

STATEWIDE BIOREGION

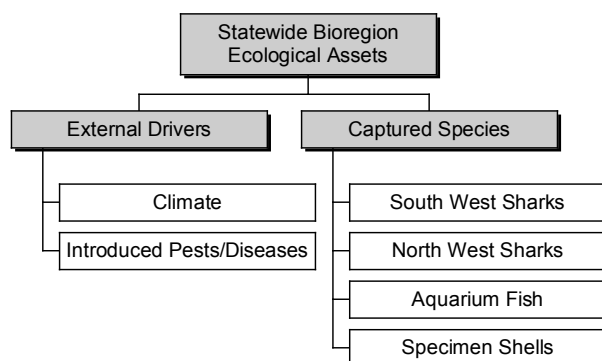
ECOSYSTEM BASED FISHERIES MANAGEMENT

Identification of Statewide Ecological Assets using the EBFM framework

While the bioregional scale of management has been adopted by the Department through the implementation of an Ecosystem Based Fisheries Management (EBFM) framework (see How to Use section for more details), due to their life histories or broader impacts, a small number of ecological assets cannot realistically be managed at a single bioregional level but need to be considered at either a Statewide or at a multiple bioregional level.

Risk Assessment of Statewide Ecological Assets and External Drivers

The EBFM process identifies the ecological assets in a hierarchical manner such that the assets outlined in Statewide Ecosystem Management Figure 1 are often made up of individual components at species or stock levels. The risks to each of the individual stocks or lower level components are mostly detailed in the individual fishery reports presented in this document. The following Ecosystem sections provide an overview and cumulative assessment of the current risks to those ecological assets that function at a Statewide. These risk levels are used by the Department as a key input into the Department's Risk Register which, combined with an assessment of the economic and social values and risks associated with these assets, is integral for use in the annual planning cycle for assigning priorities for activities across all Divisions for Statewide issues.



**STATEWIDE ECOSYSTEM MANAGEMENT
FIGURE 1**

Component tree showing the Statewide ecological assets and external drivers identified and separately assessed.

External Drivers

External Drivers	Current Risk Status
Introduced Pests	HIGH
Introduced Disease	HIGH

Marine pest surveillance programs are being implemented at key locations throughout the State. These include: Broome, Dampier, Port Hedland, Cape Preston, Cape Lambert, Geraldton, Fremantle, Garden Island, Albany and Esperance. Further targeted surveillance activities occur within metropolitan waters of Swan River and Cockburn Sound.

Captured Species

FINFISH

Captured Species	Aquatic zone	Ecological Risk
Sharks	South and lower west	MODERATE
	Mid West – North	MODERATE

The stock levels of most sharks in the south and lower west regions are now either at acceptable levels or are deemed to be recovering at acceptable rates following management intervention.

The stocks levels of sharks in the mid west and north regions are considered to be recovering with some more productive species having recovered.

Captured Species	Aquatic zone	Ecological Risk
Aquarium Fish	Marine	MODERATE

The level of capture is low and the management arrangements ensure that species are not at risk.

INVERTEBRATES

Captured Species	Aquatic zone	Ecological Risk
Specimen Shells	Marine	MODERATE

The level of capture is low and the management arrangements are such that these species are not at risk.

STATEWIDE MARINE AQUARIUM FISH AND HERMIT CRAB RESOURCES STATUS REPORT 2017

S. Newman, R. Ferridge, C. Syers and P. Kalinowski

OVERVIEW

The Marine Aquarium Fish Managed Fishery (MAFMF) is able to operate in all State waters (between the Northern Territory border and South Australian border). The fishery is typically more active in waters south of Broome with higher levels of effort around the Capes region, Perth, Geraldton, Exmouth and Dampier. The MAFMF resource potentially includes more than 950 species of marine aquarium fishes under the *Marine Aquarium Fish Management Plan 1995*. Operators in the MAFMF are also permitted to take coral, live rock, algae, seagrass and invertebrates under the *Prohibition on Fishing (Coral, 'Live Rock' and Algae) Order 2007* and by way of Ministerial Exemption.

The Hermit Crab Fishery (HCF) specifically targets the Australian land hermit crab (*Coenobita variabilis*) for the domestic and international live pet trade. The fishery operates throughout the year and is one of two land-based commercial fisheries in Western Australia. The HCF operates under Ministerial Exemptions and is currently permitted to fish Western Australian waters north of Exmouth Gulf (22°30'S).

There are no documented recreational fisheries.

Both the MAFMF and HCF underwent pre-assessment for Marine Stewardship Council certification in 2014.

SUMMARY FEATURES 2017

Fishery Performance	Commercial (n = numbers; kg = kilograms; l = litres)	Recreational	
Total Catch 2016	Fish (n) – 15,424; Syngnathid (n) – 215; Invertebrates (other than hermit crabs) (n) - 29,487; Hard coral (kg) - 3,514; Soft coral (kg) – 4,298; Living rock & Living sand (kg) - 8,621; Sponges (n) - 3,972; Algae/Seagrasses (l) - 75; Hermit crabs (n) - 79,437	NA	
Fishing Level	MAFMF: Acceptable HCF: Acceptable	NA	
Stock/Resource Performance	Stock Status	Assessment Indicators	
Statewide MAFMF & HCF	Sustainable - Adequate	Annual: Numbers of individual species taken annually.	
EBFM Performance			
Asset	Level	Asset	Level
Bycatch	Negligible Risk	Listed Species	Low Risk
Habitat	Negligible Risk	Ecosystem	Negligible Risk
Social	Low Risk	Economic	Level 2 (\$1-5 mill)
Governance	Stable	External Drivers	Negligible Risk

CATCH AND LANDINGS

Eight licences were active in the MAFMF and 3 in the HCF during 2016. The total catch in the MAFMF and the HCF in 2016 was 128,610 fishes, 16.4 t of coral, live rock & living sand and 75 L of marine plants. MAFMF fish catches were dominated by glassfish (*Ambassis vachelli*, n = 3,200), scribbled angelfish (*Chaetodontoplus duboulayi*, n = 2,670), black-axil

chromis (*Chromis atripectoralis*, n = 2,106), spotted blenny (*Istiblennius meleagris*, n = 1,222) and margined coralfish (*Chelmon marginalis*, n = 943) (Marine Aquarium Table 1), with more than 120 other fish taxa also reported. In addition, more than 160 invertebrate taxa were also landed in the MAFMF dominated by crabs, gastropods and soft coral. The

main coral species landed in 2016 were the coral like anemones of the *Corallimorphus* genus (Marine Aquarium Fish Table 2).

INDICATOR SPECIES ASSESSMENTS AND STOCK STATUS

Statewide MAFMF & HCF (Sustainable-Adequate)

Due to the large number of species captured in the MAFMF and the relatively low numbers per species, traditional stock assessments are not undertaken. Catches at the lowest taxonomic level are annually monitored based on fisher returns. A risk assessment was undertaken with industry and other marine management groups in 2014 which determined that the risk these fisheries are imposing on the stocks is **low**.

This is a result of all specimens being collected for the live market. Therefore, fishers are restricted in 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 the remote northern locations of Western Australia), restricts the levels of effort, and therefore catches, that can be expended in the fishery at any given time.

BYCATCH AND PROTECTED SPECIES INTERACTIONS

There is no bycatch in either fishery as both fisheries target specific taxon by hand. **Negligible** risk. The potential for ETP interactions is limited due to low fishing effort and small areas accessed on each trip. The MAFMF has a small take of syngnathids under a WTO from the Commonwealth. However, there is a prohibition on the take of leafy sea dragons (*Phycodurus eques*). **Low** risk.

HABITAT AND ECOSYSTEM INTERACTIONS

Habitat and ecosystem impacts are considered **negligible**. This is due to the small scale of the fisheries and the hand collection methods. While the fisheries can potentially operate over large areas catches are relatively low due to the special handling requirements of live fish. Fishing operations are also heavily weather-dependent due to the small vessels used (MAFMF) and beach access (HCF). This results in a **negligible risk** to the overall ecosystem from the fishery.

SOCIAL AND ECONOMIC OUTCOMES

Social

Eleven licences were active in 2016. Collections by the MAFMF are usually undertaken on SCUBA or surface supplied air (hookah) from small vessels, typically in small teams of 2 – 3 people. Operators in the HCF use four-wheel drive vehicles to access remote beaches where collection occurs on foot. **Low** risk.

Economic

The value per individual aquarium fish and hermit crab licence is relatively high but difficult to estimate as operators can sell direct to the public, to wholesalers or they have vertically integrated businesses including export. It is likely the combined value of both fisheries exceeds several million dollars. There is currently a **low** level of economic risk to these values.

GOVERNANCE SYSTEM

The current effort level in these fisheries is low and relatively consistent from year to year. The impact of these fisheries is very low relative to the widespread distribution of the numerous species targeted. No other fisheries exploit the majority of the species targeted and therefore there is extremely limited potential for any impact on breeding stocks. Therefore the current level of fishing activity is considered **adequate**.

There are specific performance measures for CITES species taken by the MAFMF as part of its WTO conditions. Catches of CITES species in 2016 were well below the WTO limits for hard corals (3,515 kg; limit of 6,000 kg), *Tridacnid* clams (336 individuals; limit of 700) and syngnathids (215 individuals; limit of 704).

Harvest Strategy

A harvest strategy was developed for the MAFMF in 2016 as a condition on the fisheries WTO approval. The draft MAFMF Harvest Strategy is due for release for public consultation in 2017.

An updated risk assessment was completed in 2014 for the MAFMF. The outcomes of the risk assessment are scheduled to be published in 2017.

Compliance

Operators in the MAFMF and the HCF are required to complete statutory catch and effort returns on a monthly basis. The MAFMF is also required to submit a more detailed daily logbook. The low risks to the sustainability of the stocks imposed by these fisheries results in a **low** risk and low level of compliance.

Consultation

Consultation with licensees occurs directly on operational issues and through industry Management

STATEWIDE

Meetings convened by the West Australian Fishing Industry Council (WAFIC) under a Service Level Agreement with the Fisheries Division of the Department of Primary Industries and Regional Development (Fisheries). The most recent Management Meeting occurred in December 2016.

Consultation with non-fisher stakeholders is undertaken in accordance with the Department's Stakeholder Engagement Guidelines.

Management Initiatives/Outlook Status

A major management review of the MAFMF commenced in 2014. As a result of the review, a new Management Plan is due to be implemented in 2017/18 which will replace the *Marine Aquarium Managed*

Fishery Management Plan 1995 and other subsidiary legislative tools currently used to manage this fishery. The new management plan will introduce formal quota management arrangements for coral, *Tridacnid* clams, 'live rock' and syngnathiformes. A new electronic reporting system will also be introduced to support the quota management system.

EXTERNAL DRIVERS

Fishers are typically limited by sea and weather conditions, and access to beaches. Consumer demand and unit prices also influence the target species and numbers landed. The external drivers pose a **negligible** risk to these fisheries.

MARINE AQUARIUM FISH TABLE 1

Summary of the reported catch (number of individuals) of the main fish (excluding Syngnathids) species landed from the Marine Aquarium Fish Managed Fishery for 2016, and catches over the previous four years. This table in previous Status Reports may vary among years due to varying catch levels of the species being landed.

Species	Common Name	2012	2013	2014	2015	2016
<i>Ambassis vachellii</i>	Vachell's Glassfish				5,245	3,200
<i>Chaetodontoplus duboulayi</i>	Scribbled Angelfish	2,527	1,938	1,333	1,668	2,670
<i>Chromis atripectoralis</i>	Black-axil Chromis	1,010	1,200	2,778	2,400	2,106
<i>Istiblennius meleagris</i>	Spotted Blenny	1,468	1,075	1,669	1,680	1,222
<i>Chelmon marginalis</i>	Margined Coralfish	1,048	1,429	1,082	827	943
<i>Valenciennea muralis</i>	Mural Glidergoby	345	288	262	1,458	714
<i>Chromis viridis</i>	Blue-green Chromis	109	126	52	108	545
<i>Trachinops noarlungae</i>	Yellow-headed Hulafish	580	230	380	100	307
<i>Amphiprion clarkii</i>	Clark's Anemonefish	326	280	299	359	240
<i>Chromis klunzingeri</i>	Black-headed Chromis	421	150	310	14	238

MARINE AQUARIUM FISH TABLE 2

Summary of the reported catch (kg) of the main coral species landed from the Marine Aquarium Fish Managed Fishery for 2016, and catches over the previous four years.

Species	Common Name	2012	2013	2014	2015	2016
<i>Corallimorphus spp.</i>	Corallimorphus Coral-like Anemones	72.50	1,869.00	2,318.00	2,319.00	1,708.00
<i>Zoanthidae - undifferentiated</i>	Zoanthidae Anemones	527.50	1,712.00	1,576.00	1,976.00	748.50
<i>Order Alcyonacea - undifferentiated</i>	General Soft Coral & Sea Fans	10.80	243.00	197.00	712.00	471.00
<i>Sarcophyton spp.</i>	Toadstool Soft Corals	118.80	314.60	448.00	430.00	455.70
<i>Euphyllia ancora</i>	Hammer Hard Coral	491.80	344.76	330.90	535.10	417.80
<i>Duncanopsammia axifuga</i>	Whisker Hard Coral	456.40	326.52	318.80	505.99	375.70
<i>Order Corallimorpharia - undifferentiated</i>	General Coral-like Anemones	3,815.00	1,009.00	418.00	282.00	369.00
<i>Order Zoantharia - undifferentiated</i>	General Zoanthid Anemones	736.60	404.00	632.00	609.00	340.00
<i>Euphyllia glabrescens</i>	Torch Hard Coral	504.60	246.58	277.40	362.52	290.10
<i>Trachyphyllia geoffroyi</i>	Trachyphyllia Hard Coral	266.30	230.00	180.15	279.30	272.90
<i>Goniopora spp.</i>	Goniopora Hard Corals	145.10	235.85	225.80	251.22	234.65
<i>Order Scleractinia - undifferentiated</i>	General Hard Corals	18.15	222.40	290.00	218.00	231.00
<i>Symphyllia spp.</i>	Symphyllia Hard Corals	189.90	74.80	296.00	208.60	178.00
<i>Acropora spp.</i>	Acropora Staghorn Hard Corals	186.20	98.40	165.60	198.37	173.20
<i>Catalaphyllia jardinei</i>	Elegant Hard Coral	265.20		154.10	229.50	164.70
<i>Dipsastraea spp.</i>	Dipsastraea Hard Corals	140.60	136.40	44.00	127.00	151.30
<i>Lobophyllia spp.</i>	Lobophyllia Hard Corals	293.20	555.90	333.50	439.82	145.40
<i>Zoanthus spp.</i>	Zoanthus Anemone	513.00	395.00	109.00	182.00	110.00
<i>Euphyllia paraancora</i>	Branching Hammer Hard Coral	29.00	269.00	330.00	48.50	106.60
<i>Turbinaria spp.</i>	Turbinaria Hard Corals	94.20	149.05	41.00	131.50	89.20

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STATEWIDE SPECIMEN SHELL RESOURCES STATUS REPORT 2017

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OVERVIEW

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

Just over 200 (224) different Specimen Shell species were collected in 2016, using a variety of methods. The main methods are by hand by a small group of divers operating from small boats in shallow coastal waters or by wading along coastal beaches below the high water mark. A current Exemption permits the use of a remote controlled underwater vehicle at depths of up to 300 m. While the fishery covers the entire Western Australian coastline, there is some concentration of effort in areas adjacent to population centres such as Broome, Exmouth, Perth, Mandurah, the Capes area and Albany.

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. This is a limited entry fishery with 31 licences in the fishery, with 23 of the licences being active in 2016. A maximum of 2 divers are allowed in the water per licence at any one time and specimens may only be collected by hand. Remotely operated vehicles are currently also being trialled under exemption instruments; these are limited to one per licence.

There are a number of closed areas where the SSMF is not permitted to operate. This includes 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.

SUMMARY FEATURES 2017

Fishery Performance		Commercial	Recreational
Total Catch 2016		Commercial landings: 8,531 shells	NA
Fishing Level		Acceptable	NA
Stock/Resource Performance		Stock Status	Assessment Indicators
		Sustainable - Adequate	Catch: 10,000 to 25,000 shells Catch rate: 10 – 40 shells per day
EBFM Performance			
Asset	Level	Asset	Level
Bycatch	Negligible Risk	Listed Species	Low Risk
Habitat	Negligible Risk	Ecosystem	Negligible Risk
Social	Low Risk	Economic	Level 1 (<\$1 mill)
Governance	Stable	External Drivers	Negligible Risk

CATCH AND LANDINGS

In 2016, the total number of specimen shells collected was 8,531 distributed over a wide range of species. This is based on 100% of submitted catch returns. In the past 5 years, more than 300 separate species of molluscs have been collected, with an average of more than 200 species per year – the majority in low numbers.

There is some focus of effort on mollusc families most popular with shell collectors, such as cowries, cones, murexes and volutes. Cypraeidae or cowries are noted

for their localised variations in both shape and colour, making them attractive to collectors.

Although there are 31 licences in the fishery, about 7 of these are regularly active. Effort in 2016 was 585 days, which was similar to the effort reported in 2015 (633 days). Over the past 5 years, there was an annual average of around 671 days fished.

INDICATOR SPECIES ASSESSMENTS AND STOCK STATUS

During the 2016 season the catch rate was approximately 14 shells per day.

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 of 6 cowries (*Cypraea* (*Austrocypraea*) *reevei*, *Cypraea* (*Zoila*) *friendii vercoi*, *Cypraea* (*Zoila*) *marginata* (*albanyensis*), *Cypraea* (*Zoila*) *marginata* (*consueta*), *Cypraea* (*Zoila*) *rosselli* and *Cypraea* (*Zoila*) *venusta*) and 2 volutes (*Amoria* *damoni* (*keatsiana*) and *Amoria* *damoni* (*reevei*)).

Shell sighting is the abundance category used to monitor the 8 vulnerable species. Of the 8 vulnerable species an overall average of approximately 49 % of the shells sighted were not harvested in 2016. The measure of the number of shells sighted is reported correctly in about 87 % of the cases where one of the vulnerable species is reported. It is anticipated that current sightings are an under estimate of the available populations.

Sustainable-Adequate.

BYCATCH AND PROTECTED SPECIES INTERACTIONS

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

The fishery reported no interactions with listed protected species during 2016. Reports of interactions with listed protected species are required to be recorded on monthly catch and effort returns. **Low** risk.

HABITAT AND ECOSYSTEM INTERACTIONS

Habitat and ecosystem impacts are considered **negligible**. This is due to the small scale of the fishery and the hand collection methods. While the fisheries can potentially operate over large areas catches are relatively low due to the special handling requirements. For example, collectors will ignore any specimens with slight visual imperfections, but their reproductive potential in the population remains undiminished. This results in a **negligible risk** to the overall ecosystem from the fishery.

SOCIAL AND ECONOMIC OUTCOMES

Social

In 2016 there were 31 authorisation holders in this fishery with around 7 licences recording consistent activity, the number of people employed regularly in the fishery is likely to be around 11. There were also around 17 people that operated occasionally in this fishery. **Low** risk.

Economic

The value per individual specimen shell can be relatively high but difficult to estimate as operators can sell direct to the public, to wholesalers or they have vertically integrated businesses including export. Estimated annual economic value of this fishery is currently not assessed. **Negligible** risk.

GOVERNANCE SYSTEM

The performance measures for the fishery relate to the maintenance of breeding stocks, as indicated by catch levels and catch rates. In 2016, the catch level of approximately 8,513 shells is below the range set, i.e. 10,000 – 25,000 shells and the catch rate of 14 shells/day is within the range set, i.e. 10 – 40 shells/day.

Harvest Strategy

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. This is reported under the ‘Governance System’ section of this report.

Compliance

Operators in the SSMF are required to complete statutory catch and effort returns on a monthly basis. The low risks to the sustainability of the stocks imposed by these fisheries results in a **low compliance risk**.

Consultation

The Department undertakes consultation directly with licensees on operational issues. Industry Management Meetings are convened by the Western Australian Fishing Industry Council (WAFIC), who are also responsible for statutory management plan consultation under a Service Level Agreement with the Department.

Consultation with non-fisher stakeholders is undertaken in accordance with the Department’s Stakeholder Engagement Guidelines.

STATEWIDE

Management Initiatives/Outlook Status

A review of the Exemption based remote controlled underwater vehicle trial will be carried out at the end of the 3 year trial.

EXTERNAL DRIVERS

Fishers are typically limited by sea and weather conditions, and access to beaches. Consumer demand and unit prices also influence the target species and numbers landed. The external drivers pose a **negligible risk** to these fisheries.