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A SUSTAINABLE FUTURE FOR FISHING ON CHRISTMAS ISLAND

A draft five-year strategy for managing commercial, recreational and charter fishing

Proposals for community discussion

FISHERIES MANAGEMENT PAPER NO. 223

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A Sustainable Future for
Fishing on Christmas Island

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INTRODUCTION

The Territory of Christmas Island is a small, non-self-governing Territory of Australia, located in the Indian Ocean 2,360 km (1,466 miles) northwest of Perth, Western Australia and 500 km (310 miles) south of Jakarta, Indonesia. It maintains about 2,000 residents who live in a number of towns on the northern tip of the island. The island has a unique topography and is of immense interest to scientists and naturalists.

Commercial, recreational and charter fishing activity on Christmas Island is largely unmanaged at present and there is a need to consider a more appropriate framework for the management of the Island's marine resources.

This draft strategy was developed by the Department of Fisheries, Western Australia, hereafter known as the "Department of Fisheries" which has responsibility for managing fish resources (within Territorial waters out to 12 nautical miles) on behalf of the Commonwealth Department of Transport and Regional Services (DoTARS), through the applied *Fish Resources Management Act (FRMA) (WA)(CI)* (the "Applied Act"). The Applied Act provides a legislative framework that allows for management arrangements to be developed specifically for Christmas Island.

The management of fisheries in Western Australia uses an adaptive approach which balances the need for the effective management of fish stocks with factors such as the levels of fishing pressure, stock abundance and the risk of over-fishing of individual species.

The purpose of this discussion paper is to seek community feedback on the appropriateness of a range of management strategies, which are designed to help ensure the future sustainability of fish stocks around Christmas Island.

As part of the public consultation process, meetings will be held with different interest groups to discuss the proposals contained in this paper. Feedback from these meetings along with submissions received will be considered prior to the final recommendations being made on future fisheries management arrangements for Christmas Island.

Support and involvement of the local community are vital in order to achieve effective sustainable management of the fish resources at Christmas Island. Anyone with an interest in the future management of fishing is encouraged to carefully consider these proposals and provide input to help ensure the quality and diversity of the fisheries are protected for future generations of Christmas Islanders.

MAKING A SUBMISSION

The release of this discussion paper for public comment provides an opportunity for you to express an opinion on how commercial and recreational fishing around Christmas Island should be managed.

In responding to the discussion paper it is important that you indicate whether you agree or disagree with the various proposals, and explain why you agree / why you disagree.

A response form has been prepared to assist you in making a submission. Alternatively you may choose to write your own submission.

Points to consider for submissions:

To ensure your comments are as effective as possible, please:

- clearly and briefly describe each separate subject you wish to address;
- refer to the different proposals in the discussion paper;
- tell us whether you agree/disagree with any or all of the proposals; and
- suggest alternative ways to resolve the issues raised in this paper or identified by you.

Where to send your submission

The closing date for submissions is **31 July 2007**. Please send your submission along with your full name and address to:

Indian Ocean Territories Management Officer
Department of Fisheries
Locked Bag 39
Cloisters Square Post Office
PERTH WA 6850

Alternatively you can lodge your submission at the Shire Office on Christmas Island, who will then forward these submissions to the Department of Fisheries Western Australia.

SECTION 1 FISHING AROUND CHRISTMAS ISLAND

1.1 History of Commercial Fisheries Management

The Australian Fisheries Management Authority (AFMA) (under the Commonwealth Government's *Fisheries Management Act 1991*) previously managed commercial fisheries in the waters surrounding Christmas Island; however, recreational fishing and aquaculture were beyond the scope of the *Fisheries Management Act 1991*.

In November 2002, the territorial seas (out to 12 nautical miles) of Christmas Island were declared as 'excepted waters' from the *Fisheries Management Act 1991*. Management responsibilities were transferred from the AFMA to the Department of Transport and Regional Services (DoTARS), and the Western Australian Government's Department of Fisheries has now taken on management responsibilities on behalf of DoTARS.

Under a Service Delivery Agreement with DoTARS, the WA Department Fisheries now manages commercial, recreational and aquaculture activities at Christmas Island, in addition to providing fish health diagnostic services, pathology services and licensing services. The Federal Minister for Local Government, Territories and Roads currently holds responsibility for these excepted waters under the *Fish Resources Management Act (WA) (CI/CKI)* (the 'Applied Act').

Fishing for tuna and tuna-like species in waters outside 12nm of Christmas Island continues to be managed by AFMA under the *Western Tuna and Billfish Fishery Management Plan 2005*, and Parks Australia continues to manage the waters extended 50m seaward of the low water mark where the Christmas Island National Park meets the coast.

In March 2004, the original commercial fishery operators on Christmas Island who were licensed under Commonwealth law (and held permits issued by AFMA) were "transitioned" to the applied Western Australian (WA) law, and were issued with Fishing Boat Licences (FBLs) and Commercial Fishing Licences (CFLs) for Christmas Island. The original conditions on the AFMA licences, including an annual three-tonne 'quota' on key species, were carried over to the WA licences.

While it is a requirement under WA law for all licensed commercial fishers to submit monthly catch returns regardless of their fishing activities, this requirement has not been rigorously enforced to date, for Christmas Island licence holders.

Anecdotal evidence suggests that, since initial issue by AFMA and subsequent re-issue by the WA Department of Fisheries, these licences have historically operated on a part-time and somewhat sporadic basis. Peak activity coincided at the same time as AFMA provided management and the Christmas Island Resort Casino was being operated.

The viability of commercial fishing on Christmas Island was greatly reduced following the closure of the resort in the late 1990s. With the closure of the casino and the absence of a fisheries enforcement presence, the level of illegal recreational catch being sold on the Island made the legitimate commercial fishing operations unprofitable. In 2003, the last of the active commercial fishing licensees ceased operation.

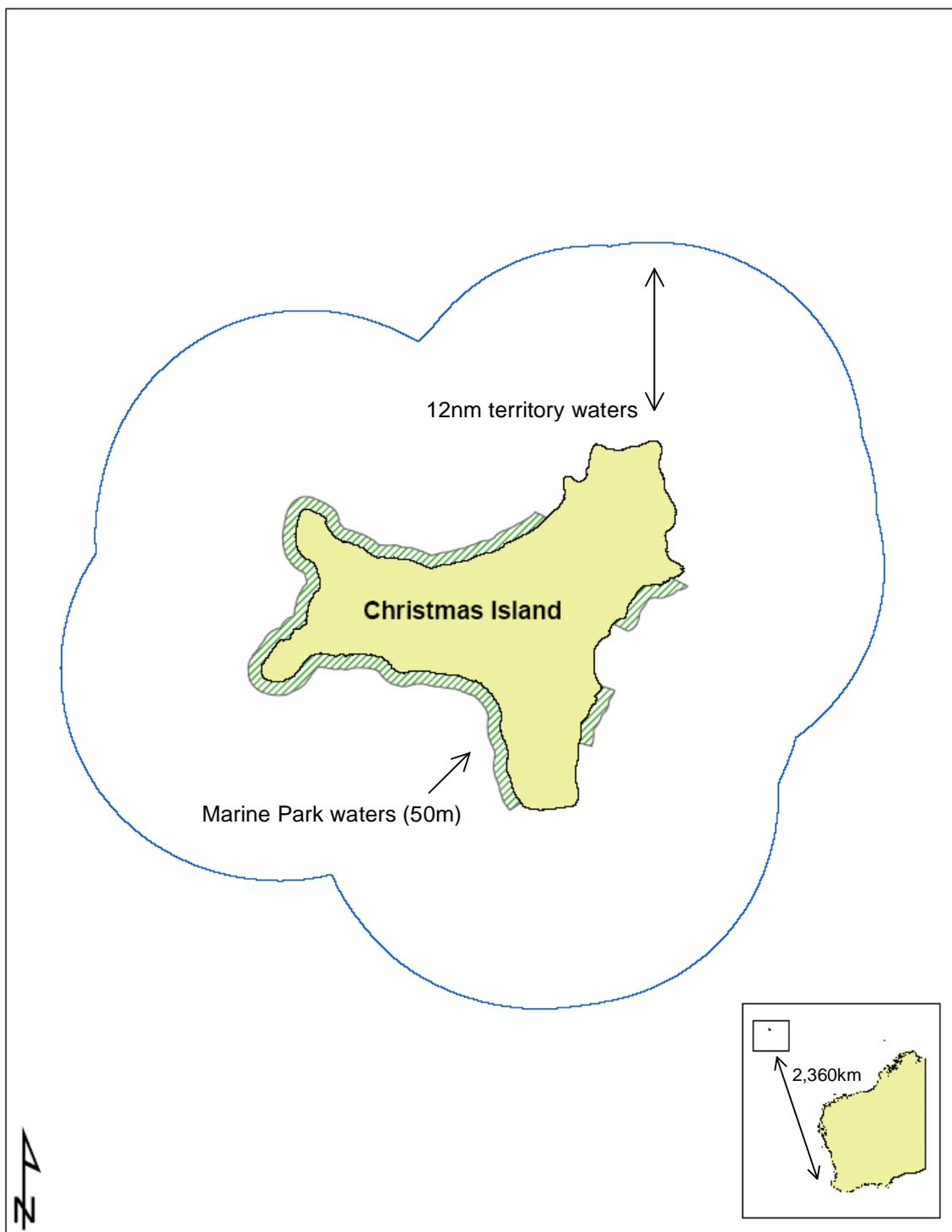


Figure 1: Map of Christmas Island.

1.2 History of recreational and charter fishing

Recreational fishing around Christmas Island is a highly valued activity by the Christmas Island community. Historically, fishing around Christmas Island was viewed as “subsistence fishing” to supplement the food supply of local residents and their extended families.

Even as recently as the 1980s, recreational fishing was largely undertaken from small dinghies and dug-out canoes, using handlines and the occasional rod and reel. This level of fishing was considered to have a relatively low impact on the Island’s fish stocks.

Based on interviews with long-term island residents, there has been a significant increase in the recreational fishing pressure around the island. Over the last two decades, a significant number of larger boats, often using more sophisticated fishing technology such as Global Positioning Systems (GPS), coloured sonar, braided line and electric winches, have been imported onto the Island.

This fishing effort has been bolstered by a number of mining and construction projects taking place on the Island in recent years, employing a transient workforce. It has also been suggested that the focus of recreational fishing has moved away from supplementing food supplies to sports fishing.

Prior to 2002, Christmas Island had a single boat launch ramp located at Flying Fish Cove. The strong northerly wind and swell exposure at this site during the monsoon season acted as a natural control on the amount of fishing taking place, making it difficult to launch boats for a large part of the year. Since then, a new ramp has been built on the eastern side of the Island at Ethel Beach, resulting in boat access to the water almost all year round.

Today Christmas Island recreational boat fishers troll for pelagic species including wahoo, dog tooth tuna, yellowfin tuna and mahi mahi (dolphin fish) in the offshore waters of the Island. Recreational boat fishers target the near-shore waters around the Island by trolling using surface lures (‘poppers’) for giant trevally.

It should be noted that sharks take a large number of fish that become hooked when fishers are trolling in both inshore and offshore waters, and this may be an important consideration in assessing the total mortality of pelagic species.

The use of short fixed boat rods fitted with electric reels and braided line is becoming an increasingly popular recreational fishing method. This method allows the capture of demersal reef fish from depths greater than 500 metres, and has been particularly effective when combined with GPS and colour sonar systems.

The lack of fringing reef found at Christmas Island means that demersal fish stocks are limited and therefore highly susceptible to over-exploitation.

Shore-based fishing is also popular with fishers mostly targeting rainbow runner and giant trevally off the rocks. The island community also holds fishing competitions on a periodic basis, targeting demersal and pelagic species. Several fishing tours (charter) have operated from Christmas Island in the past; however, information currently

available suggests that only one extractive (i.e. fishing) aquatic tour operator is currently active on the island over the peak fishing season.

Bait is usually mackerel scad and/or flying fish. Flying fish are mostly taken during night fishing in small boats from Flying Fish Cove, using a light and a dip net.

Free diving for rock lobster is also a popular fishing activity on the limited fringing reefs around the Island.

SECTION 2 PLANNING FOR THE FUTURE

2.1 Why have a Fishing Management Strategy?

If the availability of fish resources at Christmas Island is to be maintained or improved over time, it is important to ensure breeding stocks are protected so that future generations of Christmas Islanders can enjoy catching and eating fish. A variety of tools can be used to help protect stocks including:

- size limits (both minimum and/or maximum);
- daily bag limits;
- possession limits;
- gear controls (e.g. size or type of nets, lines, pots etc);
- closures (e.g. time periods to protect spawning aggregations and/or areas such as nursery grounds);
- licensing; and
- commercial catch quotas.

Generally a number of these tools are used in combination to ensure an adequate proportion of breeding stock is protected. The most appropriate combination of tools for managing commercial and recreational fishing will vary, depending upon the nature of the species and the level and type of fishing activity.

The fishing management arrangements for Christmas Island need to be developed in consultation with the local community. Community support for sustainable management arrangements is essential in order to gain maximum voluntary compliance.

One of the objectives of the management strategy is to ensure that there are fish available for sale on-island. Another objective is the need to manage the total take of fish both recreationally and commercially to ensure sustainability (see Section 4).

A comprehensive framework will be needed to deal with issues such as ensuring commercial fishing licences remain on-island; providing equitable opportunities for members of the Island community wanting to fish commercially; limiting the total catch to within sustainable levels for all sectors; and encouraging a secure domestic market for commercial fish products on Christmas Island.

2.2 Cocos Islands Fishing Strategy Example

The Department of Fisheries is also responsible for the sustainable management of the marine resources of the nearby Cocos (Keeling) Islands (out to 12nm) through a Service Delivery Arrangement with the Department of Transport and Regional Services (DoTARS).

A similar review aimed at developing a sustainable fisheries management framework for Cocos (Keeling) Islands began in 2004; however, the issues confronting fisheries management on Cocos Islands vary greatly from that of Christmas Island.

Historically there has been little commercial fishing activity undertaken at the Cocos Islands. Fish has been supplied to the community through a large, highly mobile and efficient recreational or “subsistence fishing” sector. There has also been evidence of significant quantities of fish being exported to friends and relatives on mainland Western Australia on a regular basis.

In the absence of a sustainable fisheries management framework, anecdotal evidence suggests that unmanaged fishing practices have resulted in some fish stocks becoming depleted, with some species, such as coral trout, being on the verge of localised extinction.

In order to manage Cocos Island fish stocks in a sustainable manner, a recreational fishing management framework has now been developed for the Cocos in consultation with the local community and was introduced in late 2006. The key component of this strategy is the introduction of a three-tiered bag limit structure that provides a higher level of protection for those species of greater risk to over-exploitation. An extensive community education program will also support the strategy.

The introduction of a sustainable management framework for recreational fishing on Cocos Islands has also paved the way for the possible development of a community-based commercial fishing licensing framework to supply fish to commercial outlets and the broader community (Appendix 1 - Summary of the Cocos Island Recreational Fishing Strategy).

SECTION 3 ISSUES FOR CONSIDERATION

3.1 Current Status of Stocks

Fishing around Christmas Island is largely weather-dependent. Some large pelagic species, such as yellowfin tuna, are part of a widely-distributed Indian Ocean resource while other pelagic species such as dogtooth tuna, sailfish and wahoo may be more localised, and therefore capable of localised depletion.

Demersal fish resources are also likely to be localised and vulnerable to over-fishing. For example, the deepwater snapper and other similar deepwater species are slow-growing and very long-lived, and can only sustain very low levels of exploitation. For this reason, the establishment of a substantial commercial fishery for demersal species is unlikely to be sustainable.

The export of fish off-island (mainly to relations/friends on the mainland of Western Australia) is an additional pressure on Christmas Island's fish resources. A 5kg restriction has been introduced by the Australian Quarantine and Inspection Service (AQIS) to limit the amount of fish that can be taken on board aircraft (and hence off-island); however, the level of enforcement of this restriction is not known. This is a key issue, as the take of large quantities of fish is likely to be unsustainable.

While there is comprehensive knowledge of the fish species found within the waters surrounding Christmas Island, there is minimal information available on the status of fish stocks or catch data for these species (Appendix 2: List of fish species found on Christmas Island).

Anecdotal evidence suggests that some demersal finfish stocks around the island may already be depleted. The isolation and limited habitat structure of Christmas Island may mean that the abundance of certain species will be linked by larval recruitment to other environments, often hundreds to thousands of kilometres away.

3.2 Impact of Fishing on Stocks

To protect future fish stocks and ensure sustainable fishing for the future, it is important to understand what happens to a stock of fish over time owing to fishing pressure.

When fishing pressure is exerted on a "virgin" or unfished stock, initially the catches include a number of older or larger fish that are highly sought-after by fishers. At this time catch rates are high for a relatively small number of fishers.

As more of the larger fish are removed from the population, faster-growing, younger fish replace the older fish. In this situation, the overall catch can actually increase, with more medium-sized fish being caught by the increasing number of fishers, but fewer bigger fish being caught.

Further fishing pressure can cause what is called “growth overfishing”. This means that fish are caught before they are fully grown, resulting in a decrease in the average size of fish in the fish population, and a reduction in the total weight of fish caught.

If exploitation of fish stocks increases further, the fish population may suffer from “recruitment overfishing”. This occurs when fishing pressure is too heavy to allow a fish population to replace itself, because of a reduction in the number of fish left in the wild that are of the size/age where they can reproduce. This level of fishing effort is not sustainable.

Both growth and recruitment overfishing are undesirable, with growth overfishing reducing the productivity of the fish population, and recruitment overfishing being undesirable as it is important to ensure the protection of a sufficient proportion of the breeding stock can be maintained and improved over time.

3.3 Commercial Fisheries Issues

Originally most of the AFMA fishing permit holders were residents of Christmas Island. At present, several licence holders are no longer resident on-island and some fishing licences have changed hands.

This has resulted in non-residents of Christmas Island now holding a number of these fishing licences, with the potential for any of the remaining on-island licences to be transferred to non-residents (as the applied legislation provides for transferability) or for further licence holders to move off-island.

Little information has been received from the commercial operators, with only one catch return being lodged during the time that the Department of Fisheries has been managing these resources. It is understood that the five commercial fishing boat licences of Christmas Island are not currently in use; however, one of these operators continues to operate a game fishing charter business during the peak season.

As a result of there being no active commercial fishing operations, there is no fishery data to assist in the consideration of how a commercial fishery would operate on the Island. Any locally-caught fish that are currently being sold on Christmas Island are therefore being sold illegally.

Fisheries management arrangements must be developed to ensure that the total take of fish (for commercial and recreational purposes) is sustainable. The community needs to support the arrangements and the distinction between commercial and recreational fishing.

However, in recognition of the circumstances on Christmas Island, the Department of Fisheries is considering a “community-based licensing system” as one possible future management option to provide a framework for the legal supply of commercially-caught fish. If supported, the implementation of a community-based licensing system would not be compatible with the current commercial fishing licensing arrangements.

3.4 Demand for Commercially Caught Fish on Christmas Island

The limited demand for commercially-caught fish by the island community is a key factor in determining the level of commercial fishing activity that would be required to supply fish to the Island.

Even if a regular market for commercially-caught fish was developed to supply the Island's restaurants, supermarkets and individuals, this demand is unlikely to exceed about 200kg per week at present. However, if a large-scale tourist facility such as the Christmas Island Resort Casino were to re-open in the future, the demand for locally-caught seafood would be likely to increase.

Although the demand for fresh seafood on Christmas Island is limited, there is a need for a licensing framework that can legitimately provide for a limited commercial catch, to ensure sustainable harvest levels and avoid over-supply of the Island market.

3.5 Seafood Quality Standards

All persons in the seafood supply industry are currently responsible for ensuring correct food safety standards for their catch. The implementation of the new *Food Standards Australia and New Zealand (FSANZ)* food standard code identifies temperature control and hygiene as key factors to ensure good health and quality standards for seafood product.

In order to ensure satisfactory health and quality standards, a protocol must be developed to manage temperature controls and hygiene standards during:

- on-boat storage of fresh catch;
- transport from the boat to a storage and processing facility;
- storage in appropriate facility including snap freezer facilities; and
- in the sales area.

3.6 Recreational Fisheries Issues

At present, there are no bag limits or restrictions in the Department of Fisheries regulations that relate to fishing on Christmas Island. In the absence of specific regulations, there is a need for education and compliance to support future fisheries management arrangements and ensure the cooperation of the local community.

A wide range of issues has been taken into consideration in planning for the future management of fishing at Christmas Island. A number of these issues have been identified through previous reports (*Integrated Marine Management Plan – Christmas Island*) and more recent meetings by Department of Fisheries staff and residents on Christmas Island.

SECTION 4 MANAGEMENT STRATEGY

It is important that the development of a fisheries management strategy for Christmas Island satisfies the objectives of both the Island's community and the Department of Fisheries.

Through initial discussion between fisheries managers and various members of the Island community, a number of management principles and objectives for Christmas Island have been proposed.

The overall objective of the Christmas Island fisheries management strategy is to ensure the sustainable harvest of fish stocks by all sectors of the community while maximising the environmental, economic and social benefits that can be derived from these resources. Within this overarching objective, the following specific fisheries management principles and objectives have been identified:

Proposal 1a: Fisheries Management Principles

- Fish resources of Christmas Island should be managed primarily as a food source for the Christmas Island community.
- The Island community should be engaged in any associated decision-making processes with respect to managing the fish resources around the island.
- Members of the community should have the opportunity to fish for a commercial purpose.
- All fish sold for a commercial purpose on Christmas Island should meet minimum seafood quality requirements.
- Clear guidelines for recreational fishers should be developed, taking into account the values and expectations of the Christmas Island community and ensuring sustainability.

Proposal 1b: Fisheries Management Objectives

- To gain an understanding of the status of fish stocks around Christmas Island.
- To manage the total take of fish resources around Christmas Island at a sustainable level, and ensure adequate breeding stock levels of residential and semi-residential species are maintained.

SECTION 5 INFORMATION REQUIREMENTS

5.1 Catch and Fishery Performance

Good quality time-series data on fishing activity, catches, fish biology and population structure is important for the sustainable management of fisheries. This information is essential for understanding what is being caught and detecting changes in abundance over time.

Fisheries research is expensive and considerable resources are required to determine the status of stocks and the recruitment sources. It is also important to prioritise research on the species deemed to be at highest risk.

The following steps are required for the successful implementation of effective fisheries management arrangements at Christmas Island:

Proposal 2: Review of existing literature

A detailed desk study of existing fisheries literature on Christmas Island fish stocks to incorporate all available information into a single source including:

- identification of fish species present;
- levels of abundance; and
- identification of target species.

Proposal 3: Recreational catch survey

Periodic catch surveys provide detailed information about the spatial and temporal distribution of fishing activity and catch, on which to base management decisions.

Information should be collected on indicator species and habitat zones to monitor recreational fishing activity and catch. These indicators should cover at a minimum the number and length of fish taken. This information could be collected on a voluntary basis through a logbook program or could be run as part of a school-based project. The indicator species should encompass those targeted by both shore and boat fishing.

It is proposed that the following species be used as key indicator species:

	Environment where species is most often found	
	Boat-based	Shore-based
Indicator species	Deep-sea demersal species Wahoo Dogtooth tuna Yellowfin tuna Coronation trout	Rainbow runner Giant trevally

5.2 Species Biology

Understanding the biology and lifecycle of the different species is also important. In particular, size/age at maturity, longevity, and source of recruitment to exploited stocks are key factors. For example, it is important to know the source of recruitment into the targeted fish stocks around Christmas Island - do they originate from fish distributed outside the Island's waters and rely on ocean currents, or is the source of recruitment solely from fish from within the Island's waters?

Very little baseline data is available on the range of species found around the Island and there is no up-to-date information on the composition and size of the catch or quantitative stock assessments of key species. For example, it is important to determine whether juveniles and adults occur together throughout all waters of the island, or whether juveniles are more abundant in the limited fringing reef platforms. It is also important to understand whether the species aggregate at certain times of the year (e.g. to spawn), or certain times of the day (e.g. to feed).

Proposal 4: Priority species for research

It is vital to prioritise species for biological studies to ensure efficient use of limited funding for research. Additional funding will be sought for those target species not listed in the original priority list at a later date.

In August 2006, a Risk Assessment Workshop for the Indian Ocean Territories was held at the WA Fisheries and Marine Research Laboratories in Perth. This workshop identified a list of priority species for research and management focus. The priority species for Christmas Island are listed in the table below (in order of priority).

Species	Gap analysis of research			
	Biology	Stock assessment	Exploitation status	Breeding stock level
Dogtooth tuna	Minimal	N/A	N/A	N/A
Wahoo	Minimal	N/A	N/A	N/A
Coronation trout	N/A	N/A	N/A	N/A
Deep-slope demersal species	N/A	N/A	N/A	N/A
Yellowfin tuna	Minimal	N/A	N/A	N/A

N/A (Not Available)

SECTION 6 MANAGING THE CATCH

6.1 Proposed Models for Community-Based Commercial Fishing Authorisations

This is a draft plan to facilitate discussion on how authorisation to fish commercially could be shared and managed by the community. This draft has been developed following discussions with the Christmas Island community stakeholder groups, and now requires further public comment to progress.

Three proposals on possible community-based commercial fishing models have been developed and are outlined below.

Proposal 5a is similar to the current commercial fishing licensing arrangements; however, certain conditions and requirements have been proposed to ensure that the licences remain operational and all members of the community have equal opportunity to be involved in the fishery.

Proposals 5b and 5c involve the concept of a commercial fishing licence being held by a non-profit community-focussed entity based on Christmas Island. This concept has gained initial community support through previous review processes and more recently through meetings between Department of Fisheries staff and residents of Christmas Island.

Under these models, “ownership” of the fishing licence would remain with the on-island entity, meaning that the licence would always remain on-island. Provided the entity is properly structured, the commercial “leasing” or “hiring” of the licence would operate rationally and fairly. It would also give the entity (and the community) enormous influence in the commercial use and sustainability of fish stocks.

The way the on-island entity is structured and how a licensing system operates would require further consultation with the Christmas Island community in order to integrate the social objectives of the Christmas Island community with the management objectives and legal framework of the WA Department of Fisheries.

6.1.1 Proposed Models for Commercial Fishing on Christmas Island

The three models for managing the Christmas Island commercial fisheries are outlined below:

Proposal 5a: Continuation of existing commercial fishing licensing framework

The following is a summary of how the existing commercial fishing licensing arrangements could be amended to ensure that licences remain operational and provide a regular supply of fish to the local community as well as providing members of the community with the opportunity to be involved in the fishery.

Under this model the number of commercial fishing licences would continue to be limited to the five commercial licences that currently apply to Christmas Island.

Conditions could be attached to existing licences requiring minimum levels of effort (days fished in a year) or minimum levels of fish landed. Existing licence holders who currently hold inactive licences would then need to demonstrate why that licence should be renewed (e.g. how they intend to meet the minimum licence conditions).

If they cannot show just cause why the licence should be renewed, the licence could be withdrawn and added to a “pool” of licences to be reissued. Expressions of interest could be called for members of the community interested in operating one of these commercial fishing licences.

Licences could be limited to a finite period (e.g. one to three years) and applicants meeting certain access criteria, such as being an island resident, could be issued a licence for this period. Another call for expressions of interest could be undertaken at the end of the licensing period, thus ensuring that all members of the community have the opportunity to apply on a periodical basis.

A review group consisting of island residents and the Department of Fisheries would assess the applications for the available licences.

This model would be the simplest to administer; however, it should be noted that the opportunity for different members of the community to fish under the licensing system would be less frequent.

Proposal 5b: Community-based commercial fishing licence (restricted operators)

The following is a summary model of how a community-based commercial fishing authorisation framework for Christmas Island might operate.

The model includes:

- the *Department of Fisheries* as the licensing body;
- an on-island community-based *Licence Administration*;
- a *Fisheries Co-operative*; and
- *Nominated Individual Fishers* from the community.

Licence Administration - An authorisation to fish commercially could be issued by the Department of Fisheries to an independent, community-based Licence Administration. As the holder of the authorisation the Licence Administration would effectively have responsibility for controlling the commercial take and supply of fish products on Christmas Island and for providing a service to the community.

The Licence Administration could be hosted by an established entity such as the Christmas Island Shire, to ensure any administrative costs could be absorbed and to make use of existing infrastructure. The Licence Administration could be made up of representatives from each of the community groups and could be required to share the opportunity to commercially fish in a fair and equitable manner.

The Licence Administration could also act as a ‘Management Advisory Committee’ to the Department of Fisheries to negotiate a ‘catch quota’ for the island, based on sustainable harvest levels and the community demand for fish. The Licence Administration could also be responsible for overseeing the operation of a community

Fishery Co-operative and allocating the opportunity to fish under the Fishing Boat Licence (FBL) to individual members of the community.

Fishery Co-operative - The Fishery Co-operative (the Co-operative) would be a small-scale operation involved in the day-to-day operation of commercial fishing. The Co-operative would be responsible for managing the opportunity to fish under the Commercial Fishing authorisation by individual members of the community under the supervision of the Licence Administrator.

The Co-operative could also act as a 'fish market' and be responsible for the processing, storing and retailing of fish to the community and commercial outlets such as restaurants. It is likely that the Co-operative would need to employ part time staff and be housed in suitable premises. Given the small-scale of this operation, it would be most practical if it could make use existing infrastructure, to reduce capital costs.

In order to ensure the highest fish quality and minimise deterioration, fish storage and processing standards need to be maintained. The fish need to be stored between -1°C and +4°C from shortly after they are caught and/or filleted.

To ensure fish are stored within this temperature range, any commercial boats would have to have iceboxes on-board. The boats used by commercial fishers on Christmas Island are generally small dinghies (4.5 to 6 metres in length), limiting the size of icebox that can be used and the number of fish that can be stored at any one time.

Ideally, ice could be made available through the Co-operative facility, located near to a launch site, and any commercial fishers would be required to utilise this facility. Iceboxes could be provided by the Co-operative to the nominated fisher, ensuring a consistent icebox type and standard.

The Co-operative would be responsible for implementing a Code of Practice for fishers to ensure a basic level of seafood quality management. The Co-operative and the Department of Fisheries would work together to run workshops outlining the new protocols and assisting nominated fishers to understand and appreciate the need for these new rules and practices.

The Department of Fisheries would be responsible for the creation of educational material, to be developed in appropriate languages.

The Co-operative would also be responsible for ensuring that only fish caught and processed under the Code of Practice be accepted, as this will ultimately result in higher quality fish product and food safety on the island and a higher price paid to fishers.

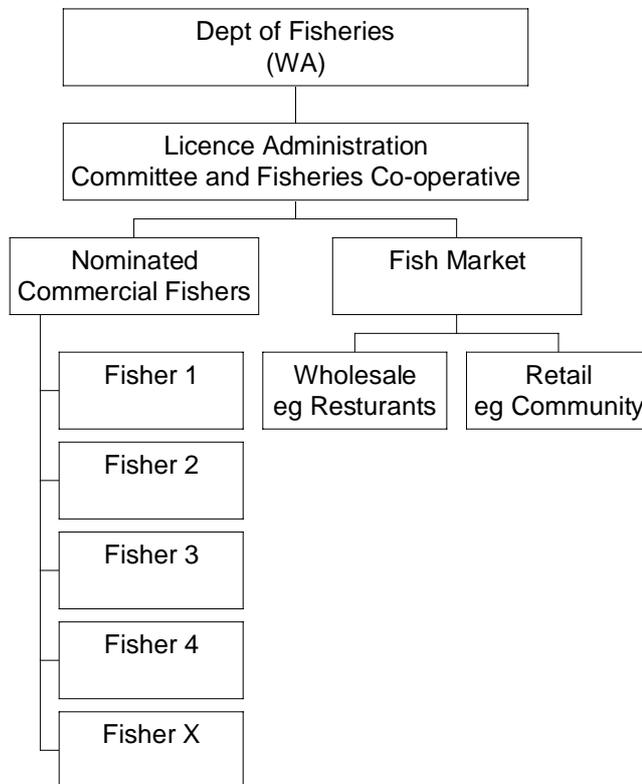
With the limited size of the commercial fishery on Christmas Island, there is the possibility that the functions of the Co-operative and Licence Administration could be combined. This will be further explored through consultation with the community.

Nominated Commercial Fishers - To ensure that commercial catches are kept to a level that meets the demand of the Christmas Island community, the number of nominated commercial fishers that can operate under the Commercial Fishing Licence would need to be limited to around the current level of five (Licensed Fishing Boats).

Community members wanting to fish commercially would apply to the Licence Administration, who would then allocate the opportunity to fish among applicants (by a method yet to be determined) and set individual catch quotas in an unbiased manner on a periodic basis.

Successful applicants would be able to fish commercially under the community licence and then supply their landed commercial catch to the Co-operative for sale to the community. Given the limited demand for commercially caught fish, it is likely that fishers would only operate on a part-time basis.

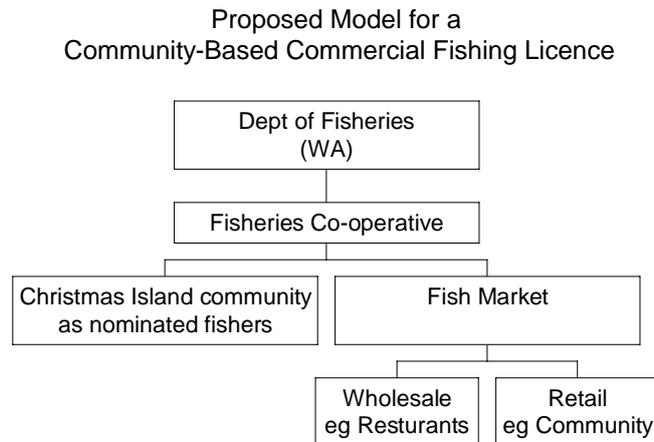
Proposed Model for a
Community-Based Commercial Fishing Licence



Proposal 5c: Community-based commercial fishing licence (unrestricted operators)

During preliminary discussion with the community, it was requested that consideration be given to allowing all interested persons within the community to sell their fish through a co-operative under the authority of a community-based licence at any time.

This model is represented below:



Fisheries Co-operative - Under this option the Co-operative would serve the same function as outlined in Proposal 5a.

Christmas Island community as nominated fishers - If anyone in the Christmas Island community wanted to fish commercially at any time without restrictions, fish stocks could be quickly over-exploited.

In an unregulated environment other issues also arise - such as the fishers not having a fair and equitable opportunity to sell their fish, given the limited demand, ensuring minimum seafood quality standards are met and keeping an accurate record of catches.

Problems can quickly arise if the demand for fish on the island is, for example, 200kg in one day and 15 boats set out with a view to catch and sell their fish. If three boats each catch seven wahoo and return to the ramp, they will supply the entire demand for fish on that day. If the other 12 boats then return with fish, the Co-operative will not be able to take them as the entire demand for fish would have been met by the first three boats.

This creates a situation where boats may “race back to the ramp” in order to sell their catch and significant quantities of fish would be wasted. It also does not provide an equitable opportunity for people within the community to be able to sell their catch.

There would also be the risk that the fish from the other nine boats would be sold “out the back door”, effectively extinguishing any demand for fish from the Co-operative.

6.1.2 Summary of Commercial Fishing Models

One of the most important aspects of developing a community-based licence is to ensure there is a fair and equitable use of the fish resources in a sustainable way. To ensure this happens, there needs to be some structure around the catching and selling of fish on Christmas Island.

Given that the all three options would still revolve around the concept of a licence to use a boat to fish commercially (a Fishing Boat Licence or FBL), people who wish to fish with boats commercially would need to have a fishing boat licence.

Currently, there is only a limited number of FBLs that apply for Christmas Island. The Department of Fisheries does not believe increasing the number of FBLs and enabling anyone who wished to fish commercially to fish would be conducive to the sustainable or equitable use of the fish resources around Christmas Island.

In addition, given the limited demand for fish on the Island, there needs to be a way of determining who fishes and what quantity of fish they are permitted to catch. This would be relatively simple to implement under Proposal 5a by way of licence conditions.

Under Proposal 5b, those people in the Christmas Island community who wish to fish commercially from a boat could be listed in a “pool” with the opportunity to fish (use a Fishing Boat Licence) being assigned to a person/boat for a set period of time (e.g. a day or a week).

The process for determining how this licence is allocated (e.g. by ballot or roster) would need to be developed with the community.

If a community-based licensing framework was pursued, the Department of Fisheries favours a system where an administrative body, made up from representatives from each community group, determines who can fish for a given period of time and what quantity of fish they can catch.

Proposal 5c would largely rely on market forces, rather than fisheries management measures, to limit the quantity of fish taken. As such, the Department of Fisheries does not consider Proposal 5c to be a viable option, as there would be no way to ensure that fish stocks are harvested at a sustainable level.

Regardless of which model is introduced, a minimum level of fisheries compliance would be necessary to ensure the long-term future of a commercial fishery on Christmas Island.

6.2 Type of Fish to be Targeted Commercially

As previously stated, the fish resources around Christmas Island are made up of the following three categories:

- pelagic;
- semi-pelagic; and
- demersal.

Large pelagic species, such as yellowfin tuna, are part of a widely distributed Indian Ocean resource. Other pelagic species such as dogtooth tuna, sailfish and wahoo may be more localised, and therefore capable of localised depletion.

Demersal fish resources such as deepwater snapper and cave sweepers are low in abundance as a result of the limited reef habitat. These species are also slow-growing, very long-lived, and can only sustain very low levels of exploitation.

For this reason, commercial exploitation of species should focus on pelagic species such as wahoo and tuna.

6.3 Guidelines for Recreational Fishing

At present there are no measures in place to manage recreational fishing on Christmas Island and the level of catch and effort is largely unknown, meaning there is very little information available to evaluate the sustainability of current recreational fishing practices.

Previous marine planning processes undertaken by Parks Australia resulted in a series of proposed management arrangements for recreational fishing on Christmas Island, including catch bag and size limits. However, due to the lack of community support and resources to enforce rules for recreational fishing on Christmas Island, these proposals were never introduced.

After further discussions with members of the Christmas Island recreational fishing community, the Department of Fisheries considers the best way to move ahead in this instance is to develop “Guidelines for Recreational Fishers on Christmas Island”.

Recreational fishing guidelines would simply be a set of guidelines aimed at outlining sustainability principles and the benefits of only taking what you need or can consume within a reasonable time. Rather than being enforced, compliance to the guidelines will be voluntary; however, depending on the community’s attitude and available resources some enforcement capacity may need to be considered in the future.

Community support for the sustainability of fish resources is a vital factor in successful recreational fisheries management and community education is the key process for the development of effective community stewardship.

Community stewardship can be evaluated against four criteria:

- the level of individual knowledge of what is required to ensure healthy fisheries;
- the attitudes and values that individuals hold in relation to fishing;
- the behaviour that people adopt when fishing; and
- the level of community support for necessary changes to management.

In promoting a sense of stewardship for fish stocks it is essential that the fishing community is informed of the reasons for management decisions.

A wide range of education and awareness strategies can be used to promote a strong fishing conservation ethic and set social standards within the recreational fishing community. These strategies include community based-education programs using

elders or volunteers, school education programs, radio advertising and information publications.

Proposal 6: Guidelines for Recreational Fishing

Recreational fishing guidelines should be developed to outline sustainability principles and the benefits of only taking what fish you need or can consume within a reasonable time. In the first instance, compliance to the guidelines will be voluntary.

6.3.1 “Catch Guidelines” for Recreational Fishing

As an introduction to the concepts of sustainable fisheries management, “catch guidelines” are considered the most appropriate pathway. There is merit in developing “catch guidelines” based on what the community believes is a fair and reasonable amount of fish for individual use, within overall catch limits that ensure sustainability.

It is likely that most recreational fishers on Christmas Island already have a personal view on what they consider to be a reasonable day’s catch. For example, one fisher may be satisfied and stop fishing after catching four Wahoo; however, the same fisher may wish to catch a greater number of demersal fish, such as cave sweeper.

Ultimately it would be up to the community, as users and shared custodians of the fishery, to contribute towards establishing appropriate levels for recreational fishing “catch guidelines”. The community and the Department of Fisheries will also need to consider if an element of enforcement should be associated with these guidelines in the future.

The proposed recreational fishing “catch guidelines” contained in the tables below have been developed after consideration of previous bag limit proposals by Parks Australia and the limits developed through the Cocos (Keeling) Islands recreational fishing planning process (Appendix 1).

The proposed “catch guidelines” should be seen as an education-based part of a total management approach to ensure fishers will enjoy the benefits of healthy fish stocks in the future. While they will not be enforced, they will provide a “social standard of practice”.

Proposal 7: “Catch Guidelines” for recreational fishing

As a starting point for community discussion it has been proposed that “Catch Guidelines” for recreational fishers be divided into three finfish categories based on a species risk to over-exploitation.

Category 1 Fish – includes pelagic fish and vulnerable demersal species;

Category 2 Fish – includes all other demersal species; and

Category 3 Fish – includes all other generally more abundant fish.

In addition to the three finfish categories, it is also proposed that two additional categories be introduced - one including invertebrate species, such as rock lobster and squid, and the other listing species that should be totally protected.

Proposal 7a: Category 1 Fish

Category 1 Fish – combined species bag limits		
Category 1 fish are generally long-lived, slow growing, mature at four-plus years, form semi-resident populations, are vulnerable to localised depletion due to their life history, or are of low abundance or highly targeted.		
Species	Scientific Name	Bag Limit
Billfish - sailfish, swordfish, marlins (combined)	Families Istiophoridae and Xiphiidae	1
Cods – including coral trout, coronation trout and coral cod (combined)	Family Serranidae	4
Snappers – including jobfish, ruby snapper and rosy snapper (combined)	Family Lutjanidae	4
Trevally – Giant, bluefin (combined)	Family Carangidae	4
Wahoo, Mackerel, Mahi mahi and Tuna (combined)	Family Scombridae	4

Proposal 7b: Category 2 Fish

Category 2 Fish – total mixed bag limit of 16		
Category 2 fish are primarily deepwater demersal “bottom-dwelling” species. These species form resident populations around Christmas Island and are likely to rely heavily on local breeding stock levels as a source of recruitment. Many fish in this category are highly valued for their eating qualities.		
Species	Scientific Name	Mixed bag limit
Barracuda	Family Sphyraenidae	16
Cave sweeper	<i>Pempheris oualensis</i>	
Emperors and Sweetlips	Family Lethrinidae	
Bigeyes	Family Priacanthidae	
Soldier fish	<i>Myripristis</i> and <i>Plectrypops</i> spp.	
Squirrel fish	<i>Sargocentron</i> spp	
Wrasses	Family Labridae	

Proposal 7c: Category 3 Fish

Category 3 Fish – no bag limit		
Category 3 fish are primarily common “baitfish” species. These species are generally in high abundance, often forming large schooling aggregations.		
Species	Scientific Name	No bag limit
Flying fish	<i>Cypselurus</i> spp.	
Mackerel scad	<i>Decapterus macarellus</i>	
All other unlisted species		

Proposal 7d: Crustaceans and Shellfish

<i>Crustaceans and Shellfish</i>		
Species are often sedentary or resident in nature, but may have pelagic or migratory phases in their life cycle, with larvae or eggs widely distributed by ocean currents. Catch guidelines apply to each species, due to the high risk of localised depletion.		
Species	Scientific Name	Bag limit
Rock Lobster	<i>Panulirus spp.</i>	2
Bugs	<i>Parribacus antarcticus</i>	2
Squid, cuttlefish and octopus	Class Cephalopoda	15

Proposal 7e: Protected species

<i>Protected species</i>	
Consideration should be given to protecting species that are low in abundance or highly valued as iconic species for tourism.	
Species	Scientific Name
Humpheaded maori wrasse	<i>Cheilinus undulatus</i>
Whale Shark	<i>Rhincodon typus</i>
Community comment should be sought on other species that may be appropriate for protection (e.g. sharks). Sharks are abundant and currently not targeted, but they could provide a major tourism drawcard for the diving industry.	

6.3.2 Size Limit Guidelines

Minimum size limits are usually based on the breeding biology of a species, and are set to protect fish until they reach maturity and have been able to spawn at least once. They can also be set to help increase the average size of fish available.

The effectiveness of size limits as a management tool is reduced in fishing gear such as set nets where there is a very high mortality. Their effectiveness also depends on voluntary compliance – particularly where filleting is allowed at sea and compliance checks are not possible.

The ability to determine appropriate size limits and hence their applicability as a management tool is limited by the level of biological information available for many species. There is also increasing concern over the mortality of fish, particularly demersal species, taken from deep water and the appropriateness of size limits as a management tool for these species is being questioned.

Maximum size or slot limits are theoretically useful for protecting large breeding fish, or reducing the take of highly prized, and often rare, large specimens.

Like minimum sizes and bag limits, the issue of mortality of fish returned to the water is of great importance. Minimum sizes may be effective for fringing reef and pelagic species – but not for deep-water species.

Size limits for finfish are measured from the nose of the fish to the tip of the tail, whereas species such as rock lobster are measured from between the horns to the back of the carapace.

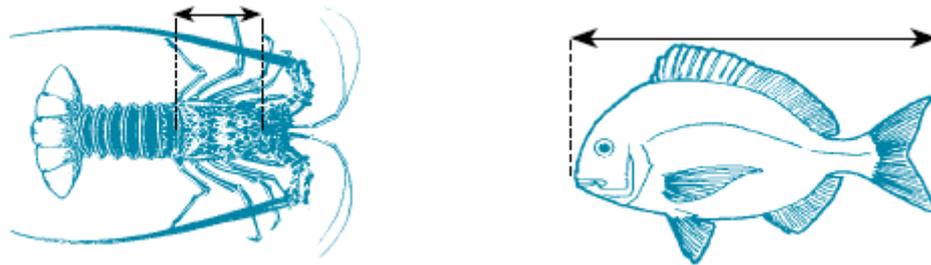


Figure 2: How to measure rock lobsters and finfish.

Proposal 8: Size limit guidelines

Size limit guidelines	
Consideration should be given to adopting minimum size limit guidelines for Christmas Islands, based on those which have been developed for similar species at the Cocos (Keeling) Islands, as follows.	
Species	Minimum size limits
Rock Lobsters	76mm
Coral and Coronation trout	45cm
Wahoo	90cm

6.3.3 Fishing Gear

In Western Australia restrictions apply to the gear that can be used by recreational fishers. Restrictions, which could have some application in the context of Christmas Island, include:

- no more than three hooks or gangs of hooks per line;
- no unattended set lines;
- no spearing rock lobster or other crustaceans; and
- no spearfishing on compressed air.

Proposal 9: Fishing gear controls

Community input is being sought on the need for fishing gear controls.

6.3.4 Fish Observation Areas

Some people visit the Christmas Islands primarily to observe fish in their natural environment. People who are diving or snorkelling like to see large fish, as well as an abundance of different species. This is important both for locals and as an attraction for visitors.

Local dive operators have highlighted that the abundance of sharks around the fringing reefs was a drawcard for diving around Christmas Island. In many parts of the world, the opportunity to dive with sharks is diminishing, as shark populations are overfished.

To ensure high quality diving experiences are maintained around Christmas Island, it is proposed that fishing for demersal species and sharks around key dive sites is discouraged.

Proposal 10: Fish observation areas

Comment is being sought from the local community on areas they believe should be managed primarily for the purpose of snorkelling and diving. Suggested locations include Flying Fish Cove.

6.3.5 Community Education Strategy

The future quality of the recreational fishing resource is dependent on the majority of community voluntarily complying with these fishing guidelines. A structured community education plan is needed to ensure the community is informed of the reasons for management decisions.

The plan should also seek to help develop broad community recognition of the value of fishing, as well as promote community support for responsible fishing behaviour and key management initiatives.

Proposal 11: Education and voluntary compliance

The following proposals are recommended for education and voluntary compliance.

Proposal 11a: Fishing Guide

A brochure on Recreational Fishing Guidelines on Christmas Island to inform and educate local and visiting fishers about recreational fishing management, and to promote stewardship for fish stocks and the environment. All guides and educational material could be available in Chinese, Malay and English.

Proposal 11b: Educational resource materials

Practical educational tools such as fish measuring rulers, measuring gauges for rock lobster and crabs, adhesive bag limit guides should be produced to support the Christmas Island fishing guidelines.

Proposal 11c: Schools program

A school education program to promote awareness of fishing guidelines, the need to protect breeding stocks, and the best methods for handling fish.

6.3.6 Fishing Competitions

Fishing competitions are held between the islands residents on a regular basis. The Department of Fisheries recognises that these competitions have value as a social activity for the community. To ensure these competitions are conducted with an

appropriate conservation ethos, the Department supports establishing a code of conduct for fishing competitions.

Proposal 12: Fishing Competitions

A code of conduct should be established for fishing competitions which includes the following elements:

- The competition should be limited to edible species only.
- Promote species based competitions rather than heaviest bag.
- Dumping of any fish should not be condoned.
- Fish should be stored in a way to ensure they are kept in the best possible quality for eating.

6.4 Future Management Arrangements for the Charter Industry

Charter activities in the Indian Ocean Territories have been low-key, *ad-hoc* operations that have reflected the small annual tourism flow.

Typically, charter operations have been set up by island residents to supplement other income. However, because of the fact that residents on Christmas Island have access to boats for recreational fishing, coupled with the high cost of getting to the island limiting the flow of tourism clientele, the demand for charter activities is not, at this point, constant enough to provide a steady income stream for more than a couple of operators.

Historically, there has not been any legislative or policy control over charter operations on Christmas Island. Consequently, in the past operations have set up, operated for a period and ceased, without record being kept of their existence.

In 2003 there were two dive tour operators, both eco-tour in their focus and totally non-extractive, catering to the European and Japanese dive-tour market. A third operator ran fishing charters part of the time and fished commercially for the remainder.

In Western Australia, the aquatic tour (charter) industry has been under licensing and management arrangements since 2001. These arrangements limit the number of charter licences, set environmental and safety criteria, and require licence holders to fill in research logbooks that detail fishing catch and effort.

Regulations set out the industry's rights and responsibilities, while a Ministerial Policy Guideline sets out criteria against licence applicants can be assessed. It is envisaged that a similar arrangement would ultimately be adopted for both Christmas and Cocos Islands, however both the regulations and the guidelines would be tailored to meet the environmental, social and economic requirements of the communities.

APPENDIX 1 SUMMARY OF COCOS (KEELING) ISLANDS RECREATIONAL FISHING STRATEGY – BAG AND SIZE LIMITS

COCOS (KEELING) ISLANDS BAG AND SIZE LIMITS			
CATEGORY ONE - HIGHEST RISK			
MIXED DAILY BAG LIMIT - 7 PER ANGLER			
Species are generally long-lived, slow-growing, mature at four-plus years, form semi-resident populations, are vulnerable to localised depletion due to their life history, or are of low abundance or highly targeted.			
SPECIES	SCIENTIFIC NAME	MINIMUM LEGAL SIZE	BAG LIMIT
Billfish (sailfish, swordfish, marlins) Ikan Layar dan Ikan Pedang	Families Istiophoridae and Xiphiidae	N/A	1
Coral trout and coronation trout (combined bag limit) Ikan Gelek Burik dan Ikan Gelek Berekor	<i>Plectropomus</i> spp. and <i>Variola louti</i>	450mm	2
Hump headed maori wrasse – greenfish Ikan Hiju	<i>Cheilinus undulatus</i>	N/A	2
Wahoo, mahi mahi (dolphinfish), yellowfin tuna and dogtooth tuna – combined bag limit Ikan Tengiri, Ikan Dolfin dan Ikan Tuna	<i>Acanthocybium solandri</i> , <i>Coryphaena hippurus</i> , <i>Thunnus albacares</i> and <i>Gymnosarda unicolor</i>	Wahoo (Ikan Tengiri)– 900mm	4
CATEGORY TWO - MEDIUM RISK			
MIXED DAILY BAG LIMIT - 16 PER ANGLER			
Species generally mature at two to three years, are of moderate abundance, are highly targeted and often found in the protected habitat of the islands lagoons.			
SPECIES	SCIENTIFIC NAME	MINIMUM LEGAL SIZE	BAG LIMIT
Bone fish Ikan Bangang	<i>Albula</i> spp.	N/A	4
Bonito and tunas – (other) Ikan Tuna	Family Scombridae	N/A	8
Cod – combined Gerapu Atau Ikan Gelek	Family Serranidae	N/A	8
Dart Ikan Bawal	<i>Trachinotus</i> spp.	N/A	8
Parrot fish – napoleon fish Ikan Dongol	Family Scaridae	N/A	8
Snapper, sea perch and emperors - including sweetlip, redthroat, paddletail and moses perch – combined bag limit Ikan Kapkuning, Ikan Merah, Ikan Raja dan Ikan Karang	<i>Lethrinus</i> spp. and <i>Lutjanus</i> spp.	280mm	8
Recreational Fishing Guide – Cocos (Keeling) Islands			

COCOS (KEELING) ISLANDS BAG AND SIZE LIMITS

CATEGORY THREE - LOW RISK

MIXED DAILY BAG LIMIT - 40 PER ANGLER

Species generally mature at one to two years, are of high abundance, distributed widely and generally pelagic. Species not listed have little known about their biology or abundance and are generally not targeted by anglers.

SPECIES	SCIENTIFIC NAME	BAG LIMIT
Garfish <i>Ikan Julung-Julung</i>	Family Hemirhamphidae	40
Mullet, sea <i>Ikan Belanak</i>	<i>Mugil cephalus</i>	40
Mullet, diamond scale <i>Ikan Sayap Hitam</i>	<i>Liza vaigiensis</i>	30
Rabbit fish <i>Ikan Menyerat</i>	<i>Siganus</i> spp.	40
Silveries <i>Ikan Bodas</i>	<i>Gerres</i> spp.	40
All other unlisted species of fish		40

CRUSTACEANS AND SHELLFISH

Species are often sedentary or resident in nature, but may have pelagic or migratory phases in their life cycle, with larvae or eggs widely distributed by ocean currents. Specific regulations apply to each species, based on biological characteristics. Low catch limits apply to shellfish due to the high risk of localised depletion.

SPECIES	SCIENTIFIC NAME	MINIMUM LEGAL SIZE	BAG LIMIT	BOAT LIMIT#
CRUSTACEANS				
Mud crab <i>Rajunan</i>	<i>Scylla</i> spp.	150mm carapace	5	10
Rock lobster <i>Udang dan Udang Galah</i>	<i>Panulirus</i> spp	76mm carapace	4	8
Slipper lobsters <i>Udang Lepoh</i>	<i>Scillarides</i> spp.		4	8
Ghost, hermit and sand crabs – All other crab species	Families <i>Ocypodidae</i> , <i>Diogenidae</i> and <i>Portunidae</i>		20	
MOLLUSCS AND OTHER REEF ANIMALS				
All species of edible mollusc including gong gong and turban shell – combined bag limit <i>Siput Kepala biola</i>	Class Gastropoda Inc Families <i>Strombidae</i> and <i>Turninidae</i>		9 litres* - In shells	
Squid and large octopus – combined bag limit <i>Sotong dan Gerita</i>	Class Cephalopoda		15	
Small octopus caught during doldrums	<i>Octopus</i> spp.		9 litres*	

*9 litres is approximately 1 standard sized bucket full.

APPENDIX 2 LIST OF KNOWN FISH SPECIES AT CHRISTMAS ISLAND

Malay Name	Common Name	Species Name
<i>Ikan puteh besar:</i> Ikan puteh bongkok (hitam) Ikan puteh biru Ikan puteh kayu Ikan puteh	<i>Large trevallies:</i> Black trevally Bluefin trevally Giant trevally Other trevallies in the genus	<i>Carangidae:</i> <i>Caranx lugubris</i> <i>Caranx melampygus</i> <i>Caranx ignobilis</i> <i>Caranx</i> spp.
<i>Ikan Lumadang:</i> Ikan lumadang	<i>Dolphinfish:</i> Dolphinfish	<i>Coryphaenidae:</i> <i>Coryphaena hippurus</i>
<i>Ikan alon tasek:</i> Alon tasek	<i>Dog-tooth Tuna:</i> Dog-tooth tuna	<i>Scombridae:</i> <i>Gymnosardia unicolor</i>
<i>Salaman:</i> Salaman karang Salaman biru Salaman kuning Salaman Ikan tanther Ikan nonya ('brazil') Ikan merah ayer dalam Ikan lala ayer dalam Salaman karang kuning	<i>Snappers:</i> Small-toothed jobfish Green jobfish Yellow margined seaperch Maori (blubberlip) seaperch Blackspot snapper Bluestripe snapper Paddletail Blue snapper Goldflag jobfish	<i>Lutjanidae:</i> <i>Aphareus rutilans</i> <i>Aprion virescens</i> <i>Lutjanus fulvus</i> <i>Lutjanus rivulatus</i> <i>Lutjanus fulviflamma</i> <i>Lutjanus kasmira</i> <i>Lutjanus gibbus</i> <i>Paracaesio sordidus</i> <i>Pristipomoides auricilla</i>
<i>Salaman air dalam:</i> Salaman merah Salaman merah Salaman merah Ikan merah besar Ikan krisi Salaman karang	<i>Deepwater snappers:</i> Ruby snapper Ruby snapper Pale snapper Red bass Oblique banded snapper Rosy snapper	<i>Lutjanidae:</i> <i>Etelis coruscans</i> <i>Etelis carbunculus</i> <i>Etelis radiosus</i> <i>Lutjanus bohar</i> <i>Pristipomoides zonatus</i> <i>Pristipomoides filamentosus</i>
<i>Kerapu:</i> Kerapu nonya Kerapu nonya Kerapu cicak Kerapu cicak Kerapu cicak Kerapu cicak Kerapu cicak Kerapu kuning Kerapu kuning	<i>Cods:</i> Strawberry cod Orange cod White-lined cod Spotty cod Reef cod Honeycomb cod Wirenetting cod Brownback cod Deepsea cod	<i>Serranidae:</i> <i>Cephalopholis spiloparea</i> <i>Cephalopholis analis</i> <i>Anyperodon leucogrammicus</i> <i>Epinephelus spilotoceps</i> <i>Epinephelus tauvina</i> <i>Epinephelus merra</i> <i>Epinephelus hexagonatus</i> <i>Epinephelus retouti</i> <i>Saloptia powelli</i>
<i>Kerapu air dalam:</i> Kerapu merah Kerapu puteh (morrhua) Kerapu bintang Kerapu bintang Kerapu hitam Kerapu boronok	<i>Deepwater cods:</i> Blacktipped cod Comet cod Sixband cod Coral cod Peacock cod Lunar-tailed cod	<i>Serranidae:</i> <i>Epinephelus fasciatus</i> <i>Epinephelus morrhua</i> <i>Epinephelus sexmaculatus</i> <i>Cephalopholis miniatus</i> <i>Cephalopholis argus</i> <i>Variola louti</i>

Ikan belang:

Ikan gigi orang
Ikan belang
Ikan belang

Deepwater Fish:

Sepat
Batik
Ikan merah
Samsing (gangsters)

Pelagic Fishes:

Ikan terbang
Ikan benggol
Coco lendih
Salaman putih
Ikan talang
Ikan tongkol (Alon kuning)
Ikan alon
Tengiri belang

Crustaceans:

Udang
Udang biasa (hijuh/hijau)
Udang galah
Udang lepeh

Emperors & Sweetlips:

Large-eyed seabream
Oriental Sweetlips
Dusky sweetlips

Deepwater Fish:

Cave Sweeper
Glass Big-eye
Soldier fishes
Squirrel fishes

Pelagic Fishes:

Flying fishes
Mackerel scad
Island trevally
Rainbow runner
Queenfish
Yellowfin Tuna
Big Eye Tuna
Wahoo

Crustaceans:

Green crayfish
Painted crayfish
Ornate ('leopard') crayfish
Spanish lobster ('bug')

Lethrinidae/Haemulidae:

Monotaxis grandoculis
Plectorhinchus gibbosus
Plectorhinchus gibbosus

Species Name:

Pempheris oualensis
Heteropriacanthus cruentatus
Myripristis and *Plectrypops* spp.
Sargocentron spp.

Species Name:

Cypselurus spp.
Decapterus macarellus
Camgoides orthogrammus
Elegatis bipinnulata
Scomberoides lysan
Thunnus albacares
Thunnus obsesus
Acanthocybium solandri

Species Name:

Panulirus pencillatus
Panulirus versicolor
Panulirus ornatus
Parribacus antarcticus

List of Fisheries Management Papers

Not all have been listed here. A complete list is available online at <http://www.fish.wa.gov.au>

- 141 Fish Protection Measures in Western Australia (June 2001)
- 142 Fisheries Environmental Management Plan for the Gascoyne Region (June 2002)
- 143 Western Rock Lobster. Discussion paper for seasons 2001/2002 and 2002/2003 (July 2000)
- 144 The Translocation of Brown Trout (*Salmo trutta*) and Rainbow Trout (*Oncorhynchus mykiss*) into and within Western Australia. Prepared by Jaqueline Chappell, contributions from Simon Hambleton, Dr Howard Gill, Dr David Morgan and Dr Noel Morrissey. (not published, superseded by MP 156)
- 145 The Aquaculture of non-endemic species in Western Australia - Silver Perch (*Bidyanus bidyanus*). As amended October 2000. Tina Thorne. This replaces Fisheries Management Paper No. 107.
- 146 Sustainable Tourism Plan for the Houtman Abrolhos Islands (February 2001)
- 147 Draft Bycatch Action Plan for the Shark Bay Prawn Managed Fishery (Full Report) (April 2002)
- 148 Draft Bycatch Action Plan for the Shark Bay Prawn Managed Fishery (Summary Report) (April 2002)
- 149 Final Plan of Management for the Lancelin Island Lagoon Fish Habitat Protection Area (March 2001)
- 150 Draft Plan of Management for the Cottesloe Reef Proposed Fish Habitat Protection Area (April 2001)
- 151 Inventory of the Land Conservation Values of the Houtman Abrolhos Islands (July 2003)
- 152 Guidelines for the Establishment of Fish Habitat Protection Areas (June 2001)
- 153 A Five-Year Management Strategy for Recreational Fishing on the West Coast of Western Australia. Final Report of the West Coast Recreational Fishing Working Group (August 2001).
- 154 A Five-Year Management Strategy for Recreational Fishing in the Gascoyne. Final Report of the Gascoyne Recreational Fishing Working Group (September 2001)
- 155 Plan of Management for the Cottesloe Reef Fish Habitat Protection Area (September 2001)
- 156 The Translocation of Brown Trout (*Salmo trutta*) and Rainbow Trout (*Oncorhynchus mykiss*) into and within Western Australia (June 2002)
- 157 Policy for the Implementation of Ecologically Sustainable Development for Fisheries and Aquaculture within Western Australia. By W.J. Fletcher (May 2002)
- 158 Draft Plan of Management for the Miaboolya Beach Fish Habitat Protection Area (March 2002)
- 159 The Translocation of Barramundi (*Lates calcarifer*) for Aquaculture and Recreational Fishery Enhancement in Western Australia. By Tina Thorne.
- 160 The Introduction and Aquaculture of Non-endemic Species in Western Australia: the 'Rotund' Yabby *Cherax rotundus* and the All-male Hybrid Yabby. A Discussion Paper. (June 2002)
- 161 Plan of Management for the Miaboolya Beach Fish Habitat Protection Area (September 2002)
- 162 Re seeding of grazing gastropods and bivalves into the marine environment in Western Australia – a discussion paper. By Jane Borg.
- 163 Review of recreational take of coral in Western Australia – a discussion paper October 2002.
- 164 Report of the Mackerel Independent Advisory Panel to the Executive Director, Department of Fisheries, on criteria for access to, and management arrangements for, the proposed Mackerel Fishery (Interim) Management Plan (November 2002)
- 165 Report to the Minister for Agriculture, Forestry and Fisheries by the Integrated Fisheries Management Review Committee (November 2002)
- 166 Fisheries Statutory Management Authority Inquiry. A background paper (February 2003)
- 167 Draft Fisheries Environmental Management Plan for the Northern Region (in press)
- 168 Aboriginal Fishing Strategy: Report to the Minister for Agriculture, Forestry and Fisheries by the Hon E. M. Franklin QC, Chairman of the Aboriginal Fishing Strategy Working Group (May 2003)
- 169 Hardy Inlet discussion paper (February 2004)
- 170 Management of the proposed Geopraphe Bay Blue Swimmer and Sand Crab Managed Fishery. By Jane Borg and Cathy Campbell (August 2003)
- 171 Draft Aquaculture Plan for Shark Bay (April 2004)
- 172 Draft Aquaculture Plan for Exmouth Gulf (April 2004)
- 173 Draft Plan of Management for the proposed Point Quobba Fish Habitat Protection Area (August 2003)
- 174 Translocation of Golden Perch, Murray Cod and Australian Bass into and within Western Australia for the Purposes of Recreational Stocking, Domestic Stocking and Commercial and Non-commercial Aquaculture (December 2003)
- 175 Fish Stock and Fishery Enhancement in Western Australia - a discussion paper. By Jane Borg (February 2004)
- 176 Fish Stock and Fishery Enhancement in Western Australia - a summary report. By Jane Borg (February 2004)
- 177 Fisheries Environmental Management Plan for the Gascoyne Region (in press)
- 178 Draft Plan of Management for the Kalbarri Blue Holes Fish Habitat Protection Area (March 2004)
- 179 A Draft Policy for the Translocation of Brown Trout (*Salmo trutta*) and Rainbow Trout (*Oncorhynchus mykiss*) into and within Western Australia for the Purposes of Recreational Stocking, Domestic Stocking and Commercial and Non-Commercial Aquaculture (August 2004)
- 180 The Sustainable Management of Western Australia's Temperate Shark Fisheries (July 2004).
- 181 A Quality Future for Recreational Fishing in the Pilbara/Kimberley. Proposals for Community Discussion. A five-year strategy for managing the recreational component of the catch, prepared by the Pilbara/Kimberley Recreational Fishing Working Group (July 2004)
- 182 A Quality Future for Recreational Fishing in the Southern Region of WA. Proposals for Community Discussion. A five-year strategy for managing the recreational component of the catch, prepared by the Southern Recreational Fishing Working Group (July 2004)
- 183 Final Report of the Fisheries Statutory Management Authority Advisory Committee. Published by the Department of Fisheries (in press)
- 184 South West Beach Seine Management Discussion Paper
- 185 Plan of Management for the Point Quobba Fish Habitat Protection Area (July 2004)
- 186 Management of the West Coast Rock Lobster Fishery - Advice to Stakeholders on Resource Sustainability Matters. (in press)
- 187 Proposals for community discussion on the future management of pink snapper fishing in Cockburn Sound and surrounding waters. (October 2004).
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- 190 Management Arrangements for the West Coast Commercial 'Wetline' Fishery. A Discussion Paper Prepared By The West Coast And Gascoyne Management Planning Panel (January 2005).
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- 192 Integrated Fisheries Management Report - Western Rock Lobster Resource (February 2005).
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- 195 Nature and Extent of Rights to Fish in Western Australia (June 2005).
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- 197 Proposed Implementation of Sea Lion Exclusion Devices in the Western Rock Lobster Fishery (June 2005). Internet publication.
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- 199 Management of the Proposed South Coast Trawl Fishery (August 2005).
- 200 Integrated Fisheries Management Draft Allocation Report for the Western Rock Lobster Resource (October 2005).
- 201 The Minister for Fisheries' Decisions in Response to the Final Report of the Pilbara/Kimberley Recreational Fishing Working Group (Fisheries Management Paper No. 193) (August 2005).
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- 204 Integrated Fisheries Management Report. Abalone Resource (September 2005).
- 205 Management Arrangements for the Gascoyne Commercial 'Wetline' Fishery. Prepared By The West Coast And Gascoyne Wetline Review Management Planning Panel (January 2006).
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- 207 Access And Allocation Arrangements For The Commercial 'Wetline' Fisheries. A Report To The Minister For Fisheries Prepared By The Commercial Access Panel (January 2006).
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- 209 Assessment of Western Rock Lobster Strategic Management Options. An Overview of Bio-Economic, Sociological and Comparative Analyses (Volume 1 of 4) (January 2006).
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- 215 The Granting, Renewal and Regulation of Aquaculture Leases in Western Australia. A discussion paper (May 2006).
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- 217 The Minister for Fisheries' Decisions in Response to the Final Report of the RFAC Recreational Freshwater Fisheries Stakeholder Sub-Committee on the Recreational Marron Fishery (Fisheries Management Paper No. 213) (June 2006).
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