STATE-WIDE

Hermit Crab at Moses Rock. Photo: Gilbert Stokman

Marine Aquarium Fish Managed Fishery Status Report

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Management input from S. Brand-Gardner

Fishery Description

The Marine Aquarium Fish Managed Fishery (MAF) targets more than 250 species of fish under the management plan. By way of endorsement, fishers also take coral, algae, live rock, live sand and invertebrates. It is primarily a dive-based fishery that uses hand-held nets to capture the desired target species from boats up to 8 metres in length. While the MAF operates throughout all Western Australian waters, catches are relatively low in volume, due to the special handling requirements of live fish. Fishing operations are heavily weather-dependent, due to the small vessels used and the potentially hazardous conditions (e.g. waves and swell) encountered. In addition, human constraints (i.e. physiological effects of decompression) limit the amount of effort exerted in the fishery, the depth of water and the offshore extent as to where collections can occur.

Governing legislation/fishing authority

Commercial

Marine Aquarium Fish Management Plan 1995
Marine Aquarium Fish Managed Fishery Licence
Commonwealth Government *Environment Protection and Biodiversity Conservation Act 1999* (Wildlife Trade Operation (WTO))

Recreational

Fish Resources Management Act 1994
Fish Resources Management Regulations 1995 and subsidiary legislation

Consultation process

Commercial

Meetings between the Department of Fisheries and industry

Recreational

Recreational Fishing Advisory Committee

Boundaries

The MAF operates in Western Australia's state waters spanning the coastline from the Northern Territory border in the north to the South Australian border in the south. The effort is spread over a total gazetted area of 20,781 km^2. During the past 3 years, the fishery has been active in waters from Esperance to Broome, with popular areas being around Dampier, Exmouth, Perth and Albany.

Management arrangements

This fishery is managed primarily through input controls in the form of limited entry to the fishery and permanent closed areas. There are 13 licences in the fishery and, in most years, all licences are used. In 2007, 9 licenses operated in the fishery.

The fishery is permitted to operate in more general-purpose zones of marine parks for the collection of fish and some invertebrates (usually excluding coral and live rock). Licensees are not allowed to operate within any waters closed to fishing (e.g. Rowley Shoals, reef protected areas and sanctuary zones). Fishing is also prohibited on Cleaverville Reef to exclude the take of coral and associated organisms.

Fish caught in this fishery may not be used for food purposes, and operators are not permitted to take species covered by other specific commercial management arrangements or management plans.

The MAF is permitted to take most species from the Syngnathid family (seahorses and pipefish), which are listed under the *Environment Protection and Biodiversity Conservation Act 1999*. However, there is a total ban on the take of leafy seadragons (*Phycodurus eques*).

Research summary

Information provided by the fishery in the form of statutory monthly catch and effort returns is used as the basis to provide research advice for fisheries management. Statutory catch and effort reporting at the fine spatial scale of 10 minutes of latitude and longitude commenced in September of 2004.

Retained Species

Commercial landings (season 2007): 37,000 fish

Collectors in this ornamental fishery can earn a high return from the capture of very small quantities of individuals. Therefore, the catches are small in comparison to the more common, food-fish fisheries. Fishers report the level of catch (kg or numbers) by species or species group. A summary of the 2007 levels of catch is provided in Marine Aquarium Fish Table 1. The reported landings of aquarium fish for 2007 are similar to those reported in 2006.

Recreational catch: Not assessed

There is no documented recreational fishery. If members of the public wish to collect specimens for their own private aquariums they are permitted to do so, but are restricted to normal recreational bag limits and, for some species, size limits. There is a complete ban on the recreational take of coral, live rock and totally protected fish such as leafy seadragons.

Fishing effort/access level

Effort in the fishery has been relatively stable over the past 3 years at an average of 809 days fished, with nearly all licensees reporting some level of activity. Effort in the fishery is concentrated in discrete areas adjacent to the limited number of boat landing sites along the Western Australian coastline.

Given that the specimens are collected for a live market, licences are restricted in terms of the quantities that they can safely handle and transport (for example, by boat to shore, by vehicle to the holding facility and then on to the retailer) without impacting on the quality of the product. The size of the holding facility and access to regular freight and infrastructure services (such as airports, particularly in remote northern locations of WA) restricts the levels of effort that can be expended in the fishery at any given time.

Stock Assessment

Assessment complete: Preliminary

Breeding stock levels: Adequate

The operating extent of the fishery is low relative to the widespread distribution of the many species targeted. No other fisheries exploit these species and therefore there is virtually no potential for impact on breeding stocks.

Non-Retained Species

Bycatch species impact: Negligible

Divers in the MAF use hand-held nets to capture desired target species. As a result of these highly selective fishing methods, there is no bycatch in this fishery.

Protected species interaction: Negligible

The MAF is permitted to take syngnathids (excluding leafy seadragons) and has retained at least 14 species of syngnathids, although only 5 are generally targeted: the Western Australian seahorse (*Hippocampus elongatus*), the western spiny seahorse (*Hippocampus angustus*), common or weedy seadragon (*Phyllopteryx taeniolatus*), knobby seahorse (*Hippocampus tuberculatus*) and spotted pipefish (*Stigmatopora argus*).

These species are widely distributed in Western Australian waters and occur in both shallow and deep waters, in both urban and remote locations. It is estimated that 80% of populations occur in areas that receive little to no impact from fishing. While in general some species of syngnathids may be vulnerable to over-fishing because they reproduce relatively slowly, have low rates of dispersal and are highly habitat-dependent, there is no evidence of decline for any syngnathid species retained by the MAF (Pogonowski *et al.* 2002).

Ecosystem Effects

Food chain effects: Negligible

Habitat effects: Negligible

Social Effects

Under clauses 9 and 10 of the Marine Aquarium Fish Management Plan 1995, a licensee (or his nominated operator) may fish with two nominated divers, thus permitting up to 3 persons to fish on each licence at any one time. A recent survey has indicated that at least 69 people are directly employed in the fishery. Another aspect to the social effects of this fishery is increased awareness of marine ecosystems through the provision of specimens for public and private aquariums.

Economic Effects

Estimated annual value (to fishers) for year 2007: Not assessed

Fishery Governance

Target catch (or effort) range: Not assessed

Current fishing (or effort) level: Acceptable

The current effort level in the fishery is constant from year-to-year and the operating extent of the fishery is low relative to the widespread distribution of the species targeted. Therefore the curent level of fishing activity is considered acceptable.

New management initiatives (2007/08)

The management arrangements for the MAF are currently under review. Among the changes under consideration is more equitable access for licensees to collect coral and 'live rock'.

The Australian Government's Department of Environment, Water, Heritage and the Arts has recently approved the MAF as environmentally sustainable under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* and therefore declared the fishery as an approved Wildlife Trade Operation (WTO) for three years.

MARINE AQUARIUM FISH TABLE 1

Summary of the reported catch landed from the Marine Aquarium Managed Fishery and associated endorsements in 2007.

Common Name	Quantity (numbers)	Weight (kg)
Fish	35,580	
Syngnathidae (not included in 'Fish' category)	1,572	
Hermit crabs (land hermit crabs only -*Coenobita variabilis*)	76,877	
Invertebrates	84,072	
Algae/seagrasses		1,487
Hard coral		5,118
Soft coral		1,121
Living rock, living sand, sponge, other		2,824

Specimen Shell Managed Fishery Status Report

A. Hart and M. Cliff
Management input from S. Brand-Gardner

Fishery Description

The Specimen Shell Managed Fishery (SSF) is based on the collection of individual shells for the purposes of display, collection, cataloguing, classification and sale.

Up to 550 different shellfish species are collected by hand by a small group of divers operating from small boats in shallow coastal waters. While the fishery covers the entire Western Australian coastline, there is some concentration of effort in areas adjacent to population centres such as metropolitan Perth, Bunbury, Albany and Port Hedland.

Governing legislation/fishing authority

Specimen Shell Management Plan 1995
Specimen Shell Managed Fishery Licence
Commonwealth Government *Environment Protection and Biodiversity Conservation Act 1999* (Export Exemption)

Consultation process

Meetings between the Department of Fisheries and industry

Boundaries

The fishing area includes all Western Australian waters between the high water mark and the 200 m isobath.

Management arrangements

This fishery is managed through input controls in the form of limited entry, gear restrictions and permanent closed areas. The primary controls in the fishery are operational limitations – depth, time and tide.

There are 32 licences in the fishery, though some of these are completely inactive and many more are fished only rarely. A maximum of 2 divers is allowed in the water per license at any one time and specimens may only be collected by hand.

There are a number of closed areas where the SSF is not permitted to operate, for example within various marine parks and aquatic reserves and other closed waters such as Reef Observation Areas and Fish Habitat Protection Areas. Much of the west side of North-West Cape and the Ningaloo Marine Park are prohibited areas for the fishery. The exclusion of Marmion Marine Park in the Perth metropolitan area is also important because of its populations of 2 rare cowrie species.

Some molluscs – such as abalone, mussels, scallops and pearl oysters – form the basis of other commercial fisheries and are subject to separate management plans. The SSF is not permitted to take any species for which separate management arrangements exist.

A comprehensive Ecologically Sustainable Development assessment of this fishery has been undertaken to identify any potential sustainability risks requiring direct management. The only issue identified through this process related to the breeding stock levels of specimen shell species. Boxed text in this status report provides the annual assessment of performance for this issue.

Some minor-scale collection of dead shells is also undertaken above the high water mark by collectors operating under the authority of a commercial fishing licence, mainly for sale into the souvenir, pet supply and hobby craft markets. However, this does not form part of the Specimen Shell Managed Fishery.

Research summary

Current fishery-dependent data collection systems monitor the catch (species-specific), effort and catch rates for the fishery. Fishers within the SSF provide monthly returns under the statutory catch and effort system (CAES). These returns contain information on catch (species, numbers and spatial area), and days and hours fished by month and year.

In August 2004, fishers commenced reporting using 10 x 10 nautical mile (nm) grids rather than 60 x 60 nm grids, providing a finer spatial scale to the data collected. At the same time, they began collecting additional information on sightings of the 8 mollusc species identified as potentially 'vulnerable.' These data are used as the basis to provide research advice for fisheries management.

Retained Species

Commercial landings (season 2007): **23,000 shells**

Recreational catch estimate (season 2007): **Unknown**

Landings

In 2007, the total number of specimen shells collected was 23,000, distributed over a wide range of species. In the past 5 years, more than 535 separate species of molluscs have been collected, with an average of more than 200 species per year – the majority in very low numbers.

There is some focus of effort on mollusc families most popular with shell collectors, such as cowries, cones, murexes and volutes. For example, *Cypraea venusta*, *C. marginata and C. friendii* make up approximately 13% of all shells collected in 2006 and 2007. Cypraeidae or cowries are noted for their localised variations in both shape and colour, making them attractive to collectors.

(Note reported total landings exclude *Trochus hanleyanus* taken for other purposes.)

Fishing effort/access level

Although there are 32 licences in the fishery, only about 6 of these are regularly active. Effort has been stable over the past 5 years, at an average of around 1,200 days fished. In 2007, 1,135 days were fished.

Recreational component: **Not assessed**

Shell collecting is a popular recreational pastime, and members of the public are permitted to collect shells for their private collections. The recreational catch, while unknown, is considered to be declining, as evidenced by declining membership in shell collecting associations.

Stock Assessment

Assessment complete: Yes

Breeding stock levels: Adequate

During the 2007 season the catch rate was approximately 20 shells per day (excluding *Trochus hanleyanus*).

Ponder and Grayson (1998) examined the specimen shell industry on a nationwide basis, rating vulnerability to over-exploitation on the basis of species biology, accessibility to collection, and rarity. Species collected in Western Australia which were identified by Ponder and Grayson as potentially vulnerable comprised 6 cowries and 2 volutes (*Amoria* spp.).

'Shell sighting' is a new abundance category. It is a measure of the population of vulnerable shells that is observed but not taken, and provides evidence for the breeding stock being conserved each year. Of the 8 vulnerable species, an overall average of approximately 61% in 2005 and 59% (previously reported as 71%) in 2006 and 58% in 2007 of the shells sighted were not harvested.

The figures for 'sighted' versus 'taken' vulnerable shells continue to be poorly recorded by the majority of licensees.

The reporting of catch and effort on the finer spatial scale of 10 x 10 nm blocks from August 2004 is also providing more accurate information on the distribution of certain species. However, licensees are not all reporting correctly and instead many continue to report using the 60 nm blocks.

All species collected in Western Australia, including the 8 prized species, occur over wide geographic ranges (hundreds or thousands of kilometres) and wide depth ranges (up to 200 m) where a substantial portion of the population cannot be collected.

Even in shallow waters, many localities cannot be fished because of the lack of access to the beach and the small boats used, and collecting is prohibited in many of the more easily reached areas which are now in marine parks and reserves. Additional protection is afforded by the fact that collectors will ignore any specimens with slight visual imperfections, but their reproductive potential in the population remains undiminished. In summary, it is considered that the fishery has very little likelihood of impacting on breeding stocks.

The performance measures for the fishery relate to the maintenance of breeding stocks, as indicated by catch levels and catch rates. In 2007, the catch level of approximately 23,000 shells and catch rate of 20 shells/day were both within the ranges set, i.e. 10,000 – 25,000 shells and 10 – 40 shells/day.

Non-Retained Species

Bycatch species impact: Negligible

There is no bycatch in this fishery owing to the highly selective fishing methods.

Protected species interaction: Negligible

The fishery had no reported interactions with protected species during 2007. Reports of interactions with protected species are required to be recorded on monthly catch and effort returns.

Ecosystem Effects

Food chain effects: Negligible

Habitat effects: Negligible

Social Effects

Over the past few years, around 30 divers have operated occasionally in this fishery. However, with only 5 or 6 licences recording consistent activity, the number of people employed regularly in the fishery (licensees plus dive buddies) is likely to be around 12.

Economic Effects

Estimated annual value (to fishers) for year 2007: Not assessed

Fishery Governance

Target catch range: 10,000 – 25,000 shells

A preliminary performance measure has been developed of a total annual catch range from 10,000 to 25,000 shells, which encompasses the range of catches taken from 2000 to 2003. This performance measure has been developed to ensure that any major change in the patterns of fishing is noticed and investigated. If it is triggered, this may not necessarily indicate any problem with the stocks, but rather fluctuations in the natural environment or market dynamics.

New management initiatives (2007/08)

The management plan for the SSF is currently under review. To address safety concerns of the licensees, a Ministerial Exemption was granted on 25 September 2006, which permits the use of up to 2 fishing boats of any size (provided that the boats are not used simultaneously) and the use of up to 2 assistant fishers who are not nominated on the Managed Fishery Licence (provided no more than 2 people are in the water at any one time).

In May 2005, the Australian Government's (now) Department of Environment, Water Heritage and the Arts found the fishery to be managed in an ecologically sustainable way and therefore included specimen shells on the list of exempt native specimens which serves to exempt the fishery from the export controls of the *Environment Protection and Biodiversity Conservation Act 1999* for a period of 5 years before reassessment.