

STATEWIDE

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 level. The risks to each of the individual stock or lower level components are mostly detailed in the individual fishery reports presented in this document. The following table (Statewide Ecosystem Management Table 1) provides an overview and cumulative assessment of the current risks to those ecological assets that function at a Statewide level and provides a mechanism for reporting on their status and the fisheries management arrangements that are being applied. These level risks are now 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.

Summary of Monitoring and Assessment of Statewide Assets

The Department is working closely with the Commonwealth Government and other jurisdictions to develop and implement the National System for the Prevention and Management of Marine Pest Incursions that will minimise the biosecurity risks associated with increased shipping in all parts of the State. Within WA, this is currently being achieved through the Fish Resources Management Act 1994 and the Biosecurity and Agriculture Management Act 2007. Work has also been undertaken to develop monitoring designs for introduced marine species for the high risk ports in WA. These designs have been approved by the Invasive Marine Pests Program within DAFF (Department of Agriculture, Fisheries and Forestry). This work contributes toward the management of introduced aquatic organism incursions and fish kill incident response programs already in place.

The Department of Fisheries’ Research Division’s Biodiversity and Biosecurity Branch works collaboratively with the Department of Parks and Wildlife (DPaW) in monitoring the condition of the state’s fish resources within Marine Parks across the State. Development of Collaborative Operational Plans between the Department and DPaW ensure efficient and cost effective delivery of research and monitoring activities where jurisdictions overlap. The Department’s risk based approach to research and monitoring (under its EBFM framework) in conjunction with marine park management plans drives research and monitoring activities within marine parks.

STATEWIDE ECOSYSTEM MANAGEMENT TABLE 1 - RISK LEVELS FOR EACH ASSET.

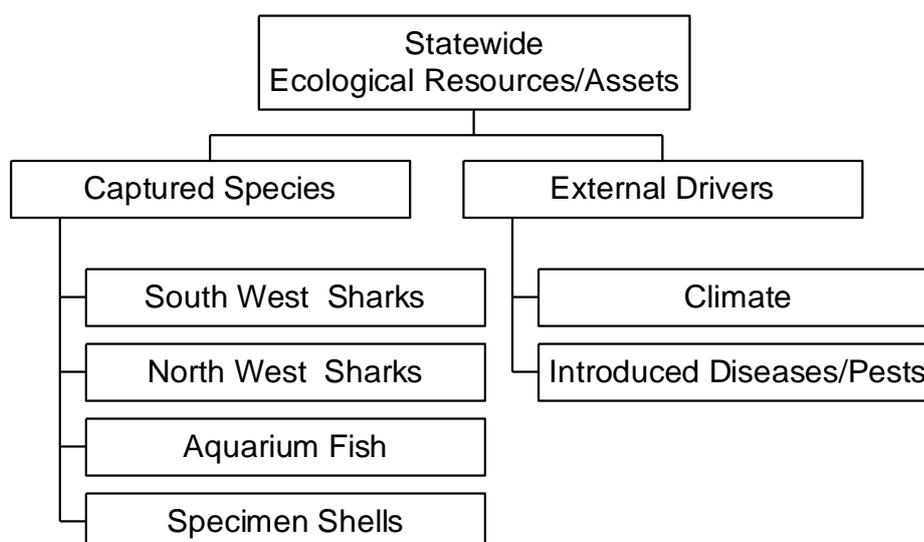
Low and Medium values are both considered to be acceptable levels of risk. High and Significant risks indicate that the asset is no longer in a condition that is considered appropriate and additional management actions are required.

Captured fish species

Fish species	Aquatic zone	Risk	Status and Current Activities
Sharks	South and lower west	MODERATE	The stock levels of most sharks in these regions are now either at acceptable levels or are deemed to be recovery at acceptable rates following management intervention.
	Mid West – North	MODERATE	The stocks levels of some sharks in these regions are now considered to be recovering. The State based fisheries for this asset is currently being reviewed and no catches by these fisheries were recorded during the past season.
Aquarium Fish	Marine	LOW	The level of capture is low and the management restrictions are such that that these species are not at risk.
Specimen Shells	Marine	LOW	The level of capture is low and the management restrictions are such that that these species are not at risk.

External Drivers (NON FISHING)

External Drivers	Risk	Status and Current Activities
Introduced Pests and Diseases	HIGH	There is a high risk that some exotic species will be introduced into the state through the increasing levels of international shipping that is occurring at ports around the country. Many of these pest species are capable of invading beyond a single bioregion. Marine pest monitoring programs are being implemented at high risk port locations throughout the State.
Climate	MODERATE in short term	The predictions for impacts of climate change affecting the Statewide ecosystems and process are moderate in the short term. The risk escalates to a higher level in the medium term.
	HIGH in Medium term	

**STATEWIDE ECOSYSTEM MANAGEMENT FIGURE 1**

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

FISHERIES

Marine Aquarium Fish Managed Fishery Report: Statistics Only

S.J. Newman, K. Crowe, C. Bruce, C. Syers and K. Green

Fishery Description

Commercial

The Marine Aquarium Fish Managed Fishery (MAFMF) has the capacity to target more than 950 species of marine aquarium fish under the *Marine Aquarium Fish Management Plan 1995* (this includes sharks and rays (Chondrichthyes), syngnathids, moray eels, and higher taxonomic groups at the Order, Family or Genus level in cases where the species cannot be specifically identified and also includes unquantified aquarium species). However, the number of marine aquarium fish species targeted and/or landed by the fishery varies from year to year (e.g. in the period from 2005 to 2014 the number of marine aquarium fish species landed ranged from 183 to 288; 170 marine aquarium fish species

were recorded in 2014). 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. In 2014, a total of over 321 species or species groups were reported in the landed catch of the MAFMF. The reported catch includes groups that were reported at the level of Order, Family, Genus or species. The MAFMF is primarily a dive-based fishery that uses hand-held nets to capture the desired target species. While the MAFMF operates throughout all Western Australian waters, catches are relatively low in volume due to the special handling requirements of live fish. Fishing operations are also heavily

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weather-dependent due to the small vessels used and the potentially hazardous conditions (e.g. waves, 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 where collections can occur.

Recreational

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 listed fish such as leafy and weedy seadragons.

Boundaries

The MAFMF 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 km². During the past three years the fishery has been active in waters from Esperance to Broome with popular areas being around the Capes region, Perth, Geraldton, Exmouth and Dampier.

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 12 licences in the fishery; however, only six licences are permitted to take all hard corals and most soft corals (all 12 licences are permitted to take coral like anemone groups such as corallimorphs and zoanthids in the Class Anthozoa). In 2014, 10 licences operated in the fishery.

Licensees are not permitted to operate within any waters closed to fishing (e.g. Rowley Shoals, Reef Protected Areas, sanctuary zones). The fishery is permitted to operate in general-purpose zones of marine parks for the collection of fish and some invertebrates (usually excluding coral and live rock). Fishing is also prohibited on Cleaverville Reef in order 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 non-fish species covered by other specific commercial management arrangements or management plans.

The MAFMF 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*). There is currently an upper limit of 2,000 individual syngnathids across the State, if this limit is exceeded, a review will be initiated, and the results used to determine whether further management action is required.

Landings and Effort

Data for assessing the status of the MAFMF are derived from the catch and effort returns provided by industry. These data are compiled annually and used as the basis for this assessment.

A total of 20,052 fish (excluding syngnathids) were landed in 2014. 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 as either - kg, numbers or litres depending upon the species or species group involved (Marine Aquarium Fish Table 1). The reported landings of aquarium fish for 2014 was higher than that reported in 2013 (19,302), but lower than that reported in 2012 (22,780). The level of catch of aquarium fish reported over the last 5 years is all somewhat similar.

The main fish (excluding syngnathids) species landed in 2014 were damselfish of the *Chromis* genus and the *Neopomacentrus* genus, followed by the spotted blenny (*Istiblennius meleagris*) and the scribbled angelfish (*Chaetodontoplus duboulayi*) (Marine Aquarium Fish Table 2). Likewise, the main coral species landed in 2014 were the coral like anemones of the *Corallimorphus* genus (Marine Aquarium Fish Table 3). The numbers of fish species and the weight of coral species landed vary from year to year depending on market demand.

The syngnathid catch was low and stable between 2009 and 2010 (i.e. 340 and 338 respectively). The syngnathid catches in 2011 (1,138), 2012 (1,232) and 2013 (1,635) were higher in comparison and were similar to the catch levels reported in 2008 (1,218). In 2014, the syngnathid catch was again low, similar to the 2009-2010 level (359 individuals).

In 2014, 10 licences reported some level of activity (effort). Effort in the fishery has decreased from 981 fishing days (2007) to 479 fishing days in 2014. Effort in the fishery is concentrated in a number of 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 the remote northern locations of Western Australia) restricts the levels of effort that can be expended in the fishery at any given time.

There were no reported listed species interactions for the fishery in 2014.

The performance measures for the fishery relate to the catch of the syngnathids. The MAFMF is permitted to take species from the Family Syngnathidae (seahorses and pipefish), which are listed under the Environment Protection and Biodiversity Conservation Act 1999, from state waters only (within 3nm). In 2014, the catch of syngnathids from all species and areas was 359, well below the target commercial catch range level of 2,000 individuals per year. The catch level of syngnathids has decreased from that reported in 2013 (1,635), 2012 (1,232) and 2011 (1,138). Note, that there is a prohibition on the take of leafy seadragons (Phycodurus eques) in the MAFMF.

Fishery Governance

Target commercial catch range:

2000 Syngnathids

Current Fishing (or Effort) Level: **Acceptable**

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

New management initiatives (2015/16)

The MAFMF is currently under review with changes to the management arrangements expected to be introduced in 2015. Among the changes under consideration is to

consolidate existing legislative instruments for the fishery into a new Management Plan that will provide for the take of finfish, invertebrates, hard and soft coral, live rock, algae and seagrass.

In December 2012 an application for reassessment of the MAFMF as ecologically sustainable under the provisions of the EPBC Act 1999 was submitted to the Department of the Environment (DotE), the then Department of Sustainability, Environment, Water, Population and Communities. This application was successful and Wildlife Trade Operation (WTO) approval was granted till December 2013. In November 2013 a subsequent application was submitted to DotE for further WTO approval, this application was successful and WTO approval was granted till October 2016.

The MAFMF is scheduled to undergo MSC pre-assessment in 2015.

MARINE AQUARIUM FISH TABLE 1

Summary of the reported catch landed from the Marine Aquarium Fish Managed Fishery and associated endorsements in 2014 (Note: the catch of hermit crabs is now reported in the Hermit Crab Fishery Status Report).

Common Name	Quantity (numbers)	Weight (kg)	Volume (litres)
Fish	20,052		
Syngnathidae (not included in Fish)	359		
Invertebrates (not including Corals)	41,587		
Hard coral		3,707.55	
Soft coral ¹		5,851	
Living rock		12,313	
Sponges	2,580		
Algae/Seagrasses			345
Live Feed (mainly shrimps/prawns)			21

¹ The soft coral category includes 2,765 kg of coral like anemone groups such as corallimorphs and zoanthids in the Class anthozoa. These are harvested under an invertebrate Ministerial Exemption and are not part of the annual coral TAC.

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MARINE AQUARIUM FISH TABLE 2

Summary of the reported catch (number of individuals) of the main fish (excluding Syngnathids) species landed from the Marine Aquarium Fish Managed Fishery for 2014, with catch for the previous six years. Note the species reported in this table vary from year to year.

Species	Common Name	Year					
		2009	2010	2011	2012	2013	2014
<i>Chromis atripectoralis</i>	Black-axil Chromis	50	1,350	1,550	1,010	1,200	2,778
<i>Neopomacentrus cyanomos</i>	Regal Demoiselle	0	0	0	0	0	2,365
<i>Istiblennius meleagris</i>	Spotted Blenny	2,846	1,040	2,081	1,468	1,075	1,669
<i>Chaetodontoplus duboulayi</i>	Scribbled Angelfish	492	1,333	2,275	2,527	1,938	1,333
<i>Chromis</i>	Chromis	2,849	2,650	2,320	400	2,039	1,213
<i>Chelmon marginalis</i>	Margined Coralfish	682	1,266	1,506	1,048	1,429	1,082
Apogonidae/Dinolestidae Undifferentiated	Cardinalfishes	1,766	94	54	0	500	950
<i>Chromis cinerascens</i>	Green Chromis	790	2,998	1,941	2,203	1,052	760
<i>Centropyge jocularis</i>	Yellowhead Angelfish	633	554	584	594	494	657
<i>Valenciennesa puellaris</i>	Orange-dashed Goby	26	440	1,559	1,250	562	513
<i>Heterodontus portusjacksoni</i>	Shark, Port Jackson	389	197	664	489	270	487
Chaetodontidae/Pomacanthidae	Angelfishes	14	18	28	0	2	440
<i>Trachinops noarlungae</i>	Yellow-headed Hulafish	420	670	1,525	580	230	380
<i>Istiblennius edentulus</i>	Rippled Blenny	0	0	0	0	0	350
<i>Chromis klunzingeri</i>	Black-headed Puller	220	480	575	421	150	310

MARINE AQUARIUM FISH TABLE 3

Summary of the reported catch (kg) of the main coral species landed from the Marine Aquarium Fish Managed Fishery for 2014, with catch for the previous six years.

Species	Common Name	Year					
		2009	2010	2011	2012	2013	2014
<i>Corallimorphus</i>	Corallimorphus	0	0	45	72.5	1,869	2,318
Zoanthidae Undifferentiated	Zoanthid anemones	2,184	1,606	799	527.5	1,712	1,576
Zoanthidea Undifferentiated	Anemones & Corals	56	105	35	736.6	404	632
<i>Sarcophyton</i>	Toadstool coral	166.2	174.1	203.4	118.8	314.6	448
Corallimorpharia Undifferentiated	Coral-like anemones	1,899	2,233	2,932	3,725	1,009	418
<i>Lobophyllia</i>	<i>Lobophyllia</i>	4,662.8	430.2	438.5	293.2	555.9	333.5
<i>Euphyllia ancora</i>	Anchor coral	414.8	605.6	599.7	491.8	344.8	330.9
<i>Euphyllia paraancora</i>	Branching hammer coral	0	0	0	29	269	330
<i>Duncanopsammia axifuga</i>	stony coral (Duncan coral)	548	877.4	407.3	456.4	326.5	318.8
<i>Symphyllia</i>	Symphyllia	169.4	289.8	225.6	189.9	74.8	296
Scleractinia Undifferentiated	Hard corals(kg)	16	4	16.4	18.15	222.4	290
<i>Euphyllia glabrescens</i>	Torch coral	149.8	374.1	402	504.6	246.6	277.5
<i>Goniopora</i>	<i>Goniopora</i>	102.5	68.4	156.1	145.1	235.9	225.8
Alcyonacea	Soft coral & Sea fans - undifferentiated	6	0.4	0.6	10.8	243	197
<i>Trachyphyllia geoffroyi</i>	stony coral (Trachyphyllia brain coral)	503.5	640.4	470.9	266.3	230	180.15
<i>Acropora</i>	<i>Acropora</i> (corals)	333.3	193.5	285.6	186.2	98.4	163.6
<i>Plerogyra sinuosa</i>	stony coral (green bubble)	0	22	380	30	60	155
<i>Catalaphyllia jardinei</i>	Elegant coral	11	23.15	16	265.2	0	129.5
<i>Zoanthus</i>	<i>Zoanthus</i> (colony polyps)	744	669	558	513	395	109
<i>Echinophyllia</i>	Echinophyllia (chalice corals)	511	293	222.4	197.3	109.3	90.9
<i>Acanthastrea</i>	Acanthastrea (large polyp stony corals)	100.3	72.4	102.2	129.5	174.5	90.7
<i>Cynarina</i>	Cynarina	10.4	83.85	118.6	34.9	7	58.8
<i>Euphyllia</i>	<i>Euphyllia</i>	31	46.2	150	0	10	54
<i>Favia</i>	<i>Favia</i> coral (brain coral)	481	267.1	243.8	140.6	136.4	44
<i>Turbinaria</i>	<i>Turbinaria</i> (cup corals)	165.3	271.3	169	94.2	149.1	41

Specimen Shell Managed Fishery Status Report

A. Hart, K. Crowe

Main Features

Status	Current Landings	
Stock level	Adequate	Specimen Shell Catch Total
Fishing level	Acceptable	Shell numbers 37,371 shells

Fishery Description

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 (218) different Specimen Shell species were collected in 2014, 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 method being employed by the fishery is using a remote controlled underwater vehicle at depths between 60 and 300 m and a new exemption method using baited habitat structures at depths is being trialled. While the fishery covers the entire Western Australian coastline, there is some concentration of effort in areas adjacent to population centres such as Broome, Karratha, Shark Bay, metropolitan Perth, Mandurah, the Capes area and Albany.

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

The Department undertakes consultation directly with licensees on operational issues. Industry Annual General 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.

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.

This is a limited entry fishery with 32 licences in the fishery, with 18 of the licences being active. Furthermore, a maximum of 2 divers are allowed in the water per licence at any one time and specimens may only be collected by hand.

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.

The SSMF is not permitted to take any mollusc species for which separate management arrangements exist – such as abalone, mussels, scallops and pearl oysters.

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 activity 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 SSMF 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 method by month and year.

A new specific Specimen Shell logbook was formally introduced in August 2013 (which built on the logbook being trialled in the fishery) to aid the reporting of the number sighted and number taken alive and/or dead of the 8 mollusc species identified as potentially 'vulnerable' and the reporting of the finer spatial scale, 10 x 10 nautical mile (nm) grid blocks.

This data is used as the basis to provide research advice for fisheries management.

Retained Species

Commercial landings (season 2014): 31,371 shells

Recreational catch estimate (season 2014):

Unknown

Commercial Landings

In 2014, the total number of specimen shells collected was 31,371 distributed over a wide range of species. This is based on 100% of submitted catch returns. In the past 5 years, more than 487 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.

Fishing effort/access level

Although there are 32 licences in the fishery, about 11 of these are regularly active. Effort in 2014 was 644 days, a decrease from 745 days in 2013. Over the past 5 years, there was an average of around 800 days 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 2014 season the catch rate was approximately 49 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 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 47 % of the shells sighted were not harvested in 2014. The measure of the number of shells

sighted is reported correctly in about 98 % 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.

This improvement in reporting of the vulnerable (indicator) species, in terms of species identification and the number sighted and number taken alive and/or dead can be contributed to the new return form.

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. Again, the 2014 season has seen 11 licensees report the smaller spatial resolution grid blocks rather than reporting the 60 x 60 nm blocks..

All species collected in Western Australia, including the 8 indicator 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 for logistical and safety reasons be collected. However, with the introduction of the remote controlled underwater vehicles these depth restrictions are starting to be overcome.

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 having an unacceptable impact 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 2014, the catch level of approximately 31,300 shells is above the range set, i.e. 10,000 – 25,000 shells and the catch rate of 49 shells/day was also above the range set, i.e. 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.

Listed species interaction: Negligible

The fishery reported no interactions with listed species during 2014. Reports of interactions with listed species are required to be recorded on monthly catch and effort returns.

Ecosystem Effects

Food chain effects: Negligible

Habitat effects: Negligible

Social Effects

In 2014 there were 32 authorisation holders in this fishery with around 11 licences recording consistent activity, the number of people employed regularly in the fishery (licensees plus crew/ dive buddies) is likely to be around 19. There were also around 8 people (licensees plus crew/dive buddies) that operated occasionally in this fishery. With many of the licences there might be the additional employment of people to prepare the shells for collection, pack and distribute the shells and also, some licensees might have shop fronts, therefore, employing shop assistants. The number employed in this area is unknown.

Economic Effects

Estimated annual value (to fishers) for 2014:

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. Catch in 2014 was above the range, due principally to increased activity of one licence holder.

New management initiatives (2015/16)

The Specimen Shell Managed Fishery is currently under review with changes to the management arrangements expected to be introduced in 2016. Among the changes under consideration is to consolidate existing management arrangements for the fishery into a new Management Plan that will provide for additional permitted methods of collection in the Fishery such as remotely operated underwater vehicles.

Hermit Crab Fishery Report: Statistics Only

S.J. Newman, K. Crowe, C. Bruce, C. Syers and K. Green

Fishery Description

Commercial

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 the only land-based commercial fishery in Western Australia.

Collectors use four-wheel drive vehicles to access remote beaches predominantly in the states north. Collection usually occurs on foot and at night when hermit crabs are most active.

Recreational

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 a recreational daily bag limit of 10 (for “unlisted” crustaceans).

Boundaries

The HCF is currently permitted to fish Western Australian waters (as defined in Section 5, Part 1 FRMA 1994) north of Exmouth Gulf (22°30'S).

Management arrangements

This fishery is managed primarily through input controls in the form of limited entry to the fishery, nominated operators, species restrictions, gear restrictions and permanent closed areas. Access to the fishery is limited to the 5 Commercial Fishing Licence (CFL) holders (or persons acting on their

behalf) listed in the Instrument of Exemption enabling the take of land hermit crabs (*C. variabilis*) by hand collection only.

The Fishery has been managed by way of an exemption authorisation since 2008. Prior to 2008 the fishery was managed by CFL conditions.

Landings and Effort

Data for assessing the status of the HCF are derived from the catch and effort returns provided by industry. These data are compiled annually and used as the basis for this assessment.

A total of 77,675 hermit crabs were landed in 2014. The reported landings of hermit crabs for 2014 were lower than those reported in 2013 (88,443), 2012 (90,364) and in 2010 (105,774) and 2009 (110,250), but were at level similar to that reported in 2011 (75,667; see Hermit Crab Fishery Table 1).

In 2014, 3 of the 5 collectors reported some level of activity in this fishery. Effort in the fishery is variable and does not appear related to catch. A total of 219 effort days were reported in the HCF in 2014. Effort in the fishery is spread over large areas along the Western Australian coastline.

Hermit crabs are collected for a live market, licensees are restricted in terms of the quantities that they can safely handle and transport.

Land hermit crabs inhabit dead mollusc shells which have no attached biota. There is no bycatch associated with this fishery.

There are no reported listed species interactions for this fishery. The HCF is highly selective and land based. It is highly unlikely that this fishery has any interactions with endangered, threatened or protected species (ETPs). The main opportunity for interaction maybe through four-wheel drive vehicles on beaches and whilst walking to collect the crabs, however, if ETPs are sighted they can be easily avoided. The potential for ETP interactions is further limited due to the low fishing effort and restricted areas of collection.

Fishery Governance

Target commercial catch range:

Not Applicable

Current Fishing (or Effort) Level:

Acceptable

The current effort level in the fishery has been relatively constant over the last 4 years and the operating extent of the fishery is low relative to the widespread distribution of the target species. There is limited potential for any impact on the breeding stock. Therefore the current level of fishing activity is considered acceptable.

New management initiatives (2015/16)

The Department of Fisheries is currently reviewing the management of the Western Australian Hermit Crab fishery with a view to transitioning the fishery to Interim Managed Fishery status through the drafting of a (Interim) Fishery Management Plan.

The development of the (Interim) Management Plan will be in accordance with Part 6 of the FRMA 1994. Management arrangements under the management plan will be consistent with, and guided by stock assessment data in accordance with Ecosystem Based Fisheries Management requirements, Commonwealth Wildlife Trade Operation export accreditation requirements, Ecological Risk Assessment outcomes, and minimum effective regulation principles.

HERMIT CRAB FISHERY TABLE 1

Summary of the reported catch of Hermit Crabs landed from the Hermit Crab Fishery for 2014, with catch for the previous six years.

Common Name	Year					
	2009	2010	2011	2012	2013	2014
Land Hermit Crabs	110250	105774	75667	90364	88443	77675

There is currently no Wildlife Trade Operation (WTO) approval for the whole fishery under the provisions of the EPBC Act (Department of the Environment (DotE)). However, one operator has received WTO approval to export land hermit crabs. This WTO is in force until November 2015 and is subject to conditions. The primary condition is the export limitation of *C. variabilis* under the EPBC Act is not to exceed 10,000 specimens per year.

External factors

Terrestrial hermit crabs such as *C. variabilis* have large gill chambers which are kept moist acting as a type of lung. This facilitates their terrestrial life stage, however females must move to the ocean to release eggs which hatch as planktonic larvae. Larvae settle as small juveniles, find a tiny shell and move onshore.

In order for *C. variabilis* individuals to grow, they must exchange their shell for a larger sized one. There is frequently strong competition for any available shells, with *C. variabilis* individuals fighting over shells as intact gastropod shells are not an unlimited resource. The availability of empty shells is dependent not only on the abundance of *C. variabilis* and the gastropods whose shells they seek, but importantly on the occurrence of predators that prey on gastropods yet leave the shells intact.

C. variabilis is endemic to northern Australia including northern Western Australia, the Northern Territory and northern Queensland. Given the warming climate of Australia and the moving of moist air southwards, the distribution of this species may extend further south in future years.