

A Review of Management Arrangements for the Recreational Fishery for Demersal Scalefish in the West Coast Bioregion

Prepared for: the Hon. Norman Moore MLC, Minister For Fisheries
Western Australia

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April, 2009



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**A REVIEW OF MANAGEMENT
ARRANGEMENTS FOR THE
RECREATIONAL FISHERY FOR DEMERSAL
SCALEFISH IN THE WEST COAST
BIOREGION**

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1. SUMMARY AND CONCLUSIONS

In December 2008, the Hon. Norman Moore, MLC, Minister for Fisheries, Western Australia appointed two independent experts to review a number of aspects relating to the west coast demersal scalefish recreational fishery; namely to assess separately 1) the validity of the scientific advice on which management decisions have been made and 2) options to manage recreational fishing of west coast demersal scalefish.

This review addresses the second issue in that it:

- provides advice on the appropriate management objectives for the recreational fishery for demersal scalefish and
- provides advice on suitable options for management arrangements for the recreational fishery for demersal scalefish to deliver the management objectives after considering environmental, social and economic impacts.

The management objectives for the fishery are based on a consideration of three issues:

- 1) the objectives of the Fish Resources Management Act, 1994;
- 2) the nature of the fishery; and
- 3) the reviewed scientific advice (particularly as contained in the companion review by Dr. Michael O'Neill).

From this, it is concluded that the appropriate *Management Objectives* for the fishery should be:

1. foremost, to take action, in a precautionary manner, to ensure the long term sustainability and viability of the fishery;
2. to meet the general community expectations of a sustainable fishery based on sound ecological management, whilst allowing appropriate economic and social benefits and returns to the community;
3. to change the “culture” of recreational fishers throughout the community from one based on a belief that the fishery is robust, highly productive and able to absorb ever increasing fishing pressure, to one based on the knowledge that the fishery is fragile, dependant on critical biological and environmental factors and capable of over-exploitation.

The review considers that the general community of recreational fishers needs to become genuine partners in fisheries management solutions through greater engagement in issues, more actively contributing to a range of information needs and playing their part in implementation of management strategies. This involves not just the minimum compliance with regulations but adopting sound management and handling practices to help sustain the fishery for future generations.

A fundamental driver behind the design of fisheries management strategies is an acknowledgement that scientific knowledge of the fishery, the biology and life history characteristics of the – in this case – many species, and their dependence on, and interaction with, complex eco-systems is incomplete, only partially understood and constantly being updated.

Furthermore, this is compounded by the need – expressed in most fisheries legislation – to take account of social and economic issues and impacts when designing management arrangements. Often this data is difficult to gather and measure in time frames necessary to make management decisions.

Because of this, fisheries management is about managing risk to the species and applying the “precautionary principle” – which states, in part, that where there is risk to the sustainability of the fishery, the absence of complete information should not be used as a reason for failing to make a decision.

It follows from this, that management must be adaptive and be based upon continuous monitoring, improved data collection and research, to respond to improved knowledge.

All of these characteristics and issues are clearly evident in the case of the west coast demersal scalefish fishery.

Furthermore, because the fishery comprises over 100 species, of which 20 are significantly targeted, it has been necessary to use three main indicator species – dhufish, pink snapper and baldchin groper – around which to design the total fishery management arrangements. A key issue to consider in such arrangements is the existence of barotrauma in these species - where fish taken in deep waters usually die on release.

Further, the costs of fisheries management administration, research, education and compliance are very high because of the nature of the fisheries resource itself. Therefore management needs to be as simple as possible so that it can be readily understood and accepted by the community. This greatly encourages compliance with the rules and the active involvement of community recreational fishers.

The scientific review by Dr O’Neill has confirmed the validity of the previous research outcomes and the subsequent need to reduce recreational fishing effort in this fishery, by 50 per cent.

Taking account of this need, together with the above issues regarding fisheries management decision – making and the socio – economic issues discussed in this review, the following fisheries management options are proposed.

Proposed Fisheries Management Strategy

- (i) Continue the current monitoring and targeted research programs, including proposed new research projects.
- (ii) Implement a general individual recreational fishing licence;
 - with endorsements for the current recreational licences and a new endorsement for the demersal scalefish fishery,
 - with a requirement for compulsory logbooks (submitted electronically as the preferred means),
 - with appropriate exemptions as per current arrangements for licences.
- (iii) Implement a seasonal recreational fishing closure, which avoids the key holiday period, but results in a decrease in fishing effort of approximately 15%.
- (iv) Design a program to implement large permanent area closures (fishing sanctuaries) to all demersal scalefish fishing.
- (v) Implement a voluntary commercial fishing licence buy – back scheme for commercial operators in the demersal scalefish fishery.

The above strategy is designed to collectively address the need for a 50 per cent reduction in fishing effort over a 1 to 2 year period, and to put in place a longer-term process to continually monitor the fishery and also effort in adjacent fisheries where that is deemed necessary. The funds raised are critical to the overall implementation of the strategy.

However should the strategy not achieve its stated goals, for whatever reasons, then the following management strategy is proposed:

Alternative Fisheries Management Strategy

- (i) Construct a ‘representative’ sample of recreational fishers and through the use of electronic surveys progressively monitor catch/effort during the year with a start date in Spring. This will give an indication of catch/effort for the whole fishery as the season progresses;

- (ii) Establish a Total Allowable Catch (TAC) for the recreational fishery for the year and progressively announce progress towards this TAC, with the intention of closing the fishery for the balance of the year when the TAC is reached.

This would provide greater certainty in achieving the 50 per cent reduction but at the expense of greater social and economic disruption to the community. It should be noted that following the introduction of these management arrangements, all other types of recreational fishing activity – other than for demersal scalefish – would still be available, although special arrangements may have to be made for the forward commitments of the charter fishing sector as this would introduce uncertainty in their forward planning and business arrangements.

The proposed fisheries management strategy is designed to encourage a change in culture and understanding for the recreational fishers in the community. It will engage them more directly and positively in the management of the fishery and provide long term management measures, which can be adapted as necessary to ensure the fishery recovers to allow a quality fishing experience into the future.

2. TERMS OF REFERENCE

This fisheries management review has been established by the Western Australian Government through the Minister for Mines and Petroleum, Fisheries, Electoral Affairs the Hon. Norman Moore MLC under the following terms of reference:

1. To consider and provide advice on the appropriate management objectives for the recreational fishery on demersal scalefish in the light of the reviewed scientific advice and the nature of the fishery.
2. To provide advice on suitable options for the management arrangements of the recreational fishery for demersal scalefish in the west coast bioregion to deliver the management objectives after considering environmental, social and economic impacts.

The review is to be conducted in conjunction with a scientific review by Dr Michael O'Neill which seeks to:

1. provide advice as to the soundness of the previous and current assessments of the status of west coast demersal finfish stocks by the Department of Fisheries' Research Division; and
2. provide any additional scientific advice that may be useful to the person undertaking the management review.

This latter review is provided under separate cover.

3. INTRODUCTORY ISSUES RELATING TO FISHERIES MANAGEMENT

It is often the case that with many fisheries, the full suite of data required to manage fisheries is usually incomplete, uncertain or not available. This reflects the complexity of not only the ecological and biological parameters impacting on the fish stocks themselves, but also the need to consider the economic and social aspects of utilization of a fishery.

For these reasons, practically all fisheries management legislation today incorporates both the need to manage fisheries by taking account of the ecological, social and economic aspects and uses of the fishery, and also the need to apply the “precautionary principle” in management.

Put simply, this principle means that the best available information should be used in management decisions and that where there is a risk to the sustainability of the fishery, the absence of complete information should not be used as a reason for failing to make a decision and implement management arrangements.

Fisheries management is therefore about risk management and taking precautionary action where the data and indicative information suggests this may be warranted. This is usually contained within a “management risk analysis” framework.

This, however, requires that fisheries management is also about “adaptive management” which means constantly observing, monitoring and measuring the impacts of management decisions on the fish stocks, as well as the social and economic dimensions, and being prepared to “fine tune” or change management arrangements where necessary.

Because fisheries management is about attempting to manage complex living and evolving fisheries, eco-systems and human interactions with them, obtaining the knowledge required is very expensive and time consuming. Costs and the ease of application issues also apply to the administration of necessary rules and regulations and ensuring compliance with these rules. These practical considerations need to be taken into account when designing management responses.

This means that management is often about “buying time” for the research to be prioritized and undertaken; that management while costly, must also at times contribute, where possible, to raising appropriate funds; and that the community must be able to easily understand and find acceptable the management framework for the fishery as this greatly aids compliance with the rules.

It follows from this, that community consultation is very important in having the community understand the need for, and accept the validity of, recreational fisheries management arrangements.

4. THE CONSULTATION PROCESS

Fisheries management arrangements impacting on the West Coast Demersal Scalefish Fishery (WCDSF) have been progressively introduced over a long period of time, with engagement by the commercial, charter boat and recreational sectors and parts of the wider community to varying degrees.

Some highlights have been:

- 1983 Freeze on commercial fishing boat licences
- 1989/91 Statewide review of recreational fisheries management
- 1996/97 Recreational creel survey
- 1996/2001 Licensing arrangements for charter fishing
- 2003 Review of the commercial fishing sector
- 2004 Dhufish Workshop
- 2005/6 Recreational creel survey
- 2007 Commercial fishing sector controls, metropolitan area closure and adjustment package
- 2007 Recreational fishing management Options Paper and public meetings; research reports released
- 2008 Commencement of new commercial fishing sector management
- 2008 Discussion Paper and Ministerial Options Paper on recreational sector management
- 2009 Commercial sector operational arrangements and zoning to reduce catch to 50% of 2005/2006 catch of “high risk” species.
- 2009 Recreational management changes introduced on boat limits, bag limits, size limits etc. for “high risk” species.

This current review of management arrangements therefore builds on a lengthy and comprehensive public consultation program, involving a discussion of the scientific research relevant to the fishery and possible management strategies and options to respond appropriately to the research information.

The published scientific reports, including the complete descriptions of the WCDSF will not be repeated here, but will be referred to, in part, as will the published discussion about management strategies and alternatives.

As part of this review, a meeting of key stakeholders was held on 3 February 2009 involving 40 persons including the Department of Fisheries' management and scientific staff, representatives from the recreational, commercial, charter fishers and diving sectors as well as persons from the conservation groups, boating industry, tourism and media.

These discussions, as well as subsequent submissions by some of these parties, have been incorporated into the considerations of this review.

5. SOCIAL AND ECONOMIC ISSUES

The fisheries of the west coast bioregion provide significant social and economic benefits to the Western Australian communities and regional centres.

The fisheries exist immediately adjacent to the major cities, towns and regional centres of the State and have driven significant industry development, income generation, employment, tourism and community development over the years.

The Demersal Scalefish Fishery (DSF) itself has played a significant role in this development.

The DSF has supported a number of commercial fisheries, a charter fishing sector and is one of the most important recreational fisheries in Western Australia.

The commercial fisheries involve the following:

- Wet Line (now West Coast Demersal Scalefish Interim Managed Fishery)
- Demersal gillnet and demersal longline
- Rock Lobster Pot – (by-catch fishery)
- Fish trawl – (Commonwealth Western Deepwater Trawl Fishery)

While the *commercial fishery* has recently been re-structured through zoning, effort/catch restrictions, a closure of the metropolitan area and buy – back of licences, it still supports a significant investment in boats and gear and generates employment and regional income and the supply of fish to the community. It is valued at approximately \$2 million spread over 61 licences- many part-time only.

The new commercial controls have resulted in a decrease of approximately 50% in catch of DSF species from the 2005/2006 commercial catch levels. The commercial fishery continues to be a purchaser of inputs from a wide range of industries supporting marine fishery operations; it supports fish wholesalers, processors and retailers, as well as the hotel and restaurant sector supplying consumer seafood needs.

This sector also significantly supplies biological catch/effort and economic information to fisheries authorities to assist in management decision-making.

The licensed charter boat sector, as a commercial activity, also relies on the DSF to support their operations and commercial viability. In turn, they rely on marine industries to support their operations, while they invest capital and operating funds into tourism, employment, accommodation and other industries of regional centres, major towns and cities.

The charter boat sector significantly services the tourism industry while also playing a role in informing and educating clients about the management needs of the DSF. They supply important catch/effort information to authorities, as well as economic and social data from their activities.

This sector is generally bound by the new recreational fishing limits introduced for the DSF while its proportion of the total catch/effort is about 5%. The industry is largely positioned for the offshore DSF where economic returns are better, although these returns are dependant on general economic conditions in the community. While these have been good, the recent global financial crisis is having a depressing impact on the economic fortunes of this sector. Falling licence values, depressed activity and rising costs have caused some diversification into eco-tours and shorter inshore pleasure/ fishing activities. These trends have prompted calls for further rationalization and diversification in this sector.

Recreational fishing activities with 640,000 fishers across the State, - both shore based and vessel based – are a significant social and economic driver in the economy. Surveys have shown that the economic impact of all recreational fishing activity in Western Australia was high and sustained and worth upwards of \$600m. per year. As with the other sectors, recreational fishing supports a wide range of industries from boat building, chandlery, bait, equipment and fuel suppliers, and the tourism, employment, hotel and accommodation industries around the State.

Some studies have found the boating industry itself to be worth \$1.5 b. to the Western Australian economy and, when added to this the value of fishing gear, fuel, bait, accommodation and other purchases, the above figure can approach \$2.0b.

Thus any fishing restrictions, without them considering the socio-economic impacts, can have significant impacts on these sectors.

The economic activity from this sector is also somewhat reliant on general economic conditions in the community. Buoyant conditions have led to continuous increases in boat registrations in recent years with some 85,000 boats registered today – an increase of some 30 per cent over the past 15 years. Although only a proportion of these would be engaged in fishing – an unknown proportion as the data is not available (but estimated by some to be 16,000 to 20,000) – it is nevertheless true that recreational fishing effort is increasing.

This has been helped by the development of fisheries technology in improved catching equipment, rod and reel designs, as well as GPS systems, color echo sounders, better weather forecasting, digital imaging equipment, underwater mapping of habitat and underwater video technology.

This combined with upgrades in vessel size, efficiencies and capacity, means that the full range of the DSF is now exploited. Also with the ready availability of web-based fishing information, the skill of individual fishers has increased.

All of this has increased the social and economic impact of the recreational sector, but it has also increased the need for the sector to increase its participation in and responsibility for, sound fisheries management.

One area lagging in fisheries management is a process to cost-effectively collect recreational fisheries catch/effort data on a real time basis. General recreational fishing surveys across the whole community are very expensive and it would be preferable if management arrangements were able to facilitate a timely and cost effective way of generating such data to assist with improved management decision-making. This is particularly an issue with the DSF fishery.

A related social issue is that annually an increase in recreational fishing – and tourism – occurs with the major public holiday periods. This needs to be factored in to any management decision making, due to the flow-on impact on businesses through businesses having to make-up this increased economic activity at other times of the year.

Collectively these three sectors – commercial, charter boat and recreational fishing – contribute significantly as economic and social drivers throughout the community. Flow – on effects of expenditure in these sectors are significant to businesses as are the employment opportunities they create. The social groupings which are created around these activities are important in many communities, while the sporting and leisure activities provided by the fishery are important to the social life of Western Australia, both now and for future generations.

6. MANAGEMENT OBJECTIVES

The review involves a consideration of the broader issue of what should be the appropriate management objectives for the fishery.

The appropriate management objectives for the fishery for DSF are derived from three considerations:

1. the objectives of the Fish Resources Management Act, 1994;
2. the nature of the fishery; and
3. the reviewed scientific advice, (and particularly the separate report by Dr. Michael O'Neill, "Scientific Review of the West Coast Demersal Scalefish Fishery, Western Australia," April 2009 and with reference to the review by Dr. Malcolm Hadden, University of Tasmania).

6.1 Legislation and the Act

The legislation requires that management is to provide for the conservation and sustainable development of the State's aquatic resources and protection of fisheries habitats. Further, the Department operates within the principles of Ecologically Sustainable Development (ESD) which requires consideration of not only sustainability issues, but also to seek to optimize the economic and social benefits from use of the fishery resources.

These are statutory requirements, which bind the Department in its fisheries management decision-making.

In addition, the State is subject to the requirements of the Australian Government's "Environmental Protection and Biodiversity Conservation Act" (E.P.B.C.) which imposes certain legal requirements about fisheries management arrangements in many State fisheries, particularly export fisheries or fisheries deemed to be "threatened".

State fisheries management decisions need to be taken in the context of an awareness of the potential application of this legislation.

6.2 The Nature of the Fishery

The fishery under consideration is the Demersal Scalefish Fishery, which comprises over 100 separate species, with 20 species being targeted regularly, and extends from North of Kalbarri to Augusta in the south.

Generally, the fishery is lacking in time series of good quality catch and effort data, and there is limited research available on most species, notwithstanding the current research underway and other research planned in the future.

Because of this a “weight-of-evidence” approach has been used to assess the state of the fishery and based also on a risk assessment of a number of the stocks within the fishery – this is described in “Fisheries Research Report (Western Australia)” No. 163, 2007.

Further, three indicator species – dhufish, pink snapper and baldchin groper - have been chosen (as having similar characteristics to many of the DSF species) to represent the fishery and for which management arrangements will be designed in order to manage the entire fishery.

This requires a risk-based approach to setting management targets based on the characteristics of the species. These characteristics highlight the vulnerability of the species to over-fishing viz. long lived, low natural mortality, slow growth, a complex reproductive strategy, where older fish play a crucial role, irregular recruitment dependent on poorly understood environmental triggers, sedentary larger fish dependant on specific habitat types and with recruitment dependent on larval dispersal at the mercy of currents.

In the case of the DSF, the lack of extended time series of appropriate fisheries data means that a formal stock assessment model cannot be developed. Hence the assessments available are based primarily on age frequency data and the estimation of fishing mortality to ensure sustainable exploitation rates.

Such information is compiled into a “weight-of-evidence” approach to the status of the indicator species, as detailed in the Fisheries Research Report No. 163.

Thus the approach here is based, not on management to achieve a desired stock or biomass level for the fishery, but management to control the level of catch/effort so that the level of fishing mortality is consistent with sustainable exploitation of the fished stock ie. if fishing mortality is too high, (in relation to accepted target reference points for such fisheries) what management is required to reduce effort/catch to generate acceptable stock recovery?

These issues are covered in greater detail in the various research and scientific reports.

The outcome of the above considerations for the three indicators species is that major reductions in both fishing effort and catches of these species are needed to reduce the rate of fishing mortality to acceptable levels as commonly accepted in international ‘best practice’ experience.

In relation to the different catching sectors, relative catches for the three indicator species from 2005/2006 data are:

	Commercial	Recreational*
Dhufish	203 tonne	206 tonne
Pink Snapper	293 tonne	57 tonne
Baldchin Groper	37 tonne	37 tonne
	-----	-----
	533 tonne	300 tonne

(* Charter boat fishery accounts for approximately 50 tonne of this total. It should be noted that the estimates for recreational fishing are still subject to further clarification, while the commercial by-catch from other fisheries is not included here)

The commercial fishery has recently been subjected to further management controls and rationalization, which has resulted in a 50% decrease in their effort/catch over the 2005/2006 levels across the whole DSF.

Recreational (and charter) fishing has also been subjected to new controls by way of bag limit reductions, for DSF Category 1 “high risk” species, boat limits, minimum size increases and other controls which will have some impact on effort/catch. While the level of this impact is as yet unknown, it has been estimated by some as less than 10%.of the estimated 2005/06 levels.

There is no effort or catch limit for the recreational fishery and effort has been consistently increasing over recent years, both in terms of boat registrations, technology, skill of fishers and technical capacity of the boats as discussed elsewhere. This has occurred despite evidence of a reduction in participation levels of younger people in recreational fishing.

6.3 Reviewed Scientific Advice

There have been a number of scientific reports on the fishery over recent years, others in the process of completion; monitoring work continuing and new projects proposed to be undertaken. Two independent reviews of these outcomes have been undertaken.

The Haddon Review made a number of observations:

- Endorsed the assessment strategy adopted (indicator species, characterizing biological productivity and estimating fishing mortality) as the best compromise between time and resources available to conduct the required assessments.

- The age structure for Dhufish populations has exhibited a significant decline in the proportion of fish older than 13 years, a pattern typical of a stock that has been severely and rapidly depleted
- Fortunately for the Dhufish, there were four good years of recruitment in the mid 1990's, which has continued to support the fishery; subsequent recruitment has not been so marked.
- Fishing mortality is greater than the (generally accepted) limit reference point of two times the natural mortality
- While there is uncertainty in these analyses, it is clear that, at least in the recreational sector, effort is too high in the Metro region and over-exploitation is occurring.
- High levels of atresia currently occurring may be compromising successful recruitment, implying low levels of reproductive activity by mature – age fish
- There are clearly risks developing to the Dhufish stocks and it would be precautionary to reduce fishing effort.
- The age structure of pink snapper in the different zones (excluding the closed area in Cockburn Sound, and its impacts), indicate severe depletion has occurred with older fish now very rare.
- Worst of all, the estimates of fishing mortality are so high; they indicate that the snapper stocks are under severe stress from fishing.
- There is a real need to reduce total fishing effort by all sectors; it is recommended that, in addition to implementing further restrictions on the commercial sector (since implemented), it is recommended that strategies be developed, in collaboration with the recreational sector, for ways to reduce fishing effort by recreational fishers.

The Scientific review by Dr. M O'Neill is separately provided and its basic finding is to agree to the fundamental outcome of the above research findings, which state that dhufish and pink snapper are being over fished throughout their geographic range and that baldchin groper are being overfished at the Abrolhos Islands.

In part Dr. O'Neill states:

- The previous and new assessments have produced high quality scientific advice and are sustained on solid collection of age and length data and analyses.
- The assessments are as good as could be achieved, given their available resources and quality constraints on fishery catch and effort data.
- Although the recommendations suggested (in the O'Neill report) will improve future assessment and reduce uncertainty in classifying the status of the three fish stocks, it is unlikely that current conclusions and triggers or reference points will change.
- The declines in standardized catch rates are consistent with the levels of fishing mortality implied by age structures, lending strong weight towards over- fishing.
- Management strategy evaluations are required to investigate the expected effects of management changes; however operating models for multi-species and their driving data still require further detail.
- One of the key requirements for future stock assessment and management is the frequent and accurate assessment of recreational catches.
- With the available information, the current management goal to reduce fishing effort by 50%, with a view to reviewing this as necessary when scientific evidence allows, is appropriate.

Management Objectives:

From the foregoing, it is concluded that the appropriate management objectives for the recreational fishery for DSF should be:

- (i) Foremost, to take action in a precautionary manner to ensure the long-term sustainability and viability of the fishery.
- (ii) To meet the general community expectations of a sustainable fishery based on sound ecological management, whilst allowing appropriate economic and social benefits and returns to the community.
- (iii) To change the “culture” of general recreational fishers throughout the community from one based on a belief that the fishery is robust, highly productive and able to absorb ever increasing fishing pressure, to one based on the knowledge that the fishery is fragile, dependant on critical biological and environmental factors and capable of over – exploitation; thus requiring recreational fishers to become genuine partners in fisheries management solutions.

Expanding on these objectives, it is necessary to consider relevant elements under the above headings to provide a clearer guide to designing management strategies and actions.

The *ecological* objects relate to adopting a fisheries eco-system approach, which takes account of the characteristics of the fishery and its dependence on the ecological processes, which support and drive the fishery.

The on-going research is being directed to answering a number of questions relating to this objective, but management decision – making cannot wait for all the questions to be answered.

Thus, there is a need to manage the fishery's eco-system aspects as well as the total effort and catch (including considering the impact of release mortality) through significantly reducing the recreational effort/catch - beyond the reductions which will arise from the recent changes introduced to bag, boat and size limits etc.

The *economic* objectives above relate to optimizing the economic benefits to the community arising from the commercial and charter fishing industries, as well as the recreational fishery through its economic contribution to the community.

The *social* objectives relate to contributing to the “way of life” for the community by providing sport and leisure activities, a quality fishing experience, the formation of social groups and bodies and support for regional communities. It also includes satisfying the community's need for fish for consumption and the community's need to be assured that the fishery will be conserved for future generations.

Finally, whilst not a management objective as such, there are a number of characteristics of management arrangements, which help frame the management strategies and actions.

Thus fisheries management must be:

- based on a risk assessment and risk management approach as complete information is not available;
- capable of continuous monitoring as to its impacts (including transfer of effort into other fisheries);
- flexible and adaptive as new information becomes available;
- relatively simple, well understood and generally accepted by the community; and
- sufficiently resourced in all of its aspects and cost-effectively administered.

7. OPTIONS FOR FISHERIES MANAGEMENT STRATEGIES

From the foregoing, it is clear that any fisheries management arrangements must address the following issues:

- further research is required into a range of issues concerning the indicator species in the DSF. These are discussed in Dr. M O'Neill's Report and others have been mentioned in this report.
- associated with this is the need for continuous, accurate time series data on catch/effort, particularly for the recreational sector. Widely varying estimates from around 200 tonnes to approaching 500 tonnes exist and better data must be collected, but in a cost-effective way, rather than relying on expensive, once-off surveys every few years.
- other critical elements are an enhanced education and communication program, particularly as part of the change of culture objective as discussed earlier. The community must be part of the management equation and provide support and acceptance of the need for enhanced management.
- the management arrangements must also be effectively enforced with appropriate compliance effort to go hand-in-hand with the education program.
- finally, there is a need to meet the additional costs of enhanced management which often require joint funding agreements with Government and the fishing sectors/community.

7.1 Management Strategies

The achievement of the abovementioned Management Objectives can be attained through a number of different management strategies. Each strategy or combination of strategies entails different levels of risk to the fishery, different impacts socially and economically and different costs and funding requirements.

At the core of the strategies is the need to reduce fishing effort/catch (mortality) on the three indicator species, which are all subject to overfishing, and which will take a number of years to re-build stocks sufficient to ensure their long – term sustainability.

The Department has developed a harvest strategy for the exploitation of the DSF (and other fisheries) as detailed in the Fisheries Research Report No 163, 2007. This contains decision rules (based on the risk status of each species) which determines the appropriate response (by way of decreasing or increasing fishery effort) when either biomass estimates or fishing mortality estimates reach a target, threshold or limit reference point.

Managing to these reference points is consistent with international best practice and provides guidance to altering fisheries management arrangements; notwithstanding that in most cases the data required to calculate the measure or reference points is not available and proxies need to be used.

The application of these performance measures in the DSF by the Department has resulted in the outcome that the total effort/catch of the three indicator species (and hence of the total DSF) needs to be reduced by at least 50% across all fishing sectors compared with the 2005/2006 effort/catch rates.

This has now been supported by the independent scientific reviews.

The proposal to achieve this was to phase in a four month seasonal closure, initially from October 15 to December 25, and then from October 1 to January 31 each year – this equates to approximately 40% of the catch of recreational fishers, and combined with the other changes to bag, boat and size limits, would constitute approximately a 50% reduction in recreational catch/effort.

The effect of this would be to begin to re-build stocks by reducing fishing mortality, however as we don't know the size of the present stocks (biomass) we don't know how urgently these measures need to be applied to prevent a "stock collapse"; we do know however, that each year the current level of fishing mortality (catch) is impacting negatively on the sustainability of the stocks.

The proposed closure would have significant negative social and economic impacts, some spread throughout the year, and others occurring with the Christmas holiday period, when tourist and holiday numbers reach a peak. These have been discussed earlier.

Thus while there are biological benefits which are necessary, the question is whether these can be achieved in other ways while also minimizing the negative social and economic impacts; further, can changes be phased – in over a period of time to allow businesses to adjust their clients and diversify their structures and markets?

There has been no suggestion that the stocks are facing "imminent collapse" but, based on the precautionary principle, action needs to be taken now to put in place an appropriate management response.

7.2 Purpose of the Fisheries Management Strategy

The fisheries management strategy presented here is designed to achieve the following:

- To put a process in place to deal with a range of fisheries management issues now and into the future;

- To put in place a cost-effective data collection process, which would contribute to achieving the Management Objectives, described earlier;
- To take account of the social, economic and environmental impacts;
- To change the “culture” of recreational fishers throughout the community.

This strategy takes a risk management approach to put in place a robust adaptive management arrangement based on applying the Precautionary Principle of taking action ahead of full scientific knowledge. It also seeks to address the economic and social issues raised with implementing a four-month closure over the Christmas holiday period.

7.3 Fisheries Management Strategy

The proposed alternative management strategy contains a range of strategies as follows:

- (i) Continue the current monitoring and targeted research programs to increase knowledge of the stock structure, recruitment, spawning behavior and spatial aspects. Engage additional research programs as suggested in the Scientific review. This will require additional funding.
- (ii) Implement a general individual recreational fishing licence with characteristics as follows:
 - licences to contain endorsements for the current recreational licences but to also include an optional endorsement for the demersal scalefish fishery;
 - compulsory logbooks to be completed by all DSF endorsement holders and returned to the Department of Fisheries - submitted electronically, after completing the paper form while in possession of the fish (paper forms would be accepted if they cannot submit electronically);
 - applied to all individuals engaged in recreational fishing (with appropriate exemption for children and discounts for pensioners etc.).

The licence structure could raise \$8.8million per year - as discussed in a recent Recfishwest, Recreational Fisheries Advisory Committee and Department of Fisheries proposal - with funds to be used to administer the licence scheme, electronic sampling of the logbooks as well as independent surveys; to fund research, monitoring compliance and education etc, as well as funding for a voluntary commercial fishery buy-back scheme and any other matters agreed.

- (iii) Implement a seasonal closure to recreational fishing (including charter fishing) for all DSF category 1 species, which avoids the key holiday period, to achieve a reduction in fishing catch/effort of approximately 15 per cent.

This will contribute to the biological need to reduce fishing effort/catch in conjunction with other measures; will again reinforce the culture change; but significantly lessen the immediate effect of adverse economic and social impacts. This could be phased in for charter fishers to allow them to adjust to alternative business activities/species etc and should be linked to a restructuring and rationalization of effort and licences in the charter boat fishery.

- (iv) Design a program to implement a number of large permanent area closures across the fishery as a precautionary measure pending further research information.

This could further assist the reduction in effort/catch, and some spawning and recruitment activity, but it is acknowledged that their initial placement may require subsequent adjustment following the research and monitoring program. Initial size and placement could be based on research and logbook data to date, as well as pragmatic considerations of simplicity in describing the areas and sharing the placement of the closure across the entire fishery. Initially compliance will largely be based on education, acceptance by the community and “peer” group pressure.

The negative economic/social impacts on commercial fishers and charter boats could somewhat be offset by buy-backs and rationalization as mentioned above.

For recreational fishers, it is part of the ‘culture’ change and with additional research and improved recreational catch/effort data, the placement and contribution of these areas could be better demonstrated.

- (v) Implement a voluntary commercial fishing licence/permit buy-back scheme over a number of years from the above funds.

This will, in part, offset the negative effects on commercial fishers of the proposed permanent closed areas. It will also further contribute to the reduction in catches/effort for the DSF fishery and hasten the restructuring of the industry. It will result in some negative economic and social impacts, but fishers may be able to re-structure into other fisheries or activities, while the reduction in the supply of fish to the market should be compensated by market adjustments with other species and sources of product.

8. ADAPTIVE MANAGEMENT ARRANGEMENTS

The proposed fisheries management strategy described here sets in place, a range of tools and mechanisms which can be used into the future to respond to changing circumstances, new research or monitoring data, changed economic or social issues, or new funding requirements.

However it is a package of measures designed to achieve the management objectives and if elements are not proceeded with, then a different package would have to be developed. For example, if the general individual recreational licence was not adopted and implemented or if other key elements of the strategy could not be effected

Such an alternative management strategy could involve the following elements:

- Longer seasonal closures and/or extended permanent closures; and/or
- Setting a Total Allowable Catch (TAC) for the DSF recreational fishery which would be measured progressively throughout the year by sampling of the electronic log books returned by a selected sample of fishers, and a total closure to recreational fishing applied once the annual TAC was reached.

Whilst these management arrangements have their difficulties, it is felt they are preferable to some other options mentioned e.g. a DSF tagging system - given the difficulties with funding, administering and enforcing a complex tagging system in a widespread fishery with significant barotrauma and “high grading” factors.

Another reason for building a management strategy such as the option here is that fishing effort will inevitably be transferred onto other species, where future management problems could arise. These proposals will put in place a system to help monitor these and other issues that may arise, so they can be addressed in a more timely fashion.

9. REFERENCES CITED

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