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## Further options for management of the Shark Bay Snapper Fishery : discussion paper.

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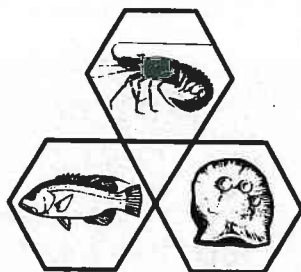
# **FISHERIES MANAGEMENT PAPER**

**No. 10**

## **FURTHER OPTIONS FOR MANAGEMENT OF THE SHARK BAY SNAPPER FISHERY**

**DISCUSSION PAPER**

**BY P MILLINGTON**



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**July 1987**



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## SUMMARY

A limited entry fishing regime for snapper was introduced in Shark Bay in order to constrain growth in fishing effort. Additional measures were introduced to reduce the number of vessels in the fishery, control areas fished and limit permitted fishing gear, with the ultimate objective of reducing catches from traditional fishing areas to long term sustainable levels. Increases in fishing efficiency in the vessels remaining in the fishery has made it evident that this objective will not be achieved under existing management rules. However, the expansion of the fishery to new grounds and the proposed increase in legal minimum size could offset some of these efficiency increases and larger annual catches.

Some of the participants in the fishery concerned about these recent higher catches and efficiency increases have therefore proposed that an individual transferable quota system replace the existing limited entry regime in order to more rapidly reduce the annual catch from the fishery.

This discussion paper examines the advantages and disadvantages of an individual transferable quota scheme and compares it with two extensions of the existing limited entry regime. These are an additional mid year (peak or spawning season) closure with further gear restraints or a system of peak or offseason access with further gear restraints.

The conclusion is that an individual transferable quota scheme would exceed the Fisheries Department's available resources to adequately administer or enforce it. If a rapid reduction in total effort and annual catch is desired then the peak/offseason access scheme can attain this through only marginally increased enforcement effort.



## 1. INTRODUCTION

A limited entry regime for the Shark Bay snapper fishery took effect on 15 May 1987. The management measures gazetted reflect the recommendations of a Working Group report adopted by the Minister for Fisheries in late 1985. The management objective for this fishery is to reduce the fishing pressure on Shark Bay snapper stocks through a reduction of fishing effort and the total annual catch of snapper from traditional fishing grounds. The Working Group thought this could be achieved by reducing the number of vessels in the fishery and restricting their fishing time and gear.

Recent developments in the fishery have shown that the current management measures have not been sufficient as yet to reduce the total annual catch, even though the number of vessels has decreased. In fact actual fishing time and greater efficiency, effort and capital investment in the fishery will result in an annual catch in 1987 comparable to 1986, the year prior to the introduction of the limited entry regime.

Although it is proposed to increase the minimum legal size of snapper in order to protect the breeding stock, and new fishing grounds outside the traditional ones in the core zone are now being exploited, there are doubts about whether these high catches can be sustained.

To achieve these high catches on a sustained basis the traditional catching grounds would have to continue producing fish at historical levels, unaffected by recent heavy fishing pressure, while the balance of the high annual catches would have to come from the newly exploited grounds.

Also fishing pressure may be so high that each year's recruits to the fishery are taken that year. These "knife edge" fisheries have very variable annual catches.

Fishermen and Fisheries Department officers have therefore been considering additional or alternative management measures for this fishery to reduce the annual catch.

A meeting of snapper fishermen with Fisheries Department officers in Carnarvon on 13 May 1987 expressed strong support for the introduction of an individual transferable quota system for the Shark Bay snapper fishery, to replace the current limited entry regime. Many fishermen saw such a system as a fair way of sharing the burden of reducing the annual snapper catch. More details of the fishermen's proposals are given in Section 3.2. Fisheries Department officers agreed to prepare and circulate a paper outlining:-

- (i) the advantages and disadvantages of individual transferable quota schemes;
- (ii) the main features of various individual transferable quota schemes which could be adopted; and
- (iii) the minimum requirements to be met before the Fisheries Department could effectively implement and enforce any such scheme.

While writing this paper it became apparent that there were a number of alternative management arrangements not involving quotas which could achieve the same objective of regulating the total catch. These measures have therefore also been considered.

## 2. TRENDS IN THE SHARK BAY SNAPPER FISHERY

### 2.1 Changes in the Fishery Since 1985

Current management arrangements for this fishery were adopted as the result of deliberations by the Shark Bay Snapper Fishery Working Group in 1985 (Reference 1). The recommendations were given effect in Fisheries Notice 250 (Reference 2) which came into force for State waters on 15 May 1987 and for all

waters in the defined management area on 1 June 1987, with the implementation of an agreement with the Commonwealth Government under the Offshore Constitutional Settlement.

Based on past fishing practice, the initial number of vessels granted endorsements were expected to take a catch closely approximating the apparently stable long term historical average. Recognising the inevitability of increased effort by fishermen once a limited entry regime was adopted a vessel reduction scheme was included in the management plan.

There were thirty three vessels initially granted access to this limited entry fishery, 13 with an A class licence allowing access to the entire fishery and 20 B class licences with access to the outer areas of the fishery. New entrants must acquire two B class licences in order to enter the fishery while an A class licensee can only dispose of his licence to a B class licence holder who in turn loses his B class licence. As a result of such transfers there were at 1 July 1987 only 15 B class licences remaining, to give a total of 27 vessels operating.

Unfortunately effort increases have outstripped vessel reductions. Not only are their licensees fishing harder in the peak season, but many are also moving to Carnarvon and fishing the entire year, rather than only during the mid year spawning or peak season. Even if only the 13 A class licences remained in the fishery, they would have the capacity, if they fished full time, to take in excess of 600 tonnes a year, much above the historical catch rate.

As high catches of snapper have continued various methods to control annual catches and further protect the breeding stock have been discussed with fishermen. The Fisheries Department will be

recommending an increase in the minimum size of snapper in order to give more protection to the breeding stock and buffer the effects of variable annual recruitment. An additional one week closure in June has been gazetted to further control fishing effort (Reference 3). These measures are not sufficient to reduce effort and annual catches and more controls will be necessary if this objective is to be achieved. If high catches cannot be sustained and a buffer to variable recruitment is desired then arrangement options available include:-

- (i) more gear restraints;
- (ii) further season reductions;
- (iii) individual transferable quotas; and
- (iv) seasonal access.

These options are discussed in more detail in the following pages.

## 2.2 Trends in Fishing Effort

Since the idea of a limited entry regime was first discussed, fishermen have been increasing their fishing effort in a number of ways.

### (a) Improved Fishing Techniques

It is now common practice to use mulies for bait. These appear to be, on average, better bait than traditional varieties. More efficient circle hooks are now widely employed and some fishermen are using prebaited clip on leaders to reduce the time lines are out of the water.

### (b) Landing of Whole Fish

In the past a significant proportion of the fleet processed their snapper at sea and

landed prepacked fillets. To increase available fishing time most boats are now landing whole fish. This is probably the main factor contributing to the recently increasing fishing effort.

(c) More Crew

Although five lines are permitted, in the past most boats only used one or two at any one time to allow crew members time to handle and process fish. Many boats now carry six or seven crew so all lines are active and someone is available to handle the fish.

(d) Better Technology and Equipment

Many boats have recently upgraded their fish finding equipment and navigation aids eg. colour echo-sounders and satellite navigators. Hand reels are continuing to be replaced by mechanical ones to reduce crew fatigue.

(e) More Fishing Time

Fishermen are now not only willing to work longer hours, but are streamlining their procedures to minimise non-fishing time by reducing unloading and refuelling times. For example, large fuel tanks and fish holding facilities are being added to many vessels.

### 3. INDIVIDUAL TRANSFERABLE CATCH QUOTA SCHEMES

#### 3.1 General Description

The major theoretical advantage of an individual transferable quota system is the certainty and flexibility given to a fisherman while ensuring the conservation of the fish stock concerned eg. Shark Bay snapper. If the total fishery catch is based on a safe sustainable yield, a fisherman can then be assigned a known quota and can plan his operations accordingly.

In theory in an individual transferable quota scheme, unproductive competition, and therefore the incentive to overcapitalise would be minimised, provided the total catch could be taken at an economic catch rate. Restrictions on fishing method, boat size, fishing gear and boat replacements would be unnecessary or only minimal. However, in order to monitor catches accurately, some controls at landing points and/or on marketing or distribution channels would be required. A fisherman could choose to operate a large, powerful vessel and catch his quota in a very short time leaving himself time to operate in other activities for the remainder of the year, or use a smaller vessel and catch on a full-time basis. If quotas are saleable, fishermen would be able to buy and sell quota and adjust to a desired level of operation.

Problems are also likely to be faced. For the fishery as whole, if the sustainable yield cannot be determined accurately, then the total allowable catch cannot be set with confidence. Therefore further measures to protect the breeding stock would be necessary to avoid problems similar to those of an open access fishery. For the individual fisherman equity questions would arise when trying to determine the size of individual quotas and who should obtain quota. There would be considerable incentive to exceed quotas and a black market will be promoted; individual boat catches may be difficult to monitor and stringent and expensive surveillance and monitoring mechanisms would be required to ensure quotas are not exceeded.

### 3.2 The Carnarvon Fishermen's Proposals

At the Industry/Government meeting in Carnarvon on 13 May it was recognised that the existing management measures were not controlling the catch of snapper in Shark Bay. A group of fishermen therefore suggested that an individual transferable quota scheme be used as an alternative.

A key factor in any individual transferable quota system is the method by which quota units are initially allocated. Options available include:-

- (i) allocating individual quota on the basis of the original number of A and B class licences issued;
- (ii) allocating individual quota to the original A and B class licences [ie. (i)], but discounting the quota of those licences which have since been transferred;
- (iii) allocating individual quota to the current A and B class licences;
- (iv) allocating individual quota according to historical catch rates.

The first three "standard" allocation options have been suggested by various Shark Bay snapper fishermen and are discussed in more detail below. The fourth option, which was used in the southern bluefin tuna fishery, is discussed in more detail in Section 3.4(f).

The first three options all propose quota should be allocated strictly according to licence type held, not on the basis of historical catches. Class A licences would be granted some multiple of the initial quota of B class licences eg. if one quota unit is granted a B class licence, an A class licence would be granted two quota units.

#### 3.2.1 Allocating to Original Licences

Under this option [(i) above] the 13 original A class licences and 20 original B class licences would be allocated quota as follows:-

13 A class licences x	
2 quota units	= 26 quota units
20 B class licences x	
1 quota unit	= <u>20 quota units</u>
Total	= <u>46 quota units</u>

If, for example, the total allowable catch was 460 tonnes in a particular year, each quota unit would be allocated ten tonnes. The option assumes that those fishermen who have acquired A or B class licences since they were originally issued also acquired their quota rights ie. they have not been lost. For example, an original B class fisherman who has since acquired an A class licence would have three quota units ie. two from his A class licence and one from his surrendered B class licence. A fisherman who has bought into the fishery would get two quota units, one from each B class licence acquired.

### 3.2.2 Allocating to Original Licences (But Discounted)

This option [(ii) above] also applies the two-for-one requirement in the current management rules. For example, a fisherman with a B class licence buying an A class licence would get 2½ quota units ie. two for his A class licence and half from his surrendered B class licence. A fisherman buying into the fishery would get one quota unit ie. half from each B class licence acquired. The total number of quota units would still be initially 46 as outlined above.

For example, if we assume there are now nine A class licences and 12 B class licences still in the hands of the original licences and four A class and eight B class licences have



changed hands since the initial allocation, the allocation of individual transferable quota units would now be:-

9 original A class licences =  $9 \times 2 =$   
18 quota units

12 original B class licences =  $12 \times 1 =$   
12 quota units

4 transferred A class licences =  $4 \times 1 =$   
4 quota units

8 transferred B class licences =  $8 \times 0.5 =$   
4 quota units

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Total = 38 quota units

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If it were decided that the tonnage represented by the eight quota units "lost" on transfer should be taken into account when determining each year the amount a quota unit represents, the total allowable catch would gradually be reduced. For example, if the total allowable catch is 460 tonnes, then each quota unit would still be ten tonnes, but only 380 tonnes could be caught. Alternatively, if it is decided to reallocate catch then the "lost" quota units could be redistributed as follows:- if the total allowable catch is 460 tonnes each quota unit would be  $460 \div 38 = 12.1$  tonnes.

### 3.2.3 Allocating to Current Licensees

This option [option (iii) above] would allocate the quotas only to those A and B class licences existing at the time the individual transferable quota system was proposed, agreed to or even gazetted. For example, as at 1 July 1987 there were 13 A class licences and 14 B class licences. If the quota system had been introduced on that

day and it was allocated on the basis of two quota units for an A class licence and one quota unit for a B class licence there would be 40 quota units in the fishery. With a total allowable catch of 460 tonnes this means each quota unit would be  $460 \div 40 = 11.5$  tonnes.

Note that in this and subsequent discussion, transfers are of whole quota units ie. an all or none approach - no splitting of quota units would be allowed.

#### 3.2.4 Enforcement

There are a number of constraints on the operation of the fishery which would be necessary under an individual transferable quota system. This issue was recognised by the fishermen at the Carnarvon meeting who suggested the following arrangements:-

- (i) only two permitted ports of landing: Denham and Carnarvon;
- (ii) all product landed by quota holders would be assumed to have been caught in the limited entry fishery;
- (iii) severe penalties for breaches of management rules;
- (iv) six hours notification would be given to fisheries officers before landing fish, to allow the opportunity for inspection;
- (v) all vessel operators would wait one hour upon arrival in port prior to unloading to allow the fisheries officer leeway to come and inspect the fish.

### 3.3 Advantages of an Individual Transferable Quota System for the Shark Bay Snapper Fishery

The theoretical advantages of an individual transferable quota system as they would apply to the Shark Bay snapper fishery are outlined below:-

#### (a) Promotes Fishing Efficiency

With a known catch quota a snapper fisherman could plan his fishing strategy with more purpose to achieve greater efficiency. There would in theory be no race to secure a catch share before the season closes or the total quota is reached. The fisherman would extend his fishing time, using economical fishing methods, less capital and manpower, and operate with greater comfort and safety by not fishing in bad weather.

#### (b) Allows More Orderly Marketing

With a limit on each fisherman's catch the catch could be spread more evenly through the year either by each fisherman or by the fleet as a whole. Much of the snapper landed is sold in the Perth metropolitan market, which appears to have a limit on the amount of fish it can absorb each week without drastically reducing prices to the fishermen. Fishermen could act to maximise their net return by trying to obtain the greatest price per kilogram of fish caught for the lowest cost rather than just trying to maximise their individual tonnage in a short time. That is, they would reduce their catch in times of glut. It would be up to the individual fisherman to decide whether to be a peak season fisherman catching lower priced fish at a low cost or an offseason fisherman catching high priced fish at a higher cost [see (g)]. Fishermen are already storing their peak season caught fish for slower, later, release or exporting for the sashimi market.

(c) Reduced Requirement for Fishing Effort Restraints

In many limited entry fisheries, fishing effort is controlled through closed seasons, closed areas or limits on the type or amount of gear which can be used. All these methods are presently employed in the Shark Bay snapper fishery. As the total amount of fish which can be taken will be fixed most of these controls would be unnecessary.

(d) Stops Friction between Between Line and Trap Fisherman

Of particular benefit would be the elimination of the trap versus line controversy, as the method by which the individual quota of fish is caught would not be so important.

(e) Allows Exploitation of Under-Used Species

Other species in the area, mainly Nor-West Snapper, would start to be taken once a fisherman had filled his quota of pink snapper. Also, a reduced pink snapper catch on the market would allow other species to compete more favourably.

(f) Reduces Boat Numbers

In an individual transferable quota system, where many fishermen were initially given only a small quota of snapper to catch, a few operators would probably buy up all the quota units. This was the case with the southern bluefin tuna fishery. It presumably would result in a smaller and possibly more profitable fleet.

(g) Distribute Fishing Effort

An individual transferable quota system could result in many fishermen electing to fish in the offseason when catch rates are lower but prices are usually higher. This could reduce fishing

pressure on the spawning aggregations in the A zone.

### 3.4 Disadvantages of an Individual Transferable Quota System for the Shark Bay Snapper Fishery

There have now been enough examples of the individual transferable quota system to identify the practical difficulties of such schemes. In New Zealand individual transferable quotas have been applied to practically all inshore fisheries (Reference 4). In Australia, an individual transferable quota system is in place for southern bluefin tuna and is also on trial for the south coast abalone fishery in Western Australia. Of the wide range of problems identified for individual transferable quota schemes (Reference 5) a few are of particular relevance to the Shark Bay snapper fishery:-

#### (a) Determining Total Allowable Catch (TAC)

In this fishery both the theoretical calculations and the supporting catch and effort data base are inadequate to calculate a reliable maximum sustainable yield and thus set a total allowable catch (TAC) from which to determine individual transferable quotas. This will inevitably mean that the TAC will be very conservative to compensate for both lack of precision in setting the TAC and the probable annual fluctuations in snapper abundance.

A long-lived species such as snapper is buffered to some extent against occasional year-class failures under light fishing pressure. That is, poor recruitment in one year is made up by better recruitment in later years. The fishing pressure on the Shark Bay snapper stock cannot be considered light and there is always the possibility of a run of bad recruitment years for environmental reasons or because of previous overfishing.

Taking the long term view, there is no guarantee that there will always be sufficient snapper in the area to support the TAC selected. If the TAC is set too high the stock will become increasingly overfished as the catches decline. Readjustments in quota would lag behind and fishermen would increase their effort to obtain their individual quota as the setting of a quota immediately sets a target which fishermen feel compelled to achieve. There is a downward spiral to a collapse of the fishery. If the TAC selected is too low, fishermen will not be taking the full potential of the fishery and the figure set may be too conservative to allow economically viable operations. Even if the TAC is not set too high, the compulsion fishermen feel to fish to their maximum quota will ensure the TAC is always taken. This has been evident in the south coast abalone fishery.

(b) Monitoring Costs

In order to have confidence in the annual calculations used to estimate the yield and thus set the TAC, detailed monitoring of the Shark Bay snapper stock would be required i.e. at least at a level comparable with the recently completed research programme. If this cannot be achieved, the basis for setting the TAC and thus determining individual transferable quotas would be inadequate. Although funding for such research could possibly be obtained from sources such as an industry levy, there is no guarantee that extra staff could be found. The Shark Bay snapper fishery is not a fishery for which the Department is planning any long term research programme. The programme recently completed was scheduled for four years to provide information for the Working Group. There are no plans for the research to continue at this level. At a minimum, enforcement and monitoring costs would

be approximately 10% of the gross value of the fishery.

(c) Focus Effort Onto Other Stocks

Although an individual transferable quota system would allow a fisherman to redirect his effort to other species once he has achieved his own quota there is no guarantee that the species or areas to which he redirects his effort will sustain the new level of fishing pressure.

(d) Poor Data from Fishermen

For reasons dealt with below, an individual transferable quota system will encourage some or all the fishermen to falsify their catch records to hide excess catches. Even if assured of the separation of research data and statutory landing certificates, a fisherman engaging in such "quota busting" is most likely to ensure there is no discrepancy between the two. Therefore the scientists involved in determining the yield from the fishery are forced to make progressively bigger assumptions about that part of the total catch which has not been recorded. This in turn can reduce the reliability of the estimates of yield and forces the setting of the TAC to become ever more conservative.

(e) Discarding

In any quota system fishermen are encouraged to maximise the value of their quota. If some types of snapper eg. legal sized smaller ones, are less desirable, the actual number of snapper killed may greatly exceed the amount landed. This discarding could be the case especially for fishermen catching sashimi snapper where a certain quality fish is required which cannot be determined until after the fish is killed.

(f) Industry Restructuring

An individual transferable quota system could also change the character of the fleet. The increased capitalisation involved in acquiring quota may encourage ownership by a few large concerns which are involved in the whole range of activities from catching through to retail sales (i.e. "vertically integrated" companies). This would probably remove much local control of the industry to Perth and make employees of fishermen. This may not be considered socially or politically desirable.

(g) Enforcement

In a quota system there is considerable incentive for some quota holders to exceed their quota, or for non quota holders to catch fish. A system of landing controls and surveillance must therefore be established, which would require enforcement staff supervision. Carnarvon based staff have four other limited entry fisheries to supervise, so rules for landing of fish and the associated controls would have to be both comprehensive and inflexible. For example, there would have to be designated ports of unloading, (presumably Denham and Carnarvon) fish landed in Shark Bay area would all be deemed to have been caught in Shark Bay, no-one could land snapper in Denham/Carnarvon unless he was a quota holder etc. Surveillance of other unloading points would therefore be required.

Special arrangements or quota allocation would be necessary for the Shark Bay trawlers which are presently allowed to take an incidental snapper catch, and there would have to be controls on and surveillance of trans-shipping snapper at sea. A special problem is posed by the fishermen who operate in the adjacent Denham



Beach Seine and Mesh Net Fishery, or have special licence endorsements to use handlines in that fishery. A decision would have to be made about whether these fishermen should be included in the quota system or not. Either way their catches of snapper would have to be monitored or controlled.

Another problem is the degree to which landings are supervised and the catch subsequently monitored. Notice of intent to land in Denham/Carnarvon would be required. However, some degree of follow up of the catch would also be necessary although not necessarily practical. The system in force for south coast abalone for example requires the product to be accompanied by the appropriate documentation until final processing. However, as this is a high unit value, low volume product this is feasible (and necessary).

Such a system is unlikely to be possible for snapper. The Department does not have sufficient staff to be on call to check vessels entering port even on the basis of advance notice to do so. There will be increased overtime costs and facilities will have to be made available to weigh the product or agreed standard containers utilised. If no fisheries officer were available to attend the landing then arrangements to notify the Fisheries Department of landing details would have to be made.

Those vessels which have processing licences to fillet snapper and other fish at sea or are involved in the sashimi trade, pose particular enforcement problems. Rules prohibiting the skinning of fish fillets would be necessary to ensure the fish species can be accurately

identified. The conversion factors which will apply when the minimum size of snapper is increased in order to relate fillet weight to fish size would have to be applied across the whole size range to get the necessary whole landed weight. Packs of sashimi fish would also need to be designed to allow easy inspection.

The degree to which enforcement (and thus the individual transferable quota system) is successful depends entirely on industry co-operation. For example, if a fisherman is convinced his colleagues are breaking the rules there will be little incentive for him to obey.

This in turn illustrates the need for higher penalties. The incentives to evade the system and the chances of successfully doing so must be balanced by penalties such as loss of all quota units if detected and convicted.

(h) Difficulties in Initial Quota Allocation

As has been discussed in Section 3.2, there are essentially two main quota allocation mechanisms which could be applied to this fishery. One is based on past history of catches and the other on some standard allocation to all licence holders. Each has distinct advantages and problems.

Most individual transferable quota systems grant the initial quotas to the original licences (or vessels) on the basis of catching history. This is quite practicable in Shark Bay, where detailed catch statistics have been kept, and subject to quite intense scrutiny by the previous licensing appeal process. However, its implementation is complicated by the amalgamation and movement of licences between owners since that date. Thus questions must be

settled about, for example which history of an amalgamated pair of B licences can be used for establishing a quota entitlement.

The standard allocation system has already been proposed ie. basing quota in two tiers depending on whether an A or B class licence is held. The A would be granted some multiple of the B quota, be it 1.5, 2 etc. Again, questions as to initial allocation apply. Should it be on the basis of the originally qualified licensees, or should it be granted only to the existing licensees as at the time of the scheme's adoption (see Section 3.2).

Those fishermen pressing for an individual transferable quota system must consider the effect that the various options will have upon them. Those responsible for managing the fishery must consider the fairness of each option as, if adopted, each discriminates against a particular group of fishermen.

For example, those fishermen resident in Carnarvon or Denham with a long history of high catches or having purchased such a licence would probably wish to have history taken as the method of initial allocation. If they do not have the financial resources to purchase additional quota to bring their catches up to previous levels they would probably oppose a standard allocation system. If it were adopted these fishermen would be forced to leave the fishery. If they remain within it, they will certainly constitute the core of those who do not accept the system.

In contrast, recent entrants with no history or possessing boats with no history would probably opt for the two tier system of standard quota

allocations to A and B licensees. The benchmark date for such allocations would then become a crucial issue. Some fishermen would feel that the initial quotas should be granted to the original A or B endorsed licences or their subsequent purchasers i.e. a recent outside purchaser of an A licence would get two B quotas in addition to his A. Others would see this as unfair to the original fishermen who have not purchased vessels in this time as they were already in the fishery. The latter would see the fairest way would be to grant quotas equally to all.

Some consideration must also be given to supplementary access holders, ie. whether they suffer a reduction in access or nominal quota and to what extent. It is likely that this question of initial allocation will be of most concern to all the fishermen in the fishery.

### 3.5 A Total Fishery Quota

Instead of individual transferable quotas, a total catch quota could be introduced. However, such a scheme would produce the worst features of both the individual transferable quota system and extended seasonal closures. Fishermen would strive to land the maximum individual catch before the total quota is reached and the fishery is closed. The same would apply if there were monthly or seasonal quotas. As with closed seasons, there would still be market gluts as the fish are all landed within a short space of time. There would still be the same pressure to fish harder, invest more capital and become more efficient. This is therefore not considered to be a viable option.

#### 4. ALTERNATIVE MANAGEMENT OPTIONS TO INDIVIDUAL TRANSFERABLE QUOTAS

If the objective is to reduce fishing pressure and total annual catch, then theoretically an individual transferable quota system will achieve this objective. However, as has been shown in the previous pages, individual transferable quota schemes, although superficially attractive, pose serious management problems, especially in initial allocation of quotas and supervision. There are other options available which do not pose such problems. Two which could be introduced, essentially as extensions of the existing limited entry regime, are a peak season closure or a system of peak or offseason access. Both of these options may have to be coupled with further controls on the amount and type of fishing gear which could be used by fishermen, but both options directly control the major causes of recent increases in fishing effort which were identified in Section 2.2.

##### 4.1 Peak Season Closure

In this option the fishery would be closed entirely from 1 June to 31 July inclusive each year, but with no other seasonal closures. Each A class licensee would have access to the core zone exclusively during April, May and August.

To inhibit effort increases in the remaining months available to fish, the amount of gear which could be carried on each boat could be initially limited to two handlines, two droplines or two traps per licence, although fishermen could have the option of putting in more than one "licence" on a boat so as to carry four or six gear units, either temporarily or permanently.

This option tries to control effort in the fleet as a whole by its season closure while reducing individual efficiency through the gear controls.

Snapper are most vulnerable during June, July and early August. This is when the greatest tonnage is usually landed, but at a time which is the least desirable biologically as it directly decreases the level of the breeding stock.

This option restricts the catching capacity of A and B licensed fishermen about equally, compensating A licensed fishermen slightly for their loss of access to the core zone during June by allowing them exclusive access in April.

The controls on season would allow fishermen an extended period to participate in other fisheries, rather than the current intermittent closures.

Fishermen who would be particularly disadvantaged by this proposal would be peak season fishermen with lucrative, offseason alternative fisheries. Rock lobster fishermen with snapper licences would be particularly disadvantaged and would have to make hard decisions about whether to retain their endorsements or not. If they did retain their endorsements they would then have to make a decision about which fishery, snapper or rock lobster, to participate in between March and May.

Another disadvantage of this option would be the need for rules to enforce the gear limits ie. the amount of gear held on board and the way in which it is stored would have to be limited. This means hooks and line would have to be stored on board in bulk condition, not as made up lines, prebaited hooks or clip on leaders.

#### 4.2 Peak or Offseason Fishing Access

This option would restrict access by fishermen to either the peak season or the offseason, while at the same time restricting gear.

If applied in full this option would return vessels approximately to the levels of individual fishing effort being expended prior to 1985 when, for example, the average number of days a boat fished in June was 13. The increased efficiency of those who have stopped gutting or filleting and who have employed more crew has already been mentioned. With these and other improvements the better boats are now more than twice as efficient as they used to be. The trend for formerly seasonal fishermen to become full time snapper fishermen has also been highlighted. This option involves a split season with fishermen choosing one part of the year to fish.

The calendar year would be divided into two parts: 16 June to 15 August is defined as the peak season, the rest is the offseason. Each licensee could work one of these seasons, but not both. A fisherman would have to decide in November or December in the previous year which season he wished to fish.

Additionally, those who worked the peak season could be restricted to working only two weeks, but could use their full five gear units ie. droplines, handlines or traps. Those who worked the offseason could be restricted to using only two handlines or two droplines.

Multiple licences could be used on one boat, eg. a double licence could be used to work:-

- (i) four lines on a boat in the offseason; or
- (ii) a four week period in the peak season; or
- (iii) two lines in the offseason and two weeks with five gear units in the peak season.

This scheme has advantages over the individual quota system in that it would limit pressure on both



snapper stocks and markets and it would allow fishermen a choice between an intensive short season and a lower level year-round operation. It would also allow licensees to purchase a bigger share in the fishery by working multiple licences on one boat. A vessel would need four licences to bring it close to its present potential of working with full gear for 11 months per year.

For resident fishermen, it would take only three more weeks time away from them than they have held in 1987, but it would return them to their old levels of efficiency. It should also solve the problem of increasing numbers of year-round fishermen.

Those who wished to maximise efficiency could fish in the peak season for about the same time they would under a quota system to obtain their quota getting better prices. There would be no competition from offseason fishermen and because the two week fishing times could be spread through the 16 June to 15 August period, probably in two weekly blocks of time, there should still be reasonable supplies of snapper available for the Western Australian public in winter because there will still be fishing in the peak season.

This option allows the system of A and B licences and two-for-one transfers to be retained. Holders of A licences electing to fish the offseason would still get the benefit of being able to fish the core area from 16 May to 15 June. There would still be incentive to buy any A licence which became available.

Those who would be disadvantaged by this scheme would be the less efficient seasonal fishermen. They would have three choices:-



- (i) become offseason fishermen;
- (ii) increase efficiency;
- (iii) sell out.

This is the group which would be expected to sell out in the long term under any management regime.

In an intensive two week season, the discrepancy in what can be caught by traps and lines may become very marked. An even shorter period for trap boats could therefore be introduced eg. under a quota system at 2.5 tonnes per day the top trap boats could catch a 20 tonne quota in eight fishing days. Perhaps their peak season should therefore be proportionally shorter.

The controls on gear held on board a boat would also have to be the same as described in the previous option.

## 5. DISCUSSION

In past years the catch of Shark Bay snapper has varied markedly, especially in the 1950's and 1960's. However, in those years the take of snapper was as a supplementary catch for boats operating in other fisheries, such as rock lobster and prawn fisheries. In years when snapper was readily available and the market price reasonable, many vessels would fish the area and good quantities of snapper were taken. However, in years of poor abundance, either because of heavy fishing in previous years or natural conditions, only a small number of boats would operate and the catches were then low. This was an ideal way to operate the snapper fishery which must be regarded as a minor rather than a major fishery in the State's array of fisheries.

Management difficulties commenced when a small number of boat owners decided to operate on snapper as a full time activity. Thus it became limited entry, with the associated fishing pressure and administration difficulties.

From current trends it is apparent that the existing two-for-one boat reduction scheme is not keeping pace with increases in fishing effort by the remaining vessels.

Introduction of an increased minimum legal size should largely protect the breeding stock, but without additional measures a "knife edge" fishery will develop, with the fishermen depending directly on each year's recruitment of juveniles. Annual catches at rates common since the early 1980's can only be sustained if both traditional and newly exploited grounds continue to produce fish at present levels.

If it is desired to reduce the current high catch levels and also reduce fishing pressure it is apparent that measures in addition to those currently in place are required. It is necessary to identify which measures can be adopted to achieve this objective with a minimum disruption of the industry and the least additional individual, administrative and enforcement costs.

Three major options have been discussed to further reduce fishing effort in the fishery:-

- (i) an individual transferable quota system;
- (ii) an extended peak season closure;
- (iii) a system of off and peak season access.

The three options differ in the ways in which they will affect individual fishermen and the fleet as a whole, the probability they will achieve the objective of reducing the

catch (ie. their effectiveness) and the risks they pose for the stock when trying to achieve this objective.

The effectiveness of individual transferable quota system centres around three main issues:-

- (i) the ability to reliably determine the TAC;
- (ii) the ability to enforce the rules of the management scheme;
- (iii) the ability, initially, to allocate individual quotas fairly.

The most desirable Shark Bay snapper fishery management scheme would:-

- (a) provide a stable environment, whereby the system can run with minimal Government intervention i.e. constant tightening of rules (such as more closed seasons,) with maximum scope for the play of economic forces.
- (b) encourage lower catches at higher prices and spread these catches over the whole year to avoid gluts.
- (c) provide a mechanism for fleet rationalisation by reducing boat numbers and gear conflicts.
- (d) have a system available to calculate sustainable yields which takes natural fluctuations in stock size into account.
- (e) keep management, research and enforcement costs and commitments low in relation to the profits generated by the fishery.
- (f) be fair in its implementation and running.

In theory, with the introduction of an individual transferable quota system, a stable environment would be provided, lower catches would be directly imposed through the TAC and a mechanism would be provided for fleet rationalisation. As has been shown in previous pages not all of these attributes have been attained in fisheries where individual transferable quotas have been introduced eg. southern bluefin tuna.

The variations on the individual transferable quota theme outlined for snapper fail to meet (d) to (f) above. As previously mentioned the data available to determine the TAC for this fishery are weak. Individual transferable quotas imply a continuing commitment to the fishery by the managing body, and at least in its implementation, an individual transfer quota system could be very unfair.

While also presenting problems, the present system can, with the modifications outlined in the other two main options, meet most of the above demands.

The peak and offseason fishing option in particular meets many of the desirable attributes outlined. It will spread fishing effort throughout the year, will be fair in its implementation and running, will provide a mechanism for fleet rationalisation and keep research costs relatively low. The degree of Government intervention will still be high, but considerably less than for an individual transferable quota system.

## 6. CONCLUSIONS

The Fisheries Department must consider at all times the monitoring and enforcement of any fisheries management scheme. A management plan which is unenforceable is not worth implementing.

The snapper fishery is, in terms of its value and number of fishermen involved, one of the smallest limited entry fisheries in Western Australia. The cost of additional

management measures must be balanced against this. Their desirability must also be critically examined given the additional stock protection an increase in legal minimum size will confer.

The probability that any scheme can be implemented fairly and with a minimum of dislocation is another important consideration.

On balance, the problems entailed in fairly allocating initial quota and subsequently enforcing an individual transferable quota system are considered to be much too great, especially in comparison with the measures applying to the existing limited entry regime. There is much greater certainty that an extension of the existing limited entry system, such as a peak and offseason access scheme, will achieve a goal of greatly reducing total catches than the problematical benefits of introducing an individual transferable quota.

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