



Australian Government

Department of the Environment and Heritage

Assessment of the
Queensland Rocky Reef Finfish Fishery

April 2005

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This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999*. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Australian Government.

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Assessment of the ecological sustainability of management arrangements for the Queensland Rocky Reef Finfish Fishery

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EXECUTIVE SUMMARY

Background

The Queensland Department of Primary Industries and Fisheries (DPI&F) has submitted a document for assessment under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The draft document *Ecological Assessment of the Rocky Reef Finfish Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in September 2004. The submission was released for a thirty-day public comment period that expired on 22 October 2004. Three public comments were received and DPI&F provided a response to the issues raised.

The submission reports on the Queensland Rocky Reef Finfish Fishery (RRFF) against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission, associated documents, public comments and DPI&F's response to the comments.

Table 1: Summary of the Queensland Rocky Reef Finfish Fishery

Area	The Fishery area includes the Great Barrier Reef Marine Park. Fishing effort is concentrated in southern Queensland waters from Baffle Creek (24.5°S) south to the New South Wales (NSW) border (the L1, L6 and L7 Queensland line fishery areas).
Target species	Snapper (<i>Pagrus auratus</i>), Pearl Perch (<i>Glaucosoma scapulare</i>) and Teraglin (<i>Atractoscion aequidens</i>).
Fishery status	Snapper considered overfished. Pearl Perch and Teraglin status unknown.
Byproduct species	Not limited. Generally pelagic species including kingfish, dolphin fish and amberjack. Fishers can retain the recreational bag limit of coral reef finfish, barramundi and spanish mackerel.
Gear	Rod and reel or hand line gear.
Season	There is no closed season for the fishery. Snapper catch is seasonal with higher catches in winter to early summer.
Commercial harvest 2003	229 tonnes (t) – including 170 t of target species.
Recreational harvest	Considered to be greater than the commercial harvest. The 2001 National Recreational and Indigenous Fishing Survey (NRIFS) estimates 309 t of snapper is harvested in Queensland.
Charter harvest 2003	40 t of RRFF species.
Indigenous harvest	Not quantified but DPI&F considers it to be small.
Commercial endorsements as at 2004	The fishery consists of fishers holding L1, L6 or L7 area endorsements. There are currently 1531 such endorsements. Approximately 100 of these were active in 2004.
Management arrangements	Output controlled through size limits for target species. Input controlled through limited entry, vessel restrictions, gear restrictions and closed areas. For further detail see Table 2.
Export	Not currently exporting.

Bycatch	Not quantified.
Interaction with Threatened Species	Grey nurse shark, marine turtles.

The area of the fishery includes the Great Barrier Reef Marine Park (GBRMP), but effort is concentrated in southern Queensland waters from Baffle Creek (24.5°S) south to the NSW border. Fishing effort is focused on the primary habitat of the target species (bands of rocky reefs running roughly parallel to the coast to depths of approximately 150 m). Part of the fishery area is in Commonwealth waters however the entire fishery is managed by Queensland under an Offshore Constitutional Settlement (OCS) between the Australian Government and the Government of Queensland.

The main species targeted are snapper, pearl perch and teraglin. Snapper is considered growth and recruitment overfished. The status of pearl perch and teraglin is uncertain although there is some concern that Pearl Perch may be growth overfished. Snapper comprises approximately 70% of the targeted catch, pearl perch approximately 25% and teraglin the remainder.

Snapper are widely distributed throughout southern Australian coastal waters. The Queensland distribution extends south of Mackay to the NSW border¹. Snapper are found in coastal waters and on the continental shelf to depths of about 200 m. Juveniles preferentially inhabit inshore waters before moving offshore at maturity. Snapper live for approximately 15 years and become sexually mature at three years of age. The species grows to at least 130 cm and can weigh up to 20 kg, however specimens larger than 8 kg are rarely seen in Queensland waters². Queensland snapper populations spawn during winter and have significantly lower fecundity than New Zealand snapper. The catch of snapper in NSW and Queensland is dominated by the harvest of individuals very close to the minimum size of 35 cm, of around two and three years of age. The Queensland and NSW populations of snapper are heavily exploited compared to other jurisdictions³.

Pearl perch are endemic to eastern Australia, occurring from the central Queensland coast to the central NSW coast in waters up to 90 m deep. They are a demersal species that are generally associated with rocky reef habitats on the continental shelf. Pearl perch are deep bodied fish that grow up to 70 cm and weigh up to 7 kg. They mature at 20-35 cm in length. Pearl perch are opportunistic carnivores that feed on a variety of prey, including cephalopods and small crustaceans.

Teraglin grow up to 20 kg and 130 cm in length, maturing at two years of age and approximately 61 cm in length. Teraglin are found in offshore waters schooling over gravel or broken reef in depths of 20 – 80 m. This species has been caught offshore from Eden on the southern border of NSW to the Torres Strait, however the majority of catch occurs between Sydney and Rockhampton. Their global distribution extends to the Eastern Atlantic region, the Western Indian Ocean and the Eastern Indian Ocean.

The total estimated catch landed by commercial fishers in the RRFF was 229 t in 2003. The three target species comprise 170 t of the total catch. The remaining catch consisted of byproduct species, primarily coral reef finfish and pelagic species including black kingfish, dolphin fish, yellowtail kingfish, amberjack, Samson fish and silver trevally. Following the introduction of the Coral Reef Finfish Fishery (CRFF) Management Plan on 1 July 2004, RRFF fishers now require coral reef finfish quota in order to retain the species which were formerly taken under RRFF licences. In addition, RRFF fishers can only retain spanish mackerel if they hold an ‘SM’ symbol and quota.

¹ Grant, 1982

² IBID

³ Ferrell & Sumpton, 1993

Harvest taken under these authorities and quotas are considered in the DEH assessments of the CRFF and East Coast Spanish Mackerel Fishery (ECSMF).

Data on the historical development of the RRFF is limited, however early reports indicate large catches of snapper were taken from offshore reefs in southern Queensland in the late 1800s. By the 1950s there was evidence that catches of large snapper were declining, being replaced by catches of squire (juvenile snapper). However, the level of fishing effort was not recorded for this period.

In 1984, in response to changes in catch composition, commercial fishing boat licenses were limited and a restriction on further primary boat licences was introduced. Prior to this time there were no restrictions on the issue of commercial fishing licences. A general freeze on the granting of new tender boat licences was implemented in 1987, as was an OCS for the fishery which delegated management of rocky reef finfish species from the Australian Government to the Queensland Government. Since this time a number of changes have taken place including amendments to the line fishery endorsements (L) to area based endorsements (L1-L9). In addition, new minimum/maximum size limits and recreational bag limits were introduced in 1993 and again in 2002.

In response to concern over target species stock status, an investment warning for the RRFF was issued in 2003 stating that expansion of fishing effort or increased investment would not be recognised in assessing new or continued access to the fishery following implementation of any new management arrangements in the future. In addition, the catch of coral reef finfish and Spanish mackerel was limited to the recreational bag limits on 1 July 2004 under the introduction of species based management plans for these fisheries.

Rocky reef finfish species are taken either with handline (favoured by commercial operators) or by rod and reel. In offshore waters, the rigs usually consist of lead sinkers of 100 g to 1 kg with no more than six 3/0 to 7/0 hooks (either individually or ganged) positioned above the sinker. Large snapper are usually taken using 'floaters', a rig comprising a running ball sinker (usually No 8) and ganged hooks. Sea and wind conditions along with current speed and direction also play an important role in determining the type of fishing gear and fishing strategy used.

Management measures in the RRFF include limited entry, size limits, spatial restrictions, gear restrictions and vessel restrictions, as detailed in Table 2. Operators in the fishery are required to hold an L1 fishery symbol, or L6 and L7 fishery symbol. There are currently 1531 commercial endorsements in the fishery and approximately 100 were active in 2004. Commercial operators may take any finfish, but are restricted by minimum size limits on many species and recreational bag limits on coral reef finfish, barramundi and spanish mackerel. All commercial fishers are prohibited from taking Great White Sharks and Grey Nurse Sharks, and from fishing within Grey Nurse Shark habitat protection areas.

The level of bycatch in the RRFF has not been documented. Anecdotal information suggests that bycatch is largely composed of target and byproduct species that are released, generally alive. Fish that are released may include those that are illegal due to size or take restrictions, less valuable, or dangerous to handle or eat. Changes in size and bag limits for both target and byproduct species have contributed to changes in the abundance and composition of bycatch in this fishery.

Limited information has been collected on the fishery's interaction with protected or listed species. Great White Sharks and Grey Nurse Sharks occur in the area of the fishery and there is significant overlap of habitat with the target species. Grey Nurse Sharks are listed as Critically Endangered under the EPBC Act and Great White Sharks are classified as Vulnerable. Maori wrasse, which is listed as Vulnerable under the IUCN Red List of Threatened Species and is listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), is

also present in the area of the fishery. Marine turtles occur in the area of the fishery and interaction is considered possible but rare. There is also potential for a number of listed seabird species present in the fishery to interact with fishing gear. These interactions are assessed further under Principle Two of this report. It is prohibited to retain any of these species in the RRFF.

Most species taken in the RRFF are also targeted by the recreational fishing sector. The recreational sector harvest is considerably greater than that of the commercial sector. Information on recreational take has been derived from Recreational Fishing Information System (RFISH) surveys and the 2001 NRIFS⁴. The RFISH surveys found that approximately 75% of saltwater recreational fishing in Queensland occurs in the waters of the RRFF⁵ where it is estimated that approximately 1.3 million snapper are caught annually, with approximately 0.8 million of these fish being released. RFISH also estimated that 110,000 pearl perch were caught in Queensland waters and 44,000 released. The NRIFS estimated snapper catch in Queensland to be significantly lower with 232,354 fish taken, weighing approximately 309 t.

The number of charter tour boats licensed to operate in the area of the RRFF has increased from 7 in 1994 to 201 in 2003, however public comment indicated that many of these licences may not be active. Harvest in the charter tour sector has varied greatly between 1993 and 2003 with no significant upward or downward trend since 1996. The charter tour sector harvest of the three main target species in 2003 included 25 t of snapper, 11 t of pearl perch and 4 t of teraglin.

There are no reliable estimates of the number of Indigenous participants in the RRFF at present.

The fishery is managed under the Queensland *Fisheries Act 1994* and the Queensland *Fisheries Regulation 1995*. There is currently no management plan in place for the fishery.

Overall assessment

The material submitted by DPI&F demonstrates that the management arrangements for the RRFF meet most of the requirements of the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. In the assessment of the ecologically sustainable management of the RRFF, DEH has identified a number of risks that must be managed to ensure that their impacts are minimised, including:

- reliance of the fishery on snapper, which is considered to be overfished and does not have a recovery strategy in place;
- the absence of robust stock assessments for any of the target species and a lack of adequate and reliable data appropriate to the scale of the fishery on catch and effort collected from all sectors of the fishery;
- limited knowledge or management of bycatch and byproduct species;
- a lack of clear fishery specific objectives, robust performance measures and a clear process and timeframe for management action when performance measures are not met;
- significant harvest of target species in adjacent fisheries, and by the recreational and charter sectors; and
- the absence of formal cross-jurisdictional management arrangements for target species.

Recommendations to address these issues have been developed to ensure that the risk of impact on the ecosystem of the RRFF is minimised in the longer term. Through the implementation of the recommendations and the continuation of a responsible attitude to the management of the fishery, management arrangements are likely to be sufficiently precautionary and capable of controlling,

⁴ Henry and Lyle, 2003

⁵ Higgs and McInnes, 2003

monitoring and enforcing the level of take from the fishery while ensuring the stocks are fished sustainably.

The current management regime, in association with commitments to strengthen the management of the fishery, aims to ensure that fishing in the RRFF is conducted in a manner that leads to the recovery of over-fished species and minimises the impact of fishing operations on the structure, productivity, function and biological diversity of the ecosystem. Through the implementation of **Recommendation 10**, DPI&F have agreed to develop a stock recovery strategy for those stocks that are considered overfished. On balance, the fishery is being managed in an ecologically sustainable manner and is working to address existing problems and minimise environmental risks.

The operation of the fishery is consistent with the objects of Part 13A of the EPBC Act. Given the current management arrangements, and a commitment by DPI&F to implement the DEH recommendations and work toward rebuilding depleted stocks, DEH considers that the fishery will not be detrimental to the survival or conservation status of the taxon to which it relates in the short term. Similarly, it is not likely to threaten any relevant ecosystem in the short term. DEH therefore recommends that the fishery be declared an approved Wildlife Trade Operation (WTO) with the actions specified in the recommendations to be undertaken by DPI&F to contain the environmental risks in the long term. DEH considers that the fishery, as managed in accordance with commitments to strengthen the management regime is not likely to cause serious or irreversible ecological damage over the period of the export decision. Specifically, the WTO declaration would allow the export of product from the fishery for a period of three years. The WTO declaration will require regular reporting on the progress of implementing the recommendations of this report and other managerial commitments.

As the fishery area encompasses Commonwealth as well as State waters, consideration under Part 13 of the EPBC Act is required regarding the impact of the fishery on listed threatened species, listed migratory species, cetaceans and listed marine species. Protected species occurring in the fishery area include Grey Nurse Sharks, Great White Sharks, marine turtles, and seabirds. The actual and potential impact on Part 13 species under the management arrangements is considered low and adequate protection is provided. There are no listed threatened ecological communities in the fishery area.

DEH recommends that the Queensland *Fisheries Regulation 1995*, to the extent that the Regulation relates to the management of the RRFF, be declared an accredited management plan under Sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the management regime relates does not, or is not likely to, adversely affect the survival in nature of listed threatened species or a population of that species, or the conservation status of a listed migratory species, cetacean species or listed marine species or a population of any of those species. DEH also considers that the management regime requires that all reasonable steps are taken to avoid the killing or injuring of protected species, and the level of interaction under current fishing operations is low. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the management regime, would not be expected to have a significant impact on a listed threatened species or listed migratory species protected by the EPBC Act.

The assessment also considered the possible impacts on the World Heritage values of the GBRMP World Heritage Area (WHA). DEH notes that while the fishery area incorporates the GBRMP, fishing effort predominantly occurs south of the GBRMP. In addition, some areas of the fishery are subject to fishing closures through marine park zoning established under the Commonwealth *Great Barrier Reef Marine Park Act 1975* and the *Marine Parks Act 1982*, and serve to protect areas of the WHA from the impacts of this fishery. The recent re-zoning of the GBRMP has also increased the extent of areas closed to fishing, providing further protection. On this basis, DEH considers that an

action taken by an individual fisher, acting in accordance with the fishery management regime, would not be expected to have a significant impact on the World Heritage values of the GBRMP WHA.

The implementation of recommendations and other commitments made by DPI&F in the submission will be monitored and reviewed as part of the next DEH review of the fishery in three years time.

Recommendations

1. DPI&F to inform DEH of any intended amendments to the management arrangements that may affect sustainability of the target species or negatively impact on by-product, bycatch, protected species or the ecosystem.
2. By the end of 2006, DPI&F to develop fishery specific objectives linked to interim performance indicators and performance measures for target, by-product, bycatch, protected species and impacts on the ecosystem. Within three months of becoming aware that a performance measure has not been met, the DPI&F to finalise a clear timetable for the implementation of appropriate management responses.
3. From 2005, DPI&F to report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure, once developed.
4. DPI&F to conduct a compliance risk assessment of the RRFF and develop a strategy to implement key outcomes within two years.
5. DPI&F to continue to pursue collaborative management of shared rocky reef stocks with the AFMA and NSW DPIE.
6. DPI&F to develop and implement a robust system to validate commercial logbook reporting in the fishery within 18 months.
7. Within 18 months, DPI&F to develop a process to improve estimates of recreational take, which will be progressively implemented over the next 3 years.
8. DPI&F to develop a stock assessment program that considers all commercial, recreational, charter and indigenous harvest, provides information on the status of target species and estimates ecologically sustainable harvest levels for target species of the RRFF.
9. DPI&F to identify areas of localised depletion by the end of 2006, and progressively implement relevant mitigation measures over the next 3 years.
10. DPI&F to develop and implement a recovery strategy by the end of 2006 to actively promote the recovery of overfished RRFF target species to ecologically viable stock levels.
11. DPI&F to develop and implement a system sufficient to identify changes in the composition and quantity of bycatch, within two years.
12. Within one year, to support the implementation of the Species of Conservation Interest logbooks, DPI&F to ensure that an education program for fishers, both recreational and commercial, is developed and implemented, to promote the importance of protected species protection and accurate incident reporting.

PART I - MANAGEMENT ARRANGEMENTS

The RRF is managed by DPI&F. The management regime is described in the following documents, all of which are, or will be publicly available:

- the Queensland *Fisheries Act 1994*;
- the Queensland *Fisheries Regulation 1995*; and
- relevant Gazetted notices and licence conditions.

A number of other documents, including research reports, scientific literature and discussion papers are integral to the management of the fishery.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Because of the importance of the documents referred to above to DEH’s assessment of the fishery, an amendment could change the outcomes of the assessment and decisions stemming from it. Export decisions relate to the arrangements in force at the time of the decision. In order to ensure that these decisions remain valid, DEH needs to be advised of any changes that are made to the management regime and make an assessment that the new arrangements are equivalent or better, in terms of ecological sustainability, than those in place at the time of the original decision.

Recommendation 1: *DPI&F to inform DEH of any intended amendments to the management arrangements that may affect sustainability of the target species or negatively impact on by-product, bycatch, protected species or the ecosystem.*

A Reef Fisheries Management Advisory Committee (ReefMAC) was established in 1995 to advise DPI&F on appropriate management arrangements for the sustainable use of reef finfish (including RRF and coral reef finfish species) in Queensland. ReefMAC currently has 14 members, which represent a range of stakeholder groups including commercial, recreational and charter fishers, scientists, DPI&F, the Great Barrier Reef Marine Park Authority (GBRMPA), the Queensland Boating and Fisheries Patrol (QBFP) and DEH (observer). A conservation representative has now also been appointed to ReefMAC. Although ReefMAC does not currently include representatives from the Indigenous and general community sectors, DEH understand that DPI&F continually seeks involvement from these sectors both through participation in ReefMAC and other consultation activities.

Management of the fishery incorporates a sound range of consultative mechanisms and a clear commitment to effective consultation with a variety of stakeholders. DEH considers the level of consultation to be adequate and is confident that the management agency will continue to ensure interested parties are consulted appropriately.

Management of the fishery is based on a mixture of input and output controls. These controls are outlined in Table 2 below.

Table 2. Management controls in the RRF

Limited Entry	Limited to current endorsements: L1 1504 L6 7 L7 20
Minimum Size Limits	Snapper 35 cm Pearl perch 35 cm

	Teraglin 38 cm * Size limits are also in place for many byproduct species.
Bag Limits	<u>Commercial</u> : subject to varied recreational bag limits for coral reef finfish, barramundi and Spanish mackerel. <u>Recreational</u> : Possession limit of 5 for each target species.
Gear Limits	Restricted to manual or mechanically operated rod and reel or handlines. No more than three fishing lines and a maximum of six hooks may be used by any one person. The number of people fishing is not regulated.
Spatial Restriction	As outlined in the <i>Fisheries Regulation 1995</i> , primarily for Grey Nurse Shark protection.
Vessel Restrictions	Primary boats limited to 20 m. Tender fishing boats limited to 7 m. The number of tender boats is limited to the pre-1993 levels.

The fishery is guided by the objectives of the Queensland *Fisheries Act 1994* and does not have any fishery specific management objectives. DPI&F have identified the need to develop a management plan for the RRFF but have stated that its completion is not a priority and therefore it is not likely to occur for a number of years.

The current overfished status of a target stock calls for a precautionary and strategic approach to harvest in the fishery. The strategic management of a fishery is contingent on articulating the objectives for management of the fishery, and developing performance indicators and measures against which performance of the fishery can be assessed. Bearing in mind the likely timeframe for development of a management plan containing fishery specific measures, DEH recommends that DPI&F develop fishery specific management objectives linked to appropriate interim performance indicators and performance measures. Precautionary interim performance measures and indicators should be implemented while biologically based sustainable harvest levels are being investigated (see **Recommendation 8**). DEH would expect that these interim limits would evolve as more information becomes available to inform the ecologically sustainable management of the fishery.

In order to ensure that the breaching of a performance measure is responded to in a timely manner, DEH recommends that DPI&F finalise a clear timeframe for implementation of management responses within three months of a breach being detected.

Recommendation 2: *By the end of 2006, DPI&F to develop fishery specific objectives linked to interim performance indicators and performance measures for target, by-product, bycatch, protected species and impacts on the ecosystem. Within three months of becoming aware that a performance measure has not been met, the DPI&F to finalise a clear timetable for the implementation of appropriate management responses.*

Management of the fishery is reviewed by ReefMAC twice a year, however this review is rudimentary and is not strategically conducted against fishery specific management objectives and performance indicators, as these have not been developed (see Part II). DEH is concerned that insufficient time is allocated to the discussion of the management of the RRFF, given the current priority placed on the management of the CRFF. DEH considers it important that the MAC process allows adequate allocation of time, expertise and resources for the discussion of issues relating to the RRFF and encourages ReefMAC to regularly review the fishery's status and efficacy of management arrangements.

DPI&F regularly reviews the catch and effort data from the RRFF and irregularly publishes this information in the 'Fisheries Resource Condition and Trends Report' along with a summary of the status of the fishery and an assessment of potential sustainability problems. The development of fishery specific objectives, performance indicators and performance measures will allow DPI&F to conduct more strategic annual reviews of the status and management of the RRFF. DEH recommends that DPI&F continue to publicly report on the status of the fishery and to enhance the current analysis to include reporting against each performance measure, once developed.

Recommendation 3: *From 2005, DPI&F to report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure, once developed.*

Compliance and enforcement tools implemented in the fishery, by QBFP, include random at sea and port inspections to identify undersized catch and illegal fishing. Compliance risks in this fishery include inaccurate reporting of catch, effort and protected species interactions, possible black marketing of catch, and non-compliance with gear restrictions and bag and size limits. DEH is aware that QBFP are conducting risk assessments of compliance and enforcement for several fisheries to enable them to identify resource needs and the most effective responses. DEH believes that this risk assessment should be expanded to cover risks in compliance and monitoring in the RRFF.

Recommendation 4: *DPI&F to conduct a compliance risk assessment of the RRFF and develop a strategy to implement key outcomes within two years.*

Fishery dependent information relating to the target species is obtained through compulsory daily commercial fishing logbooks. Fishery independent information is collected in the fishery, however current programs are limited. Information collection systems, for target, byproduct and bycatch species, are discussed in detail in Part II of this report.

An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates is contained under Principle 2.

The spatial distribution of target species stocks in the RRFF is known to incorporate NSW and Commonwealth waters, where significant commercial and recreational harvest also takes place. DPI&F recognises the need to manage harvest of snapper along the east coast of Australia as a single genetic stock, and is working with the NSW Department of Primary Industries (DPIE) on cross-jurisdictional management. While there are no formal arrangements in place at this time, DPI&F reports that meetings between managers generally occur at least a couple of times each year while meetings between researchers occur on a regular, but informal, basis. Issues discussed at these meetings have included catch data from the commercial, recreational and charter sectors, comparisons of size and possession limits across jurisdictions and research and monitoring. DEH considers it essential that fisheries accessing shared stocks consider cross-jurisdictional issues in research, assessment and management as understanding and managing the cumulative impacts of the fisheries will be essential to rebuild and subsequently maintain the fishery at sustainable levels. DPI&F appears to be committed to working with NSW on collaborative management arrangements and DEH encourages DPI&F to continue to work cooperatively with both NSW DPIE and the Australian Fisheries Management Authority (AFMA) in managing the species of the RRFF throughout their range.

Recommendation 5: *DPI&F to continue to pursue collaborative management of shared rocky reef stocks with the AFMA and NSW DPIE.*

DEH considers that current management arrangements comply with all relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies

developed under that policy. DEH expects that DPI&F will also ensure compliance with any future plans or policies as they are developed. Specific measures being undertaken to meet with these requirements are discussed in Part II of the report.

No regional or international management regimes, to which Australia is a party, are of direct relevance to the fishery. The prime international regime affecting the fishery is the United Nations Convention on the Law of the Sea. The management regime essentially complies with this convention. Other international regimes are applicable to fisheries management but do not explicitly involve this fishery, for example the 1992 Convention on Biological Diversity and in particular the 1995 Jakarta Mandate requiring that, in relation to the sustainable use of marine and coastal biological diversity, the precautionary principle should apply in efforts to address threats to biodiversity. While these agreements are not specifically addressed in the submission, the fishery's compliance with their requirements can be assessed by examination of Part II of this report. The application of the International Convention for the Prevention of Pollution from Ships (MARPOL) to vessels operating in the fishery is explicitly discussed under Principle 2, Objective 3.

DEH considers it is incumbent on all authorities to develop a thorough understanding of the framework of national, regional and international agreements and their applicability to export-based fisheries for which they are responsible.

Conclusion

DEH considers that the RRF management regime is relatively well documented, publicly available and transparent, and is developed through a consultative process. The management arrangements are adaptable and DPI&F have committed to strengthen them in accordance with the recommendations to ensure that fishery specific objectives, performance indicators and performance measures are developed by which the effectiveness of the management arrangements can be measured, enforced and reviewed.

The management arrangements are capable of controlling the harvest through a combination of input and output controls appropriate to the size of the fishery. Periodic review of the fishery is provided for, as are the means of enforcing critical aspects of the management arrangements.

The management regime adheres to arrangements established under Australian laws and international agreements and would benefit from greater cross-jurisdictional cooperation on shared stock issues.

DEH considers that there is scope to further refine the management arrangements and has provided a number of recommendations for improvements in the longer term.

PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

Stock Status and Recovery

Principle 1: *‘A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover’*

Maintain ecologically viable stocks

Objective 1: *‘The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability’*

Information requirements

Fishery dependent data are obtained through compulsory daily commercial fishing logbooks submitted on a monthly basis. The logbook requires fishers to report fishing location, number of dories, number of fishing lines, total catch (kg), species retained and interactions with species of conservation interest. Current logbooks do not require the discarded component of the catch to be recorded. A companion logbook to collect more detailed information on interactions with protected species, the Species of Conservation Interest (SOI) logbook, has also been recently introduced. There are penalty procedures in place to encourage timely submission of logbook information.

Commercial logbook data is transferred to the Commercial Fisheries Information System (CFISH) database, which DPI&F uses to monitor all commercial catch reporting. DPI&F advises that logbook data is for the most part unvalidated, although quarterly compliance checks are undertaken on the CFISH database to identify anomalies in the data.

The current commercial logbook program does not include a reliable process to validate on-board catch information. Within its submission, DPI&F has identified the need to increase data validation in the logbook system and is investigating the implementation of on-board observer programs or validation through buyers’ returns. As management of the fishery relies heavily on accurate fishery dependent data, DEH is concerned with the lack of validation of catch and effort information, for both target and byproduct species, and therefore recommends that DPI&F develop and implement a system to validate commercial logbook data.

Recommendation 6: *DPI&F to develop and implement a robust system to validate commercial logbook reporting in the fishery within 18 months.*

Charter boat operators are required to complete a daily fishing log for each fishing day. The logbook records the locations fished, number of fishers, type of fishing (e.g. line fishing, speargun), species landed, number of fish kept and number of fish released. In addition, some individual charter operators maintain catch information as presented in public comment. DEH considers that DPI&F have sufficiently accurate data on charter harvest to inform management of the RRFF.

A number of surveys have been undertaken on the extent and harvest of recreational fishing in the area of the RRFF. The RFISH surveys implemented by DPI&F included telephone surveys in 1996, 1998 and 2001 and a voluntary fisher diary program during 1999 and 2001. Results from RFISH indicated that 1.3 million snapper are caught annually, with 0.8 million of these released. The 1999 survey estimated that 110,000 pearl perch were caught with 44,000 released. NRIFS also

encompassed the area of the fishery, however results varied considerably from the surveys undertaken by DPI&F with only 232,354 snapper (weighing approximately 309 t) estimated to be taken in Queensland waters. Although the different surveys produced vastly different estimates of recreational harvest, the results show that there is significantly higher snapper take in the recreational sector than in the commercial sector.

Due to the status of the snapper stocks, all harvest from these stocks must be considered in the management of the RRFF. It is therefore important that robust information on the recreational harvest is obtained for the purposes of ensuring the total catch is within sustainable levels. DEH therefore recommends that DPI&F develop a process to improve estimates of recreational harvest within the next 18 months, and progressively implement that process over the life of the export approval.

Recommendation 7: *Within 18 months, DPI&F to develop a process to improve estimates of recreational take, which will be progressively implemented over the next 3 years.*

Information on the indigenous fishing sector of the RRFF is limited. NRIFS data is not applicable to the RRFF as indigenous fishing surveys were only conducted in northern Queensland. The DPI&F has developed an 'Indigenous Subsistence Fishing Survey Kit', which is yet to be implemented in south east Queensland. DEH considers the indigenous harvest is likely to be minimal, however encourages DPI&F to improve harvest estimates to further inform the total harvest of RRFF species.

Fishery independent data collection in the RRFF is limited. There has been little research to date focusing on the RRFF and there is currently no independent monitoring of any of the target species by DPI&F. However, the biology and ecology of the main target species are relatively well understood as a result of studies undertaken elsewhere in Australia and New Zealand. DPI&F is working together with the Cooperative Research Centre (CRC) Reef to investigate the short and long term survival of tropical and subtropical finfish in line fisheries (FRDC Project 2003/019). This project and its application to management of bycatch in the RRFF is discussed in Principle 2, Objective 1.

A risk assessment has been undertaken on the vulnerability to overexploitation of species taken in the Queensland multiple hook fishery⁶. The study considered the species biology, behaviour and exposure to fishing pressure and found snapper to be at a very high risk to overexploitation and pearl perch to be at a moderate/high risk.

DEH is concerned with the lack of independent data collection, validation of fishery dependent information and specific research focussing on the RRFF. Data collection programs for the fishery should be reviewed to resolve these issues, with a robust fishery dependent data collection system the first priority (see **Recommendations 7 and 8**) so that management arrangements can be adjusted and appropriate performance criteria established. In the longer term DEH suggests DPI&F develop a strategic data plan to support the management needs of the RRFF.

Due to the common information needs and objectives of NSW, AFMA and Queensland in management of rocky reef species, DPI&F should cooperate with these jurisdictions on data collection and research efforts relating to the RRFF (see **Recommendation 5**).

Assessment

There have been no formal stock assessments undertaken for any of the target species in the RRFF. A yield per recruit analysis was undertaken in the mid 1990s to inform changes in minimum size

⁶ White & Sumpton, 2002

limits for target species. However this form of analysis is not regularly used in the fishery to monitor the status or abundance of target stocks.

Given the overfished status of snapper and the uncertain status of teraglin and pearl perch, DEH is concerned that no robust stock assessments have been conducted on any of these species and that management arrangements are not based on sustainable harvest levels. This concern was also raised in public comments.

Studies suggest that two of the main target species in the fishery, snapper and teraglin, form part of a single east coast stock (Ferrell and Sumpton 1993). A number of fisheries in Queensland and other states are known to harvest significant amounts of snapper and teraglin from these stocks, which was a point of concern in public comment submissions. DEH therefore believes that any stock assessment that is undertaken should also include consideration of mortalities from adjacent fisheries operating in Queensland, the Coral Sea and NSW. Analysis of stock status should also incorporate consideration of recreational, indigenous and charter take of RRFF species.

DEH recommends that DPI&F develop a stock assessment program for the RRFF that periodically examines the ecological sustainability of the management arrangements for target species. DEH considers that the stock assessment should be robust, in that it should use the best available information (e.g. logbook, research, observer, survey and historical fishery data), and provide sufficiently robust estimates of sustainable harvest levels of target species.

DEH considers the development of a stock assessment program a priority in the future ecologically sustainable management of the fishery and appreciates that implementation of such a program may take a couple of years. DEH will therefore monitor the progress of implementing this recommendation in the annual reports and at the next review of the fishery. Progress on improving the data available for the fishery, through the implementation of other recommendations, will also enhance DPI&F's ability to develop and implement a robust stock assessment program.

Recommendation 8: *DPI&F to develop a stock assessment program that considers all commercial, recreational, charter and indigenous harvest, provides information on the status of target species and estimates ecologically sustainable harvest levels for target species of the RRFF.*

DEH is concerned with the impact of discarding RRFF target species by both commercial and recreational operators on the total fishing-related mortality of these species. Through the implementation of **Recommendation 11** and the CRC post-release mortality project DPI&F are endeavouring to obtain estimates of this mortality. DEH expects that once obtained, DPI&F will incorporate this data in the stock assessment process and consider this mortality in the management of stocks.

There is very little information on the distribution and spatial structure of RRFF stocks. Logbook data provides limited information on the spatial distribution of catch and research undertaken on the main target species provides only broad distribution information. The snapper along the east coast of Australia have been found to form a single genetic stock (Ferrell and Sumpton 1993), however regional differences in age and size composition suggest changes to management arrangements will have different impacts regionally. Given the characteristics of some of the species taken in the fishery and the restricted habitat suitable for fishing (i.e. bands of rocky reefs), DEH is concerned at the possibility of localised depletion.

Tagging studies undertaken in Moreton Bay have indicated that snapper present within the bay only have a limited migration rate, whereas the offshore population may exhibit large migrations throughout the State and into NSW (Sumpton et al 2003). The vulnerability of different areas of the fishery to localised depletion may therefore vary and warrants further investigation, especially in

areas where there is overlap with the recreational sector. As acknowledged by DPI&F, monitoring of catch per unit effort data is not a good indicator for schooling species as depletion of localised populations may not be detectable.

Management response

The RRFF management regime incorporates a combination of input and output controls. These measures are outlined in Table 2. DEH notes that snapper is considered overfished and there is currently no robust stock assessment process in place that is linked to management arrangements. In addition, the fishery area encompasses a popular area for recreational harvest. Recreational snapper take is considered to be higher than the commercial take and there are known to be high levels of discarding of undersized snapper (also known as squire).

No specific biological reference points have been developed for RRFF species that would trigger management actions. Management intervention currently relies on the extent of catch rate decline based on logbook returns, the estimated role of fishing in that decline, and the known characteristics of the stock. DEH is concerned that, given the main target species is considered overfished, there is a lack of formal performance criteria incorporated into management arrangements (see **Recommendation 2**).

DPI&F have identified the need to improve the current management arrangements to ensure fish stocks are restored and maintained at sustainable levels. DEH is concerned that current management arrangements do not ensure that harvest is within ecologically sustainable levels. In particular DEH is concerned that current management arrangements primarily rely on the use of minimum size limits to control harvest levels and that there exists a large amount of latent effort in the fishery. This problem is exacerbated by the fact that there are no direct measures implemented in the RRFF to limit effort or the harvest of overfished stocks, and DEH considers that this should be a key aspect to any stock recovery process (see **Recommendation 10**). Under the current management arrangements latent effort poses a potential risk to the target species in the RRFF, however DEH considers that the suite of recommendations made in the assessment should ensure that this risk is removed from the fishery.

DEH has recommended that DPI&F develop a stock assessment process that will establish sustainable harvest levels for target species in the RRFF (see **Recommendation 8**). DEH recognises the time and resources required to conduct a robust stock assessment process but considers the need for harvest to be within precautionary levels to be urgent. DEH has therefore recommended that DPI&F develop fishery specific performance measures that include precautionary interim harvest levels while a robust stock assessment process is being developed (see **Recommendation 2**). To ensure harvest is reduced to within precautionary levels, DEH has recommended that DPI&F implement a recovery strategy for overfished species (see **Recommendation 10**). DEH notes that the recommended measures focus on the management of target species, however the establishment of management objectives, performance indicators and performance measures for byproduct species should ensure that any shift of effort to byproduct species is detected and appropriately responded to.

DEH considers it important that increased consideration is given to the spatial structure of species taken in the RRFF with regard to the fishing effort of all sectors in the fishery and the interconnectivity of stocks into other jurisdictions. As highlighted in Sumpton et al 2003, further investigation may also provide support for the implementation of spatial management measures in areas of limited migration, which could provide a source of recruitment for offshore stocks. DEH therefore recommends that DPI&F review the spatial characteristics of the fishery to identify areas of localised depletion by the end of 2006, with a view to progressively implementing measures to mitigate these impacts over the life of the export approval.

Recommendation 9: *DPI&F to identify areas of localised depletion by the end of 2006, and progressively implement relevant mitigation measures over the next 3 years.*

Byproduct in the RRFF includes all fish species retained by operators other than snapper, pearl perch and teraglin. Species now included as coral reef finfish under the CRFF Management Plan have comprised the majority of byproduct in the past followed by a number of pelagic species such as various mackerels, trevally and kingfish. Following the introduction of the CRFF and ECSMF Management Plans in July 2004, fishers can now only retain the recreational bag limit of these species. In addition, all species under these plans are subject to minimum size limits. RRFF fishers can obtain an authority and quota to retain coral reef finfish and Spanish mackerel species, however this harvest is managed as part of the CRFF and ECSMF, both of which are being assessed separately by DEH.

The current logbook provides for the recording of byproduct species that are retained. As mentioned previously however, there is currently no validation of this logbook data. Implementation of **Recommendation 6** will assist in validating the extent of byproduct taken in the fishery.

DEH considers it important that the amount and composition of byproduct is closely monitored to ensure that any potential issues can be detected and responded to with appropriate management arrangements. The implementation of **Recommendation 2** will ensure that changes in byproduct will be monitored against a strategic set of management objectives linked to performance indicators and performance measures.

Conclusion

DEH considers that the RRFF management regime is appropriately precautionary for the short term however there is a need to strengthen the management regime to minimise significant risks that exist in the fishery. DEH considers that there is scope to refine some of the existing information collection, assessment and management responses to ensure a structured management approach to the target and byproduct species in the RRFF.

DEH has provided a number of recommendations to address these management improvements in the longer term.

Promote recovery to ecologically viable stock levels

Objective 2: *‘Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes’*

Reliable historical catch data for snapper is scarce, however the Queensland Harbours and Marine Department was concerned about the depletion of snapper stocks as early as the 1950s. Records maintained by the Queensland Fish Board showed a significant increase in commercial catch of snapper during the late 1940s, which was followed by a decline in the 1950s, with the harvest of large snapper being replaced by smaller species. According to the submission, this trend is consistent with the ‘fish down’ of larger and older individuals from a previously lightly exploited stock. More recent CPUE data reveals a consistent declining trend for snapper, and both DPI&F and ReefMAC recognise that this reflects the overfished status of the stock. DEH considers that this recognition is a positive step forward and recognises that DPI&F have implemented some precautionary management measures for the RRFF in general. However, DEH is concerned that these measures are not specifically aimed at the recovery of the snapper stocks and, in particular, there is no mechanism in

place that limits effort or the total harvest of overfished stocks. A Management Plan has been proposed for the fishery to allow DPI&F to reduce catch and effort to levels that are considered sustainable, however this is likely to be a number of years from completion.

DEH considers the recovery of overfished stock in the RRFF to be a management priority, particularly given that the decline in snapper stocks appears to have been occurring for at least half a century, and recommends that DPI&F develop and implement a recovery strategy for overfished stocks in the RRFF. This recovery strategy should detail objectives and management measures for recovery of the target species with clear timeframes for implementation and review. In developing the strategy, DPI&F should incorporate management measures that will seek to reduce harvest to enable recovery of the stocks. Measures that should be reviewed and considered for the recovery strategy include, but are not limited to, spatial management, latent effort removal, changes to size limits, catch triggers and harvest limits.

Recommendation 10: *DPI&F to develop and implement a recovery strategy by the end of 2006 to actively promote the recovery of overfished RRFF target species to ecologically viable stock levels.*

Conclusion

The implementation of **Recommendation 10** in association with other recommendations to ensure the ecologically sustainable management of the fishery will provide greater confidence in DPI&F's ability to protect stocks from overfishing and to allow recovery to ecologically viable stock levels.

Ecosystem impacts

Principle 2: *'Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem'*

Bycatch protection

Objective 1: *'The fishery is conducted in a manner that does not threaten bycatch species'*

Information requirements

Historically, commercial fishers have not been required to report bycatch. Bycatch species and release rates are monitored for the recreational sector through the RFISH recreational fishing surveys, and for the charter sector through the compulsory CFISH logbooks. The commercial discard rate has not been quantified in detail for the fishery, however observers on commercial RRFF vessels have reported a discard rate under 10%.

DPI&F have advised that historically, the species comprising the majority of bycatch from the fishery are actually target species released or discarded because they are illegal due to size, subject to no-take restrictions, unwanted or undesirable due to economic reasons (i.e. less valuable), personal preference, safety reasons (i.e. dangerous to handle or eat due to size or toxicity) or beyond the storage capacity of the fisher/vessel.

DEH notes that the level of bycatch is anecdotally low but considers that this needs to be verified and monitored on an ongoing basis. DEH therefore recommends that DPI&F implement a mechanism that will allow composition and quantity of bycatch to be established and monitored on an ongoing basis. In addition, the mechanism should provide robust information on the amount of undersized target species being discarded which can be built into the stock assessment discussed in **Recommendation 8**. At a minimum, this mechanism should allow baseline bycatch data to be

obtained and allow monitoring sufficient to assess performance against the objectives, measures and indicators related to bycatch that are to be developed (see **Recommendation 2**).

Recommendation 11: *DPI&F to develop and implement a system sufficient to identify changes in the composition and quantity of bycatch, within two years.*

As part of the National Strategy for the Survival of Released Line Caught Fish, the DPI&F and CRC Reef in collaboration with the Australian National Sportfish Associations 'Suntag' program are investigating the short and long term survival of tropical and subtropical fish in line fisheries (FRDC Project 2003/19). Objectives of the study include identifying best practice handling procedures to increase survival rates and to develop more accurate assessments of cryptic mortality. DEH is concerned over the post release mortality of bycatch species in both the commercial and recreational sectors of the RRFF, particularly given the reliance of management on bag limits and minimum size limits. DEH commends the work being undertaken by DPI&F and other agencies on post-release mortality and DPI&F's ongoing commitment to this work and the implementation of outcomes.

Assessment

There has been little assessment of the risk to bycatch species in the RRFF. DPI&F believe that bycatch in the fishery mainly consists of discarded target species. DEH encourages DPI&F to work towards a risk assessment of bycatch species, which will be assisted through the implementation of **Recommendation 11**.

In addition, the outcomes of the post-release mortality project are expected to contribute to an understanding of those bycatch species most vulnerable to line fishing. DPI&F have committed to respond to the outcomes of the project in the development of appropriate management arrangements to reduce mortality of released fish. A preliminary assessment undertaken as part of the project has identified snapper and pearl perch as having a high susceptibility to post release mortality. Species caught as bycatch in the fishery that are considered to be particularly susceptible to post release mortality include jobfish, nannygai and red emperor.

Management response

Although anecdotal evidence suggests that bycatch in the fishery is relatively low, further information on the abundance and composition is required for precautionary management of bycatch species (see **Recommendation 11**). In order to ensure that any significant changes in the abundance and composition of bycatch is detected and responded to in an appropriate manner, DEH has recommended the development and implementation of strategic management objectives, performance indicators and performance measures relating to bycatch in the RRFF (see **Recommendation 2**). DEH also considers that in the long term estimates of discards of undersized target species should be considered in the stock assessment of target stocks in the RRFF (see **Recommendation 8**). The implementation of **Recommendation 9** is also likely to minimise the risk of localised depletion of bycatch species in areas of high effort.

DPI&F has been involved in educating the recreational fishing sector on the release of bycatch species through the distribution of information brochures. Recfish Australia members have also compiled and voluntarily agreed to support a National Code of Practice for recreational fishers, which promotes appropriate handling and release of line caught fish. DEH supports the implementation of further measures that seek to minimise the mortality of RRFF target stocks.

Conclusion

DEH considers that, under current levels of catch and effort, there is a high likelihood the fishery is conducted in a manner that does not threaten bycatch species and notes that anecdotal evidence suggests bycatch in the fishery is relatively low and mainly consists of discarded target species. DEH is concerned however that there is no method in place to quantify bycatch and assess changes in abundance. A number of recommendations have been developed to ensure that the risk of unacceptable impact on bycatch species is detected and minimised in the longer term.

Protected species and threatened ecological community protection

Objective 2: *‘The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities’*

Information requirements

In the past, commercial fishers in the RRFF have not been required to report details of interactions with endangered, threatened or protected species in logbooks. However, DPI&F has recently amended the commercial reef finfish logbook (LF04). The logbook now requires Queensland line fishers to record any interaction with species of conservation interest. If an interaction occurs the fisher must then complete a separate SOCI logbook sheet detailing the species involved, the time and location of the interaction, and the condition of the animal following release. To ensure that the information collected through the new logbook system is a robust reflection of interactions in the fishery, DEH recommends that DPI&F develop and implement an education program to promote the importance of protected species and accurate incident reporting.

Recommendation 12: *Within one year, to support the implementation of the Species of Conservation Interest logbooks, DPI&F to ensure that an education program for fishers, both recreational and commercial, is developed and implemented, to promote the importance of protected species protection and accurate incident reporting.*

The Queensland Parks and Wildlife Service (QPWS) have compiled a Wildlife Stranding and Mortality Database for several species of conservation interest, including dugongs, cetaceans, pinnipeds and turtles. DPI&F utilises this information, in addition to data collected from logbooks, when considering issues regarding interactions with endangered, threatened and protected species in the RRFF.

Assessment

There has been no formal assessment of the impact of the RRFF on endangered, threatened and protected species. DEH notes that the recent introduction of the SOCI logbook into the commercial fishery will increase the information base available to DPI&F.

Available research indicates a low level of interaction with protected species in the RRFF. Rod and reel and handline fishing is considered to have a relatively low level of impact on wildlife and the wider ecosystem compared to other fishing methods. In its submission, DPI&F states that a detailed risk assessment of the actual and potential impacts of the RRFF on these species is still some time off. To compile its submission DPI&F consulted a number of experts with knowledge on different endangered, threatened and protected species and asked them to rate the likelihood and severity of interactions with Queensland’s line fisheries.

The maori wrasse, which is listed as vulnerable on the IUCN Red List of Threatened Species, and which is being considered for listing under the EPBC Act may occur within the fishery area of the RRFF. However, there is limited overlap between maori wrasse habitat and the RRFF area, so interactions with this species are likely to be minimal. Fish species of concern that are known to exist in the area of the RRFF include Great White Sharks, which are classified as Vulnerable under the EPBC Act. Grey Nurse Sharks, classified as Critically Endangered, also have preferred habitats in the area of the fishery. A number of closures have recently been implemented within the area of the fishery to protect known critical habitat areas for Grey Nurse Sharks.

A public comment received by DEH was concerned that the black cod, which is protected in NSW, may occur in the fishery area and be impacted by the RRFF. DPI&F state that interactions with the species are uncommon in the RRFF and that the prohibition of fishing within Grey Nurse Shark habitat may provide further protection to black cod in the fishery area. DEH encourages DPI&F to continue to review the level of interaction between black cod and the RRFF as new information becomes available from byproduct and bycatch data.

Interactions with green turtles (*Chelonia mydas*), loggerhead turtles (*Caretta caretta*) and hawksbill turtles (*Eretmochelys imbricata*) in the RRFF have been rated as possible (though considered uncommon and unlikely). Possible interactions with other marine turtles and dugongs have been classified as rare.

The limited evidence available indicates there is minimal likelihood of injury or mortality to cetaceans as a result of the operation of the RRFF. Advice provided by QPWS officers is that the likelihood of RRFF fishers interacting with most species of cetaceans is remote, with the exception of bottlenose dolphins (*Tursiops truncatus*), Indo-Pacific humpback dolphins (*Sousa chinensis*) and killer whales (*Orcinus orca*) with which the likelihood of interactions is rated as possible.

DPI&F consider interaction with seabirds in the fishery to be minimal. There may be some indirect risk of impacts to prey species population structure, but birds scavenging for discarded fish frames and offal is the most likely interaction. DPI&F believe that seabird strikes on hooks are extremely rare.

DEH expects that DPI&F will review their analysis of the potential risk of the RRFF to endangered, threatened and protected species on an ongoing basis as new information becomes available.

There are no listed ecological communities in the fishery area.

Management response

Both Grey Nurse Sharks and Great White Sharks are currently regulated under the *Fisheries Act 1994*. A number of critical habitat areas for Grey Nurse Sharks excluding fishing activities have been established within the fishery area to minimise the risk of interactions.

To ensure that DPI&F strategically review the risk and respond to new information arising from the implementation of logbook reporting, DEH has recommended that DPI&F develop management objectives, performance indicators and performance measures related to protected species interactions in the RRFF (see **Recommendation 2**). The recently introduced SOCI logbook will assist DPI&F in determining the level of interactions and measuring the fishery's performance against management objectives, performance indicators and performance measures once developed.

Conclusion

DEH notes that there is anecdotal evidence suggesting that interactions with protected species in this fishery are minimal. The recent implementation of logbooks that require protected species recording, combined with an adequate education program will help quantify interactions and verify current assumptions. As information becomes available DEH expects that appropriate actions will be undertaken to ensure the fishery avoids mortality or injury to these species.

Recommendations have been developed to ensure that the risk of unacceptable impact on protected species is minimised in the longer term.

Minimising ecological impacts of fishing operations

Objective 3: *‘The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally’*

Information requirements

No specific studies have been conducted to determine the impacts of the RRFF on the ecosystems with which the fishery interacts. It is generally considered that the line fishing gear and methods used in the RRFF would have a relatively low level of impact on the wider marine ecosystem compared to other forms of fishing.

DEH is concerned at the lack of information collection and research covering the fisheries impact on the ecosystem and environment generally. DEH understands that this lack of information is the case across a range of Australian and International fisheries and until appropriate research techniques and programs are developed and implemented this will continue to be the case. DEH strongly supports research in this area.

Assessment

The target species in the RRFF are predatory species. Of the target species snapper is currently recognised as overfished by DPI&F and ReefMAC. Limited information is available outlining the effects of predator removal on rocky reef communities and prey species, however it is assumed that there is a food chain and ecosystem effect.

Fishing may affect the behaviour of predatory fish through attraction to baited lines. This opportunistic behaviour may temporarily affect feeding behaviour or feeding related patterns of movement in predatory species such as snapper, and therefore may also indirectly affect prey species through predator avoidance. There is limited evidence that the removal of fish in lower trophic levels of reef ecosystems results in significant effects on individual species or levels of biomass in other trophic levels.

The impact to the physical environment from rod and reel and handline fishing is considered to be relatively low compared to other forms of fishing. Potential impacts may result from vessel anchor damage and gear contact with the sea floor. Handlining in the RRFF is generally undertaken at anchor, with anchor damage considered to be greatest in heavily used areas such as sheltered locations. Fishers generally avoid gear contact with the seafloor as it often results in lost gear, which is an economic disincentive to operators.

Potential impacts to water quality from the RRFF arise from the at-sea discards of fish frames and offal and vessel-borne pollution. Given the relatively low levels of bycatch assumed in the fishery, the amount of discard is considered to be low. The implementation of a mechanism to monitor the abundance and composition of bycatch (see **Recommendation 11**) will assist management in verifying this assumption.

Vessel borne pollution released by fishers in the RRFF is also considered to be of a low level as the area of the fishery is subject to substantial flow from tidal and cross shelf currents. Vessels with more than 6 people are required by Queensland Transport legislation to return their sullage to an onshore point of disposal.

Management response

Little evidence has been gathered relating to the impact of the RRFF to benthic or pelagic communities. DEH notes that the fishing methods employed in the RRFF are considered to have a low level of impact to the wider marine ecosystem. However, given the overfished status of a target species and the identified requirement for enhanced data collection processes, consideration should be given to the impacts on the wider marine ecosystem as information becomes available and management arrangements are reviewed. This opinion was shared by the public comment submissions. The implementation of a recovery strategy for overfished stocks (see **Recommendation 10**) and other recommendations relating to ecologically sustainable harvesting of target, byproduct and bycatch species will seek to minimise the food chain and ecosystem impact of the removal of a predatory species from the ecosystem. In the longer term, DEH also expects that DPI&F will gain a greater understanding of the impacts of habitat degradation on the stocks and will consider this in management of the fishery.

Impacts on water quality through the discharge of plastic wastes and pollution from vessels are controlled under MARPOL legislation. Operators are required to comply with the legislation and must retain any plastic waste and dispose of it only when the vessel returns to port. DEH considers that these measures and legislative controls seek to ensure that impacts in the form of discarded waste or interactions with protected species and on the wider marine environment are further reduced.

Conclusion

DEH considers that the fishery is conducted in a sufficiently precautionary manner to minimise the impact of fishing operations on the ecosystem generally. Recommendations have been developed to ensure that the risk of significant impact by the fishery on the marine environment generally is minimised in the longer term.

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LIST OF ACRONYMS

AFMA	Australian Fisheries Management Authority
CFISH	Commercial Fisheries Information System
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
CRC	Cooperative Research Centre
CRFF	Coral Reef Finfish Fishery
DEH	Department of Environment and Heritage
DPI&F	Department of Primary Industries and Fisheries (Queensland)
DPIE	Department of Primary Industries (NSW)
ECSMF	East Coast Spanish Mackerel Fishery
EPBC Act	Environment Protection and Biodiversity Conservation Act
GBRMP	Great Barrier Reef Marine Park
GBRMPA	Great Barrier Reef Marine Park Authority
MARPOL	International Convention for the Prevention of Pollution from Ships
NSW	New South Wales
NRIFS	National Recreational and Indigenous Fishing Survey
OCS	Offshore Constitutional Settlement
QBFP	Queensland Boating and Fisheries Patrol
QPWS	Queensland Parks and Wildlife Service
ReefMAC	Reef Management Advisory Committee
RFISH	Recreational Fishery Information System
RRFF	Rocky Reef Finfish Fishery
SOCI	Species of Conservation Interest
WTO	Wildlife Trade Operation