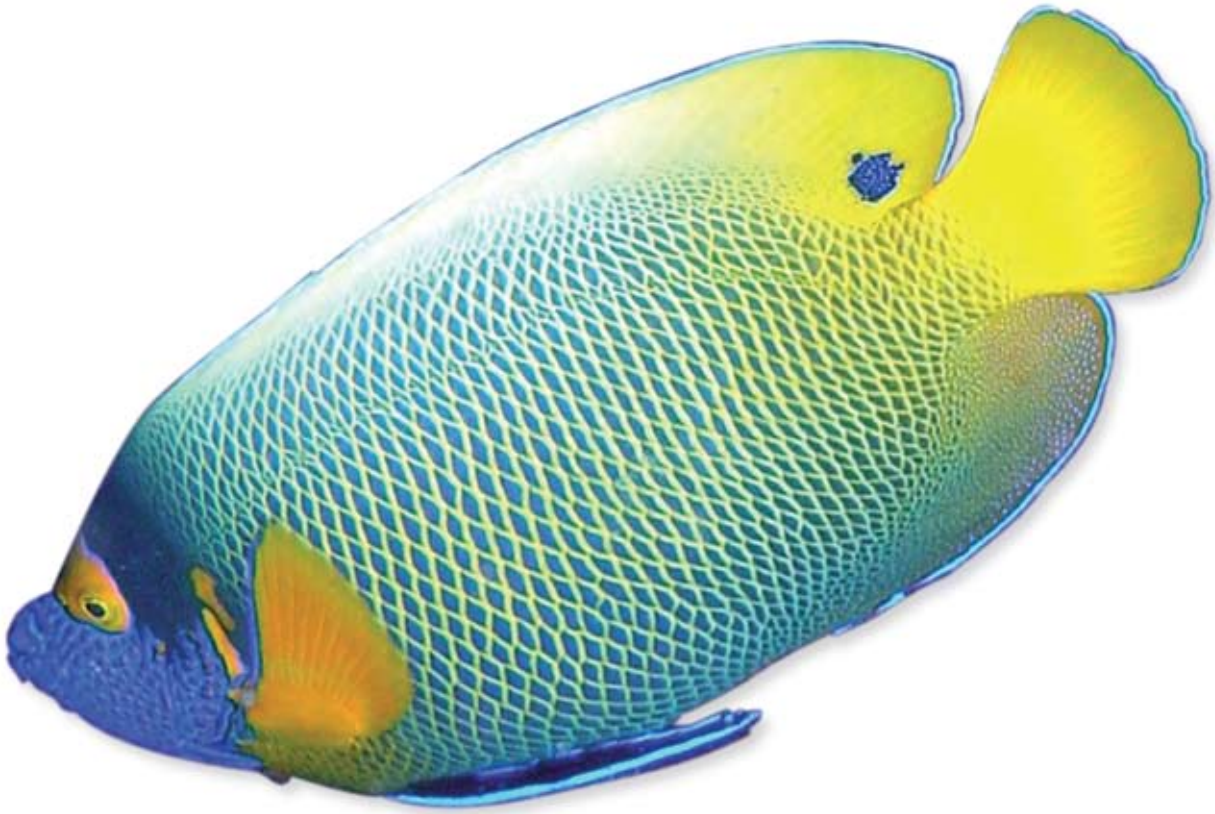
Annual status report 2010

Marine Aquarium Fish Fishery



Photograph courtesy of Helen Taylor

Queensland Government

Fishery Profile 2009	
Key species Majority of targeted fish species belong to the following families; Pomacentridae, Pomacanthidae, Labridae, Chaetodontidae and Gobiidae. Invertebrate species are also commonly harvested.	**Total number of commercial licences in 2009** 44 A1 licences and 4 A2 licences as of December 2009
Total harvest from all sectors 163 305 individuals fish from 41 species groups	**Commercial licences accessing the fishery in 2009** 34 (A1 and A2 combined)
Commercial harvest 163 305 individuals fish from 41 species groups	**Fishery season** All year (however two 9-day closures applied for coral reef fin fish in October and November 2009)
Recreational harvest (2005) No estimate level of harvest for 2009	**Fishery symbols** A1 or A2
Indigenous harvest No estimate level of harvest for 2009	**Monitoring undertaken** Commercial logbooks (CFISH)
Charter harvest Not applicable to the fishery	**FOP days monitored in 2009** Nil days
Allocation between sectors Predominantly commercial	**Accreditation under the EPBC Act** WTO: expires 25 November 2011
Total exports 94 000 live fish, valued at $2.8 million in 2008–09.	**Logbook validation** No
Commercial Gross Value of Production (GVP) The GVP for the MAFF and the Queensland Coral Fishery (combined) was estimated to be $10–12 million in 2008–09	**Quota managed** No

Key fish resources	Stock status
Families Pomacentridae, Pomacanthidae, Labridae, Chaetodontidae and Gobiidae, Invertebrates and Crustaceans	Not assessed
Comments: Key species collected under the above families in the MAFF will be considered for assessment as a part of the Fisheries Queensland stock status reporting program roll out in 2010–11.	

Introduction

The Queensland Marine Aquarium Fish Fishery (MAFF) is one of a range of harvest (hand collection) fisheries managed by the Fisheries Queensland. The commercial fishery is focused on the collection of marine aquarium fish and invertebrates that are marketed both domestically and internationally. Specimens can also be collected recreationally for display in home aquaria.

This report covers fishing activity during the 2009 calendar year.

Fishery description

The MAFF harvests from a diverse suite of marine fish and invertebrate species, most of which are associated with shallow and deeper water coral reef and inter-reef habitats. MAFF authority holders are permitted to collect fish and invertebrates species only for display purposes and not for human consumption.

The MAFF operates under an 'A1' or an 'A2' fishery symbol. Fishers endorsed with an A2 fishery symbol have possession limits of ten fish comprising not more than two fish of the same species. Introduced in September 2003, the fishery symbols and associated regulations addressed latent effort for the fishery and issues of localised concentration of effort and its potential effects on ecological sustainability.

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 2008. Recreational fishers are not permitted to sell their catch.

Collection and trade levels in the MAFF are small compared to the global aquarium trade which ranges from 20–24 million individuals annually (Wabnitz et al. 2003).

The fishery operates along the east coast of Queensland within the bounds of the Offshore Constitutional Settlement (Figure 1). Operators in the MAFF are permitted to harvest aquarium fish and invertebrates 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*.

Figure 1: Queensland Marine Aquarium Fish Fishery area.

The fishery area also comprises five Special Management Areas (SMAs) that can only be accessed by certain holders of an A1 symbol. Allocation of access to these areas was undertaken in 2003 based on a licencee's historic participation in the region. 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.

This MAFF exported a total of 94 000 live fish, valued at $2.8 million in 2008–09 (Donnelly In prep). Live Australian species of ornamental fish (excluding syngnathids) comprise the majority of these exports.

Fishing methods

Commercial harvesters in the MAFF are permitted to harvest fish and invertebrate species using a range of gear types, 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.

Recreational harvesters are not permitted to use SCUBA or hookah gear.

Key species

The following is an overview of biology and life cycle information (taken from Randall et al. 1990) of the main family groups in the MAFF.

- Pomacentridae—damselfish and anemone fish[1]
- Pomacanthidae—angelfish
- Labridae—wrasses
- Chaetodontidae—butterflyfish
- Gobiidae—gobies.

Invertebrate species are also commonly harvested include: coral shrimp, small non-commercial colourful sea cucumbers[2], nudibranchs, gastropods and other molluscs, sponges and ascidians.

Damselfish and anemone fish belong to the Family Pomacentridae. Damselfish engage in active courtship displays of rapid swimming and fin extension, around constructed nest sites on the sea floor. Males typically guard the eggs which are attached to the sea floor by adhesive strands. Eggs hatch within one week and larvae rise to the surface where they are transported by ocean currents. After travelling, the transparent young settle to the bottom where they develop their juvenile colouration; juveniles grow at a rate of approximately 5–15 mm per month. Damselfish feed on either algae or plankton. Anemone fish occur exclusively with large tropical sea anemones. Anemone fish display sex reversal where they change from male to female as they grow.

Many species of angelfish inhabit shallow, while other species are restricted to deeper waters to at least 75 m depth. Angelfish are mainly found around coral reefs in sheltered boulders, caves or coral crevices and may occur solitarily or in aggregations. Angelfish are territorial and are active during the day searching for food. Their diet varies depending on species; some feed on algae and detritus and others on sponges and benthic invertebrates.

Species belonging to the Family Labridae vary in size from 5 cm to just over 2 m in length. Many labrids undergo sex reversal, where fish start their adult life as females and then later change to male. Species undergo either group spawning or individuals spawning dependant on the life cycle phase of the particular individual. All wrasses are carnivores, but depending on the species food items may include zooplankton, coral polyps, worms, small fish, molluscs, crustaceans and sea urchins. Wrasses are most active during the day and retire to an inactive state on the sea floor at night.

Most of the species belonging to the Family Chaetodontidae inhabit depths of less than 20 m. Butterflyfishes are active during the day and seek shelter in the reef at night. Most species are restricted to a relatively small area of the reef, but travel throughout their home range foraging for food. Many butterflyfishes feed on coral polyps; others feed on small benthic invertebrates and algae.

The Family Gobiidae includes all species of gobies; which are generally under 10 cm in length. Some species of goby can be extremely difficult to identify, due to their small size and the presence of many closely related species with similar appearances. Gobies are found in a variety of habitats residing in the benthic zone; dwelling on the bottom or hovering just about sea floor. Gobies are generally carnivorous, their diet consisting of crabs, prawns, small crustaceans, molluscs, sponges and various small invertebrates.

There are differences in the population abundance, characteristics of spawning and other life history parameters that impact on biological diversity and reproductive success of MAFF species.

Main management methods used

Under Offshore Constitutional Settlement (OCS) arrangements between the Commonwealth and Queensland governments, management of aquarium fish species adjacent to the east coast of Queensland falls under Queensland law. Fisheries in the Coral Sea (outside of the OCS) are managed by the Commonwealth Government.

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 MAFF (see Ryan & Clarke 2005), including the following:

- Commercial fishing controls—limited entry, limits on the number of operators under an authority, gear restrictions (type and dimensions), in-possession

[1] The majority of anemone fish traded are aquacultured.
[2] Sea cucumber species collected in the MAFF are not the same commercial species harvested in the East Coast Beche-de-mer Fishery.

limits (for A2 symbol holders) and size limits for particular species, Special Management Areas, and spatial and seasonal closures.

- Recreational fishing controls—gear restrictions (type and dimensions), in-possession and size limits for certain species, and spatial and seasonal closures.

Catch statistics

The MAFF is considered to be a predominantly commercial fishery. There are no quantitative data 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 (Ryan & Clarke 2005) and will not be reported on further in this report.

Commercial

The 2009 total annual reported commercial harvest of specimens collected in the MAFF increased 8% over the average annual catch from 2006–08 (Figure 2). Collection of damsel fish from the Family Pomacentridae comprised a major proportion (27%) of the observed increases in 2009 although there were also increases in catches across all the other major collecting groups compared with 2008 (Figure 3). Fisheries Queensland closely monitors collection levels in the MAFF through a Performance Measurement System (PMS) (see Table 1). The review reference point for total catch has not been triggered since the PMS was implemented. Total effort remained at approximately 1500 days which is similar to the previous two years.

In 2009, approximately 70% of the total harvest in the MAFF was collected in the Cairns SMA and non SMA areas (Figure 4). The Keppel SMA contributes the least number of individuals to the overall fishery harvest.

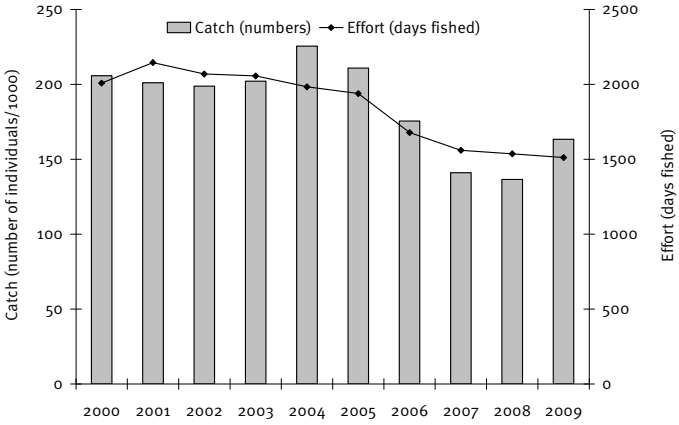


Figure 2: Commercial catch and effort for the Queensland Marine Aquarium Fish Fishery, 2000–09 (Source: Fisheries Queensland CFISH database, 15 September 2010).

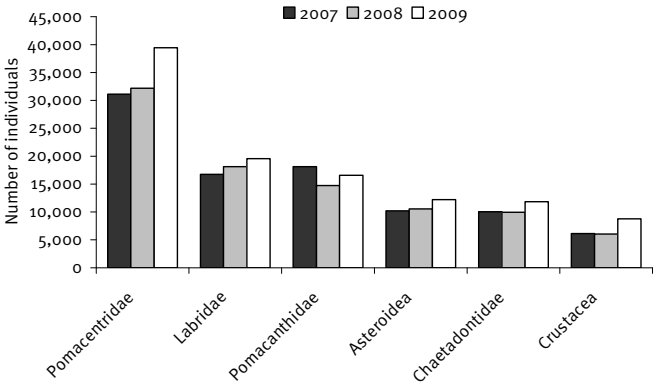


Figure 3: Composition of the top six phyla/families collected in the Queensland Marine Aquarium Fish Fishery, 2007–09 (Source: Fisheries Queensland CFISH database, 15 September 2010).

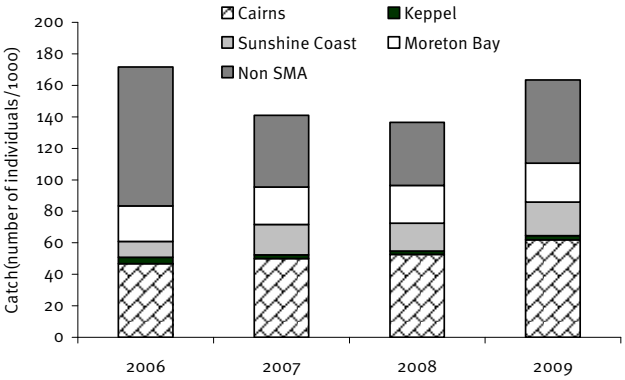


Figure 4: Total commercial harvest (all species combined) in the Queensland Marine Aquarium Fish Fishery separated into the major management regions, 2006–09 (Source: Fisheries Queensland CFISH database, 15 September 2010).

Increases in the collection of unspecified species of fish were reported in 2009 (rise from 2% of harvest in 2007 to 5% in 2009). This increase is of interest given the MAFF is considered a highly selective fishery where individuals in general are knowingly chosen for their marketability. With growing global interest and scrutiny in the

collection of individual species in wild caught aquarium fisheries, this represents a challenge for Fisheries Queensland and the industry members to move towards more complete catch reporting. Both parties have highlighted the opportunities presented by the adoption of electronic logbooks that allow for efficient and highly detailed catch reporting to ensure sustainable harvest levels are maintained and that stakeholders are well informed on the activity and impact of the fishery. Fisheries Queesland regularly review fishery specific logbooks to ensure the information collected is appropriate for sustainability assessments and fishery performance measurement. This includes investigating the feasibility of adoption of 'e-logbooks' across a variety of commercial fisheries including the MAFF.

Special Management Areas

Five Special Management Areas (SMA) are monitored annually through the Performance Measurement System (PMS) for indications of unsustainable harvest levels brought about by localised concentration of effort (Figures 4 and 5). There were no indications of unsustainable fishing occurring in the SMAs in 2009.

The highest annual total number of specimens collected in the SMAs came from the Cairns SMA in 2009 (Figure 5). Catches have been slowly increasing in the Cairns SMA since 2006 (Figure 5). Catch rates also rose to an average 142 individuals per day. The next highest catches were collected in other areas outside the SMAs. Increased catch rates were also reported in all other SMAs and non SMA areas in 2009, although these are close to or within historical levels.

Recreational

Recreational aquarium fishers generally take only a few specimens of each species for personal displays. Recreational collection of fish while using scuba or hookah is prohibited so harvest is effectively limited to shallow areas accessible by free-diving (generally no deeper than five metres). There are limits placed on a variety of species caught by recreational fishers as prescribed under the *Fisheries Act 1994* and subordinate legislation and through zoning in the Great Barrier Reef Marine Park. 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 Regulation 2008. Under the regulation and in addition to individual take and possession limits, all coral reef fin fish species have a combined take and possession limit of 20.

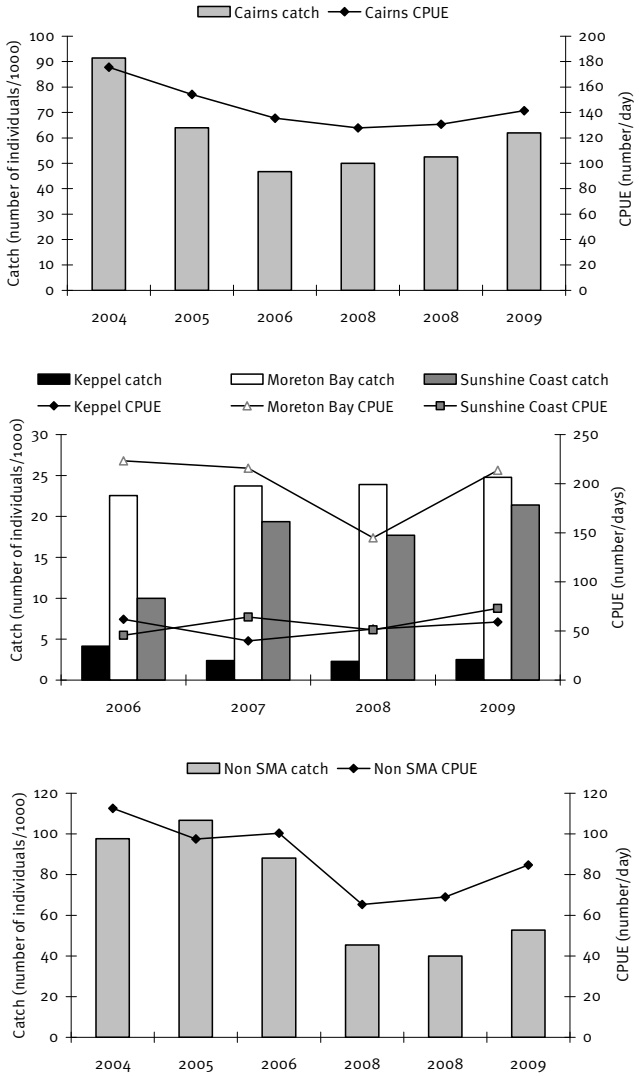


Figure 5: Commercial collection (all species combined) and catch rates in the Queensland Marine Aquarium Fish Fishery separated into the major management regions: Cairns and non SMA (2004–09); Keppel, Sunshine Coast and Moreton Bay (2006–09) (Source: Fisheries Queensland CFISH database, 15 September 2010).

At present there are no data available on the level of recreational harvest of marine aquarium species. Fisheries Queensland commenced the next state-wide recreational fishing survey in 2010 to provide an updated estimate of recreational fishing participation and catch estimates. The state-wide survey uses an improved methodology which will result in recreational catch estimates with higher levels of precision and accuracy. The survey methodology allows for the recording of a wide range of species including the recreational take of aquarium fish.

Charter

Not applicable to the MAFF.

Indigenous

There are no data available on the indigenous harvest of marine aquarium species. Marine aquarium species are not believed to be of high value to indigenous fishers (Ryan & Clarke 2005).

Spatial issues/trends

There have been no changes to the general spatial trends in collection in 2009. Commercial catch and effort in the MAFF continues to be concentrated in waters off Cairns and South East Queensland. These population centres have good, close access to fishing grounds and domestic and international airports.

Socio-economic characteristics and trends

There were 34 commercial MAFF licences active in 2009 compared to 31 licences in 2008.

The Great Barrier Reef Marine Park Authority recently funded the preparation of a Climate Change Vulnerability Assessment (CCVA) for the aquarium supply sector. A draft assessment report has been prepared which represents the first stage of a Climate Change Adaptation Plan (Donnelly, In prep). The Plan is designed to assist the sector in understanding the potential impacts to the biological and economical sustainability of the industry. Assessed across a broad range of vulnerabilities including, climate change impacts on coral reef, industry fossil fuel reliance, sensitivity to international market access and currencies, and institutional frameworks governing fishery access, the aquarium sector is believed to be well positioned to adapt to predicted range of climate change scenarios. The CCVA report is due for release in 2011.

A comprehensive supply chain analysis of the aquarium supply sector complemented the CCVA. The preliminary findings estimated the gross value of production of the aquarium fishery (MAFF and Coral Fishery combined) to be roughly $10 to $12 million dollars per annum. The assessment concludes that the industry as a whole is highly profitable.

Biological and ecological information

Monitoring programs

Fishery Dependent Sampling

Logbook data provides Fisheries Queensland with detailed information on catch trends reported by the commercial fishery. This includes specific recording of collection information for priority species identified through ecological risk assessments. No independent monitoring is currently being undertaken.

Interactions with protected species

Commercial operators record interactions with protected species in a Species of Conservation Interest (SOCI) logbook. Because of the selective, relatively benign harvesting method and high attendance of fishing gear, operators pose negligible risk to protected species. There have been no reported interactions with SOCI during this reporting period.

Ecosystem impacts

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. The findings of a comprehensive ecological risk assessment of the MAFF provide evidence for the low impact nature of the fishery (Roelofs 2008; Roelofs & Silcock 2008)

Sustainability Assessment

Performance against fishery objectives

A Performance Measurement System (PMS) for the MAFF (Table 1) was developed in collaboration with the Harvest Management Advisory Committee (Harvest MAC) and other stakeholders, including members of the commercial fishing sector, fishery managers, researchers and assessment and monitoring staff. The PMS was finalised in April 2009 and provides meaningful, defensible, precautionary and measureable objectives.

Fisheries Queensland investigated two incidences of triggered performance measures relating to reported catch and effort in 2008. It was assessed that both incidents were minor and not requiring further management action. Continued monitoring through the PMS was recommended.

Assessment of fishing activity in 2009 against the PMS indicated that only the measure related to catch of low

risk species had triggered. The collection of blue tang decreased beyond the 50% threshold in the Cairns SMA. This effectively reversed the increase (and triggered measure) observed in 2008. Harlequin tuskfish increased by greater than 50% in the Moreton Bay SMA in 2009. Fisheries Queesnland will investigate this incident and report on a response in the 2011 Annual Status Report.

Table 1: Performance measures and outcomes for the Marine Aquarium Fish Fishery.

Performance measure	Performance
Target species	
A 30% increase or decrease in total annual catch compared with the average annual catch over the previous 3 years.	*Not triggered* The 2009 total annual catch increased 8% over the average annual catch from 2006–08.
More than a 50% change in annual catch (of a species in the list below and where the difference is greater than 100 individuals) per SMA compared with the previous year. **Medium risk** Personifer angelfish (*Chaetodontoplus meredithi*) Scribbled angelfish (*Chaetodontoplus duboulayi*) **Low risk** Tomato anemonefish (*Amphiprion melanopus*) White banded anemonefish (*Amphiprion latezonatus*) Ocellaris anemonefish (*Amphiprion ocellaris*) Percula anemonefish (*Amphiprion percula*) Harlequin tuskfish (*Choerodon fasciatus*) Blue tang (*Paracanthurus hepatus*) Pineapplefish (*Cleidopus gloriamaris*)	*Triggered in 2009* The following species annual catch by SMA exceeded the review reference point due to a change from the previous year (2008) by more than 50%. • Blue tang (decreased in Cairns) • Harlequin tuskfish (increased in Sunshine Coast)
More than 20% increase in annual fishing days in a SMA compared with the average annual number of fishing days over the previous 3 years in that SMA since 1 January 2004.	*Not triggered* Reported increases in effort levels for each SMA were less than 20% compared with the previous 3 year average.
Bleaching severity and interaction with fishery is greater than Level 2 as defined in Fisheries Queensland Coral Stress Response Plan.	*Not triggered*
Ecosystem	
Less than 80% of active operators have adopted best practice protocols* *Measure reflects the protocols formalised in the industry developed Stewardship Action Plan (SAP) implemented in 2009. Membership of the peak industry representative body, Pro-vision Reef, includes a signed commitment to the SAP.	*Not triggered*

Performance measure	Performance
Species of Conservation Interest	
(i) Total harvest of syngnathids exceeds 25 in any calendar year. (ii) Total harvest of Maori wrasse taken under the General Fisheries Permit issued to an operator in the MAFF exceeds 30 during the period 11/5/2007 to 11/5/2012. (iii) Total harvest of the sawfish *Pristis microdon* taken under the General Fisheries Permit issued to an operator in the MAFF exceeds 75 during the period 11/5/2007 to 11/5/2012.	*(i) Not triggered* No syngnathids were caught during the 2009 calendar year. *(ii) Not triggered* No Maori wrasse were harvested during the 2009 calendar year. The total number of Maori wrasse harvested under a General Fisheries Permit to date is three (from 11/5/2007 to 31/12/2009). *(iii) Not Triggered* No sawfish *(Pristis microdon)* were harvested during the 2009 calendar year. The total number of sawfish *(Pristis microdon)* harvested under a General Fisheries Permit to date is eight (from 11/5/2007 to 31/12/2009).
Social	
More than five Ministerial Letters are prepared per calendar year.	*Not triggered* No Ministerial Letters were prepared during the 2009 calendar year.
More than 10% of the active vessels in the fleet are used to commit an offence under the Fisheries Regulation 2008.	*Not triggered* No offences relating to the MAFF were detected by compliance officers during 2009.
Economic	
A 20% decrease in the number of active licences compared to the previous year.	*Not Triggered* The number of active licences increased in 2009. A total of 34 licences reported catch in the MAFF during 2009.

Current sustainability status and concerns

Important species collected in the MAFF will be considered for assessment as a part of the Fisheries Queensland stock status assessment program in 2010–11.

Fisheries Queensland is 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 the coral communities that support the majority of fish species collected than the present level of effort in this fishery. The Coral Stress Response Plan and industry commitment to sustainable fishing practices through their Stewardship Action Plan provide confidence that should these impacts arise, responsible and sustainable fishing will ensue.

Research

Recent research and implications

The Climate Change Vulnerability Assessment has been the recent focus of the MAFF and provides an excellent synthesis of research on climate change and the

implications this has on the future management of the fishery. The report is due for release in 2011.

Collaborative research

There has been no collaborative research this year.

Fishery management

Compliance report

During 2009, 25 units, including 20 commercial fishing vessels, were inspected by Queensland Fisheries and Boating Patrol (QBFP). No offences were detected during the course of these inspections.

Changes to management arrangements in the reporting year

There have been no changes to the management arrangements in the reporting year.

Communication and education

Education forms an important component of the compliance strategy for all of Queensland's fisheries. QBFP are proactive in their education programs which include attending events, such as boating and fishing shows and Seafood Industry events, to liaise with fishers, delivering lectures, utilising various forms of media to release important information, answering enquiries and conducting extensive one on one education with both commercial and recreational fishers during the course of field patrols and inspections. During inspections officers hand out recreational fishing guides and flyers which contain information on size and in-possession limits and answer queries from commercial fishers on an ad hoc basis. Education plays a particularly important role when new legislation is implemented and QBFP make every effort to ensure that all fishers have a good understanding of their rights and responsibilities.

Complementary management

Complementary management in the MAFF is delivered through the institutional and non-institutional frameworks implemented in 2008–09. Industry and government agency involvement in decision making processes extends from the commitment by all parties to the Coral Bleach Response Plan and the Coral Stress Response Plan as well as industry commitment to best practice standards in the Stewardship Action Plan. While formal, strategic level engagement and consultation with the MAFF is through the Queensland Fisheries Advisory Committee, there is currently no formal mechanism for engagement and consultation at an operational level. Fisheries Queensland can however convene a Coral and Aquarium Working Group on as needs basis to review and provide advice on management matters related to the industry. This group has a defined list of members sourced from industry, the scientific community, conservation groups and management agencies.

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Information compiled by

Anthony Roelofs

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Front cover image

Yellowface Angelfish (*Pomacanthus xanthometapon*)—photo courtesy of Helen Taylor.