainability concerns (including the precautionary principle) should not be set so sensitively that minor changes lead to constant variations to management settings of dubious statistical or practical utility. As an example, rather than year-to-year comparisons for considering over or under catches, moving five-year averages could be used.*"

2.2.1 The commercial fishery

The South Australian Southern Rock Lobster Fishery is one of several State-managed fisheries operating in Southern Australian waters. The species, *J. edwardsii*, supports important commercial and recreational fisheries in South Australia, Tasmania, Victoria, Western Australia and New Zealand.

The most productive fishing grounds are in waters adjacent to South Australia, which have historically supported the largest fishery for the species. The total commercial catch from South Australian waters is on average 2,500 tonnes per year, which represents about 30 per cent of the total annual commercial catch for the species. However, for the 2009/10 Total Allowable Commercial Catch limits have been reduced to a total of 1,710 tonnes (1,400 tonnes Southern Zone and 310 tonnes Northern Zone).

The regulations that govern management of both South Australian rock lobster fisheries are the Fisheries Management (Rock Lobster Fisheries) Regulations and the Fisheries (General) Regulations. The fishery is managed in two separate zones – the Southern and Northern Zones (Figure 2) - under formal management plans using an individually transferable quota (ITQ) system.

The quota management system is monitored through catch disposal records (CDR). CDR forms are formally used to decrement quota, and are submitted by fishers at the time of weighing and consigning the catch. A limited entry regulation applies to the fishery and a total allowable commercial catch (TACC) is set each year for each zone of the fishery. A closed season is used to protect spawning females, and gear restrictions apply. Minimum size limits are also in place for each fishery.

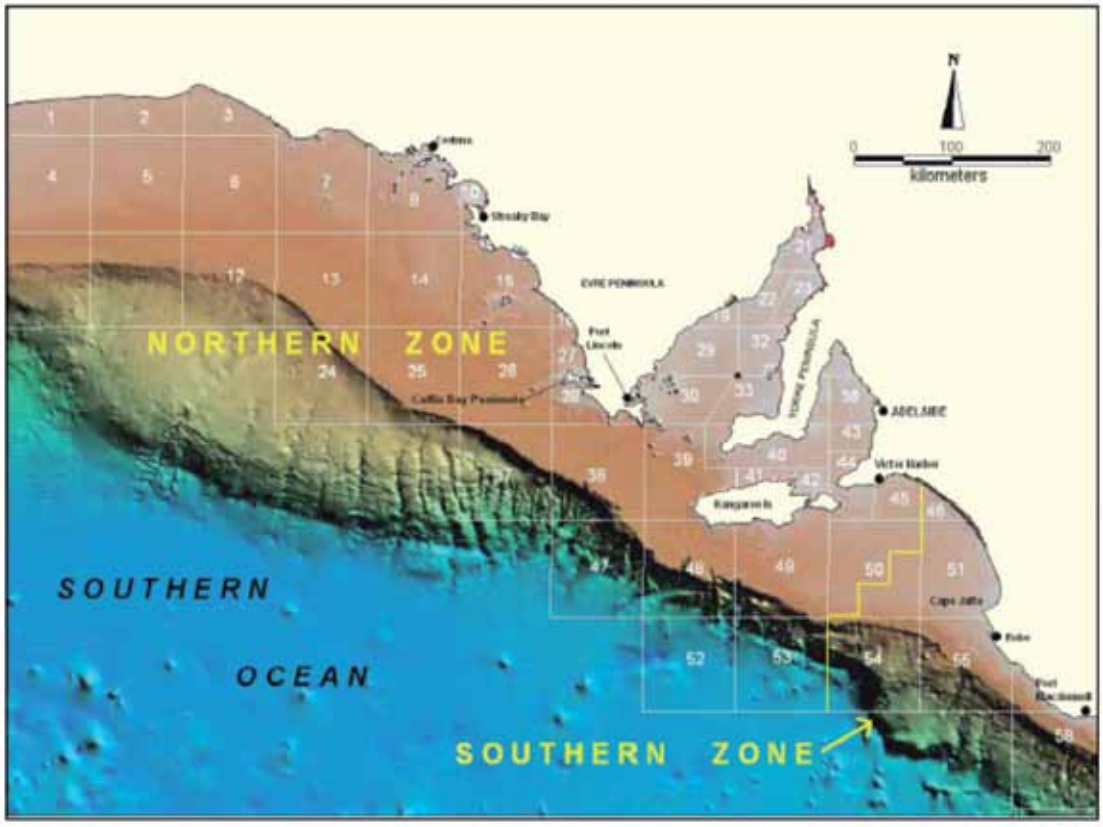

Figure 2. The Northern and Southern Zones of the South Australian rock lobster fishery (the numbered boxes are data collection map codes)

In the Southern Zone the system is based on the total number of quota units and pots in the fishery (11,923 of each) and each quota unit entitles the holder to take 1/11,923 of a given TACC and to use one pot per unit (up to a maximum of 100 pots per boat). Each licensee can access the entire southern zone fishery (i.e. there is only one zone).

Licences and quota and pot units are transferable (but quota and pot units must be attached to a licence). Pots and quota are linked so that for each quota unit that is transferred, a pot unit must be transferred at the same time to the same licence. In the Northern Zone, there is not an explicit link between pots and quota with the two being separate. A minimum quota unit holding of 320 quota units applies to all licences but there is no upper limit on the quantity of quota held by a single operator. Each quota unit entitles the owner to a fixed proportion of the TACC (Bray *et al* 2006). There are minimum and maximum pot entitlements but these may be transferred separately to quota units.

In the Southern Zone in 2008/09, a total of 1,916,436 potlifts were required to catch the 1,407 tonnes caught (out of a 1,770 tonnes Total Allowable Commercial Catch (TACC)). This was an increase of 15 per cent from 2007/08 and the sixth successive season in which the effort required to take the TACC increased (PIRSA 2008a). In the Northern Zone in 2008/09 a total of 600,347potlifts landed a catch of 402.7 tonnes - 67.3 tonnes below the TACC of 470 tonnes.

2.2.2 The recreational fishery

Recreational fishers are permitted to catch lobsters using pots, drop and hoop nets, and by diving. While no licence is required only registered pots can be used to capture lobsters. Anyone over the age of 15 years may register up to two recreational rock lobster pots each season. There are also in place a range of other restrictions similar to those used for the western rock lobster recreational fishery including restrictions on when fishing is allowed, minimum size regulations, and bag and boat limits.

The total South Australian recreational catch of southern rock lobster has been estimated to be between 95 and 118 tonnes (Sloan and Crosthwaite 2007a) with the catch estimates derived through a survey undertaken every two years.

2.2.3 The Customary fishery

The *Fisheries Management Act 2007* commenced in South Australia on 1 December 2007. This legislation recognises Aboriginal traditional fishing as a separate category of fishing for the first time. Previously, all non-commercial catch was considered as part of recreational fishing.

The legislation provides that access for Aboriginal traditional fishing will be provided through Aboriginal traditional fishing management plans. These plans may be made where an Indigenous Land Use Agreement (ILUA) is in place in relation to a native title claim area. The State is currently engaged in ILUA negotiations with native title claimants and other stakeholders, including the commercial fishing industry. The agreement negotiation process will inform the way that access to fisheries resources by Aboriginal communities is defined and implemented.

The legislation provides the framework for the recognition of Aboriginal traditional fishing access, however actual recognition is dependant on the implementation of an ILUA and associated management plan. Therefore, as no ILUAs have yet been signed in relation to fishing, no access arrangements have yet been recognised.

2.2.4 Sectoral allocations

Initial allocations

One of the objectives under the management plan for both the southern and northern rock lobster fisheries is for "Shares of access to rock lobster explicitly allocation [*sic*] between Aboriginal, commercial, charter and recreational sectors." Sloan and Crosthwaite (2007a,b)

To achieve this objective the following strategies are provided:

- control the State-wide recreational and charter share of the rock lobster resource to 4.5 per cent of the total State-wide catch;
- control the State-wide commercial catch of rock lobster to 95.5 per cent;
- integrate any traditional fishing access prescribed in Aboriginal traditional fishing management plans with the management of the commercial, charter and recreational sectors; and
- develop mechanisms for adjusting shares in the future that utilise market tools.

Implementation of Sectoral Allocations

In March 2009 Primary Industries and Resources SA (PIRSA) released a Draft Discussion Paper, *Allocation of Fisheries Resources Between Fishing Sectors*, for public consultation. From the perspective of this report the salient parts of the Draft Discussion Paper is that it provides:

- A process for determining initial allocations.
- An implicit requirement that all sector's are managed under a target catch set at a level equal to its allocated portion of the fisheries total allowable catch while noting that a 'proxy' may need to be set for the recreational sector in order to track or estimate the catch actually taken.
- A mechanism for adjusting allocations. This mechanism is based on a review of the appropriateness of the existing allocation from an economic and social perspective every five-years or in the event of major change in the management of the fishery.
- Principles for determining and adjusting allocations. The two principles of particular relevance to this study, these are:
    - "Optimum Utilisation: Allocation of aquatic resources is to achieve optimum utilisation of those resources for the benefit of the community. This means that resources are to be allocated in a way that achieves the best use of the resources for the community at large, not just best for a particular sector."
    - "Equitable distribution: Allocation of aquatic resources is also to achieve an equitable distribution of those resources for the benefit of the community. This means that resources are to be allocated in a way that distributes the benefits of use fairly amongst users and serves the community at large." (PIRSA 2009 p10).

3.0 INTER-SECTORAL REALLOCATION MECHANISMS

As noted by Pearse (2006) although there is a wealth of literature on fisheries allocation issues, there is not much on mechanisms that facilitate the adjustment and transfer of sectoral allocations. The available literature outlines two broad approaches to developing inter-sectoral reallocation mechanisms - the administrative approach and the market approach. From what literature is available there appears to be a paucity of applications of market mechanisms for inter-sectoral reallocation in fisheries, with allocation decisions typically being made through an administrative/government process.

Administrative/government processes to date have predominately taken the form whereby *de facto* allocations arise as a result of management measures aimed at restricting catch in one or more sectors and without allocations being explicitly made.[4] Reallocation decisions are implicitly expressed through changes in target sectoral catch levels.

Burrows and Thomson (2007) noted within the Western Australian context that re-allocation processes between sectors had been based on commercial fishing licence buy-backs and various forms of Voluntary Fisheries Adjustment Schemes arguing that:

"*Although [the buy-backs and various schemes have provided] a useful start to address issues of effort and re-allocation has been made, quantifying the extent of shifts in resource allocation as a result of these measures has been (and continues to be) difficult through the lack of available recreational catch data. Other problems with the Schemes as reallocation mechanisms include:*

- *where sustainability is of concern, removing one sector in itself, without appropriate management arrangements for the remaining sectors, will not necessarily address issues of sustainability;*
- *although removing some commercial fishers potentially makes that stock available to other sectors, whether the stock will in fact become available to other sectors will depend on whether enhanced management arrangements are put in place to preclude other commercial fishers expanding their effort;*
- *the redistribution of allocations after the buy-out process is unstructured – each of the remaining sectors compete for the redistributed resource, but the 'interests of the community' may be best served by specifically allocating it to a sector; and*
- *the opportunistic nature of purchases under a voluntary scheme makes planned resource shifts difficult to manage within a particular timeframe. Opportunities may also be lost to trigger changes to other sectors that may enhance other value of the resource to the community."*

As previously noted under the *de facto* allocation approach, re-allocation decisions are implicitly expressed through changes in target catch levels. The focus of this paper is to examine mechanisms that result in a move away from *de facto* allocations and allow for the transfer of explicit allocations between sectors. The first step to moving away from *de facto* allocations is for explicit initial sectoral allocations to be made. This allows for the development of a reallocation mechanism to allow for transparent sectoral reallocations in the future and, as noted by Pearse (2006), it is a necessary precondition that initial well-defined sectoral allocations be made for the effective functioning of a market reallocation mechanism.

There are two issues regarding initial allocations, the process by which they are determined and the form that they take. It is beyond the scope of this paper to investigate processes to

[4] While many recreational fisheries are usually not explicitly managed to ensure a given target catch level and there is no restriction on the number of participants in the fishery, rules such as bag limits, minimum sizes and gear restrictions reflect an implicit attempt to restrict catch levels.

determine initial allocations or make recommendations with regard to the suitability of any particular process. Rather, in this paper it is simply noted that to move beyond the approach of *de facto* allocations and to allow for the development of a transparent reallocation mechanism, it is necessary that explicit initial sectoral allocations be made. It is, however, worth noting that for both the Western and South Australian rock lobster fisheries, initial allocations were determined through an administrative review process, with historical catch shares being a primary consideration in the allocations granted to the commercial and recreational sectors (IFAAC 2007 and Sloan and Crosthwaite 2007a).

With regard to the form of the initial allocation, Pearse (2006) argues that for the effective functioning of a market reallocation mechanism not only must initial allocations be made but that they must also be divisible, transferable and denominated in terms of the same base across all sectors.

As outlined in the recently released Draft Discussion Paper, *Allocation of Fisheries Resources Between Fishing Sectors*, PIRSA proposes that allocations to the commercial, recreational and indigenous sectors will be specified under a given fishery's management plan. These allocations "should be expressed explicitly, as the proportional share of each fishing sector to the sustainable yield of the aquatic resources the subject of the management plan. For example, rock lobster is presently shared 95.5 per cent to the commercial sector and 4.5 per cent to the recreational sector." noting that a 'proxy' for the share may need to be set for the recreational sector in order to track or estimate the shares actually taken.

There is also in effect a requirement that all sectors are managed under a target catch set at a level equal to the particular sector's allocated proportion of the fishery-wide total allowable catch. The PIRSA Draft Discussion Paper also provides for a process to allow for adjustments to allocations. This is done through a periodic review of the appropriateness of the prevailing allocation from an economic and social perspective.

The review is to be conducted every five-years or in the event of a major change in the management of the fishery. The Draft Discussion Paper also notes the need for a fishery's management plan to either set-out the method that will be used to adjust allocations during the life of the plan or to set-out the process that will be followed to determine the method to be used for adjusting allocations.

Finally, the paper provides a number of approaches that could be utilised in implementing adjustments to allocations, the appropriateness of a given approach being dependent on: the species and the management technique (input or quota, or a mix); whether the adjustment is in favour of the commercial or non-commercial sector, or between commercial sectors; and the time within which the adjustment must be completed.

The approach outlined by PIRSA is a significant step away from the *de facto* allocation approach, with allocation/reallocation decisions being made explicit, and is an example of what Pearse (2006) refers to as building on the governmental model (or as referred to in this paper as the administrative approach). In Section 4 an administrative mechanism based on the approach outlined by PIRSA (2009) and its operation is outlined within the context of the current management arrangements in place in the Western and South Australian rock lobster fisheries. Below, an alternative to the administrative approach, that is the use of a market mechanism, is discussed.

3.1 Market mechanisms for inter-sectoral reallocation

A market mechanism is an instrument that encourages behaviour through market signals rather than through explicit directives (Productivity Commission (2006)). In the case at hand, that is sectoral allocations within a fishery, the objective of a market reallocation mechanism is to remove

the administrative decision maker and allow the market to determine the level of catch that can be taken by a given sector given a predetermined fishery-wide total allowable catch. In doing this the market will also determine what level of compensation is to be given to those that exit the fishery.

It is important to note that an arrangement where reallocations are decided administratively and then adjustments to prevailing allocations made by entering the market for commercial entitlements – whether with Government or private funds – is not a market mechanism as the sectoral allocations are determined administratively, even though the market for commercial entitlements determines the cost of, and compensation received from, the reallocation.

While, as previously noted, there is a general paucity of applications of market mechanisms for inter-sectoral reallocation, the use of such a mechanism has been proposed for the Canadian Pacific halibut fishery (Fisheries and Oceans Canada 2009). In October 2003, the Minister of Fisheries and Oceans Canada announced an allocation framework for the commercial and recreational sectors of the fishery. Under this framework, a 12 per cent recreational catch "ceiling" was allocated to the recreational sector until both parties developed an acceptable market-based mechanism that allows for adjustment of the recreational share through acquisition of additional quota from the commercial sector.

According to Gislason (2006), the recreational halibut fishery is managed under the assumption that the catch in the previous year will be realised in the current year, that is, there is a one-year lag in management actions. If the recreational sector catches less than the total allowable recreational catch (TARC) the surplus can be sold to commercial halibut licence holders in the following year. If the recreational sector's catch exceeds the TARC, in theory quota can be bought from commercial halibut licence holders or the recreational fishery must be managed in a way so as to reduce catch, such as through reduced bag limits, in the following year. As noted by Gislason (2006) the lack of an institutional structure for the recreational sector precludes the first approach,[5] and in effect prevents reallocation from commercial operators to the recreational sector, thus even this approach falls short of being a complete market reallocation mechanism.

Fisheries and Oceans Canada (2009) notes that the implementation of a market-based mechanism has yet to occur, saying: "Dialogue continues with the commercial and recreational fishing sectors to identify an approach that will achieve this goal. Discussions continue to be held with both sectors on implementation of the allocation framework, the development of the mechanism to adjust shares over time, and the process for accommodating seasonal variations in TAC."

3.1.1 The argument for the use of market mechanisms for inter-sectoral allocation

The argument for the use of market mechanisms is based on the premise that allocation via administrative/government process results in inferior outcomes with regard to the best economic utilisation of the resource.

As noted by McIlgorm (2006):

> *"Direct government intervention to re-allocate between sectors is less desirable and more socially costly than inter-sectoral allocation frameworks that assist in apolitical re-allocation of fishery access. In the absence of inter-sectoral allocation frameworks, politics is a crude but potent tool to address perceived imbalances in inter-sectoral levels of access."*

[5] As the recreational fishery sector does not have a legal entity to represent itself, the Pacific Halibut Management Association (PHMA) set up a separate trust account or endowment fund for the monies collected.

Similarly Pearse (2006) argues:

> *"There are two broad avenues for improving allocation methods: build on the governmental model and provide for market mechanisms. The governmental approach leaves the determination of sectoral shares to political or administrative decision-making. The advantage is that it builds on existing processes, has structural simplicity, and is responsive to values and interests other than economic ones. But it preserves all the shortcomings of governmental decision-making, especially insofar as it does nothing to encourage utilization of the resource to best economic advantage; it aggravates competitive lobbying among groups with the governmental authority at the centre of contention; and it maintains a competitive barrier to cooperation and collective action among those who share the rights to fish in a fishery.*
>
> *An efficient inter-sectoral allocation system must meet two requirements: certainty about catch shares so fishers can organize their operations efficiently, and some means of redistributing the shares to ensure the most beneficial utilization as conditions change. Governmental decision-making does not lend itself well to reconciling these needs. To calculate the optimal sectoral allocations, governments would need enormous amounts of information and they would inevitably have difficulty altering sectoral shares. But this is a role markets play often and effectively, as demonstrated in the allocation of individual quota rights among commercial fishers. With minimal information other than the price of fishing rights, fishers can bargain with other fishers to solve these problems, which governments cannot do."*

In summary, market mechanisms have advantages in that they remove the government from the role of deciding allocations and encourage the utilisation of the resource to best economic advantage. On the other hand, the administrative approach has advantages in that it builds on existing processes, has structural simplicity, and is responsive to values and interests other than economic ones.

3.1.2 Sectoral management and market reallocation mechanisms

As discussed by Pearse (2006), the complexity of the design of a market reallocation mechanism is dependent on the form of entitlement that arises from management arrangements in place in each of the participating sectors. Pearse (2006) notes that where individual transferable catch entitlements exists in all sectors "the role of the government is simply to ensure that there are no impediments to the divisibility and transferability of the quota rights among sectors, as well as within them and that the allocation among sectors will be determined by the purchases and sales of quota among individual quota-holders in different sectors".

Pearse goes on to argue that: "In the more challenging case in which one or more sectors in a fishery does not employ individual quotas, fishers have no individual entitlement to any part of the catch, so they cannot trade in fishing rights. To adjust their allocation through trading the fishers in such sectors need an organization with authority to represent them, hold their sector's total allocation, raise and hold money, and buy and sell fishing rights on their behalf."

Given Pearse's arguments, it is evident that the design of potential market mechanisms is dependent upon the management regime employed in the respective sectors of a fishery and the form of entitlements that arise as a consequence of them. With regard to the fisheries of particular interest to this study, in Section 2 it was seen that the South Australian commercial sector is managed through the use of ITQs and, as such, individual transferable catch entitlements exist and are effectively denominated in the same base as the sectoral allocations.

On the other hand, the western rock lobster commercial fishery is managed using ITEs and, while individual transferable effort entitlements exist, these are not the same as catch entitlements, nor are they aligned with the sectoral allocations. Regarding the recreational sectors, in both

fisheries they are managed through a combination of input (for example, seasonal closures and restrictions on permitted fishing devices) and output controls (for example, bag and boat limits) with no individual catch entitlement arising from the management regime.

In examining potential mechanisms in Section 4, potential mechanism are developed under various scenarios with regard to the form of reallocation mechanism used – administrative and market – and the form of management used in the participating sectors.

4.0 POTENTIAL INTER-SECTORAL REALLOCATION MECHANISMS

Under any reallocation mechanism, as previously outlined, it is necessary that initial sectoral allocations be made. In developing potential mechanisms in this paper it is taken that initial sectoral allocations have been made and that, as for the South Australian and Western Australian rock lobster fisheries, these allocations are specified in terms of a percentage of the total allowable catch (TAC), except where a nominal allocation is made in which case the allocation may be specified in terms of tonnage or kilograms.

It is also taken that there is sufficient liquidity in the market for commercial entitlements, so that any required purchases/sales of these entitlements can take place as is likely to be the case in the fishery of particularly interest to this study.

In addition, as discussed previously the design of any reallocation mechanism is dependent upon the form of management used in each participating sector. In the text below, potential reallocation mechanisms are addressed under two scenarios with regard to the form of management used in the commercial fishery. First, in Section 4.1 the situation where the commercial sector is managed under ITQs, reflecting the current situation in the South Australian rock lobster, is addressed.

Following this, in Section 4.2 an examination of potential reallocation mechanism is conducted for the situation where the commercial sector is managed under ITEs, reflecting the current situation in the western rock lobster fishery. Under each of these scenarios, a variety of options are presented, reflecting both the administrative and the market approach to developing a reallocation mechanism and different approaches to managing the recreational sector.

Finally, there are two situations that can give rise to changes in sectoral target catch levels. These are where there is a change to the fishery-wide TAC, and where there is a change to sectoral shares. While both result in changes to sectoral target catch levels, they involve two fundamentally different things.

The first involves adjustments to sectoral catch allocations as a result of changes to the total available catch. In this situation, it is taken that this will be accommodated through processes currently employed in the respective fisheries and that no recompense for reductions or payments for increases are required.

Where the sector's target catch level is managed through the use of ITQs, adjustments are achieved through changes to the allowable catch per ITQ unit. Where the sector is managed in any other way, adjustments are achieved through changes to the sector's management regulations. It is worth noting that in Australian commercial rock lobster fisheries where a TACC is set, it is usually set less than six months before the start of the fishery - and some times significantly so. Thus, where ITQs are not employed, there is a need to allow for adjustments to management regulations to be able to be implemented within a reasonably short timeframe.

The second involves adjustments to sectoral catch allocations, as a result of a transfer of catch shares from one sector to another. In this case the approach taken, as detailed under the individual options, follows the principle with regard to transfers outlined in PIRSA (2009), that is: "A management plan that reduces the shares of any sector in favour of another sector must provide for a form of recompense for those whose fishing activities are curtailed."

4.1 Where the commercial sector is managed under ITQs

As previously outlined, there are two broad approaches to the development of a reallocation mechanism – the administrative approach and the market approach. In the text below, a reallocation mechanism is developed under an administrative approach drawing on PIRSA's recent report (2009).

4.1.1 An administrative approach

Option 1: An administrative inter-sectoral reallocation mechanism

Option 1 is based on reallocation decisions being made through a periodic administrative review of the appropriateness of the existing allocations. The framework under this approach is as follows:

- Initial sectoral allocations are made and these allocations are specified in terms of a percentage of the total allowable catch (TAC), except where a nominal allocation is made, in which case the allocation may be specified in terms of tonnage or kilograms.
- Sectoral catch targets, based on a given sector's allocation and the fishery wide TAC, are set under each sector's management regime, and each sector is managed to its target catch level.
- A review process is established under which a review of sectoral allocations is undertaken periodically, for example, every five years.
- Adjustments to allocations will be implemented through changes to the respective sector's target catch and appropriate adjustments to the sector's management regulations within a specified time frame, for example, 12 months.
- Where a downward adjustment to the commercial sector's allocation is required, the adjustment will be implemented through a reduction in the TACC and the number of ITQ units in the fishery, with ITQ units purchased through a voluntary, open tender process and withdrawn from the fishery.
- Where an upward adjustment to the commercial sector's allocation is required, the adjustment will be implemented through an increase in the TACC and an open tender process under which additional ITQ units equivalent to the increase in the commercial sector's allocation will be sold to the commercial sector.
- There is no allowance for allocations to be transferred between sectors between reviews, including any proportion of an allocation that is not caught by any sector.

The approach outlined above is not meant to represent the only approach that could be taken, but rather to provide an illustrative framework within which the operation and requirements for the implementation of an administrative reallocation mechanism can be examined. Based on the above framework, the operation of the mechanism where a decision is made to reallocate catch rights from the commercial sector to the recreational sector is provided below:

- Taking as a starting point that an initial allocation has been made whereby the commercial sector was allocated 95 per cent of the total allowable catch (TAC) and the recreational sector 5 per cent of the TAC. Further, the commercial fishery is managed through the use

of individual transferable quotas (ITQs) and each unit of ITQ equates to 0.1 per cent of the TACC, with a total of 950 ITQ units in the commercial fishery.[6]

- A review is conducted and a decision is made to increase the allocation of the recreational sectors by five percentage points of the TAC such that the allocation of the TAC becomes 90 per cent to the commercial sector and 10 per cent to the recreational sector.
- The sectoral allocation for the recreational sector is increased to 10 per cent of the TAC and the recreational fishery is managed under a target catch set at this level.
- The sectoral allocation for the commercial sector is reduced to 90 per cent of the TAC. To ensure that commercial ITQ units retain the same right with regard to the percentage of the TACC that can be caught, 5.3 per cent (50/950) of the commercial ITQ units in the fishery are acquired, that is 50 units, on a commercial basis. There are now 900 remaining ITQ units in the commercial fishery, with each ITQ unit equating to 0.1 per cent of the TACC.

Taking the same starting point, the following provides an illustration of how a reallocation from the recreational sector to the commercial sector would be undertaken:

- A review is conducted and a decision is made to increase the allocation of the commercial sectors by two percentage points of the TAC such that the allocation of the TAC becomes 97 per cent to the commercial sector and three per cent to the recreational sector.
- The sectoral allocation for the recreational sector is reduced to three per cent of the TAC and the recreational fishery is managed under a target catch set at this level.
- The sectoral allocation for the commercial sector is increased to 97 per cent of the TAC. To ensure that commercial ITQ units have the same right with regard to the percentage of the TACC that can be caught, 20 additional commercial ITQ units are sold to commercial operators. There are now 970 ITQ units in the commercial fishery, with each ITQ unit equating to 0.1 per cent of the TACC.

To allow for Option 1 to be developed, in addition to the requirement that initial allocations are made, three processes would need to be developed and implemented. First, that sectoral catch targets, based on a given sector's allocation and the fishery-wide TAC, are set under each sector's management regime and each sector is managed to its target catch level. Second, that an allocation review process is established. Finally, that a process to allow for the funding of the purchase of commercial entitlements in the event of a downward (upward) adjustment to the commercial (recreational) sector allocation is established.

With regard to a process to allow for the funding of the purchase of commercial entitlements in the event of a downward adjustment to the commercial sector allocation, the approach proposed by PIRSA is that adjustments in favour of the recreational and Aboriginal traditional sectors (i.e. adjustments away from the commercial sector) will be funded by the Crown. Under this approach, the Crown participates in the commercial ITQ market, buying and withdrawing units where the commercial sector allocation is reduced and selling units where the commercial sector allocation is increased. Other options could include the use of funds raised through fees levied on participants in the recreational sector.

[6] The numbers used in the illustrative examples presented in this paper are not meant to be reflective of the actual situation in either the Western Australian or South Australian rock lobster fisheries. Rather, they are set so that subsequent calculations are simple. In addition, the fishery is treated as a single entity in which the commercial and recreational sectors are managed at the same spatial level. While the commercial sectors of the Western and South Australian rock lobster fisheries are managed in zones and the recreational sectors as a whole, the principles and processes outlined remain the same.

An issue associated with the requirement that sectoral management explicitly targets catch levels that needs to be considered is the precision with which they are required to achieve the target catch level. Previously it was noted that IFAAC (2009) argued: "IFM does not and cannot require absolute precision in hindsight, but merely requires that proportional allocations be respected when setting out sector catch levels for each forthcoming year. It is important to realise that the IFM process does not expect to manage the sectors' catches in a particular year to the targets but will monitor the catches and over time progressively endeavour to manage them to the sustainable total harvest level and to the allocated proportions."

This holds true within the context of an administrative re-allocation mechanism, as adjustments to allocations are determined by *fiat* and, while the effectiveness of sectoral management regimes may be taken into consideration in deliberations, the reallocation decision is not in itself dependent on the effectiveness of sectoral management regimes in ensuring that each sector achieves their given catch.

While there is little point making allocation or reallocation decisions in the face of totally ineffective sectoral management arrangements, so long as sectoral allocations influence the design of sectoral management regimes, and these in turn influence sectoral catch, re-allocation decisions will have some impact on the distribution of catch between sectors. Current management regulations in recreational sectors of the Western and South Australian rock lobster fisheries, while aimed primarily at catches of individuals and not restricting total participation levels, can impact on total catch levels in the immediate term and could be adjusted in a meaningful way to reflect allocation adjustments. At the same time, other management approaches for the recreational sector could also be employed, so long as they allow for the targeting of catch in the sector.

4.1.2 Market approaches

In this section, potential market mechanisms where the commercial fishery is managed under ITQs are examined. These are developed with regard to a number of scenarios in relation to the management approach used in the recreational sector.

However, before doing this it is important that the reasons that the Customary sector is not included in the development of the potential market mechanisms is provided. These being that it is understood that:

- the Customary fishing allocations are intended exclusively for use with regard to customary matters;
- should there be any adjustment to these allocations it will result from an administrative decision, and:
- there is no intent that Customary allocations be allowed to be transferred to the recreational and/or commercial sectors.

Consequently, whatever mechanism is used to allow for reallocations between the commercial and recreational sectors, it is taken that an administrative process will be employed to determine the Customary allocation. That is, from time-to-time a review of the Customary allocation will be made and any adjustments required will be implemented through a proscribed process.

For this reason, in addressing market mechanisms the analysis is confined to the commercial and recreational sectors. This is not to say that Customary allocations must necessarily be treated in this manner; potentially these allocations could be treated in a similar manner as that described below for the recreational sector, if it is considered appropriate. It is also not to exclude the use of market values in determining appropriate levels of compensation for the transfer of fishing entitlements to (from) the Customary sector from (to) the commercial and recreational sectors,

under an administrative reallocation mechanism.

Option 2: A market inter-sectoral reallocation mechanism where the recreational fishery is managed using traditional recreational sector management tools, a recreational sector trust fund is established and trading in catch entitlements between commercial operators and the recreational sector trust fund is permitted

Under Option 2, a market mechanism is developed where the management of the recreational sector reflects the approach currently employed in the Western and South Australian rock lobster fisheries, that is, through a combination of input (for example, seasonal closures and restrictions on permitted fishing devices) and output controls (for example, bag and boat limits).

Given that no individual transferable catch entitlement or any form of individual transferable entitlements arise under this form of management, the approach employed to allow for the development of a market reallocation mechanism is to establish an organisation with the authority to represent recreational fishers, act on their behalf, hold the sector's allocation, raise and hold money, and buy and sell the sector's allocation. In presenting Option 2, this representative body is referred to as the "recreational sector trust fund".

An issue that needs to be addressed in developing this approach is that of the timeframe required for the management authority to adjust management regulations in the recreational fishery following an adjustment to the recreational catch share. For example, if the recreational sector acquires (sells) catch entitlements from (to) the commercial sector entitling it to a larger (smaller) catch and the particular fishery is managed primarily using daily bag and boat limits, it is a costly process to change limits and educate recreational fishers about new rules.

It is not practical or desirable to be adjusting bag and boat limits frequently and it is not possible to do so within short time frames. Under Option 1 this issue was addressed by allowing a specified time for the adjustments to take place. A similar approach is taken for Option 2 whereby purchases or sales of catch entitlements by the recreational sector are deemed to take effect during a specified future season. For example, it may be stipulated that transactions agreed on during the period 1 January to 31 December 2010 would take effect for the 2011/12 season.

It is also important to bear in mind, given the need for delays in allowing transactions to take effect, that the 'goods' being traded is a right to catch a given percentage of the TAC and not a right to catch a given tonnage. Thus, buyers and sellers will need to consider the risk that the TAC will be changed between the time the transaction is agreed on and the time that it will take effect.

Option 2 is structured as follows:

- Initial sectoral allocations are made and these allocations are specified in terms of a percentage of the total allowable catch (TAC), except where a nominal allocation is made, in which case the allocation may be specified in terms of tonnage or kilograms.
- Sectoral catch targets, based on a given sector's allocation and the fishery-wide TAC, are set under each sector's management regime and each sector is managed to its target catch level.
- A recreational fishing sector trust fund is established.
- The recreational sector's initial allocation is transferred to the trust fund and the trust fund holds the allocation on behalf of recreational fishers. The recreational sector trust fund may lease this allocation to commercial operators.
- The recreational fishing sector trust fund may buy/lease/sell commercial entitlements, that is ITQ units.

- Purchases or sales of catch entitlements by the recreational sector trust fund will take effect during a future specified season rather than immediately. For example, it may be stipulated that transactions agreed on during the period 1 January to 31 December 2010 would take effect for the 2011/12 season.
- Where the recreational sector trust fund leases part of its allocation to commercial operators, the recreational sector will be managed under a catch target equal to its allocation less the proportion leased. The proportion leased to commercial operators will be converted into ITQ units and the commercial sector's share of the TAC, that is the TACC, increased accordingly.
- Where the recreational sector trust fund leases or buys ITQ units from a commercial operator, the recreational sector will be managed under a catch target equal to its allocation plus the catch associated with the purchased or leased ITQ units. The ITQ units purchased or leased will be withdrawn from the commercial sector and the TACC reduced accordingly.

Below is an illustration of how a reallocation from the recreational sector to the commercial sector would occur under Option 2:

- The framework is as for Option 1, that is, one within which an initial allocation was made whereby the commercial sector was allocated 95 per cent of the TAC and the recreational sector five per cent of the TAC. Further, the commercial fishery is managed through the use of ITQs and each unit of ITQ equates to 0.1 per cent of the TAC with a total of 950 ITQ units in the commercial fishery. The recreational sector's five per cent allocation is equivalent to 50 ITQ units.
- The TAC for the 2010/11 season is set at 10,000 tonnes, with a TACC of 9,500 tonnes and a TARC of 500 tonnes.
- During 2010 the recreational sector trust fund agrees to lease 20 per cent of its allocation to commercial operators. This is equivalent to one per cent of the TAC and 10 ITQ units.
- For the 2011/12 season the TAC is set at 9,000 tonnes. The TACC is set at 96 per cent of the TAC, that is, 8,640 tonnes and the TARC is set at four per cent of the TAC, that is 360 tonnes.
- The recreational sector's catch is managed to target the revised TARC.
- The commercial operators who leased the recreational sector allocation are issued with an additional 10 ITQ units and there are now 960 ITQ units in the commercial sector.

A reallocation from the commercial sector to the recreational sector would be undertaken as follows:

- During 2010 the recreational sector trust fund agrees to lease 20 ITQ units from commercial ITQ unit holders. This is equivalent to two per cent of the TAC.
- For the 2011/12 season the TAC is set at 9,000 tonnes. The TACC is set at 93 per cent of the TAC, that is, 8,370 tonnes and the TARC is set at seven per cent of the TAC, that is 630 tonnes.
- The recreational sector's catch is managed to target the revised TARC.
- The 20 units leased from commercial operators are withdrawn from these operators' holdings and the total number of ITQ units held by the commercial sector declines to 930.

To allow for Option 2 to be developed, in addition to the requirement that initial allocations are made, two processes would need to be developed and implemented. First, that sectoral catch targets, based on a given sector's allocation (after accounting for any catch entitlements purchased, leased or sold) and the fishery-wide TAC, are set under each sector's management regime and that each sector is managed to its target catch level.

Second, that a recreational sector trust fund is established. Under Option 2, the primary role of the recreational trust fund would be to decide whether to purchase ITQ units from the commercial sector, in order to increase the recreational sector overall allocation or to lease its allocation to the commercial sector to raise funds. It would have no direct role in managing the fishery or in determining how the sector's allocation would be distributed among participants in the recreational fishery. The relevant fisheries management authority would undertake these roles, although they would no doubt consult with the recreational trust fund and other stakeholder groups on relevant matters.

The funds raised from leasing its allocation could be used for a number of purposes including the future leasing or purchases of ITQ units, reductions in recreational fishing fees, and the purchasing of catch allocations in other recreational fisheries. Consideration of the latter, that is allowing the recreational trust fund to purchase catch allocations in other recreational fisheries using funds raised from the sale of its rock lobster allocation, would give rise to a number of issues, including cross-subsidisation and the disenfranchisement of recreational lobster fishers in favour of recreational fisheries, that would need to be addressed.

The effectiveness of this body in undertaking its role will be dependant on ensuring that robust governance structures and decision-making rules are put in place. In addition, issues such as funding and constraints on the expenditure of funds raised from the potential leasing of the recreational sector's allocation will need to be addressed. The development of these structures and decision-making process and the addressing of issues such as funding will require a significant amount of research and consultation with the recreational fishing sector and other stakeholders.

Examples of organisations controlling communal fisheries resources on behalf of a community, such as those controlling Maori fishing rights in New Zealand, currently exist and it is reasonable to expect that it is feasible that a "recreational sector trust fund" could be established for the recreational sectors of both the Western and South Australian rock lobster fisheries.

Another issue that needs to be considered is that of the precision with which sectoral management regimes can achieve target catch levels. Under Option 2, the recreational trust fund takes on the role of determining the recreational sector's allocation of the TAC through trading catch entitlements with commercial operators. It is then the role of the management authority to ensure that the recreational sector's catch is in line with its allocation.

In effect, the recreational trust fund becomes a quota holder, but with its quota taken by recreational fishers. Under ITQ management in a commercial sector it is vital for the integrity of the system that the catch taken by individual operators is reconciled with, and limited to, their quota holdings. Similarly, under the outlined reallocation mechanism the integrity of the system will rely on the ability of the management authority to reconcile and target catches in the recreational sector to that associated with the recreational trust fund's catch entitlement holdings.

To do this will require that a system be developed whereby recreational catch is monitored and reconciled with the recreational trust fund's catch entitlement holdings and, where necessary, appropriate adjustments are made to the recreational sector's management arrangements or additional ITQ units are purchased by the recreational sector trust fund. The design of an appropriate and cost-effective system in any given fishery will be dependent on the nature of the fishery and the pre-existing systems of research and management in the fishery.

Given that there are currently significant delays in obtaining estimates of recreational catch in both fisheries, in the order of six months for the Western Australian rock lobster fishery and up to two years for the South Australian rock lobster fishery, and the need for time to implement

changes to management regulations in the sector, the only realistic approach for these fisheries appears to be the use of some form of time-lag management.

Under this approach, the management authority assesses recreational catches over recent preceding seasons against the recreational sector's TARC and makes a determination as to whether the sector's catch was lesser or greater than the TARC. If the catch was less than the TARC, the surplus as determined by the management authority becomes available for the recreational sector to sell to commercial operators. If the recreational sector's catch exceeded the TARC, quota must be bought from commercial quota holders or adjustments made to the management of the recreational fishery so as to reduce catch, such as through reduced bag limits, in subsequent years.

Option 3: A market inter-sectoral reallocation mechanism where a recreational trust fund is established, trading in catch entitlements between commercial operators and the recreational sector trust fund is permitted, and management of the recreational sector includes the use of a market allocation mechanism

Under Option 2 a market reallocation mechanism was presented which allowed for the participation of the recreational sector in the market for catch entitlements through the establishment of a recreational trust fund. However, under this mechanism, individual recreational fishers do not participate in the catch entitlement market and the distribution of the recreational catch allocation is determined administratively through the sector's management regime. As previously outlined in Section 3.1.1 the rationale for the adoption of a market mechanism is that it better encourages utilization of the resource to best economic advantage.

In this section, the market mechanism presented under Option 2 is extended so that it allows for a role for market signals to influence the distribution of the sector's catch allocation among recreational fishers. This is done under Option 3 through the creation of short-term or seasonal individual non-transferable catch entitlements in the recreational sector and a market for them. This approach limits ownership of the recreational allocation to a representative organisation and gives it the sole role in the trading of allocations with operators in the commercial sector while creating a secondary market in which recreational catch entitlements are sold by the representative organisation to recreational fishers.

Adopting this approach will necessitate changes to the management of the recreational fishery in order to allow for the creation of short-term or seasonal individual non-transferable catch entitlements in the fishery that can be distributed by the recreational fishing sector trust fund. The approach taken in developing this approach is through revising management arrangements for the recreational sector so that caught and kept recreationally-caught lobsters are required to be tagged within a short period of their capture. These tags could be provided as licences are issued and/or available for purchase, with the method of distribution decided by the recreational sector trust fund. The tag effectively acts as an entitlement to capture a lobster within a given period, such as a season.

The requirement to tag kept lobsters would be similar to the current requirement in Western Australia that fishers clip or punch the central flap on the tail fan of all lobsters that are kept, within five minutes of taking them. It is important to bear in mind that the requirement to obtain a licences or register pots would still be required and that the management authority would be likely to seek to raise revenue to recover, or partially recover, costs associated with the management of the recreational sector through licence/registration fees. The profits made from the sale of tags would be kept by the recreational sector trust fund for use as per the organisation's charter and could include payments to the management authority for management services and an accompanying reduction in licence/registration fees.

Under this approach, the need for the management authority to make adjustments to the management regime in the recreational sector is reduced, with the primary catch control mechanisms being the determination of the total number of tags to be made available. The primary function of the management authority would be to ensure that all recreationally-caught lobsters were tagged, with the number of tags made available being used as a proxy for the sector's catch. As such, the need for significant time-lags in the management of the recreational fishery, and delays in purchases or sales of catch entitlements by the recreational trust fund taking effect, could be significantly reduced.

Under Option 3, the following elements additional to Option 2 would be required:

- Tags, in conjunction with traditional recreational management tools such as pot and bag limits as appropriate, are used to manage the recreational catch, and recreational fishers are required to tag all lobsters caught within a specified time from their capture.
- A recreational sector trust fund is tasked with the function of managing the distribution of the recreational sector's initial allocation and any funds that it may obtain from this.
- The recreational sector trust fund can convert all or part of its allocation into tags, using an agreed weight-to-number conversion ratio.
- The trust fund can distribute the recreational sector's allocation through allocating a given number of tags with every recreational rock lobster licence taken out, selling tags to recreational fishers, or leasing part of the sector's allocation to the commercial sector.
- ITQ unit holders can sell their quota to the recreational trust fund for conversion into tags, using an agreed weight-to-number conversion ratio.

The approach outlined above gives rise to short-term individual catch entitlements in the recreational sector. The base in which the individual catch entitlement within the recreational sector is denominated is numbers of animals, which varies from the previous bases used for the sectoral allocation and catch entitlements within the commercial sector. Nonetheless, tags could be converted to weight by using the average weight of recreational rock lobsters caught, as illustrated below.

- The framework is as previously, that is, one within which an initial allocation was made whereby the commercial sector was allocated 95 per cent of the TAC and the recreational sector five per cent of the TAC. The commercial fishery is managed through the use of ITQs and each unit of ITQ equates to 0.1 per cent of the TACC, with a total of 950 ITQ units in the commercial fishery. The recreational sector is managed through the use of tags, where the number of tags is determined using a conversion ratio of two tags for every one kilogram of catch allocated to the sector.
- The TAC is set at 10,000 tonnes, with a TACC of 9,500 tonnes and a TARC of 500 tonnes.
- The recreational trust fund is allowed to issue up to one million tags.
- The recreational trust fund expects that demand for tags will be such that recreational fishers will not catch the recreational allocation. As such, it decides to issue 300,000 tags (equivalent to 150 tonnes of its allocation) to recreational fishers when they take up a licence and make available an additional 400,000 tags (equivalent to 200 tonnes of its allocation) for sale to recreational fishers. The remaining 150 tonnes is leased to commercial operators.

While a reallocation from the commercial sector to the recreational sector would be undertaken as follows:

- The recreational trust fund expects that demand for tags will be such that recreational fishers will exceed the recreational sector's allocation. As such, it decides to purchase 100 tonnes of quota held by ITQ unit holders and converts this into 200,000 tags.
- The recreational trust fund now has 600 tonnes (1,200,000 tags) available for distribution to the recreational sector and issues 300,000 tags (equivalent to 150 tonnes of its allocation) to recreational fishers when they take up a licence and makes available an additional 900,000 tags (equivalent to 450 tonnes) for sale to recreational fishers.

While there are a number of benefits for adopting such an approach, its implementation will require the commitment of significant resources. Tags have been used in some commercial fisheries such as the southern rock lobster and New South Wales rock lobster fisheries, however, the tags have been introduced primarily as a marketing tool whereby rock lobster can be traced from their capture through to the "plate".

The Freycinet Inlet pink snapper fishery is the only known fishery in Australia where tags are used as a management tool in the recreational sector – they are also used in the commercial sector. In the Freycinet Inlet pink snapper fishery for the 2008 season, 1,050 tags were available to the public and 350 to commercial operators.

The recreational tags were distributed on the basis of a lottery, with winners allotted two tags each and required to pay $10 for each tag. The tags are for one season only and are non-transferable and non-refundable. The costs of managing the program is difficult to ascertain due to the fact that the officers involved are also undertaking other activities, but are believed to be in the order of $15,000 to $20,000 per annum - which is greater than the $10,000 or so earned from the sale of tags to recreational fishers.

Actual recreational catches in the Freycinet Inlet pink snapper are estimated to be only about one-third of the allowable catch, that is, roughly only one-third of the tags issued were actually used (Department of Fisheries 2009). This raises issues as to the appropriateness of using tags as a proxy for the sector's catch, although the characteristics of the Western and South Australian lobster recreational fisheries are significantly different and the catch-to-number ratio may be significantly higher.

An alternative approach would be to use a time-lag management approach as for Option 2, where estimated actual catches are used to determine the proportion of the recreational sector's catch allocation that is used. Using this approach will maintain the influence of market signals in the determination of the distribution of the sector's allocation, but maintains the long-time delays in required adjustments taking effect.

As noted by IFAAC (2009) the requirements with regard to tag numbers and delivery in the Western Australian rock lobster fishery would be substantially greater, with an annual requirement of between 500,000 and a million tags, which would be used by up to 40,000 fishers. IFAAC argues that due to this burden and the need for a sophisticated distribution system to allow tags to be supplied on an "as needed" basis, the use of tags as a catch control tool is not likely to be feasible in the near future for the recreational sector of the Western Australian rock lobster fishery.

Option 4: A market inter-sectoral reallocation mechanism where individual transferable catch entitlements exist in all sectors

Options 2 and 3 are based on the establishment of a recreational trust fund that holds the recreational sector's catch entitlements and participates in the market for catch entitlements with individual commercial catch entitlement holders. Option 4 is based on establishing ITQs

in all sectors through converting the recreational sector's allocation into ITQ units, distributing these units among participants in the recreational sector, and allowing ITQ units to be exercised in both the commercial and recreational sectors.

The latter component allows the catch associated with a given ITQ unit to be taken by recreational or commercial fishers and establishes ITQs throughout the fishery. As previously outlined, Pearse (2006) argues in this situation that the role of the government [through the fishery's management authority] in this situation would be to ensure that there are no impediments to the divisibility and transferability of the quota rights among sectors, and that the allocation among sectors will be determined by the purchases and sales of quota among individual quota-holders in different sectors (Pearse 2006).

Within an idealized quota system, it is up to individuals to decide how they wish to take their quota. The role of the management authority is simply to ensure that all catches are only taken under a quota holding, with no distinction made between recreational and commercial fishers.

However, it is likely that there will be a desire to maintain a distinction between recreational and commercial fishing activity and greater restrictions on participating in either sector than just the possession of catch entitlements. In the South Australian rock lobster fishery, for example, in the Northern Zone, operators must hold a minimum 320 quota units to undertake commercial fishing activity (Sloan and Crosthwaite 2007b).

Option 4 is structured around ensuring a clear delineation between commercial and recreational fishing activity. As such, under Option 4 it is taken that commercial and recreational fishing activity are viewed as separate activities and a licensing system is in place, with only commercial licence holders being able to undertake commercial operations. Recreational fishers would require a recreational fishing licence and tags to participate in the fishery. Additional restrictions on the type of fishing activity that could be undertaken by recreational licence holders - and restrictions on the sale of the catch - may also be required to ensure that they do not indulge in commercial activities.

Option 4 is structured as follows:

- Initial sectoral allocations are made and these allocations are specified in terms of a percentage of the total allowable catch (TAC), except where a nominal allocation is made, in which case the allocation may be specified in terms of tonnage or kilograms.
- ITQ units equivalent to the recreational sector's allocation are created and distributed.
- There are no restrictions on the ownership of ITQ units and they can be freely bought and sold.
- Tags are used to manage the recreational catch and recreational fishers are required to tag all lobsters caught within a specified time from its capture. Additional restrictions on the type of fishing activity that can be undertaken by recreational licence holders - and restrictions on the sale of their catch to ensure that they do not indulge in commercial activities - are also used, as required.
- ITQ units can be converted into tags on an annual basis using an agreed weight-to-number conversion ratio. The tags will be valid for the duration of one season.
- Holders of ITQ units that have been converted into tags can use the tags to capture lobsters while undertaking recreational fishing activity, provided they also hold a recreational fishing licence. Alternatively, they can sell the tags to licenced recreational fishers directly or through an intermediary.

- Holders of ITQ units not converted into tags can use the ITQ units to undertake commercial fishing activity within the rules for that fishery, provided they hold an appropriate commercial fishing licence. Alternatively they can lease the units to an appropriately licenced commercial operator.

As previously, the approach outlined above is not meant to represent the only approach that could be taken, but rather to provide a framework within which the operation and requirements for the implementation of a market mechanism where individual catch entitlements exist in all sectors can be illustrated. An example of the operation of the mechanism is as follows:

- The framework is as previously, that is, one within which an initial allocation was made whereby the commercial sector was allocated 95 per cent of the TAC and the recreational sector five per cent of the TAC. The commercial fishery is managed through the use of ITQs and each unit of ITQ equates to 0.1 per cent of the TACC, with a total of 950 ITQ units in the commercial fishery.
- The recreational sector's allocation in converted into ITQ units. Given that there are 950 ITQ units in the commercial sector and this is associated with 95 per cent of the TAC, the recreational sector's allocation of five per cent of the TAC equates to 50 ITQ units. The combined total of ITQ units in the fishery is now 1,000.
- 50 ITQ units are distributed to participants within the recreational sector.
- The recreational sector is managed through the use of tags.
- The TAC is set at 10,000 tonnes
- The number of kilograms per ITQ unit is 10,000. The number of tags per ITQ unit is determined using a conversion ratio of two tags for every one kilogram associated with an ITQ unit. The number of tags per ITQ unit is set at 20,000.
- A holder of 10 ITQ units who previously leased them to a commercial operator decides to convert their ITQ units into 200,000 tags and sell them to recreational fishers. This in effect results in a transfer of one per cent of the TAC available from the commercial sector to the recreational sector.

Under this approach a major issue, beyond those that would also arise under Option 3, is the acceptability of distributing the recreational sector's initial allocation in the form of ITQs. To create a market in which individual recreational catch entitlements can be traded with the commercial sector requires that the catch entitlements created in both sectors have the same properties as that required of the sectoral allocations; that is, that there is an initial allocation to participants in the respective sectors and that this allocation is denominated in terms of the same base across and within each sector, divisible, and transferable. In effect, this approach involves the allocation of the recreational catch entitlements to individuals who are then free to use the entitlement or sell it to other recreational fishers, commercial fishers or another party.

4.2 Where the commercial sector is managed under ITEs

In the previous section, potential reallocation mechanisms and their operation were examined for a fishery in which the management regime in the commercial sector gives rise to individual catch entitlements, namely ITQs. As illustrated under the various potential mechanisms outlined, as ITQs are denominated in the same form as sectoral allocations, transfers between the recreational sector and individuals who hold ITQs, and hence the commercial sector, can be achieved directly through the buying and selling of ITQ units.

Under ITEs (and any other commercial management regime which gives rise to individual entitlements in the commercial sector that differ from that in which the sectoral allocations are based) there is, however, an additional complexity in developing a reallocation mechanism that arises from different entitlements in the fishery being denominated differently. Commercial entitlements are denominated in terms of ITE units, while sectoral allocations are denominated in terms of shares of the fishery-wide TAC. As ITE units are not associated with an entitlement to take a given level of catch, transfers of sectoral allocations cannot be achieved directly through purchases/sales of ITE units from/to commercial operators.

This gives rise to two inter-related issues - how are transfers between the respective sectors to be achieved, and how are those individuals or sectors that suffer a reduction in entitlements to be compensated? These issues are first addressed below within the context of an administrative reallocation mechanism.

4.2.1 An administrative approach

Option 5: An administrative inter-sectoral reallocation mechanism

Under an administrative inter-sectoral reallocation mechanism where the commercial sector is managed under ITQs, downward adjustments to the commercial allocation can be adjusted through purchasing and withdrawing ITQ units from the commercial fishery in proportion to the reduction in the commercial sector's allocation, as outlined under Option 1. However, where the commercial fishery is managed under ITEs, units of entitlement in the commercial fishery do not correspond to a proportion of the TACC. If the TACC is reduced in order to transfer catch allocation to the recreational sector, the question arises as to how this reduction is to be realised while providing appropriate compensation to the commercial sector.

There are three approaches that can be employed to achieve the reduction in catch: a tightening of the management regulations in the fishery (including, changing the value of ITE units); the purchase and withdrawal of ITE units; or a mix of the two.

The former approach impacts on the commercial fishery as a whole and, as such, would require sector-wide compensation to be paid. The latter approach allows for direct compensation to those who choose to exit the fishery, but may also give rise to significant benefits to those who remain in the commercial fishery.

These benefits are likely to arise as the amount of effort that would be required to take the reduce TACC would be proportionately greater than the catch reduction. In effect, the reduction in the number of ITE units not only allows for the transfer of catch allocation to the recreational sector, but also results in the rationalisation and likely increased profitability of the commercial sector.

Given these factors, in developing Option 5, a mixed approach is taken under which the level of ITE units to be purchased and withdrawn from the fishery is decided as part of the review process, while allowing for the application of additional management measures to target the TACC as required. The framework for Option 5 is outlined below.

- Initial sectoral allocations are made and these allocations are specified in terms of a percentage of the total allowable catch (TAC), except where a nominal allocation is made, in which case the allocation may be specified in terms of tonnage or kilograms.
- Sectoral catch targets, based on a given sector's allocation and the fishery-wide TAC, are set under each sector's management regime and each sector is managed to its target catch level.

- A review process is established under which a review of sectoral allocations is undertaken periodically, for example, every five years.
- Adjustments to allocations will be implemented through changes to the respective sector's target catch and appropriate adjustments to the sector's management regulations within a specified time frame, for example, 12 months.
- Where a downward adjustment to the commercial sector's allocation is required, the adjustment will be implemented through a reduction in the TACC which will be achieved through a combination of a reduction in the number of ITE units and changes to the commercial sector's management regulations. ITE units will be purchased through a voluntary, open tender process and withdrawn from the fishery. The number of ITE units to be withdrawn from the fishery will be determined as part of the review process.
- Where an upward adjustment to the commercial sector's allocation is required, the adjustment will be implemented through an increase in the TACC, which will be achieved through a combination of an increase in the number of ITE units and changes to the commercial sector's management regulations. ITE units will be sold under an open tender process. The increase in the number of ITE units in the fishery will be determined as part of the review process.
- There is no allowance for allocations to be transferred between sectors between reviews, including any proportion of an allocation that is not caught by any sector.

An illustration of the operation of Option 5 for a reallocation from the commercial to the recreational sector is provided below:

- The framework is one within which an initial allocation was made whereby the commercial sector was allocated 95 per cent of the TAC and the recreational sector five per cent of the TAC. Further, the commercial fishery is managed through the use of ITEs and there are a total of 950 ITE units in the commercial sector.
- A review is conducted and a decision is made to increase the allocation of the recreational sectors by five percentage points of the TAC, such that the allocation of the TAC becomes 90 per cent to the commercial sector and 10 per cent to the recreational sector.
- The sectoral allocation for the recreational sector is increased to 10 per cent of the TAC and the recreational fishery managed under a target catch set at this level.
- The sectoral allocation for the commercial sector is reduced to 90 per cent of the TAC and the fishery is managed under a target catch set at this level.
- As part of the review process, it is decided that 50 ITE units, will be purchased from ITE unit holders and withdrawn from the fishery, leaving 900 ITE units in the commercial sector.
- Changes to management measures to ensure that the commercial fishery catch is managed in accordance with the revised target catch level are implemented as required.

Conversely, a reallocation from the recreational to the commercial sector would be achieved as follows:

- A review is conducted and a decision is made to reduce the allocation of the recreational sectors by two percentage points of the TAC, such that the allocation of the TAC becomes 97 per cent to the commercial sector and three per cent to the recreational sector.
- The sectoral allocation for the recreational sector is reduced to three per cent of the TAC and the recreational fishery managed under a target catch set at this level.

- The sectoral allocation for the commercial sector is increased to 97 per cent of the TAC and the fishery is managed under a target catch set at this level.
- As part of the review process it is decided to increase the number of ITE units in the commercial sector by 20 to a total of 970 units. These units are sold to commercial operators.
- Changes to management measures to ensure that the commercial fishery catch is managed in accordance with the revised target catch level are implemented as required.

As for situations where the commercial sector is managed under ITQs under Option 1 to allow for the implementation of Option 5, the establishment of a review process and the provision of funding to allow for the purchase of commercial entitlements where there is a reallocation away from the commercial sector will be required.

The issue of the precision with which sectoral management arrangements are required to achieve target catch levels under Option 5 is the same as that in regard to the administrative approach where the fishery is managed under ITQs (Option 1), as discussed in Section 4.1.1. However, there is an additional issue in that there is a need, as part the review process, for a decision to be made as to the number of ITE units that are to be withdrawn from (added to) the commercial sector under a given reduction (increase) to the commercial sector's catch allocation.

The approach taken will be dependent on the characteristic of fishery in question, particularly the relationship between catch and effort, and no single approach will be suitable for all fisheries. However, it is important that possible outcomes from withdrawing or adding an inappropriate number of ITE units be considered. This is done through a highly simplified examination of the illustration of a reallocation from the commercial to the recreational fishery that was previously provided.

To recap, there was originally 950 ITE units in the commercial sector and a 9,500t TACC (based on a 95 per cent share of the TAC). Following a review of the allocation, the commercial share of the TACC is reduced to 9,000t and 50 ITE units are purchased and withdrawn from the fishery, such that there are 900 ITE units in the fishery. Overall there has been no change to the average catch available per ITE unit at 10t per unit. However, given variations in historical catch levels between operators, there is likely to be a change to the average catch available to those operators that remain in the fishery.

If those operators that sell their entitlements caught on average 5t for each unit held, the other operators in the fishery were previously averaging a catch of 10.3t per unit. Thus, following the exit of the those operators selling their entitlements and the revision to the TACC, the average available catch to the operators remaining in the fishery will fall from 10.3t per unit to 10t per unit.

Conversely, if 100 units of effort were purchased and withdrawn from the fishery, there would be 850 ITE units remaining after the effort withdrawal and the average catch per ITE unit would increase to 10.6t. If those operators that sell their entitlement and exit the fishery had previously caught an average of 8t per unit, the other operators in the fishery were previously averaging a catch of 10.2t per unit. Thus, following the exit of those operators selling their entitlements and the revision to the TACC, the average available catch to the operators remaining in the fishery will rise from 10.2t per unit to 10.6t per unit.

Given the above, an appropriate approach may be to use the historical catch of the exiting operators to calculate the catch transferred to the recreational fishery. However, this has approach also has problems that are both specific to the western rock lobster fishery and general to all fisheries. Specifically, in the western rock lobster fishery using historical catch is problematic, due to the difficulty of associating a catch history with any given ITE unit.

Generally, as *a priori* it is not known which units will be offered, it would not be possible to decide how many units would have to be withdrawn from the fishery until acceptance for the tender was finished. Also, more generally, where there is a large amount of latent effort in a fishery, the amount of effort required to be withdrawn from the fishery in order to achieve even a small reduction in actual catches could be substantial.

The issue of what is the appropriate level of effort to withdraw (add) to the commercial sector, given an reduction (increase) in the commercial sector's catch allocation, arises due to the complexity of the relationship between catch and effort and the fact that changes at the margin changes to the total number of ITE units in the commercial sector will not result in proportionate marginal changes to the total catch. However, it is important to note that the complexity of the relationship between effort and catch is an issue faced in effort-managed fisheries, regardless of whether a mechanism to allow for reallocation between sectors is in place or not.

4.2.2 Market approaches

Option 6: A market inter-sectoral reallocation mechanism where a representative body is established for both the commercial and recreational sectors, and these bodies can trade their sector's catch allocations

Where sectoral catch allocations are made and the commercial sector is managed under ITEs, there are effectively three forms of entitlements in the fishery - the recreational sector's catch allocation, the commercial sector's catch allocation, and ITE units held by individuals in the commercial sector.

Under Option 6, a market reallocation mechanism based on allowing trading of sectoral catch allocation is examined. As the catch allocations are 'owned' by a sector and individuals within them do not have an explicit right to proportions of the allocations, this can only be achieved through the establishment of representative bodies in both the commercial and recreational sectors. As previously noted, these bodies need to have the authority to represent fishers in the given sector, act on their behalf, hold the sector's allocation, raise and hold money, and buy and sell the sector's allocation.

Under this approach, the commercial sector's representative body would be able to sell/purchase catch allocation to/from the recreational trust fund and *vice-versa*. Any adjustments to sectoral allocations resulting from such trading would then result in a change to the respective target sectoral catch under the respective sector's management plan.

Option 6 is structured as follows:

- Initial sectoral allocations are made and these allocations are specified in terms of a percentage of the total allowable catch (TAC), except where a nominal allocation is made, in which case the allocation may be specified in terms of tonnage or kilograms.
- Representative bodies for the recreational and commercial sectors are formed with the authority to represent fishers in the given sector, act on their behalf, hold the sector's allocation, raise and hold money, and buy and sell the sector's allocation.
- Subsequent to any agreement between the representative bodies of the respective sector for a transfer of catch allocation, the management authority will adjust the TACC and TARC and to reflect the agreed transfer. Each sector is then managed to its revised target catch level.

An illustration of the operation of Option 6 for a reallocation from the commercial to the recreational sector is provided below:

- The framework is one within which an initial allocation was made whereby the commercial sector was allocated 95 per cent of the TAC and the recreational sector five per cent of the TAC. Further, the commercial fishery is managed through the use of ITEs and there are a total of 950 ITE units in the commercial sector.
- The two representative bodies meet and an agreement is made is made to increase the allocation of the recreational sectors by five percentage points of the TAC, such that the allocation of the TAC becomes 90 per cent to the commercial sector and 10 per cent to the recreational sector.
- The sectoral allocation for the recreational sector is increased to 10 per cent of the TAC and the recreational fishery managed under a target catch set at this level.
- The sectoral allocation for the commercial sector is reduced to 90 per cent of the TAC and the fishery is managed under a target catch set at this level.
- The commercial sector representative body uses the funds from the sale of the catch allocation to buy ITE units and withdraw them from the fishery.
- Changes to management measures, to ensure that the commercial fishery catch is managed in accordance with the revised target catch level, are implemented as required.

Under this approach it is also possible that the representative bodies may be able to reach agreement to trade sectoral allocations for non-financial considerations, for example, the recreational sector may be willing to trade some of its catch allocation if the commercial sector agreed to an extension of areas accessible only by recreational fishing.

As for the establishment of a recreational sector trust fund, the establishment of a commercial sector representative authority would require that robust governance structures and decision-making rules be put in place and issues such as funding and the distribution of proceeds from the sale of part of the commercial sector's catch allocation would need to be addressed. In the example provided above, it was assumed that these funds would be used to buy ITE units and withdraw them from the fishery. The other obvious options would be to distribute the funds among ITE unit holders as compensation for the reduced TACC and accompanying tightening of management restrictions.

The major issue in developing a reallocation mechanism based on this approach would be in obtaining the acceptance of holders of ITE units to establish such a representative body and allow for the sector's catch allocation to be traded on their behalf.

Option 7: A market inter-sectoral reallocation mechanism allowing for the trading of commercial effort entitlements and the recreational sectoral allocation between commercial entitlement holders and the recreational sector trust fund

Option 7 is based on adjusting Option 2 to allow for the trading of commercial effort entitlements and the recreational sectoral allocation between individual commercial entitlement holders and the recreational sector trust fund. As for Option 2, the recreational fishery is taken to be managed using traditional recreational sector management tools.

Other management approaches for the recreational sector that allow for the targeting of catch in the sector, such as the use of tags as discussed under Option 3, could also be employed using a similar framework. The approach considered under Option 4, that is, changing management to allow for the creation of individual catch entitlements within the recreational sector, is not considered, as the purpose of this approach was to create such entitlements in all sectors, whereas here it is taken that such catch entitlements do not exist in the commercial or recreational sectors.

Under Option 7, the recreational sector is allowed to lease/purchase commercial effort entitlements, which are then converted into a recreational sector catch entitlement, forming part of the recreational sector's allocation in the calculation of the TARC. Commercial operators are allowed to lease the recreational sector's catch allocation, or part thereof, which then forms part of the commercial sector's allocation in determining the TACC and is converted into a commercial effort entitlement, which the individual commercial operator who leased the catch allocation can use.

It is worth noting that Pearse (2006) does not consider this option, saying as previously outlined that: "In the more challenging case in which one or more sectors in a fishery does not employ individual quotas, fishers have no individual entitlement to any part of the catch, so they cannot trade in fishing rights. To adjust their allocation through trading, the fishers in such sectors need an organization with authority to represent them, hold their sector's total allocation, raise and hold money, and buy and sell fishing rights on their behalf." All of the permutations contained in this statement by Pearce have previously been addressed.

Nonetheless, in the conduct of research for this paper and previously, as noted in IFAAC 2005, there has been considerable discussion involving a market-based mechanism in the Western Australian rock lobster fishery under which a conversion ratio is used to convert commercial effort into recreational effort or catch. Given this, a possible framework to allow for the trading of individually held commercial effort entitlements, and the recreational sectoral allocation held by the recreational sector trust fund, is now examined.

In developing the framework, it is necessary that as the TACC is expressed as a percentage of the TAC (which may vary from season-to-season) that the conversion ratio is defined in terms of percentage changes to the TACC and the number of ITE units in the fishery, as outlined in the framework for Option 7 provided below:

- Initial sectoral allocations are made and these allocations are specified in terms of a percentage of the total allowable catch (TAC), except where a nominal allocation is made, in which case the allocation may be specified in terms of tonnage or kilograms.
- Sectoral catch targets, that is the TACC and TARC, based on a given sector's allocation and the fishery-wide TAC, are set prior to the opening of the fishing season under each sector's management regime - and each sector is managed to its target catch level.
- A recreational fishing sector trust fund is established.
- The recreational sector's initial allocation is transferred to the trust fund and the latter holds the allocation on behalf of recreational fishers. The recreational sector trust fund may lease this allocation to commercial operators.
- The recreational fishing sector trust fund may also buy or lease commercial entitlements; that is, ITE units.
- To allow for the time to revise target catch levels and adjust management regulations in the recreational fishery, transactions will not take effect immediately but during a future specified season. For example, it may be stipulated that transactions agree on during the period 1 January to 31 December 2010 would take effect for the 2011/12 season.
- A conversion ratio - defined as the percentage of the TACC deemed to be associated with one per cent of the total number of ITE units in the commercial sector - is set by the management authority. This conversion ratio may be subject to periodic review.
- Where the recreational sector trust fund leases or buys ITE units, the recreational sector will be managed under a catch target equal to its allocation plus the catch allocation deemed

to be associated with the leased or purchased ITE units. The ITE units purchased or leased will be withdrawn from the commercial sector and the TACC reduced by the level of commercial sector's catch allocation deemed to be associated with the ITE units. The catch allocation deemed to be associated with an ITE unit will be determined under the following formulae:

Percentage of the commercial sector's allocation deemed to be associated with transferred ITE units = conversion ratio x percentage of available ITE units purchased by recreational trust fund

- Where a commercial operator leases part of the recreational sector's allocation from the recreational sector trust fund, the recreational sector will be managed under a catch target equal to its allocation less the proportion leased. The proportion leased to individual commercial operators will be added to the commercial sector's share of the TAC; that is, to the TACC. The proportion leased will also be converted into ITE units for the use of the commercial operator who leased the associated recreational allocation. The additional commercial entitlements the operator will be granted will be determined under the following formulae:

ITE units granted to a lessee of the recreational catch allocation = total number of ITE units x (leased recreational sector allocation /commercial allocation)/conversion ratio

where the commercial allocation is that prevailing at the time the transaction took place and is expressed as a percentage of the TAC and the leased recreational sector allocation leased is also expressed as a percentage of the TAC.

- Management measures to ensure that the recreational and commercial catch are managed in accordance with the each sector's revised allocation and target catch levels will be implemented as required.

Below an illustration of how a reallocation from the commercial sector to the recreational sector would occur under Option 7 is presented:

- The framework is as previously, that is, one within which an initial allocation was made whereby the commercial sector was allocated 95 per cent of the TAC and the recreational sector five per cent of the TAC. Further, the commercial fishery is managed through the use of ITEs and each unit of ITE equates to 0.1 per cent of the total of 950 ITE units in the commercial fishery.
- The TAC for the 2010/11 season is set at 10,000 tonnes, with a TACC of 9,500 tonnes and a TARC of 500 tonnes.
- The conversion ratio is set at 0.7 by the management authority.
- During 2010 the recreational sector trust fund agrees to purchase 50 ITE units, which represents 5.3 per cent of the total number of ITE units. Based on a conversion ratio of 0.7, this is deemed as being equivalent to 3.7 per cent of the TACC or 3.5 per cent of the TAC. The recreational allocation for the 2011/12 season is revised to 8.5 per cent of the TAC.
- For the 2011/12 season, the TACC is reduced to 91.5 per cent of the TAC and the 50 ITE units purchased by the recreational sector trust fund are withdrawn from the fishery, so that the total number of ITE units is 900.
- The TAC for the 2011/12 is set at 9,000 tonnes, with a TACC of 8,235 tonnes and a TARC of 765 tonnes. Management regulations of the recreational and commercial sectors are adjusted accordingly.

Below is an illustration of how a reallocation from the recreational sector to the commercial sector would occur under Option 7:

- During 2010, commercial operators agree to lease 40 per cent of the recreational sector's catch allocation, equivalent to two per cent of the TAC.
- For the 2011/12 season the recreational sector allocation is adjusted to three per cent of the TAC and the commercial sector's allocation is adjusted to 97 per cent of the TAC
- Based on the proscribed formulae and conversion ratio for the 2011/12 season, 14 additional ITE units are granted to the lessees of the recreational allocation and the total number of ITE units rise to 964.
- The TAC for the 2011/12 is set at 9,000 tonnes, with a TACC of 8,730 tonnes and a TARC of 270 tonnes. Management regulations for the recreational and commercial sectors are adjusted accordingly.

A major issue under the above approach will be the level at which the conversion rate is set. The implications with regard to the equity of using too high, or too low, a conversion ratio are the same as that outlined in for the administrative approach where the commercial sector is managed under ITEs (Option 5).

If the ratio is set too low, then the amount of effort withdrawn from the fishery may result in those remaining in the commercial sector bearing an inequitable burden in relation to reduced catches under tightened management measures, and the recreational sector paying (receiving) too little (much) for an increased (reduced) catch allocation. Conversely, if a conversion ratio is set too high, then the recreational sector could end up subsidising the rationalisation of the commercial sector and paying (receiving) too much (little) for an increased (reduced) catch allocation.

Further, the major rationales for the use of a market mechanism, that is, that it removes the government from the role of deciding allocations and that it encourages the utilisation of the resource to best economic advantage, are compromised by the need to convert commercial effort entitlements into a catch allocation and *vice-versa*. The necessity of administratively setting a conversion ratio and the implications for setting it too high, or too low, negate the first of these rationales at least to some degree, if not fully.

Just as representatives of the commercial and recreational sectors are likely to lobby for increased shares under an administrative mechanism, they are also naturally likely to lobby for a higher, or lower, conversion ratio as it best aligns with their own interest.

The second rationale that a market mechanism encourages the utilisation of the resource to best economic advantage is also negated at least to some degree, if not fully. Under Option 7 the cost and benefits of purchasing and selling catch entitlements will be determined in part by the conversion ratio set, so unless the ratio is set 'correctly' the market will be distorted and improvements in the utilisation of the resource from an economic viewpoint may not be achieved.

Nonetheless, Option 7 does remove the need for an administrative determination of allocations and allows allocations to be determined by stakeholders directly.

5.0 SUMMARY AND DISCUSSION

The purpose of this report has been to investigate potential reallocation mechanisms for the transfer and/or adjustment of catch shares between sectors and the requirements to allow for their implementation, with particular reference to their application in the Western and South Australian rock lobster fisheries. While the report focuses on the commercial and recreational sectors of these fisheries, potentially all non-commercial fishing sectors could be included under a given mechanism in the same manner as that outlined for the recreational sector, subject to the appropriateness of allowing the sector's allocation to be transferable.

Two broad approaches for the design of inter-sectoral reallocation mechanisms - the administrative approach and the market approach - are identified. The rationale for the use of the market approach - that is, that it removes the government from the role of deciding allocations and encourages the utilization of the resource to best economic advantage - is then discussed. It is also noted, however, that the administrative approach also has advantages in that it builds on existing processes, has structural simplicity, and is responsive to values and interests other than economic ones.

The report then identifies that a major factor bearing on the design of any reallocation mechanism, regardless of whether an administrative or market approach is used, is the closeness with which the base, in which allocated sectoral shares are denominated, aligns with the base in which entitlements that arise from the sectoral management regimes in place in the fishery are denominated.

In the fisheries of concern to this study, sectoral allocations are denominated primarily in the form of a percentage of the fishery's total allowable catch, while two different forms of entitlement exist in the commercial sectors, ITQs in the South Australian rock lobster fishery and ITEs in the western rock lobster fishery. Under ITQs, commercial entitlements are closely aligned with sectoral allocations, whereas under ITEs the base in which commercial entitlements and sectoral allocations are denominated are intrinsically different.

It was also noted that before any inter-sectoral reallocation mechanisms can be developed, a resource-sharing (or Integrated Fisheries Management) framework must be in place, onto which the re-allocation mechanism can be built. The resource sharing framework used in the report and based on that in place in, or proposed for, the Western and South Australian rock lobster fisheries, contained the following elements:

- initial allocations are made and incorporated into the fishery's management arrangements;
- the allocations are specified in terms of a percentage of the total allowable catch (TAC); and
- sectoral catch targets, based on a given sector's allocation and the fishery-wide TAC, are set under each sector's management regime.

Potential mechanisms are first investigated for a fishery where the commercial sector is managed under ITQs. Under Option 1, a mechanism using an administrative approach, where sectoral allocations are examined under a periodic review and adjustments to prevailing allocation undertaken through a prescribed process, is developed. Under this mechanism, the requirements for the development of the mechanism are the establishment of an allocation review process and a process to allow for the funding of the purchase of commercial entitlements in the event of a downward (upward) adjustment to the commercial (recreational) sector allocation.

Option 2 was developed under a market approach and is based on the establishment of a recreational trust fund to represent recreational fishers, act on their behalf, hold the sector's

allocation, raise and hold money, and buy and sell the sector's allocation. Under Option 2 the recreational sector trust fund participates in the market for catch entitlements, with the management authority setting management arrangements to a target catch determined by the recreational trust funds catch entitlement holdings. Implementation of this mechanism requires that a recreational trust fund be established, and that a system whereby recreational catch is monitored and reconciled with the recreational trust fund's catch entitlement holdings (and that, where necessary, appropriate adjustments are made to the recreational sector's management arrangements or additional ITQ units are purchased by the recreational sector trust fund) is developed.

Option 3 was then developed as a variant of Option 2, whereby tags were introduced as a management tool in the recreational fishery. The recreational sector trust fund, in addition to participating in the market for catch entitlements, also determines the distribution of the sector's allocation. To allow for this, a recreational trust fund would need to be established, and that the use of tags would need to be implemented as a catch control mechanism in the recreational fishery.

Option 4 is based on establishing ITQs in all sectors through converting the recreational sector's allocation into ITQ units, distributing these units among participants in the recreational sector and allowing ITQ units to be exercised in both the commercial and recreational sectors, while maintaining a distinction between recreational and commercial fishing activities. A major issue in implementing Option 4 would be the acceptability of distributing the recreational sector's initial allocation in the form of ITQs, with this approach involving the allocation of the recreational catch entitlements to individuals who are then free to use the entitlement or sell it to other recreational fishers, commercial fishers or another party.

Potential mechanisms were then examined where the base in which commercial entitlements and sectoral allocations are denominated differs significantly. This situation is analogous to the Western rock lobster fishery entitlements, where commercial entitlements are based in ITEs and sectoral allocations in catch entitlements expressed as a percentage of the TAC. Under this situation, regardless of the mechanism, an additional complication arises as the units of entitlement in the commercial fishery do not correspond to a proportion of the commercial sector's catch allocation.

This gives rise to the issues if the TACC is reduced, in order to transfer catch allocation to the recreational sector, the question arises as to how this reduction is to be realised while providing appropriate compensation to the commercial sector. Three approaches that can be employed to achieve the reduction in catch are a tightening of the management regulations in the fishery (including, changing the value of ITE units); the purchase and withdrawal of ITE units; or a mix of the two.

The former approach impacts on the commercial fishery as a whole and, as such, would require sector-wide compensation to be paid. The latter approach allows for direct compensation to those who choose to exit the fishery, but may also give rise to significant benefits to those who remain in the commercial fishery. These benefits are likely to arise as the amount of effort that would be required to take the reduce TACC would be proportionately greater than the catch reduction.

In effect, the reduction in the number of ITE units not only allows for the transfer of catch allocation to the recreational sector, but also result in the rationalisation and likely increased profitability of the commercial sector. Given these factors, in developing Option 5 a mixed approach is taken under which the level of ITE units to be purchased and withdrawn from the fishery is decided as part of the review process, while allowing for the application of additional management measures to target the TACC as required.

Option 5 was examined within the context of an administrative approach. The approach used to address this problem was that commercial entitlements would be purchased and 'retired', based on a pre-set commercial effort-to-catch conversion ratio, and additional management measures used to target the commercial sector's catch, as required. To allow for the implementation of Option 5 it was noted that, as for Option 1, the establishment of a review process and the provision of funding to allow for the purchase of commercial entitlements where there is a reallocation away from the commercial sector would be required.

The need as part of the review process for a decision to be made as to the number of ITE units that are to be withdrawn from (added to) the commercial sector under a given reduction (increase) to the commercial sector's catch allocation was also noted - and possible outcomes from withdrawing or adding an inappropriate number of ITE units were discussed.

Options 6 and 7 developed potential market mechanisms, where the commercial sector is managed under ITEs. Option 6 required that representative bodies in both the recreational and commercial sectors be established, with reallocation arising through the trading of the sectoral allocations between these bodies.

Option 7 was based on adjusting Option 2 to allow for the trading of commercial effort entitlements and the recreational sectoral allocation between commercial entitlement holders and the recreational sector trust fund. Under Option 7, the recreational sector trust fund is allowed to lease/purchase commercial effort entitlements that are then converted into a recreational sector catch entitlement and forms part of the recreational sector's allocation in the calculation of the TARC.

Similarly, commercial operators are allowed to lease the recreational sector's catch allocation, or part thereof, and this then forms part of the commercial sector's allocation in determining the TACC and is converted into a commercial effort entitlement that the commercial operator who leased the catch allocation can use. It was noted that a major issue under the above approach will be the level at which the conversion rate is set and the associated implications.

It was also noted that the process required under Option 7 negate, if not fully than at least to some degree, the major rationales for the use of a market mechanism; that is, that it removes the government from the role of deciding allocations and encourages the utilisation of the resource to best economic advantage.

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