

Annual status report

Marine Aquarium Fish Fishery

March 2007



Photograph courtesy of Helen Taylor

The Department of Primary Industries and Fisheries (DPI&F) seeks to maximise the economic potential of Queensland's primary industries on a sustainable basis.

While every care has been taken in preparing this publication, the State of Queensland accepts no responsibility for decisions or actions taken as a result of any data, information, statement or advice, expressed or implied, contained in this report.

© The State of Queensland, Department of Primary Industries and Fisheries 2007.

Copyright protects this material. Except as permitted by the *Copyright Act 1968* (Cth), reproduction by any means (photocopying, electronic, mechanical, recording or otherwise), making available online, electronic transmission or other publication of this material is prohibited without the prior written permission of the Department of Primary Industries and Fisheries, Queensland.

Inquiries should be addressed to:

Intellectual Property and Commercialisation Unit
Department of Primary Industries and Fisheries
GPO Box 46
Brisbane Qld 4001
or
copyright@dpi.qld.gov.au
Tel: +61 7 3404 6999

Introduction

The Queensland Marine Aquarium Fish Fishery (MAFF) is one of a number of harvest fisheries managed by the Department of Primary Industries and Fisheries (DPI&F). Commercially collected marine aquarium fish and invertebrates are marketed both domestically and internationally. Aquarium specimens can also be collected recreationally.

This report covers fishing activity during the 2005 calendar year.

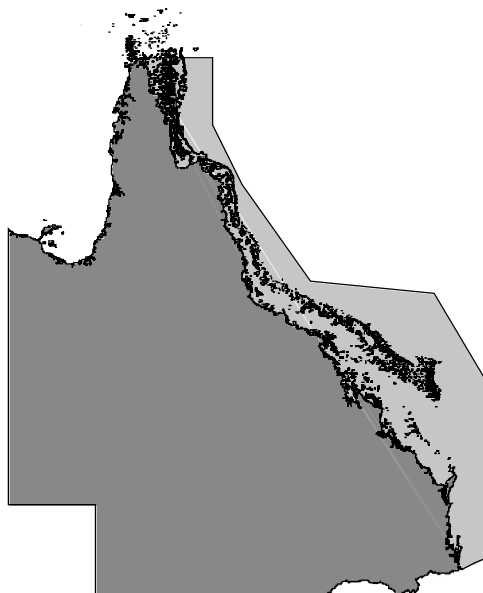


Figure 1: Map of fishery area

Description of the fishery

The MAFF harvests from a diverse suite of marine fish and invertebrate species, most of which are associated with coral reef and inter-reefal habitats. MAFF authority holders are permitted to collect fish and invertebrates species only for display purposes and not for human consumption. Fish species targeted in the MAFF belong to the families (in no order):

- Pomacentridae—damselfish and anemone fish
- Chaetodontidae—butterflyfish
- Pomacanthidae—angelfish
- Labridae—wrasses
- Gobiidae—gobies.

Invertebrate species commonly harvested include coral shrimp, small non-commercial sea cucumbers, nudibranchs, gastropods and other molluscs, sponges and ascidians.

Fishery profile 2005

Commercial harvest: 208 932 individual fish from 88 species/species groups

Recreational harvest: No estimate of level of harvest for 2005

Indigenous harvest: No estimate of level of harvest for 2005

Charter harvest: Not applicable to the fishery

Commercial Gross Value of Production (GVP): No estimate available

Number of authorities: 49 licences

Commercial boats accessing the fishery: 33 boats

Fishery season: All year (however three 9-day spawning closures apply for coral reef fin fish in October, November and December)

The MAFF deals with the operations of authorities to take under an 'A1' or an 'A2' fishery symbol. Fishers endorsed with an A2 fishery symbol have possession limits of 10 fish comprising not more than two fish of the same species. Introduced in September 2003, the fishery symbols and associated regulations addressed latent effort and localised depletion concerns in the fishery.¹

Marine aquarium fish and invertebrates are also collected by recreational fishers for personal home aquaria. Recreational fishers are limited by all existing in-possession and size limits and apparatus restrictions for fisheries, as outlined in the Queensland Fisheries Regulation 1995. Recreational fishers are not permitted to sell their catch.

Fishing methods

Commercial harvesters in the MAFF are permitted to harvest fish and invertebrate species using a range of gear, including fishing lines, cast, scoop and seine nets with the assistance of SCUBA or hookah equipment. A single barbless hook must be used when using a fishing line and a herding device may be used when taking fish. Attendance rules and size restrictions govern the use of nets.²

Recreational harvesters are not permitted to use SCUBA or hookah gear, but are permitted to use a mask and snorkel.

Fishery area

The fishery operates along the east coast of Queensland within the bounds of the Australian Fishing Zone (AFZ). Operators in the MAFF are permitted to harvest aquarium fish along the entire Queensland east coast in areas that are not closed through general fisheries closures or marine parks zoning under the Commonwealth *Great Barrier Reef Marine Park Act 1975* and the Queensland *Marine Parks Act 1982*. The fishery area also comprises five Special Management Areas (SMAs) that can only be accessed by a limited number of A1 symbol holders. Authority to access these areas is based on historic participation in the region and an A1 authority holder may be granted access to one or more areas. The remainder of the fishery area is open to both A1 and A2 authority holders. The majority of commercial aquarium fish collecting occurs in coastal and reef waters in northern Queensland.

Main management methods used

Under Offshore Constitutional Settlement (OCS) arrangements between the Commonwealth and Queensland governments, management of aquarium fish species throughout most of the AFZ adjacent to the east coast of Queensland falls under Queensland law. Consequently, harvest of aquarium fish from the east coast of Queensland south of 10°41' is managed under Queensland law by DPI&F. Fisheries in offshore waters of the Coral Sea that are managed by the Commonwealth Government under an exploratory and developmental fisheries policy are excluded from this arrangement.

¹ Licensing changes implemented on 1 July 2006 provide for transfer of aquarium fishery symbols between commercial fishing boat licences and commercial harvest fishery licences (formerly 'authorities to take fish for trade of commerce', referred to within text as 'aquarium fishery authorities'). Conditions relating to catch and possession limits will remain attached to a particular symbol rather than relating to the type of licence to which the symbol is attached.

² Ryan, S and Clarke, K 2005, *Ecological assessment of the Queensland Marine Aquarium Fish Fishery. A report to the Australian Government Department of Environment and Heritage on the ecologically sustainable management of the Queensland marine aquarium harvest fishery*, Department of Primary Industries and Fisheries, Brisbane, Australia, 78 pp.

The MAFF has been subject to a limited entry policy (no new licences issued) since 1997.

A variety of input and output controls are used to manage harvest in the MAFF³, including:

- limited entry, limits on the number of operators under an authority, gear restrictions (type and dimensions), in-possession limits and size limits for important commercial and recreational species, SMAs and seasonal closures for commercial operators
- gear restrictions (type and dimensions), in-possession and size limits for important commercial and recreational species, spatial and seasonal closures for recreational fishers.

Approximate allocation between sectors

The MAFF is considered to be a predominantly commercial fishery. There is no information available on the level of take for the recreational harvest of marine aquarium species. Hobby aquarists are known to harvest some marine aquarium species; however, the scale is believed to be negligible relative to the number of fish harvested in the commercial MAFF.

Collecting ornamental marine fish and invertebrate species is not considered to be a part of traditional or customary fishing practice by Indigenous fishers and will not be reported on further in this report.⁴

Fishery accreditation under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

The MAFF was granted a Wildlife Trade Operation (WTO) approval under Part 13A of the Commonwealth EPBC Act in November 2005. The WTO approval acknowledges that the fishery is being managed in an ecologically sustainable manner and allows the continued export of product caught in this fishery. The current approval expires in November 2008.

³ *ibid.*

⁴ *ibid.*

Catch statistics

Commercial

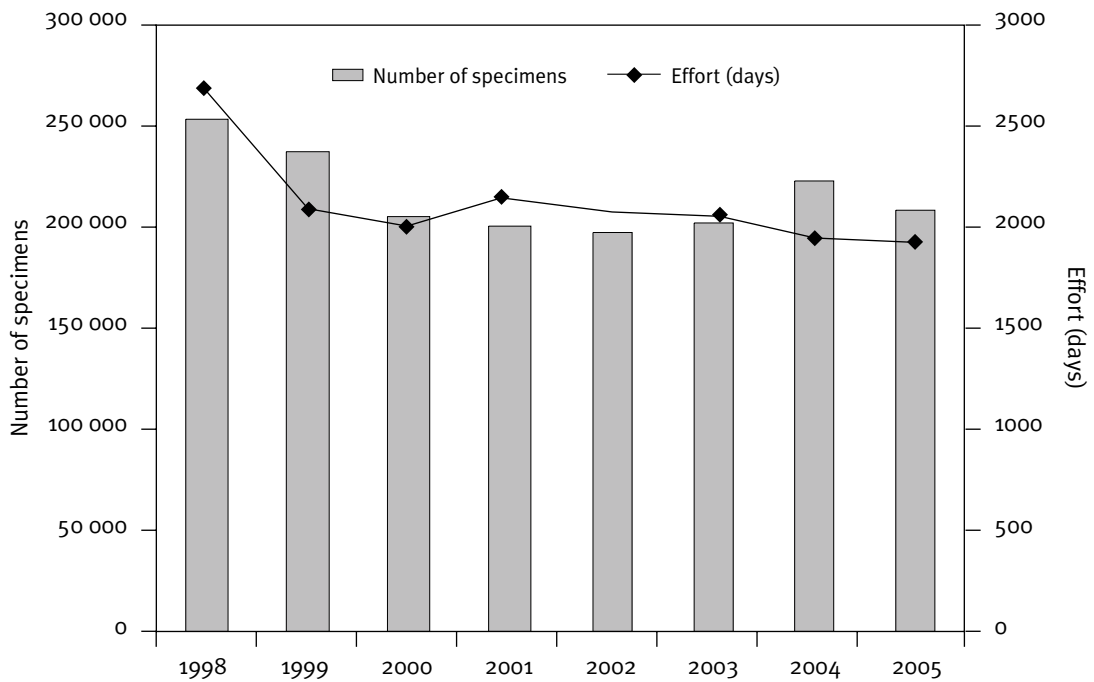


Figure 2: Commercial catch and effort for the Queensland Marine Aquarium Fish Fishery, 1998–2005 (Source: DPI&F CFISH database as at 15 November 2006).

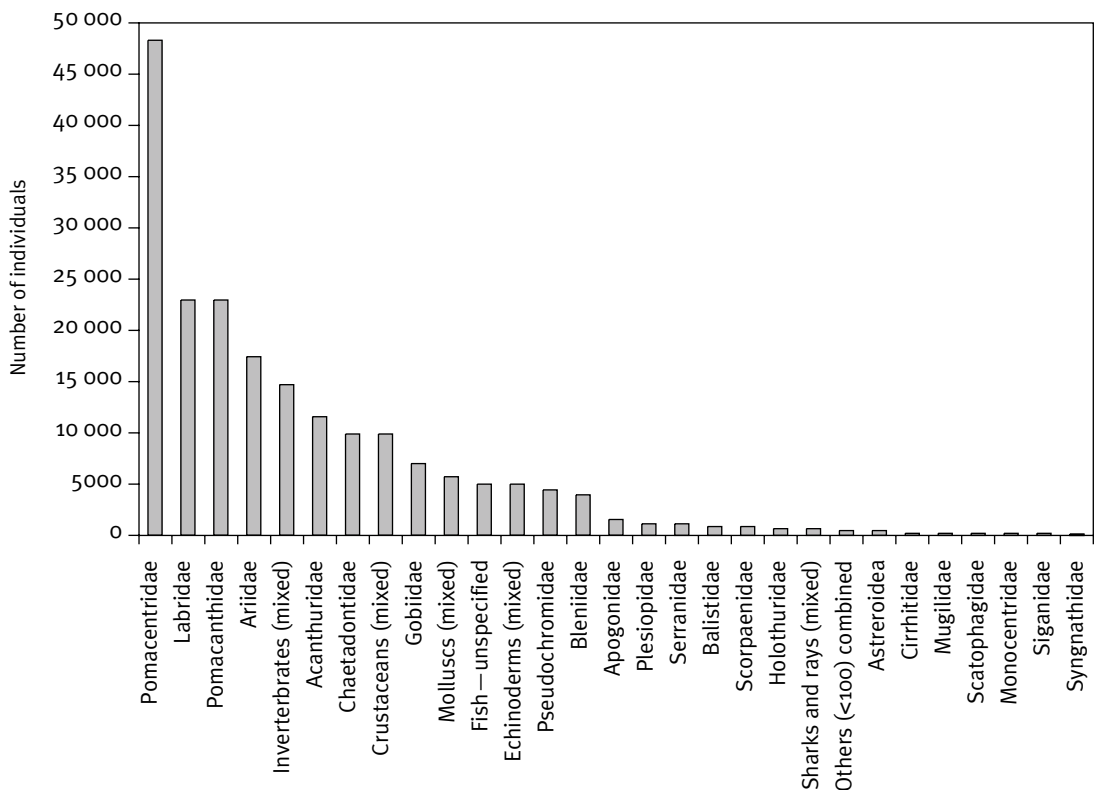


Figure 3: Composition of the commercial catch (208 932 individual fish) for the Queensland Marine Aquarium Fish Fishery, in 2005 (Source: DPI&F CFISH database as at 15 November 2006).

The total annual number of specimens collected in the MAFF has been steady (around 200 000 individuals) since 2000. This is a remarkably constant figure given the diverse range of species that are collected in the MAFF (approximately 88 species groups in 2005). Damsel fish (Family Pomacentridae), wrasses (Family Labridae), angelfish (Family Pomacanthidae) and catfish (Family Ariidae) were the most collected species in 2005 (Figure 3). MAFF operators collected more than twice as many Pomacentrids than any other species group in 2005. The family Pomacentridae comprises popular aquarium fish such as damselfish, chromis and anemone fish. Of the non-fish species collected in the reporting year, the most common were crustaceans (coral shrimps, hermit crabs, spiny lobsters etc.), molluscs (octopus, cuttlefish, squid etc.) and echinoderms (sea urchins, starfish etc.).

Commercial fishing effort has varied around the 2000-day mark since 1999.

Special Management Areas

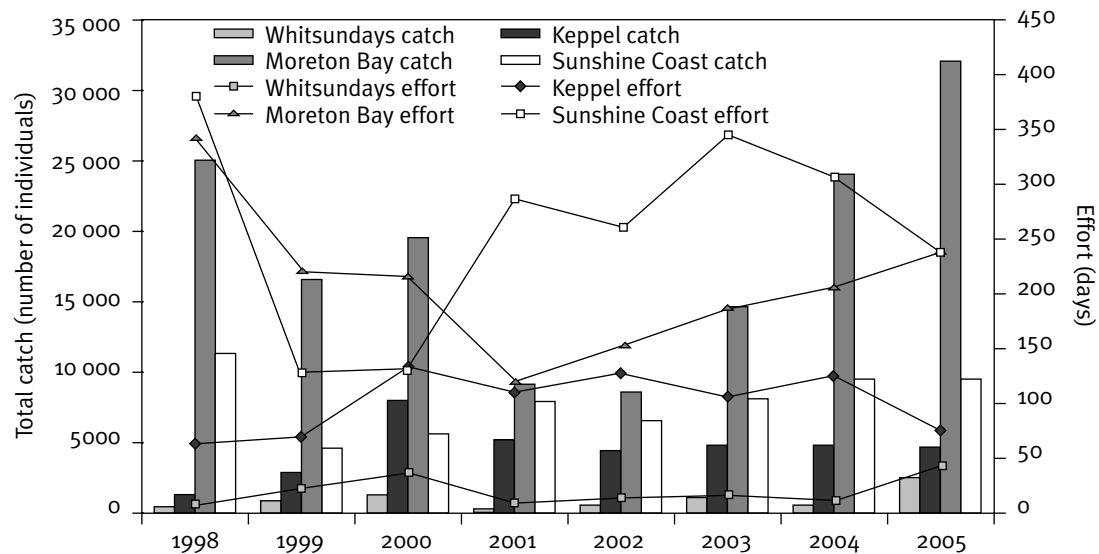


Figure 4: Commercial catch (numbers of individuals) and effort data (total days fished) for the Moreton Bay, Sunshine Coast, Keppel and Whitsundays Special Management Areas (introduced in 2003) in the Queensland Marine Aquarium Fish Fishery, 1998–2005 (Source: DPI&F CFISH database as at 15 November 2006).

MAFF catch and effort in all of the SMAs are examined by DPI&F for indications of localised depletion (Figures 4 and 5). Apart for the Cairns SMA (see discussion below), there are no other indications of this occurring since the introduction of the SMAs in 2003. Access to SMAs is limited to A1 licence operators who have demonstrated a history of participation in that area.

Total catch and effort levels in the Moreton Bay SMA have been increasing since 2001 (Figure 4). Invertebrate species (e.g. echinoderms and crustaceans) are the most collected species groups in this SMA (approximately 40% or greater of the total catch). Damsel fish and wrasses were commonly collected in 2005 when more than twice as many were harvested compared with 2004.

Personifer angelfish and butterflyfish species are the most harvested species groups in the Sunshine Coast SMA, averaging nearly 40% of the total catch since 2003. Harvest levels appear to be steady for this area (Figure 4).

Catches in the Keppel SMA have been steady since 2001 (Figure 4). Personifer and scribbled angelfish, and damselfish species are the most harvested species for this region.

There are only three licences in the Whitsundays SMA and catches consequently appear to be more variable. Damsel fish, gobies and blennies were the most harvested species groups in 2005.

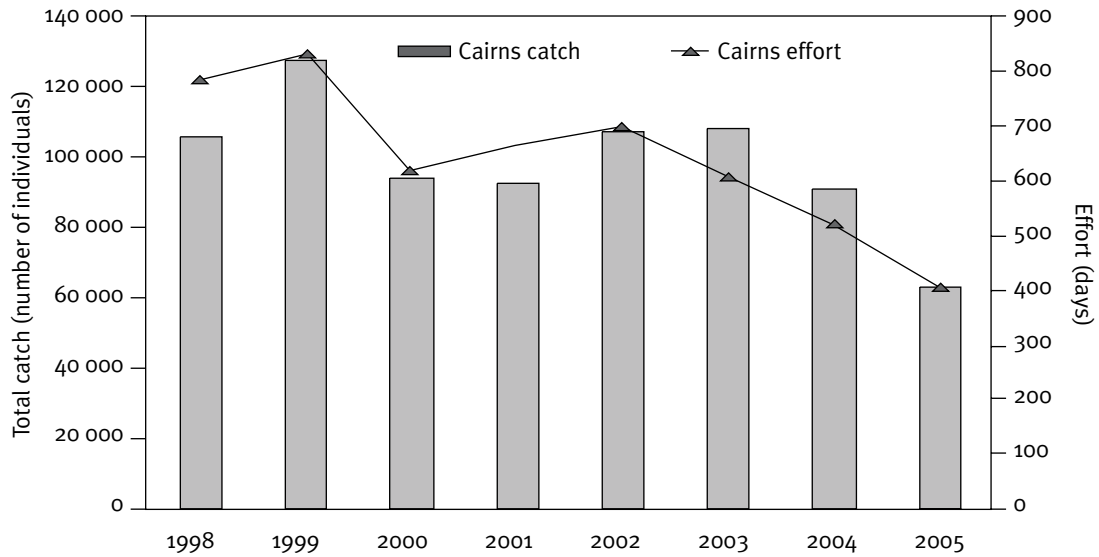


Figure 5: Commercial catch (numbers of individuals) and effort data (total days fished) for the Cairns Special Management Area (introduced in 2003) in the Queensland Marine Aquarium Fish Fishery, 1998–2005 (Source: DPI&F CFISH database. Data correct as at 15 November 2006).

Fishing effort and total catches in the Cairns SMA have been decreasing since 2003 (Figure 5). July 2004 saw the introduction of the Representative Areas Program (RAP) zoning for the Great Barrier Reef Marine Park (GBRMP). The new zoning further restricted the number of inner shelf reefs accessible to the fishery and effectively forced operators to spread effort into areas further offshore. This is likely to have increased the amount of search time for suitable fishing grounds, adding to operational costs and decreasing harvesting efficiency. MAFF operations in the Cairns region that relied on small vessels also may not have had the capacity to access fish on offshore reefs. Damsel fish are the most collected species group in this area, averaging around 30% of the total annual catch since 2002.

Recreational

Recreational aquarium fishers generally take only a few specimens of each species for personal displays. Collection of fish while using scuba or hookah is prohibited recreationally so harvest is effectively limited to shallow areas to a depth of about 5 metres.

There is no information available on the level of recreational harvest of marine aquarium species. DPI&F's recreational fishing telephone survey and diary rounds (RFISH) are not suitable for estimating recreational catches for the MAFF.

There are limits placed on a variety of species caught by recreational fishers as detailed under the *Fisheries Act 1994* and subordinate legislation. The take of hump-headed Maori wrasse, potato cod, barramundi cod, Queensland groper, red bass, Chinaman fish and paddletail is prohibited within Queensland waters under the Fisheries (Coral Reef Fin Fish) Management Plan 2003. Under this plan and in addition to individual take and possession limits, all coral reef fin fish species have a combined take and possession limit of 20.

Indigenous

There is no information available on the Indigenous harvest of marine aquarium species. Marine aquarium species are not believed to be of high value to Indigenous fishers.⁵

Spatial issues/trends

Commercial catch and effort in the MAFF is concentrated in waters off Cairns and South East Queensland. These population centres have good, close access to fishing grounds and domestic and international airports. Operators in South East Queensland also have access to the expanding domestic market in the area. Smaller concentrations of catch and effort are found in the Mackay–Whitsunday region and around Gladstone.

Recent coral bleaching events in the Keppel region has caused local concern for aquarium fish stocks. A working group under the Harvest Management Advisory Committee (Harvest MAC) has been formed by DPI&F to investigate whether this presents any long-term sustainability issues for the MAFF. The working group will prepare a position statement on MAFF operations and coral bleaching in the Keppel region and their findings will be released in 2007.

Socio-economic characteristics and trends

There are currently 49 commercial MAFF licences in Queensland.

There are no GVP estimates for the fishery. The small size of the fishery, its multi-species focus and variations in market prices make it difficult to accurately estimate GVP.

The majority of MAFF operators that rely on access to the GBRMP have applied for funding under the Great Barrier Reef Marine Park Structural Adjustment Package. The package was set up to assist operators in realigning and retooling their businesses to remain cost effective and profitable since introduction of the RAP zoning in 2004. Changes under the new zoning meant that many previously fished areas and reefs close to coastal centres were closed to commercial fishing operations. Businesses operating in these areas were now faced with longer distances to travel, an increase in search time to find new viable fishing grounds, a need to change their existing infrastructure to be able to travel further and to provide good husbandry to sustain their live product for longer times at sea.

⁵ Ryan, S and Clarke, K 2005, *Ecological assessment of the Queensland Marine Aquarium Fish Fishery. A report to the Australian Government Department of Environment and Heritage on the ecologically sustainable management of the Queensland marine aquarium harvest fishery*, Department of Primary Industries and Fisheries, Brisbane, Australia, 78 pp.

Fishery performance

Appraisal of fishery in regard to sustainability

Catch and fishing effort data from commercial fisher logbooks suggest that the MAFF fishery continues to be managed by DPI&F in a sustainable manner. There have been no significant changes to harvest levels in the fishery as a whole or at the species group level. The MAFF will undergo an Ecological Risk Assessment (ERA) in 2007. The ERA will determine if there are any risks to the sustainability of the target species in the fishery, based on the best available data on catch levels, biological characteristics and the distribution of harvested species.

Progress in implementing Department of Environment and Heritage (DEH) recommendations

Recommendation	Progress
DPI&F to inform DEH of any intended amendments to the management arrangements that may affect sustainability of the target stock or negatively impact on protected species or the ecosystem.	<i>Ongoing</i> There have been no management changes during the reporting period.
Within 3 years, DPI&F to develop fishery specific objectives linked to performance indicators and performance measures for target stocks, protected species and impacts on the ecosystem. DPI&F will develop precautionary harvest limits for CITES and EPBC Act species within 12 months.	<i>In progress</i> A Performance Measurement System (PMS) is planned for development in 2007 following the outcomes of the ERA. A draft performance measure has been developed to ensure that the harvest of Convention on International Trade in Endangered Species (CITES) and EPBC Act listed species is managed in an ecologically sustainable way.
DPI&F to monitor the status of the fishery in relation to the fishery specific objectives, performance indicators and performance measures specified in the MAFF regime once developed. Within 3 months of becoming aware of a breach in a performance indicator or a performance measure not being met, DPI&F to finalise a clear timetable for the implementation of appropriate management responses.	<i>In progress</i> MAFF performance will be measured against the PMS after it is developed in 2007.
Within 18 months, DPI&F to conduct a compliance risk assessment for the MAFF, including specific analysis of compliance risks in the harvest of CITES and EPBC Act listed species. If significant risks are identified, DPI&F to develop and implement an appropriate compliance strategy to address these risks within 12 months.	<i>Completed</i> A compliance risk assessment was completed in October 2006. Detailed strategies addressing the identified risks have been developed and are being implemented through the Queensland Boating and Fisheries Patrol operational plans.

DPI&F to implement data validation mechanisms for fishery dependent data collected on the harvest of CITES and EPBC Act listed species for the MAFF within 18 months.	<i>In progress</i> DPI&F will address this recommendation by the due date (mid-2007).
DPI&F will develop a research strategy for CITES and EPBC Act listed species within three years. Research strategies will be developed for other key target species identified at high risk through the ecological risk assessment process. DPI&F will cooperate with other Australian jurisdictions with marine aquarium fisheries to undertake research.	<i>In progress</i> DPI&F plans to complete this task by the due date (end of 2008), taking into account the results of the ERA and any research activities undertaken in other jurisdictions (especially Northern Territory and Western Australia).
Within 2 years, DPI&F to undertake an ecological risk assessment to identify key target species and CITES and EPBC Act listed species (other than finfish species managed under the <i>Fisheries (Coral Reef Fin Fish) Management Plan 2003</i> most at risk from the MAFF and areas at risk from overfishing. DPI&F to develop and implement responses to mitigate identified high risks within 12 months of the completion of the ecological risk assessment process.	<i>In progress</i> Background information is being collated to inform this process.
Within 2 years DPI&F to investigate the potential for localised and serial depletion of key target species groups within the fishery as part of the ERA process. DPI&F to implement management measures to mitigate any risks identified within 12 months of the completion of the ERA.	<i>In progress</i> Investigations have started for the Keppel Islands region following reports of significant coral bleaching in the area.

Management performance

A PMS has not yet been developed for the MAFF. The PMS development workshop is planned for late 2007.

Resource concerns

DPI&F are satisfied that there are no resource concerns in this fishery at the current participation levels and with the suite of management controls that are in place. Natural catastrophic events such as coral bleaching and cyclones are likely to have more localised impact on aquarium fish resources than fishery activity at the present level of effort in the fishery. Further management measures, perhaps at a local or regional scale, may be required to mitigate the impacts of the fishery on resources if linkages with these events can be demonstrated.

Ecosystem

Non-retained species/bycatch

There is no bycatch or by-product from this fishery due to the highly selective harvesting methods used.

Interactions with protected species

Commercial operators are required to fill in a Species of Conservation Interest logbook if they have interactions with protected species. However, because of the selective, relatively benign harvesting method and high attendance of fishing gear, operators pose negligible risk to protected species.

Fishery impacts on the ecosystem

The physical impact on the broader ecosystem is considered negligible as a result of the selective fishing method and the small number of individual animals that are collected relative to the available resource.

Because small numbers of individuals are collected from a broad suite of species, it is unlikely that MAFF operations are significantly impacting on natural food webs and critical predator/prey relationships. Broader ecosystem impacts from natural events, such as cyclone damage to reefs and coral bleaching, are likely to have greater ecological impacts than the fishery operations. DPI&F is responsible, however, for ensuring fishing activities post-impact are managed in a sustainable manner, taking into account the status of target species populations and their capacity to recover from such natural events.

Research and monitoring

Recent research and implications

Recent research on the impacts of natural catastrophic events such as coral bleaching and cyclone damage on the survival of reef fish species and communities is providing discussion on the flow-on effects of these events on aquarium fishery sustainability.^{6 7 8} Declines in coral cover from natural destructive events have been shown to result in the initial immediate decline of corallivorous fish (e.g. butterflyfishes) and coral dwellers (e.g. damselfishes) although there are variations in responses within each group. The type of disturbance also varies the response with widespread loss of habitat complexity (e.g. cyclones) having a greater initial negative effect on species richness compared with events where the coral reef structure remains intact (e.g. coral bleaching). Wilson et al. (2006) caution that the long-term consequences to small-bodied coral fish species from coral bleaching and Crown of Thorn starfish damage may be greater than the short-term effects documented in the scientific literature to date.

The degree of decline in population abundances and species diversity within an impacted area appears to vary with each species within each coral-associated fish group and can be a combination of mortality (e.g. loss of food type) or simply species moving out of the affected

6 Pratchett, M, Wilsons, S and Baird, A 2006, Declines in the abundance of Chaetodon butterflyfishes following extensive coral depletion, *Journal of Fish Biology*, 69(5): 1269–1280.

7 Berumen, ML and Pratchett, MS 2006, Recovery without resilience: persistent disturbance and long-term shifts in the structure of fish and coral communities at Tiahura Reef, Moorea, *Coral Reefs*, 25(4): 647–653.

8 Wilson, SK, Graham, NAJ, Pratchett, MS, Jones, GP and Polunin, NVC 2006, Multiple disturbances and the global degradation of coral reefs: are reef fishes at risk or resilient?, *Global Change Biology*, 12(11): 2220–2234.

area to other suitable habitats. Recovery of populations of corallivores and coral dwellers is dependent on many factors, such as the spatial and temporal extent of coral loss (i.e. reef-wide coral bleaching or isolated patch storm damage), the rate of coral recovery and the availability of fish recruits (juveniles or adults from plankton or nearby reefs). Other functional groups, such as pelagic and demersal predatory fish (e.g. trevally and coral trout), are less affected initially by coral damage, but are likely to suffer longer term impacts as other food sources in the affected habitat decline. It is important that DPI&F's current fishery management regime continues to remain flexible and adaptable to mitigate the longer term impacts on aquarium fish sustainability in affected areas.

Monitoring programs and results

Compulsory logbook program

Logbook data provide DPI&F with detailed information on catch trends in the commercial fishery. No independent monitoring is currently undertaken by the DPI&F for the fishery.

Summaries of logbook data are provided to the Harvest MAC for consideration by representatives from industry, scientists and managers. Data will be assessed further, if required, by the DPI&F Harvest Fishery Scientific Advisory Group (Harvest SAG).

The general status of GBR fish stocks, including some species of importance to the MAFF are monitored by reef surveys conducted by the Australian Institute of Marine Science (AIMS) as part of an extensive Long Term Monitoring Program (the AIMS LTMP). The AIMS LTMP provides long-term surveys of the status of fish, including species harvested in the MAFF, and corals on up to 180 coral reefs. A long-term finding of the program is that changes in damselfish abundances appear positively correlated to changes in coral cover (i.e. as coral cover increases, damselfish abundance increases) (see also www.aims.gov.au).

Fishery management

Compliance report

Compliance and enforcement in the MAFF are the responsibility of DPI&F, Queensland Boating and Fisheries Patrol (QBFP).

In 2005, 30 inspections were conducted on MAFF commercial vessels, with no offences detected, and one caution issued.

A compliance risk assessment was conducted for the MAFF in October 2006 in order to determine compliance priorities and allow the most effective use of QBFP resources. The risk assessment identified take/possession of non-permitted species as the highest priority for enforcement and compliance in the fishery. A number of activities rated as having a moderate risk are also being addressed.

Changes to management arrangements in the reporting year

No changes have been made to the management arrangements in the reporting year.

Consultation, communication and education

Consultation with stakeholders in the MAFF mainly occurs through the Harvest MAC and one meeting was held in 2005. Harvest MAC provides advice to the DPI&F on management measures for the MAFF.

Complementary management

There were no complementary management issues in the reporting period.

Information compiled by

Anthony Roelofs

Acknowledgements

Tara Smith, Dr Tracey Scott-Holland, Dr Malcolm Dunning, Dr Brigid Kerrigan.

Front cover image

Yellowface angelfish (*Pomacanthus xanthometapon*)

Photograph courtesy of Helen Taylor

