



Australian Government

Department of the Environment and Heritage

Assessment of the
Western Australian Marine Aquarium Fish Fishery

August 2005

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ISBN: 0 642 55153 7

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This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999*. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Australian Government.

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**Assessment of the ecological sustainability of management arrangements for the Western
Australian Marine Aquarium Fish Fishery**

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EXECUTIVE SUMMARY

Background

The Department of Fisheries Western Australian (DFWA) has submitted a document for assessment under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The draft document *Final Application to the Australian Government Department of the Environment and Heritage on the Marine Aquarium Fish Managed Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in August 2004. The submission was released for a thirty-day public comment period that expired on 17 September 2004. One public comment was received. DFWA provided a response to the issues raised, but no changes were made to the submission as a result of public comment.

The submission reports on the Western Australian Marine Aquarium Fish Fishery (MAF) against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission, associated documents, public comments and DFWA's response to the comments.

Table 1: Summary of the MAF

Area	Waters adjacent to the State of Western Australia (WA), from the Northern Territory border to the South Australian border (including Commonwealth waters). The fishery has been active in waters from Esperance to Broome with popular areas being Perth to Busselton, Karratha to Pt Headland, the Gascoyne Region and Albany.
Fishery status	Unknown, however the target species are considered underfished.
Target Species	Over 250 species of marine aquarium fish in the Class Osteichthyes (bony fish) and Class Chondrichthyes (all cartilaginous fish). Several licences have endorsements for the take of other species including soft and hard coral, syngnathids, live rock and sand, invertebrates, tropical rock lobster and seagrass and algae.
By-product Species	There are no byproduct species taken in the fishery.
Gear	Nets and handheld nets only with the use of scuba or hookah gear.
Season	Year round, however harvest is heavily weather dependent due to small vessels and potentially hazardous conditions.
Commercial harvest 2002/03	Aquarium fish: 130 408 individuals; Invertebrates: 7362 individuals; Hard coral: 4637 kg; and Soft coral, living rock and algae: 6049 individuals.
Value of commercial harvest	Uncertain.
Recreational harvest	No documented recreational take. Indigenous take is unknown, however an indigenous group is currently trialling the aquaculture of several marine aquarium fish species.
Commercial licences issued	13 licences (12 fully transferable). Some licensees also hold exemptions or endorsements for the harvest of a range

	<p>of species including:</p> <ul style="list-style-type: none"> ▪ 5 licences are permitted to take coral (7500 kg combined Total Allowable Catch (TAC)); ▪ 3 licences are permitted to take live rock and sand (500 kg each); ▪ three licences are permitted to take invertebrates (two have an exemption to take 250 animals each while the other is permitted to take two species of sea urchins, three species of sea cucumbers and terrestrial hermit crabs); ▪ four licences are permitted to take tropical rock lobsters; and ▪ two licences are permitted to take seagrass and algae.
Management arrangements	<p>Output controlled through a TAC for a range of species harvested.</p> <p>Input controlled through:</p> <ul style="list-style-type: none"> ▪ limited entry (currently limited to 13 licences with some licensees holding exemptions and endorsements for the harvest of a range of species – see above); ▪ closed areas including Ningaloo Marine Park, Rowley Shoals, Reef Observation Areas and Sanctuary Zones; ▪ gear limitations (cast nets and hand held nets only); and ▪ limitations on the number of divers permitted under each licence (two). <p>Management arrangements are currently under review.</p>
Export	Exported live to the United States, Europe and, to a lesser extent, Japan.
Bycatch	Bycatch is considered minimal due to the highly selective nature of harvest.
Interaction with Threatened Species	No interactions have been reported to date.

The MAF licence area extends through all WA waters, from the Northern Territory (NT) border to the South Australian border. The fishery technically includes Commonwealth waters, however in practise the fishery currently operates only in WA waters. Effort is spread over a total gazetted area of 20 781 km. During the last two years, the MAF has been active in waters from Esperance to Broome with popular areas being Perth to Busselton, Karratha to Pt Headland, the Gascoyne Region and Albany.

The MAF targets more than 250 species of aquarium fish. The most targeted species of aquarium fish caught in 2000-2003 were from 15 finfish taxa and include: Atherinidae, Apogonids, Gobiesocids, Clupeids, Mugilids, *Ambassis vachellii*, *Amniataba caudavittatus*, Pomacentrids, *Neopomacentrus azyron*, *Chanos chanos*, *Selenotoca multifasciata*, *Plotosus lineatus*. The fishery also targets invertebrates (including anemones, sea urchins, sea cucumbers, starfish and shrimp), live rock and sand, seagrass, algae (particularly encrusting red algae species and coralline algae) and a range of soft corals from the family Alcyoniidae.

The fishery harvests a number of species currently listed under the Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES) including hard corals (from families including Euphyllidae, Caryophylliidae, Dendrophylliidae, Trachyphylliidae and Acroporidae) and seahorses (*Hippocampus angustus/elongatus* and *Hippocampus breviceps*). Special consideration must be given to these species in this assessment to ensure that the fishery meets the international obligations of CITES.

The fishery also targets syngnathids (*Phyllopteryx taeniolatus*, *Stigmatopora argus*, *Filicampus tigris*, *Haliichthys taeniophorus* and *Hippocampus spp*), which are listed under Part 13 of the EPBC Act.

As the MAF targets such a large range of species, it is not possible to provide biological information on each species. A brief overview of the main finfish taxa targeted by the fishery, as well as information on invertebrates, live rock, and CITES/EPBC Act listed species is included in Appendix A. Further information on the species harvest in the fishery can be found in: Edgar 2000; Jones and Morgan 1994 and Carson-Ewart 2000.

It is important to note that, based on a study conducted in 2002 (Pogonoski *et al* 2002), there is no evidence of decline of EPBC Act listed syngnathid species or the CITES listed *Hippocampus sp*.

Approximately 130 408 individual aquarium fish, 7362 individual invertebrates, 1216 individual syngnathids, 4637 kg of hard coral and 6049 kg of soft coral, living rock and algae were harvested in the MAF in 2002-03. The value of the fishery is unknown because details on the domestic market are difficult to obtain.

The MAF began in the 1960s, with early commercial operators working on permits or conditions on their commercial fishing licences. In 1986, the number of commercial licences was limited to 20. After a review of the fishery in 1991, licences were increased from 20 to 24. Since 1994, a Fisheries Management Paper *Management of the marine aquarium fish fishery* was developed and outlined performance criteria which had to be met by each licensee to retain their licence. The number of licences subsequently decreased to 13. The total number of licences has since been capped at 13 with no additional licences to be issued.

Product from the fishery is marketed live in both domestic and export markets. The domestic market currently comprises the majority of demand.

Harvest in the MAF is by nets or hand held nets only, with the assistance of hookah or SCUBA equipment. Once captured in nets, fish are held in buckets that remain attached to a drop line until fishing is complete. During hauling, buckets are held on the drop lines a few metres below the water surface for a period to allow for gradual decompression of the captured fish.

No limitations on the number of nets are currently in place, however no more than two authorised vessels may be used in the fishing operation, and no more than two nominated divers are permitted to assist the licence holder at any one time. Quotas are also in place for the harvest of coral, syngnathids, live rock and seagrass.

Due to the highly selective nature of harvest, bycatch in the fishery is limited to commensal organisms living on or within target species such as coral, live rock, invertebrates and seagrass. The impact of the MAF on bycatch species is likely to be minimal due to the small scale of harvest and management measures limiting the take of specimens likely to provide habitat for commensal organisms.

Some species impacted by this fishery are currently listed protected species under the EPBC Act. While interactions with marine turtles and cetaceans are possible through boat strikes, they are unlikely due to the limited number of vessels permitted in the fishery. The MAF interacts with syngnathids, however the harvest is controlled by management measures and has been shown to

have no effect on population densities to date (Pogonoski et al 2002). These interactions are assessed under Principle Two of this report.

Take of MAF species by the indigenous and recreational sectors is not significant. Recreational fishers are subject to a range of bag and possession limits for a range of finfish species and are not permitted to harvest coral, live rock, seagrass or syngnathids. An indigenous group is currently developing an aquaculture facility for a number of MAF targeted species.

A number of exemptions have been issued to public aquarium facilities to collect and hold aquarium specimens for educational and community awareness programs. Recreational and indigenous harvest is further assessed under Part I of this report.

The fishery is managed under the *Marine Aquarium Fish Management Plan 1995* (the Plan) in force under the *Fish Resources Management Regulations 1995* and the *Fish Resources Management Act 1994*. The Plan is currently under review, with a number of changes to be undertaken in 2005 (discussed in further detail in Part I and II of this report).

Overall assessment

The material submitted by DFWA demonstrates that the management arrangements for the MAF meet the requirements of the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*.

DEH has identified a number of risks that must be managed to ensure that their impacts are minimised:

- lack of information on critical elements of species biology, particularly for CITES and EPBC Act listed species;
- potential for localised depletion of some species targeted in the MAF;
- lack of data validation for commercial catch data; and
- current absence of strategies to address identified compliance risks.

Recommendations to address these issues have been developed to ensure that the risk of impact is minimised in the longer term. Through the implementation of the recommendations and the continuation of a responsible attitude to the management of the fishery, management arrangements are likely to be sufficiently precautionary and capable of controlling, monitoring and enforcing the level of take from the fishery while ensuring the stocks are fished sustainably.

The management regime aims to ensure that fishing is conducted in a manner that does not lead to over-fishing and for fishing operations to be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. On balance, the fishery is being managed in an ecologically sustainable manner and is working to address existing problems and minimise environmental risks.

The operation of the fishery is consistent with the objects of Part 13A of the EPBC Act. Given the management arrangements specified in the Plan, the existing review of management arrangements and the commitment to the precautionary management of vulnerable species, DEH considers that the fishery will not be detrimental to the survival or conservation status of the taxon to which it relates in the short term. Similarly, it is not likely to threaten any relevant ecosystem in the short term. DEH therefore recommends that the fishery be declared an approved Wildlife Trade Operation (WTO) with the actions specified in the recommendations to be undertaken by DFWA to contain the environmental risks in the long term. DEH considers that the fishery, as managed in

accordance with the management plan is not likely to cause serious or irreversible ecological damage over the period of the export decision. Specifically, the WTO declaration would allow the export of product from the fishery for a period of 3 years. The WTO declaration will require annual reporting on the progress of implementing the recommendations of this report and other managerial commitments. The implementation of the recommendations will be monitored and reviewed as part of the next DEH review of the fishery in 3 years time.

As the official fishery area encompasses Commonwealth as well as State waters, consideration under Part 13 of the EPBC Act is required regarding the impact of the fishery on listed threatened species, listed migratory species, cetaceans and listed marine species.

Under the management arrangements for the MAF, harvesters are permitted to take all bony and cartilaginous fish, and a number of other species under exemption. No other vertebrate (including cetaceans and turtles) apart from fish are permitted to be harvested. Regulations are also in place to prevent the harvest of State protected species, including the Great White Shark which is listed as a threatened and migratory species.

Syngnathids are listed marine species under Part 13 of the EPBC Act. Various offence provisions (sections 254A, 254B, 254C and 254E) state that it is an offence to kill, injure, recklessly take, trade, keep, or move a member of a listed marine species, if the member was taken in or on a Commonwealth area. DFWA advise that all syngnathids are currently taken only in State waters and a condition will be placed on the WTO declaration, that no syngnathids are permitted to be harvested in Commonwealth waters.

Section 265 of the EPBC Act state that the Minister may accredit a plan of management for a fishery if satisfied that the plan requires persons engaged in fishing under the plan to take all reasonable steps to ensure that members of listed marine species are not killed or injured as a result of the fishing. As the MAF actively targets syngnathids in the fishery, accreditation under section 265 of the EPBC Act cannot be granted.

No species currently targeted in the fishery are listed as a threatened species are under the EPBC Act, however as the management arrangements for the fishery permit the harvest of any bony or cartilaginous fish and do not exclude the harvest of species protected under the EPBC Act, accreditation under section 208A cannot be granted at this time.

The MAF does not currently harvest any listed migratory species under the EPBC Act, however the management arrangements do not explicitly prevent the harvest of EPBC Act listed migratory species (although harvesters are not permitted to take migratory listed Great White Sharks). Accreditation under section 222A therefore cannot be granted at this time.

DEH recommends that the *Marine Aquarium Fish Management Plan 1995* be declared an accredited management plan under Section 245 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the plan relates does not, or is not likely to, adversely affect the survival in nature of the conservation status of a listed cetacean species or a population of any of those species. DEH also considers that the management plan requires that all reasonable steps are taken to avoid the killing or injuring of these species, and the level of interaction under current fishing operations is low. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the management plan, would not be expected to have a significant impact on a cetacean species or a population of any of those species protected by the EPBC Act.

The assessment also considered the possible impacts on species harvested in the MAF which are listed under CITES. As a party to the Convention, Australia must apply all CITES provisions of the EPBC Act to hard coral and *Hippocampus* species imports and exports as appropriate. Under these provisions, export of CITES specimens may only occur where a permit, supported by a non-detriment finding, has been issued by the CITES Management Authority of the country of export. As Part 13A of the EPBC Act incorporates the requirements of CITES, there are no changes to the criteria for export approval, aside from administrative changes to the permits issued. As a result of the listing, specimens of hard coral and *Hippocampus* taken from the wild may only be exported under a single use CITES permit, while specimens bred in captivity may be exported under either a single use or a multiple use CITES permit.

Given the management arrangements in place to protect hard corals and *Hippocampus* seahorses, DEH considers that the harvest of the species from the fishery will not be detrimental to the survival of the taxon in the wild.

The implementation of recommendations and other commitments made by DFWA in the submission will be monitored and reviewed as part of the next DEH review of the fishery in 3 years time.

Recommendations

1. DFWA to advise DEH of any material change to the MAF's legislated management plan and/or arrangements that could affect the criteria on which EPBC Act decisions are based, within three months of that change being made.
2. DFWA to consult with DEH prior to a change to the management arrangements for a CITES or EPBC Act listed species being implemented.
3. The ESD Report, including all performance measures, responses and information requirements to be incorporated into the management regime and decision making process.
4. Within 18 months DFWA to develop and implement strategies to address identified compliance risks within the fishery.
5. DFWA to implement data validation mechanisms for CITES and EPBC Act listed species harvested in the fishery within 18 months.
6. Within 2 years DFWA to develop and implement a research strategy to gather further information on the stock status, biology and ecology of CITES and EPBC Act listed species. DEH notes that the research strategy will need to be implemented within the constraints of available resources.
7. Within 2 years DFWA to identify species at risk of localised and serial depletion and to implement management measures to mitigate these risks in the fishery.
8. Within 12 months DFWA to develop a timeline for the implementation of proposed changes to the Management Plan for the MAF, as outlined in the DFWA submission.
9. DFWA to provide a mechanism which allows fishers to record interactions with protected/listed species. DFWA to ensure that industry has the capacity to make these reports at an appropriate level of accuracy.

PART I - MANAGEMENT ARRANGEMENTS

The MAF is managed by DFWA.

The management regime is described in the following documents, all of which are, or will be publicly available:

- the *WA Marine Aquarium Fish Management Plan 1995*;
- *WA Fish Resources Management Regulations 1995*;
- *WA Fish Resources Management Act 1994*;
- *WA Government Gazette Notice No. 366, Notice No. 387, Order No. 7 of 2001*; and
- relevant Gazetted notices and licence conditions.

A number of other documents, including research reports, scientific literature and discussion papers are integral to the management of the fishery.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Due to the importance of the management plan and documents referred to above to DEH's assessment of the fishery, an amendment could change the outcomes of our assessment and decisions stemming from it. Decisions resulting from this assessment relate to the arrangements in force at the time of the decision. In order to ensure that these decisions remain valid, DEH needs to be advised of any changes that are made to the management regime and make an assessment that the new arrangements are equivalent or better, in terms of ecological sustainability, than those in place at the time of the original decision.

Recommendation 1: *DFWA to advise DEH of any material change to the MAF's legislated management plan and/or arrangements that could affect the criteria on which EPBC decision are based, within three months of that change being made.*

DEH considers that the current consultative process is sufficient for the general management of the fishery but that consultation with DEH in regards to the management of CITES and EPBC Act listed species needs to be strengthened, given that DEH acts as the Australian CITES Management Authority and enforces EPBC Act legislation. As CITES/EPBC Act listed species are subject to additional protection measures, there is an ongoing need to closely manage these species to ensure that harvest levels are not detrimental to their survival in the wild. DEH therefore recommends that, if a change to the management arrangements, such as catch limits, for a CITES or EPBC Act listed species is proposed, DFWA consult with DEH prior to the change being implemented.

Recommendation 2: *DFWA to consult with DEH prior to a change to the management arrangements for a CITES or EPBC Act listed species being implemented.*

No management advisory committee has been established for the fishery, however licensees in the MAF have recently established a formal Industry Association to foster improved communication between fishers, DFWA and the community. One of the Association's key projects is to revise and formalise a Code of Practice for the licensees. The Code of Practice is discussed further in Part II of this report.

DFWA advise that all discussion papers and proposals for modifications to the management arrangements for the MAF are distributed widely to stakeholder groups and are available on DFWA's website: www.fish.wa.gov.au. The current review of the Management Plan has involved a range of stakeholders, in particular through a 2004 workshop held to seek outside involvement in

changes and improvements to the management of the MAF. Representatives on the workshop included DFWA, Department of Conservation and Land Management WA, Western Australian Fishing Industry Council, Conservation Council WA, Marine and Coastal Community Network, WA Museum and the Marine Aquarium Industry members.

An ESD (Ecologically Sustainable Development) report, on which the submission is largely based, is an integral part of the management regime. It examines benefits and costs associated with the fishery. It also identifies and assesses risks posed to the fishery and environmental components. The ESD Report will document the performance of the fishery and its management in terms of the ecological, economic, social and governance issues associated with the fishery. This report will be publicly available in document form and on the DFWA website. The management commitments specified in this report have been fundamental in DEH's assessment and consequent recommendations. The ESD report is not currently a formal component of the legislative arrangements. Although DEH is satisfied that this lack of a legislative base will not cause issues in the fishery in the short term, we recommend that the report be formally incorporated into the management regime and decision making process. DFWA has advised that it proposes to formally publish the management objectives and performance measures for the fishery as part of a series of Ministerial guidelines, as an adjunct to the management plan that is currently being developed. The Ministerial Policy Guidelines will provide the policy framework for the management for each fishery. This document will reflect the management objectives, philosophy and guidance for decision making, including the upcoming legislated management plan, the ESD report, and as relevant, reference to other documents.

Recommendation 3: *The ESD Report, including all performance measures, responses and information requirements to be incorporated into the management regime and decision making process.*

Management of the fishery is based on a mixture of input and output controls including:

- limited entry with 13 licences (12 licences fully transferable);
- gear restrictions (nets or hand held nets only);
- effort limits (1 vessel per licence, no more than 2 divers assisting the licence holder);
- limited exemptions for the harvest of species other than bony and cartilaginous fish; and
- TACs for exemption holders:
 - hard coral: 8500 kg;
 - 3 licences permitted to take 500 kg each of live rock and sand;
 - 3 licences permitted to take invertebrates; and
 - 2 licences permitted to take seagrass and algae.

A number of these controls are currently under review, and it is the intention of DFWA that all licence holders will have access to exemption holder specimens but that strict TACs will remain in place.

Syngnathids were previously limited to a TAC of 750 individuals however, this was considered not sufficiently precautionary as it potentially allowed for the take of 750 individuals of the one species from the one location. DFWA is currently developing species specific TACs for syngnathids that will be in place when the management plan review is complete. These new quotas are discussed further in Part II of this report.

Compliance and enforcement tools utilised in the fishery are limited due to the limited resources available to the MAF. Compliance checks are generally conducted in conjunction with other

fisheries. In 2002/03 three formal compliance checks were carried out in the MAF, with no breaches reported.

In March 2003, DFWA conducted a compliance risk assessment for the MAF and found a number of difficulties with the current management plan for proficient compliance check to be conducted. The review of the management plan aims to address these problems and compliance gaps and implement new compliance measures. To date, one compliance measure has been identified for implementation (mandatory notification by the licensee to DFWA of the intention to fish) and has yet to be implemented. DEH considers that additional measures should be developed and implemented to ensure compliance with management measures, particularly in relation to the harvest of CITES and EPBC Act listed species.

Recommendation 4: *Within 18 months DFWA to develop and implement strategies to address identified compliance risks within the fishery.*

As outlined above, the Management Plan for the MAF is currently undergoing review. DFWA also reviews the MAF through the annual State of the Fisheries report. This report is updated and published each year. The ESD Component Reports contain a comprehensive performance evaluation of the MAF as discussed above. DFWA advise that the ESD assessment will be reviewed externally every 5 years.

DEH considers that a five year review of the ESD Report is suitable while critical aspects are reviewed annually through the State of the Fisheries Report, and while DFWA is committed to act if adverse signals appear in the fishery. The annual reviews and the current review of the Management Plan are discussed more fully in Part II of this report.

Fishery dependent data relating to the target species is collected regularly in the fishery. Some fishery independent information is also collected. Discussion of the information collection system can be found in Part II of this report.

An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates is contained under Principle Two of this report.

A number of the species harvested in the MAF have wide distributional ranges and stocks may be shared with other jurisdictions including NT and SA. DEH therefore encourages DFWA to pursue complementary management arrangements and joint research opportunities with relevant States, where appropriate.

DEH considers that the current management arrangements comply with all relevant threat abatement and recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. DEH considers that DFWA will comply with all relevant future plans and policies.

The main international convention, to which Australia is a party is CITES (as discussed above). The MAF is also affected by the United Nations Convention on the Law of the Sea. The management regime essentially complies with this. Other international regimes are applicable to fisheries management but do not explicitly involve this fishery, for example the 1992 Convention on Biological Diversity and in particular the 1995 Jakarta Mandate requiring that, in relation to the sustainable use of marine and coastal biological diversity, the precautionary principle should apply in efforts to address threats to biodiversity. While these agreements are not specifically addressed in the Submission, the fishery's compliance with their requirements can be assessed by examination of Part II of this report. The application of the International Convention for the Prevention of Pollution

from Ships (MARPOL) to vessels operating in the fishery is addressed under Principle 2, Objective 3.

DEH considers it is incumbent on all authorities to develop a thorough understanding of the framework of national, regional and international agreements and their applicability to export-based fisheries for which they are responsible.

Conclusion

DEH considers that the MAF management plan is documented, publicly available and transparent, and is developed through a consultative process. The management arrangements are adaptable and underpinned by appropriate objectives and performance criteria by which the effectiveness of the management arrangements can be measured, enforced and reviewed.

The management arrangements are capable of controlling the harvest through a combination of input and output controls appropriate to the size of the fishery. Periodic review of the fishery is provided for, as are the means of enforcing critical aspects of the management arrangements.

The management regime takes into account arrangements in other jurisdictions, and adheres to arrangements established under Australian laws and international agreements.

DEH considers that there is scope to further refine the management arrangements and has provided a number of recommendations for improvements in the longer term.

PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

Stock Status and Recovery

Principle 1: *‘A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover’*

Maintain ecologically viable stocks

Objective 1: *‘The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability’*

Information requirements

Fishery dependent data are obtained through compulsory daily logbooks, which are provided to DFWA on a monthly basis under the statutory catch and effort system (CAES). These returns contain information on catch (individuals caught and spatial area (10x10 nm blocks)) and days and hours fished by month and year.

No fishery independent data is collected on a regular basis. Studies conducted on, or in relation to the fishery, are used by DFWA where appropriate. Fishery dependent data is therefore the only source of data for the fishery. DEH considers that given the importance of this data to the management of the fishery and given the harvest of CITES and EPBC Act listed species, DFWA should implement data validation mechanisms for the fishery to ensure that all fishery dependent data is robust and reliable to base management decisions on.

Recommendation 5: *DFWA to implement data validation mechanisms for CITES and EPBC Act listed species harvested in the fishery within 18 months.*

No research is currently underway or proposed for the fishery. Gaps in the knowledge of stock status, biology and ecology exist for a number of key species targeted in the MAF, particularly CITES listed coral and *Hippocampus* seahorses and EPBC Act listed syngnathids. While DEH commends DFWA for utilising available data on key target species including syngnathids to inform management decisions, DEH considers that any changes to the management of CITES and EPBC Act listed species needs to be supported by scientific evidence to indicate that the change would not be detrimental to the survival of the species in the wild. DEH therefore recommends that DFWA implement a research strategy for the fishery, to gather further information on the stock status, biology and ecology of CITES and EPBC Act listed species.

Recommendation 6: *Within 2 years DFWA to develop and implement a research strategy to gather further information on the stock status, biology and ecology of CITES and EPBC Act listed species. DEH notes that the research strategy will need to be implemented within the constraints of available resources.*

Overall, given the range of fishery dependent data gathered by DFWA and the commitment to implement **Recommendations 5 and 6**, DEH considers that there will be a reliable information collection system in place appropriate to the scale of the fishery.

Assessment

No stock assessment has been conducted for the fishery due to the large number of species harvested and limited resources available. Finfish taxa taken in the fishery are divided into two groups according to the annual catch level. Group A contains those taxa that have an average annual catch of <2000 individuals per year, while Group B contains taxa that have an average annual catch of >2000 individuals per year. Syngnathids, coral and all other species (including algae, seagrass, live rock, sand invertebrates) are considered separately in management.

Group A includes 97% of taxa caught by the fishery. These species are generally small and abundant and have biological characteristics (high fecundity, planktonic larvae dispersal, early age of first maturity) that minimise the risks of overfishing.

Group B comprise approximately 15 finfish taxa, none of which are currently listed as threatened. Group B taxa share similar biological characteristics as Group A taxa (high fecundity, planktonic larvae dispersal, early age of first maturity).

Six species of syngnathids are targeted in the fishery. In 2003 a total of 383 individuals were harvested from 7 blocks. While the potential productivity of syngnathids targeted in the fishery is largely unknown, a 2002 study (Pognowski) indicated that no species of syngnathid occurring in WA waters was at risk. Since harvest levels have remained relatively stable since the study, it is unlikely that species of syngnathids are at risk.

Research into the distribution and spatial structure of species targeted in the MAF has not been extensive. Generally, finfish, coral species and invertebrates targeted in the fishery have a wide distribution throughout Australia and are found in a wide array of habitat types. One species of syngnathid however is endemic to WA and other syngnathid species may be more restricted in range due to habitat requirements.

DFWA states that 85% of effort in the fishery occurred in five 60x60 nm blocks during 2002/03. DEH notes that during this year, 45% of effort was focused in one block alone. While the majority of species targeted in the fishery are widespread, highly fecund and abundant, a number of species targeted are at risk of localised and serial depletion, including corals and syngnathids. This is of particular risk for the most targeted syngnathid species *H. angustus*, which is endemic to WA waters. DEH considers that measures to mitigate the risk of localised and serial depletion should be implemented as a priority for at risk species. Management measures could include closed zones, closed seasons and/or size restrictions.

Recommendation 7: *Within 2 years DFWA to identify species at risk of localised and serial depletion and to implement management measures to mitigate these risks in the fishery.*

Dedicated marine aquarium fisheries are also operating in other jurisdictions, including NT, SA and Queensland. DEH believes it would be beneficial for DFWA to pursue cross-jurisdictional actions to address any issues common across aquarium fisheries.

No significant indigenous or recreational fishing occurs from the MAF. Some illegal fishing has been known to occur, however DFWA has identified this as a compliance issue and DEH considers that it will be dealt with through the implementation of **Recommendation 4**.

Management response

The MAF management regime aims to maintain ecologically viable stock levels through a range of input and output controls. These measures were outlined in Table 1 and Part I of this report.

DEH considers that the combination of management controls, both in place and in development, and the implementation of **Recommendations 5, 6 and 7** should ensure adequate protection of the target stocks.

The MAF is managed with a range of input and output controls including limited entry, TAC and gear restrictions. The Management Plan for the MAF is currently under review and DFWA has committed to review the take of all species, particularly coral and syngnathids.

DFWA state that trigger points for the take of Group A and Group B species are currently being developed as part of the revision of the management plan.

The current limits on coral will be reviewed with a view to increasing the TAC from 7 tonnes to 8.5 tonnes and allowing all licence holders to access this resource. DFWA states that these changes will be reviewed by an expert panel before implementation. This expert panel will also develop a robust list of coral species, which the MAF will be allowed to take. DEH commends this approach and notes that DEH should be notified before these changes are made in accordance with **Recommendation 2**. In addition, species specific TACs are being developed for the harvest of syngnathids.

DEH commends DFWA for the development of these management changes and considers that they should be implemented over the next three years to ensure the continuing sustainability of the fishery. The proposed management changes have been integral to the DEH assessment of the fishery and should therefore be implemented as soon as possible, particularly in relation to proposed management changes for CITES and EPBC Act listed species. DEH therefore recommends that DFWA develop a timeline for the implementation of the proposed changes to the Management Plan for the MAF as outlined in the submission, including the trigger points for the take of Group A and Group B species, reviewed TACs and species list for the take of coral and species specific TACs for syngnathids.

Recommendation 8: *Within 12 months DFWA to develop a timeline for the implementation of proposed changes to the Management Plan for the MAF, as outlined in the DFWA submission.*

DEH considers that the implementation of **Recommendation 6** may assist in the setting of trigger limits and TACs for both coral and syngnathids.

No byproduct is taken in the MAF.

Conclusion

DEH considers that the management regime in the MAF is appropriately precautionary and provides for the fishery to be conducted in a manner that does not lead to over-fishing. DEH considers that the information collection system and management arrangements generally are sufficient to ensure that the fishery is conducted at catch levels that maintain ecologically viable stock levels with acceptable levels of probability.

DEH considers that there is scope to further refine some of the existing information collection, assessment and management responses and has provided a number of recommendations for improvements in the longer term.

Promote recovery to ecologically viable stock levels

Objective 2: *'Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes'*

This objective is not applicable to the fishery at present. Management arrangements are in place to prevent overfishing of species in the MAF, and trigger limits and precautionary TACs will be developed in the fishery within the next three years.

Conclusion

DEH considers that the WA Aquarium stock is not below a defined reference point but should that occur in the future, the fishery is conducted such that there is a high degree of probability the stock would recover to ecologically viable stock levels within nominated timeframes.

Ecosystem impacts

Principle 2: *'Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem'*

Bycatch protection

Objective 1: *'The fishery is conducted in a manner that does not threaten bycatch species'*

Information requirements

Due to the highly selective nature of harvesting in the fishery (hand collection of live specimens) no bycatch is taken in the MAF apart from commensal organisms living on or within live rock, coral and invertebrates. Bycatch of commensal organisms is unlikely to have a significant impact on the survival of the species in the wild due to the limited amount taken and management controls on the level of take of species in which commensal organisms live.

Conclusion

DEH considers that there is a high likelihood the fishery is conducted in a manner that does not threaten bycatch species. Should this situation change, or a risk assessment process indicate otherwise, DEH expects that DFWA would undertake appropriate actions to ensure that the fishery does not threaten bycatch species.

Protected species and threatened ecological community protection

Objective 2: *'The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities'*

Information requirements

Protected species occurring in the area include cetaceans, syngnathids, sea snakes and marine turtles. No interactions with endangered, threatened or protected species has been recorded to date, with the exception of syngnathid harvest, which is permitted under MAF endorsements.

Monthly logbook data provides information on the number of syngnathids harvested in the MAF. At least 6 species of syngnathids have been retained by the MAF, although only four are generally targeted. Harvesters are not permitted to take weedy seadragons. Fishers are not required to report on any other interactions with endangered, threatened or protected species.

Assessment

With the exception of syngnathids, limited data are available on protected species interactions in the MAF and no assessment of the impact of the fishery on protected species has been undertaken. Given the low impact and benign fishing method used in the fishery, the most likely negative impact on protected species, apart from the harvest of syngnathids, would be boat strikes, however, boat strikes are unlikely due to the limited number of vessels permitted in the fishery.

No assessment on the impact of harvest on syngnathids has been conducted to date, however a recent study (Pogonowski, 2002) indicated that there is no evidence of decline for any syngnathid species retained in the MAF. DEH is concerned that the most targeted syngnathid species *Hippocampus angustus* is endemic to WA and therefore may require more stringent management controls to ensure that harvest levels are sustainable. DEH considers that the implementation of **Recommendation 7** will address this issue.

No listed ecological communities are found in the fishery area.

Management response

Measures to manage the impact of the MAF on protected species are limited, however DFWA advise that species-specific limits on harvest are currently being developed for syngnathid species. DEH considers that the implementation of **Recommendations 6, 7 & 8** will assist in obtaining further information on the impact of harvest on syngnathids and improve management strategies to protect these species.

Whilst DEH agrees that interactions with other endangered, threatened or protected species are unlikely, DEH considers that a mechanism should be developed to allow for the reporting of interactions with endangered, threatened or protected species in the fishery, particularly as the fishery operates in Commonwealth waters.

Recommendation 9: *DFWA to provide a mechanism which allows fishers to record interactions with protected/listed species. DFWA to ensure that industry has the capacity to make these reports at an appropriate level of accuracy.*

Conclusion

DEH notes that there are minimal interactions with protected species in the MAF (apart from the permitted harvest of syngnathids) and considers that the fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities. Should this situation change, or a risk assessment process indicate otherwise, DEH suggests that appropriate actions be undertaken to ensure the fishery avoids mortality, injury to these species and avoids or minimises impacts on threatened ecological communities.

Recommendation 9 has been developed to ensure that the risk of unacceptable impact on protected species is minimised in the longer term.

Minimising ecological impacts of fishing operations

Objective 3: *'The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally'*

Information requirements

Research regarding ecosystem impacts is not available for the fishery due to its relatively small size and limited number of participants. Impacts are believed to be minimal due to the relatively benign method of fishing and the range of external drivers (outlined in Part II, Objective 1) that prevent harvest in certain locations of the fishery area.

Assessment

The potential of the MAF to impact unacceptably and unsustainably on the environment generally is considered to be low, due to the highly selective nature of harvest in the fishery. A risk assessment conducted as a component of the MAF ESD report indicated that the overall impact of the MAF on the ecosystem was negligible.

The impact of vessel discharge on the ecosystem is considered to be low. All vessel survey, manning, safety and operational requirements in WA are managed under legislation administered by the Department for Planning and Infrastructure. There have been no issues with vessel discharge from the fishery to date.

Fishing gear is not regarded as posing a significant risk to the physical environment in the fishery as harvesters are limited to hand collection only, with the assistance of scuba or hookah breathing apparatus. The number of vessels permitted in the fishery is strictly regulated as is the number of divers permitted to harvest under each licence/exemption.

The impact of removing finfish, syngnathids, coral, live rock and invertebrates from the ecosystem is not well understood, however it is generally believed that the species play an important role in water quality, benthic communities and structure and productivity flows of the ecosystem.

Given that the majority of species are found in abundance and across a wide distribution, the impacts of removal of these species is unlikely to have a significant impact on the ecosystem. The removal of coral, live rock and syngnathids may be compounded by the possibility of localised depletion of these species. The implementation of **Recommendation 6 & 7** should provide further information on these potential impacts.

Management response

No management measures are in place to specifically minimise the effects of harvesting aquarium species on the wider ecosystem. Management measures to protect the target species, including limited entry, gear restrictions and the future development of TACs may provide some mitigation for the ecosystem effects of harvesting finfish, coral, live rock, invertebrates and syngnathids.

DEH considers that the risk of localised depletion of a number of target species and subsequent impacts on the ecosystem have not been adequately addressed in management arrangements. DEH has made a recommendation (**Recommendation 6**) to address the issue of localised depletion and serial depletion, which should also address potential ecosystem impacts and to ensure that the impact of removal of the species on the ecosystem is minimised.

Conclusion

DEH considers that the fishery is conducted in a sufficiently precautionary manner that minimises the impact of fishing operations on the ecosystem generally. Recommendations have been developed to ensure that the risk of significant impact by the fishery on the marine environment generally is minimised in the longer term.

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LIST OF ACRONYMS

CAES	Catch and Effort System
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
DEH	Australian Department of the Environment and Heritage
DFWA	Department of Fisheries Western Australia
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESD Report	Ecologically Sustainable Development Report
MAF	Western Australian Marine Aquarium Fish Managed Fishery
MARPOL	International Convention for the Prevention of Pollution from Ships
NT	Northern Territory
SA	South Australia
SCUBA	Self Contained Underwater Breathing Apparatus
TAC	Total Allowable Catch

APPENDIX A

Species distribution and biology (modified from WA submission *Final Application to the Australian Government Department of the Environment and Heritage on the Marine Aquarium Fish Managed Fishery*)

Aquarium Finfish Species

In terms of number of individuals caught per year, the most targeted species (ie > 2000 individuals taken) in 2000-2003 were from 15 finfish taxa that are described below.

Atherinidae are small (typically <10cm), pelagic fish that typically form schools. *Atherinomorus ogilbyi* inhabits shallow coastal and estuarine waters of Northern Australia, usually in schools. It occurs in WA, Qld and NSW. Maximum length is 17 cm.

Apogonids are typically small (<10cm), demersal fish. They are mouth-brooders, producing pelagic larvae. There are approximately 91 species of apogonids in Australia, mainly occurring in tropical areas.

Gobiesocids are small (<5 cm), demersal fish that attach to substrate via a sucking disc. They produce demersal eggs and pelagic larvae. They feed on small invertebrates. There are approximately 15 tropical species, and numerous temperate species.

Clupeids are small or medium sized (<20 cm) pelagic species that typically form large, dense schools. Most clupeids feed on plankton. Clupeids are a major prey item for piscivorous fish and birds. There are numerous tropical and temperate species in Australia. They produce pelagic eggs and larvae.

Mugilids are medium to large sized, schooling fish. Most mugilids are demersal feeders, consuming detritus and vegetation. There are numerous tropical and temperate species in Australia. They produce pelagic eggs and larvae. Some of the larger mugilid species (mainly *Mugil cephalus* and *Aldrichetta forsteri*) are targeted by commercial fishers in WA. *Valamugil buchanani* is a tropical species occurring in coastal and estuarine waters throughout the Indo-west Pacific. Maximum length is 40 cm. This species is not targeted by other commercial fishers in WA.

Ambassis vachellii is a tropical species occurring in estuarine waters throughout the east Indian Ocean and Indo-Australian Archipelago. It forms pelagic schools. Maximum length is 7 cm.

Amniataba caudavittatus is a demersal species occurring in estuarine waters across western (from Cape Leeuwin northwards) and northern Australia and southern New Guinea. Maximum length is 28 cm. Individuals are caught and occasionally retained by recreational fishers.

Pomacentrids are typically small (<10cm), producing demersal eggs and pelagic larvae. *Chromis atripectoralis* is a tropical species that forms large aggregations above coral reefs throughout the Indo-central Pacific. Maximum length is 10 cm. *Neopomacentrus azysron* inhabits coral reefs throughout the Indo-west Pacific. Maximum length is 9 cm.

Chanos chanos is a tropical species occurring in coastal and offshore waters of the Indo-west Pacific. In Australia, it occurs in WA (from Shark Bay northwards), NT, Qld and NSW. Maximum length is 180 cm. It is targeted by commercial fishers in some regions, but is not targeted by commercial fishers in WA.

Selenotoca multifasciata is a tropical species occurring in estuarine and freshwater waters of the Indo-Australian Archipelago. Maximum length is 28 cm.

Plotosus lineatus inhabits coastal waters throughout the Indo-central Pacific, often in the vicinity of coral reefs. Maximum length is 32 cm. Eggs and larvae are demersal.

Corals

This fishery collects small quantities of numerous species of soft and hard corals. The difficulties associated with accurate coral identification results in the majority of the catch being reported at family level or as 'unspecified coral'.

Of the soft corals identified, species from the family Alcyoniidae are the most commonly collected. This family forms the vast majority of octocoral coverage throughout the world, except in the Atlantic. These octocorals are known for their thick and encrusting forms and leathery skin. Many grow very large but can also form large colonial and/or clonal aggregations of individual colonies.

There are many more families of hard coral collected. Of the corals identified, the most commonly collected families during 2003 by volume in decreasing order were: Euphyllidae, Caryophylliidae, Dendrophylliidae, Trachyphylliidae and Acroporidae.

Invertebrates

The most commonly collected invertebrates are anemones, sea urchins, sea cucumbers, starfish and shrimp. Similar to the coral species, most are only reported to family level due to the lack of standard taxonomy for marine invertebrates.

Live Rock/Sand

Live rock is usually either a limestone based rock or dead coral that has live marine organisms growing on or in it. Typical inhabitants of live rock are anemones, tunicates, bryozoa, octocorals, sponges, echinoids, molluscs, tube worms, and calcareous algae. Live rock is often targeted for its cover of encrusting red algal species such as coralline algae. Live sand is marine sand containing live organisms including bacteria.

Syngnathids

In general, some species of syngnathids may be vulnerable to overfishing because they reproduce relatively slowly, have low rates of dispersal and are highly habitat dependent. The distribution and biology of many syngnathids is poorly understood, however there is no evidence of decline for any syngnathid species retained by the MAF.

There is an annual limit of 750 syngnathids imposed on the MAF by DEH. No leafy sea dragons are permitted to be taken. At least six species of syngnathids have been retained by the MAF, although only four are generally targeted. Since 1999 the following species have been recorded:

- *Hippocampus angustus/elongatus* (catch reported as *H. angustus* but catches are probably mainly *H. elongatus*, with minor quantities of *H. angustus*, as *H. angustus* is not recorded south of Shark Bay where most captures in the fishery occur);
- *Phyllopteryx taeniolatus*;
- *Hippocampus breviceps*;
- *Stigmatopora argus*;
- *Filicampus tigris*; and
- *Haliichthys taeniophorus*.

The syngnathid species primarily taken are widely distributed within WA 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 (based on the distributional ranges and the spatial catch and effort data).

The **western spiny seahorse** (*Hippocampus angustus*) is endemic to WA and has a recorded distributional range from Shark Bay to the Dampier Archipelago. The species has been trawled to depths of 30 metres but is also found in shallows. It is generally found in association with seagrass beds. There is no evidence of decline for this species. The species is often misidentified as *H. hystrix* or *H. elongatus*.

The **common weedy seadragon** (*Phyllopteryx taeniolatus*) is endemic to Australia and has a distributional range from the central coast of NSW through to WA's midwest coast (including Tasmania). The species is usually found in kelp reefs with edges of sand to depths of 50 metres. Individuals are often found washed up on the shore following storm events. Consequently, the natural mortality is considered higher than any other mortality source. Longevity in aquaria is at least 4 years, but lifespan in the wild is unknown. This species breeds early summer and generally only produces one brood per season. There is no evidence of decline for this species.

The **short-snouted seahorse** (*Hippocampus breviceps*) has a distributional range from the central coast of NSW through to Lancelin on WA's midwest coast (including Tasmania). The species is usually found in association with seaweed and algal communities and occurs to depths of 20 metres. Individuals are rarely seen because of their good camouflage and small size. Longevity in aquaria is at least 3 years, but lifespan in the wild is unknown. This species breeds on a monthly cycle over the summer months. There is no evidence of decline for this species.

The **spotted pipefish** (*Stigmatopora argus*) is endemic to Australia and has a distributional range from southern QLD through to WA's midwest coast (including Tasmania). The species is usually found in shallow seagrass beds and weedy areas on rocky reefs and they are thought to have a life span of approximately 12 months. They are abundant but are rarely seen because of good camouflage.

The other syngnathid species retained by the MAF each have a relatively wide distribution, encompassing the waters of WA and at least 1 other Australian state.