Australian Government

Department of the Environment and Heritage

Assessment of the

South Coast Purse Seine Managed Fishery and the West Coast Purse Seine Managed Fishery

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Disclaimer

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 South Coast Purse Seine Managed Fishery and West Coast Purse Seine Managed Fishery

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EXECUTIVE SUMMARY

Background

The Department of Fisheries, Western Australia (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 *Application to Department of Environment and Heritage on the West Coast Purse Seine Managed Fishery and South Coast Purse Seine Managed Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in June 2005. The submission was released for a thirty-day public comment period that expired on 30 September 2005. No public comments were received.

The submission reports on the South Coast Purse Seine Managed Fishery (SCPSMF) and West Coast Purse Seine Managed Fishery (WCPSMF) against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. DEH assessment considers the submission and associated documents.

Table 1: Summary of the SCPSMF and WCPSMF

Area	SCPSMF: State and Commonwealth waters between Cape Leeuwin to South Australian (SA) border, broken into 5 zones. WCPSMF: State and Commonwealth waters between Lancelin 31^{o}00' S latitude to Cape Bouvard 33^{o}00' S latitude. Two Development Zones (DZ) exist on either side of the WCPSMF: Northern DZ operates from Steep Point 26^{o} 08' S latitude to WCPSMF and the Southern DZ, which operates from WCPSMF to Cape Leeuwin 34^{o} 40' S latitude, both include State and Commonwealth waters. The WCPSMF will be extended to include the Northern and Southern DZs under the proposed new management plan.
Fishery status	Pilchards - considered fully exploited. Scaly mackerel - uncertain.
Target Species	Pilchards *Sardinops sagax* (landed in both SCPSMF and WCPSMF); and Scaly mackerel *Sardinella lemuru* (landed in WCPSMF only).
Byproduct Species	Perth herring (*Nematalosa vlaminghii*); Yellowtail scad (*Trachurus novazelandiae*); Australian anchovy (*Engrualis australis*); and Maray (*Etrumeus teres*).
Gear	Purse seine (mixture of power and hand hauled nets).

Season	Year round (officially 1st April to 31st March).
Commercial harvest 2003/04	SCPSMF: 1,592 t. WCPSMF: 1,164 t.
Value of commercial harvest 2003/04	SCPSMF: AUD$1.59 million. WCPSMF: AUD$660,000.
Recreational harvest	Negligible.
Commercial licences issued	SCPSMF: 33 licences. WCPSMF: Eight full managed licences; five supplementary licences; one endorsement under a Fishing Boat Licence (FBL). Northern DZ: one endorsement under a FBL. Southern DZ: three endorsements under a FBL; one exemption to operate through an objection process.
Management arrangements	SCPSMF: Output: • Total Allowable Catch (TAC) with Individual Transferable Quotas (ITQs) reviewed annually. Input: • limited entry; • limited species (those listed as target or byproduct); and • restrictions on zones that can be fished as a condition of licence WCPSMF current (including Northern and Southern DZ) Output: • TAC, reviewed annually. Input: • limited entry; • boat size (maximum 16 m); • type of net hauling equipment (power or hand); • length of net (max 350 m); • mesh size (min 18 mm); • limited species (those listed as target or byproduct); and • closed areas. WCPSMF proposed: Output: • TAC with ITQs. Input: • limited entry; • net type (purse seine or lampara); • mesh size (min 18 mm) • limited species (those listed as target or byproduct);

	and • closed areas.
Export	Sporadic canned product depending on market.
Bycatch	Negligible, some small pelagic fish and predators.
Interaction with Threatened Species	Interaction with dolphins and seabirds, potential interactions with other marine mammals.

The SCPSMF operates in waters between Cape Leeuwin and the Western Australia (WA) and SA border out to the Australian Fishing Zone (AFZ). The fishery is subdivided into five zones. Zone 1, King George Sound, is a subset of Zone 2, Albany, which extends from Point D'Entrecasteaux to Cape Knob, and the two zones are reported together. Zone 3 is known as the Bremer bay zone and extends from Cape Knob to longitude 120^{o} E. Zone 4 is the Esperance zone and occupies waters from 120^{o} E to the WA/SA border. Zone 5 exists between Cape Leeuwin and Point D'Entrecasteaux, but has not been fished significantly to date.

The WCPSMF is a purse seine fishery that extends from Lancelin 31^{o} 00' South to Cape Bouvard 33^{o} 00' S latitude out to the AFZ. A Northern and Southern DZ exists on either side of the WCPSMF, which under the proposed management plan will be incorporated into the WCPSMF so that the WCPSMF will extend from Steep Point 26o 08' S latitude to Cape Leeuwin 34^{o} 40' S latitude out to the AFZ.

Both fisheries operate in State and Commonwealth waters, however under the Offshore Constitutional Settlement (OCS), which came into effect in 1988, most small pelagic fish species in the AFZ came under State jurisdictional control.

The two nominated target species for the fisheries are pilchards *Sardinops sagax* and scaly mackerel *Sardinella lemuru*. The SCPSMF and Southern DZ of the WCPSMF target pilchards, while the Northern DZ of the WCPSMF focuses on scaly mackerel; the remainder the of WCPSMF takes a mixture of pilchards and scaly mackerel. Several byproduct species are taken in the fisheries, including maray, Australian anchovy, Perth herring and yellowtail scad. The take of these species is comparably small and collectively they contributed less than 5 % of the total catch of target species in the WCPSMF in 2003/04 (Gaughan *et al*., 2005a). For the SCPSMF, less than 5 t of byproduct was taken in 2003/04 equating 0.3 % of the 1,592 t of pilchards landed that year (Gaughan *et al*., 2005b).

Pilchards are widespread around temperate coasts of Australia, from Noosa on the east coast to Carnarvon on the west coast, including northern Tasmania. In WA, pilchards live to approximately 8 years of age and grow to a length of 200 mm. Pilchards begin to recruit to the fishery in their second year, which coincides with sexual maturity at 120-130 mm fork length, however fishery landings are dominated by three to four year old fish. There are two distinct spawning populations in WA, the south coast and west coast. There is some indication of smaller scale distinctions in adult populations on the south coast, with two or possibly three distinct populations, however there is evidence of mixing of juvenile stages between these areas (Gaughan *et al*., 2001b). The submission indicates that spawning occurs over two peak periods, August and February-March. Pilchards are opportunistic feeders, feeding predominantly on zoo- and phyto-plankton.

Scaly mackerel can be found as far south as Fremantle, which is considered the outpost of a tropical distribution centred in the Indo Chinese region. Fish begin to reach maturity at 120 mm fork length with 50 % of 140-150 mm fork length fish having attained maturity. Data suggests that fish begin to recruit to the fishery in the second and third year of life, with full recruitment achieved in the three-four

age class; recruiting fish are mature. Similar to pilchards, scaly mackerel feed predominantly on zoo- and phyto-plankton (Gaughan & Mitchell, 2000).

The SCPSMF and WCPSMF are relatively small fisheries in terms of employment and economic value in comparison to other fisheries operating in the same area. The SCPSMF was valued at $1.59 million in 2003, up from $1.17 million in 2002. Nearly all the catch goes to higher value angling block/trays and individually quick frozen fish. This fishery employed approximately 80 people directly in 2003. Annual turnover for the WCPSMF was $660,000 in 2003, which was a significant downturn from $1.6 million in 2002. Some fish in this fishery are utilised for human consumption and recreational bait. However in 2003, slightly more than half of the landings went to lower value uses such as pet food and commercial rock lobster baits, largely explaining the drop in revenue. The WCPSMF employed approximately 17 full time and 7 part time workers in 2003.

Fishing for pilchards developed in WA in the Fremantle area in the 1950's. The industry grew in size in the 1970's with the introduction of purse seining and the main market being bait for the southern bluefin tuna fleet. In the Albany region, catches of pilchard reached 8,500 tonnes from 32 operating boats in 1988, however over subsequent years management arrangements reduced the fleet to 22 operators and TACs of 3,000-5,000 tonnes. In 1989, the *West Coast Purse Seine Limited Entry Fishery Notice 1989* (the management plan) was produced to control the development of purse seining on the west coast. The WCPSMF still currently operates under this plan although proposed new management arrangements have been drafted. The *South Coast Purse Seine Limited Entry Fishery Notice 1994* (the management plan) was gazetted in 1994, and remains the current management plan for the SCPSMF.

The WA purse seining industry for pilchards suffered a major setback with the 1995/98 pilchard mass mortality events, likely caused by a *herpevirus*. These mortality events occurred across the full distribution of the Australian pilchard population. The 1998 mortality event was more severe with an estimated 60-70 % of the spawning biomass of pilchards killed in WA waters. Consequently, all fishing for pilchards was halted and a 'no take' policy implemented. During this time, major markets were lost and many operators left the industry. As the stock recovered, the SCPSMF and WCPSMF have been permitted a small TAC, determined by close monitoring of planktonic egg counts and age composition of commercial catch. Research indicates the pilchard stocks are recovering strongly, although they are yet to reach pre-mortality levels.

The scaly mackerel fishery is relatively new and is the focus of the Northern DZ of the WCPSMF. After initial failures, mainly due to lack of processing plants, landings grew quickly and approximately 2,000 t were taken in 1994. A non-legislated TAC of 2,700 t was introduced in the Northern DZ in 1995 due to concerns over the rapid growth of the industry and possible effects on breeding populations of seabirds on the Abrolhos Islands. The submission provides no indication if the nominal TAC of 2,700 t in the Northern DZ of the WCPSMF has been reviewed more recently to determine if it is sufficiently precautionary. The catch of scaly mackerel in 2003 was 773 t, an increase from 701 t in 2002.

The submission notes that the take of pilchards, scaly mackerel and other small pelagics by recreational fishers is minimal due to the specialised equipment required. In addition, the low value per unit weight of species taken in the fisheries discourages any illegal take.

Both the SCPSMF and WCPSMF are purse seine fisheries, using a mixture of power hauled net equipment and hand hauled nets. In the SCPSMF, all operators are licensed to use power haul nets. In the WCPSMF, full managed fishery licenses are able to use power haul equipment. Supplementary

licenses may target all target and byproduct species with hand hauled nets and one additional fisher may operate with power hauled gear to target species other than pilchards. The Northern and Southern DZ also have a mix of fishers able to use power haul and hand haul nets to target pelagic species, including or not including pilchards. There is one fisher in the Southern DZ who, through an objection process, is able to take pilchards and other small pelagic species with a hand hauled purse seine within one kilometre of the beach.

The SCPSMF is currently managed under a plan gazetted in 1994. Except for minor administrative amendments and annual quota setting, there have been no major changes since implementation. The SCPSMF is a limited entry fishery managed largely through output controls. An annual TAC is developed for the industry using a 'decision matrix' based on egg surveys to estimate spawning biomass and mean age of the previous year's commercial catch. The matrix limits commercial catch to a maximum of 10% of available biomass. The SCPSMF is divided into five zones, which are allocated a fixed number of ITQ units, whose values change depending on stock assessment data. The decision matrix is applied to each zone of the SCPSMF. Some spatial and temporal closures apply to the fishery.

The WCPSMF is currently managed under a plan gazetted in 1989. Except for minor administrative amendments and the introduction of a TAC to deal with the mass mortality of pilchards, there have been no major changes since implementation. Although a TAC for pilchards and other small pelagic species exists, the fishery is mainly managed through input controls. Controls currently in place include restrictions in boat size (less than 16 m), type of net hauling equipment (mechanical or hand), length of net (max 350 m) and size of mesh (min 18 mm). In addition, several area closures apply. A new management plan is proposed for the WCPSMF. The new plan will move towards ITQs contributing to a TAC, bringing management of the WCPSMF in line with that of the SCPSMF. In accordance, some restrictions on boats and gear will be removed, however net type (purse seine or lampara) and mesh size will remain.

The SCPSMF and WCPSMF target fish species that exhibit schooling behaviour; schools of mixed fish species rarely occur. Fishers therefore are able to target specific species of fish with considerable accuracy. As a result, the submission indicates that bycatch in the fisheries is minimal and restricted to incidental capture of larger pelagic fish predators, though no bycatch species are identified. The SCPSMF has documented interactions with dolphins and to a larger extent, seabirds, particularly the flesh-footed shearwater. DFWA has been working with the SCPSMF to significantly reduce interactions through the establishment of an improved code of practice and formation of a seabird mitigation group. Interactions with protected/listed species are considered to be minimal in the WCPSMF, with possible interactions with dolphins, though none have been recorded to date. Commercial logbooks are being amended for both fisheries to allow specific recording of all interactions with protected and threatened species.

The fisheries are managed under the *West Coast Purse Seine Limited Entry Fishery Notice 1989* and the *South Coast Purse Seine Limited Entry Fishery Notice 1994* (the management plans) as appropriate and in accordance with the *Fish Resources Management Act 1994* (FRMA). The WCPSMF management plan is currently under review and a proposed new plan is drafted. The proposed implementation of the new management plan is addressed in further detail in Part II of the report.

Overall assessment

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

While the fisheries are relatively well managed, DEH has identified a number of risks that must be managed to ensure that their impacts are minimised:

- the lack of fishery objectives to maintain the take of all species at sustainable levels and to minimise interactions with protected/listed species and the wider marine environment;
- the absence of robust and comprehensive data on bycatch species, including interactions with protected and listed species;
- the possible significant interaction with a Japan and Australia Migratory Bird Agreement (JAMBA) listed species, flesh-footed shearwaters;
- the lack of data validation in the current management arrangements for the WCPSMF;
- the uncertain stock status of scaly mackerel and the increasing harvest of this species in the WCPSMF; and
- inconsistency in the current management regimes applied to the SCPSMF and WCPSMF.

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 fisheries, management arrangements are likely to be sufficiently precautionary and capable of controlling, monitoring and enforcing the level of take from the fisheries 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 fisheries are being managed in an ecologically sustainable manner and are working to address existing problems and minimise environmental risks.

The operation of the fisheries is consistent with the objects of Part 13A of the EPBC Act. DEH considers that the fisheries will not be detrimental to the survival or conservation status of the taxa to which they relate in the short term. Similarly, they are not likely to threaten any relevant ecosystem in the short term. DEH therefore recommends that the fisheries each 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 fisheries, as managed in accordance with the management plans are not likely to cause serious or irreversible ecological damage over the period of the export decision. Specifically, the WTO declarations would allow the export of product from the fisheries for a period of three years. The WTO declarations 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 fisheries in three years time.

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

There are confirmed interactions with seabirds, particularly the JAMBA listed flesh-footed shearwater, and dolphins in the SCPSMF. There is also potential for interactions with dolphins in the WCPSMF. There is some uncertainty of the actual and potential impact on Part 13 species under the management arrangements, however recommendations have been made to minimise any potential impact. There are no listed threatened ecological communities in the area of the fisheries.

DEH recommends that the SCPSMF and WCPSMF each be declared accredited management plans under Sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fisheries to which the plans relate or are not likely to adversely affect the survival in nature of listed threatened species or a population of that species, or the conservation status of a listed migratory species, cetacean species or listed marine species or a population of any of those species. DEH also considers that the management plans, through the implementation of the recommendations, will require that all reasonable steps are taken to avoid the killing or injuring of protected species, and the level of interaction under current fishing operations is moderate. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the management plans, would not be expected to have a significant impact on a listed threatened species or listed migratory species protected by the EPBC Act.

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 fisheries in three years time.

Recommendations

1. DFWA to advise DEH of any material change to the SCPSMF and WCPSMF's legislated management plans that could affect the criteria on which EPBC Act decisions are based, within three months of that change being made.

2. The Ecologically Sustainable Development Report, including all performance measures, responses and information requirements to be incorporated into the management regime and decision making process.

3. DFWA to incorporate into the management regime, objectives to maintain at sustainable levels the take of all target and byproduct species, minimise protected/listed species interactions, to minimise or maintain at sustainable levels the take of other non-retained species and to minimise impacts on the marine environment. Appropriate performance measures and indicators should accompany each objective.

4. DFWA, in its Annual State of the Fisheries Report, to report on the performance of the fisheries against performance measures that relate to the sustainability of the fisheries.

5. DFWA to commence, in the 2006/07 fishing season, ongoing monitoring of the age composition of commercial catches of scaly mackerel in the WCPSMF, as part of a process to develop precautionary harvest limits for scaly mackerel by the end of 2007.

6. DFWA to finalise and implement the proposed new management plan for the WCPSMF in time for the 2008/09 season. In the interim, DFWA to develop a catch validation system for the commencement of the 2007/08 season.

7. DFWA to implement a program sufficient to obtain base-line data on abundance and composition of by-catch and level of interactions with protected/listed species.

8. DFWA to provide a mechanism, within 1 year, which allows fishers to record interactions with protected/listed species. DFWA to implement relevant protected species identification and handling procedures from the Manual for Setting Protocol, Wildlife Interactions and Species Identification to ensure that industry has the capacity to make these reports at an appropriate level of accuracy.

9. DFWA to develop specific performance measures and indicators for interactions with flesh-footed shearwaters and dolphins and to report annually on the performance of the SCPSMF and WCPSMF at minimising seabird and dolphin interactions.

10. Within 1 year, DFWA to trial mitigation mechanisms to minimise protected/listed species interactions, particularly with flesh-footed shearwaters in the SCPSMF. Mitigation measures considered should include spatial and temporal closures, effective deterrents and/or appropriate net setting and handling protocols, and be implemented within six months of being demonstrated effective.

PART I - MANAGEMENT ARRANGEMENTS

The SCPSMF and WCPSMF are managed by the DFWA .

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

- FRMA;
- *West Coast Purse Seine Limited Entry Fishery Notice 1989* (the management plan for the WCPSMF); and
- *South Coast Purse Seine Limited Entry Fishery Notice 1994* (the management plan for the SCPSMF).

A number of other documents, including the Ecologically Sustainable Development (ESD) Report for the SCPSMF and WCPSMF (a draft of which is included in the submission), research reports, scientific literature and discussion papers, are relevant to the management of the fisheries.

Further information on the fisheries and their performance can be found in the following reports:

- the State of the Fisheries Report (annual);
- the Annual report to the Auditor General; and
- other reports, including the submission to DEH.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Because of the importance of the management plan and documents referred to above to DEH's assessment of the fisheries, an amendment could change the outcomes of the 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 SCPSMF and WCPSMF's legislated management plan that could affect the criteria on which EPBC Act decisions are based, within three months of that change being made.*

The ESD Report, on which the submission is largely based, is an integral part of the management regimes. It examines benefits and costs associated with the fisheries. It also identifies and assesses risks posed to the fisheries and environmental components. The ESD Report documents the performance of the fisheries and their management in terms of the ecological, economic, social and governance issues associated with the fisheries. Once finalised, this report will be publicly available in document form and on the DFWA website (http://www.fish.wa.gov.au). 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 fisheries 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 fisheries as part of a series of Ministerial guidelines, as an adjunct to the management

plans. The Ministerial Policy Guidelines will provide the policy framework for the management of each fishery. This document will reflect the management objectives, philosophy and guidance for decision making, including the legislated management plan, the ESD Report, and as relevant, reference to other documents.

Recommendation 2. *The Ecologically Sustainable Development Report, including all performance measures, responses and information requirements to be incorporated into the management regime and decision making process.*

The current management arrangements for the SCPSMF and WCPSMF were developed through formal consultation with industry. The FRMA requires that the Fisheries Minister must gazette a notice of intention to determine a management plan and invite interested persons to comment. When amending a management plan, the FRMA requires consultation with persons nominated in the management plan. The Purse Seine Management Advisory Committee (PSMAC) is the peak consultative committee for the SCPSMF and WCPSMF and was formally ratified by the WA Minister for Fisheries in 1995. The committee brings together a broad range of expertise and interests and consists of an independent chair, a member from the processing industry, members from the SCPSMF and WCPSMF, a recreational fishing representative and the Executive Director of the DFWA or his/her representative. A representative from the Conservation Council of WA has recently been nominated for membership and will bring environmental representation to PSMAC.

Management of the fisheries incorporates a sound range of consultative mechanisms and a clear commitment to effective consultation with a variety of stakeholders. DEH considers the level of consultation to be adequate and is confident that the management agency will continue to ensure interested parties are consulted appropriately.

DFWA state that the ESD component of the submission meets DEH's requirement for the management plan to be strategic and contain objectives and performance criteria. However, for retained species, the ESD component provides a single operational objective for target species, which addresses pilchards only and ignores the importance of scaly mackerel as a target species in the WCPSMF. The performance measure for this objective gives no indication of how management performance is to be reviewed, mentioning only the use of a matrix for setting the TAC for subsequent seasons. There are no operational objectives and appropriate performance measures for byproduct and bycatch species, nor interactions with protected species and endangered ecosystems. DEH recommend that appropriate operational objectives and performance measures are included into the management regime to facilitate the sustainable harvest of target and byproduct species and to minimise interactions with non-retained species, including protected species.

Recommendation 3. *DFWA to incorporate into the management regime, objectives to maintain at sustainable levels the take of all target and byproduct species, minimise protected/listed species interactions, to minimise or maintain at sustainable levels the take of other non-retained species and to minimise impacts on the marine environment. Appropriate performance measures and indicators should accompany each objective.*

The SCPSMF is principally managed through output controls including a TAC reviewed annually and broken into ITQs for each operator in the fishery. Some spatial and temporal closures also apply. The WCPSMF is currently managed through a mixture of input and output controls. A TAC applies, however several input controls including limits on boat, net and mesh size, and method of hauling the net (power haul or hand haul) also exist. In addition, some spatial closures apply. A new management

plan is proposed for the WCPSMF. The new plan will move towards ITQs contributing to a TAC, bringing management of the WCPSMF in line with that of the SCPSMF. In accordance, some restrictions on boats and gear will be removed, however net type and mesh size will remain.

DFWA utilise a number of methods to ensure critical aspects of the management arrangements for the SCPSMF and WCPSMF are enforced. Compliance staff conduct at-sea patrols as well as inspections at the point of landing and processing factories. All vessels will be required to be fitted with a Vessel Monitoring System (VMS). Catch and disposal forms are integral for the integrity of the quota system for the SCPMSF and will become so for the WCPSMF once the proposed new management plan comes into effect. Therefore breaches relating to the completion of catch and disposal forms will be treated as major offences. Catch and disposal forms must be completed at the time and place of unloading the catch. The issue of accurately recording catch quantities will be simplified by the use of standardised trays and bins of specific sizes.

The performance of the SCPSMF and WCPSMF are subject to annual review as part of the DFWA State of the Fisheries Report. In addition, the ESD Report for the fisheries will be reviewed in five years. DEH considers that a five year review of each entire fishery is suitable as long as critical aspects, such as the performance of each fishery against performance measures, are reviewed annually. In addition, the outcomes of these reviews should be made publicly available in the annual review of major aspects of the fisheries.

Recommendation 4. *DFWA, in its Annual State of the Fisheries Report, to report on the performance of the fisheries against performance measures that relate to the sustainability of the fisheries.*

Fishery dependent data on target species are collected on a regular basis in the fisheries through the compulsory catch and effort logbooks. In addition, fishery independent information is collected biennially for pilchards through the process of collecting planktonic egg density data for the development of spawning biomass estimates. Regular fishery independent data are not collected for scaly mackerel, however this species has been the recipient of an independent Fisheries Research and Development Corporation (FRDC) study (project 95/037), which investigated the biology and endeavoured to produce a stock assessment of scaly mackerel. Discussion of the information collection system can be found in Part II of this report.

An analysis of the fisheries' 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 fisheries operate is contained under Principle II of this report.

Some harvest of the southern Australia pilchard stock occurs in SA and Victoria. Scientists from all three southern states discuss the impacts of harvest levels on stocks and provide advice to managers across the jurisdictions. DEH encourages DFWA to continue to be involved in 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 plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. DEH expects that DFWA will also ensure compliance with any future plans or policies as they are developed.

No regional or international management regimes, to which Australia is a party, are of direct relevance to the fisheries. The prime international regime affecting the fisheries is the United Nations

Convention on the Law of the Sea (UNCLOS). The management regimes essentially comply with this. Other international regimes are applicable to fisheries management but do not explicitly involve these fisheries, 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 fisheries' 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 fisheries is discussed 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 SCPSMF and WCPSMF management plans are documented, publicly available and transparent, and are developed through consultative processes. The management plans are adaptable and, through the implementation of the recommendations, will be underpinned by appropriate objectives and performance criteria by which the effectiveness of the management plans can be measured, enforced and reviewed.

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

The management plans take into account arrangements in other jurisdictions, and adhere 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 for both fisheries are collected via compulsory catch and effort forms submitted to DFWA on a monthly basis and which record data on total catch and effort as days fished for each vessel. In addition, the length and age composition of a sub-sample of the commercial catch for pilchards is periodically analysed throughout the fishing season by DFWA research staff.

Fishery independent data on the adult pilchard stock is not regularly collected due to the specialised gear required to catch pelagic fish. However, fishery independent data is collected for pilchards on a biennial basis via planktonic egg surveys which contribute to an estimated pilchard spawning biomass. Egg density surveys are conducted on both the south and west coast during peaks in pilchard spawning activity.

A FRDC project (95/037) studied the biology of scaly mackerel and endeavoured to provide a stock assessment on this species. The study examined aging techniques and spawning characteristics of scaly mackerel. This is the only comprehensive study of scaly mackerel on the west coast of Australia. Byproduct species in the SCPSMF and WCPSMF have not been the recipient of any comprehensive research programs in WA.

Catch and disposal forms must be completed at the place and time of unloading catch for the SCPSMF and this system will be introduced in the WCPSMF with the commencement of the proposed new management plan. Catch and disposal forms are the basis of catch data validation and therefore any breaches in completion of the forms is considered a major offence.

In addition to biennial egg surveys which contribute to annual stock assessments, pilchards have been the subject of numerous independent research studies which have investigated aspects of biology, stock assemblages, larval movement, recruitment to nursery areas and recovery following the 1995/98 mass mortality events (e. g. Gaughan *et al*., 2001a; 2001b; Murray & Gaughan, 2003). Pilchard research has benefited from a FRDC project designed to monitor the recovery of stocks following the 1995/98 mass mortality events.

Overall, given the range of fishery dependent and independent data gathered by DFWA and the mechanisms for regularly reviewing the data requirements, DEH considers that there is a reliable information collection system in place for pilchards appropriate to the scale of the fisheries. Continuation of existing data collections and research programs, combined with some extension and refinement of such activities will be important for the future management of this target species. DEH

has some concerns regarding the depth of information obtained for scaly mackerel and byproduct species and those concerns are discussed in more depth below.

Assessment

Pilchards are a target species for both the SCPSMF and WCPSMF. The TAC for this species is reviewed on an annual basis and involves a stock assessment process. Stock assessment utilises data from egg density surveys, conducted every two years, to estimate spawning biomass as a proportion of unfished biomass. This estimate, together with age composition data of commercial catches from the previous year, is entered into a 'matrix'. The matrix recommends the TAC for the subsequent season, restricting catches to a maximum of 10 % of the estimated pilchard biomass. Individual TACs are determined for the WCPSMF and each of the zones in the SCPSMF.

There are two separate spawning populations of pilchards in WA, one on the south coast and the other on the west coast. Therefore, pilchard stocks are managed independently between the SCPSMF and WCPSMF. There is some indication of smaller scale distinctions in adult populations on the south coast, with two or possibly three distinct populations, however there is evidence of mixing of juvenile stages between these areas. Although distinct TACs are developed for each of the zones in the SCPSMF, DFWA maintain a degree of flexibility in the application of TACs in recognition that all zones target a highly mobile stock. This approach aids to stabilise market and economic conditions in zones of the fishery.

Since the mass mortality events in the 1990s, conservative TACs have been implemented to facilitate the recovery process of pilchards. The assessment process has indicated strong recovery of pilchard stocks and estimates the current stock to be approximately 60 % of pre-mortality biomass. The TACs have been increased gradually to correspond with recovering stocks.

Scaly mackerel are an important target species for the WCPSMF, particularly in the Northern DZ of the fishery. The fishery for scaly mackerel targets a stock that consists of recruits from more northern waters (Gaughan & Mitchell, 2000). Although some spawning occurs within the range of the fishery, it is not known what degree of self-replenishment occurs within the fishery. There is a risk of localised depletion of scaly mackerel stocks within the fishery if pulses of recruits from more northern waters fail. Although the process of localised depletion may not jeopardise the principle, more northern spawning population of scaly mackerel, there has been no robust risk assessment of the potential impact of localised depletion of scaly mackerel within the WCPSMF on the broader environment, especially considering their important trophic status. DEH notes that a nominal TAC of 2700 t of scaly mackerel was introduced in 1995 in response to concerns over the impact of harvests on breeding populations of seabirds on the Abrolhos Islands. However the submission provides no indication as to whether this nominal TAC has been reviewed more recently to determine if it is sufficiently precautionary.

In 2003/04, scaly mackerel was the main species harvested in the WCPSMF, contributing 773 t of the 1,164 t total landings. In comparison, only 300 t of pilchards were harvested from the WCPSMF in the same period. There are no refined yield estimates for scaly mackerel although it is the current predominant species taken in the WCPSMF. The scaly mackerel fishery is based on stocks that are derived from recruiting fish from more northern spawning populations. Therefore, DEH acknowledge that developing robust annual estimates of scaly mackerel biomass would be difficult and is likely to be unfeasible. However, the scaly mackerel fishery is largely in a developmental stage at the moment and scaly mackerel enjoy a premium price over other small pelagic species. Both of these points translate

into the potential for increased harvests of this species in the WCPSMF. DEH consider it important, therefore, that DFWA develop a more robust and transparent process for developing precautionary sustainable harvest limits for scaly mackerel, than that presently in force. Ongoing analysis of the age composition of commercial catches may prove a useful tool within a more comprehensive process to monitor the health of scaly mackerel stocks within the range of the fishery.

Recommendation 5. *DFWA to commence, in the 2006/07 fishing season, ongoing monitoring of the age composition of commercial catches of scaly mackerel in the WCPSMF, as part of a process to develop precautionary harvest limits for scaly mackerel by the end of 2007.*

The submission notes that there is minimal take of pilchards, scaly mackerel or other small pelagic species by other sectors including recreational and Indigenous fishers. The harvest of schooling pelagic species requires specialised equipment and effectively excludes targeted fishing outside of the commercial fisheries. In addition, the low value per unit weight of target species discourages any illegal take from the fisheries.

Management response

The current management arrangements for the SCPSMF and WCPSMF are outlined in Table 1 and Part I of this report. The WCPSMF is currently managed principally through controls including boat and gear restrictions, and separate TACs for pilchards and all other small pelagic species combined. New management arrangements are proposed for the WCPSMF, which will move management arrangements towards ITQs contributing to a TAC for all target and byproduct species. This move will bring it in line with management of the SCPSMF and will result in the removal of some boat and gear restrictions.

The submission places considerable emphasis on the proposed WCPSMF plan for the assessment process, however it does not indicate a clear timeline for the finalisation and implementation of the proposed new management plan. DEH notes that DFWA have been proposing the change in management arrangements for several years. DEH considers the proposed management plan to be a key management development for the WCPSMF, as it currently provides a mechanism to introduce a catch validation program and formalisation of harvest levels and yield estimates through ITQs. DEH encourages DFWA to commit to a clear timeline for the finalisation and implementation of the proposed management arrangements for the WCPSMF. DEH acknowledges that time-consuming legal processes must be followed to implement the proposed management plan and therefore recommends DFWA commit to implementation by the commencement of the 2008/09 fishing season. DEH suggests however, that there are critical aspects of the proposed plan that are not dependent on legislative approval, such as the development of a program to validate catch data, which could be implemented in the interim.

Recommendation 6. *DFWA to finalise and implement the proposed new management plan for the WCPSMF in time for the 2008/09 season. In the interim, DFWA to develop a catch validation system for the commencement of the 2007/08 season.*

Annual TACs are reviewed and determined through the use of the matrix for the harvest of pilchards in both the SCPSMF and WCPSMF. Through the matrix, mean age of commercial catch and/or biomass estimates may trigger management actions such as more conservative TACs or even a zero TAC.

No decision matrix is available for determining TACs for scaly mackerel. Current management of this resource includes a preliminary TAC of 1,500 t in the WCPSMF (excluding the Nothern DZ), which includes the harvest of other non-pilchard pelagic species; the Northern DZ has a separate TAC for scaly mackerel (2,700 t). The submission indicates that in the proposed new management plan for the WCPSMF, the concomitant real-time recording of catches as part of the catch and return recording system will allow catches to be well monitored and reviewed during each fishing season. However, DEH notes that the basis for robust review of scaly mackerel management is limited due to the absence of performance measures and indicator points for this species. DEH encourages the development of appropriate performance measures and indicators through the implementation of **Recommendation 3** and **5**.

DEH suggests that performance measures and indicators, once developed, should be capable of detecting and responding to changes in the fisheries. This would require ongoing monitoring of the fisheries against such performance measures and a clear process for responding to breaches of performance measures. DFWA have advised that if there is a breach in a performance measure, this will be reported in the State of the Fisheries Report. If a breach materially affects the sustainability of the target species or negatively impacts on byproduct, bycatch, protected species or the ecosystem, the breach will be reported to the Minister for Fisheries within three months for subsequent management review and action with timeframes for implementation.

Several species are taken as byproduct in the SCPSMF and WCPSMF: Perth herring; yellowtail scad; Australian anchovy; and maray. The take of these species is comparably small and in the SCPSMF, less than 5 t of byproduct was taken in 2003/04, equating 0.3 % of the total catch landed that year (Gaughan *et al*., 2005b). In the WCPSMF, byproduct collectively contributed less than 5 % of the total catch of target species in 2003/04 (Gaughan *et al*., 2005a), the majority of that consisted of maray (75 t). Maray has been the predominant byproduct species in recent seasons, with catches exceeding 130 t in the 2001/02 and 2002/03 fishing seasons, demonstrating a considerable increase in harvests compared to years preceding 2000 where harvests of less than 10 t were typical.

Although byproduct harvest is generally low, there is potential for the harvest of byproduct to significantly change in response to the closure of pilchards when a fish kill occurs, or as a result of market changes. Management arrangements do not currently contain any management objectives or measures to ensure that the harvest of byproduct is maintained at sustainable levels. To ensure that any significant change in the harvest of byproduct is detected and appropriate management measures are put in place, DFWA should develop a management objective addressing the need to maintain precautionary harvest levels of byproduct species. Appropriate performance measures and indicators should be linked to the management objective (see **Recommendation 3**).

Conclusion

DEH considers that the management plans in the SCPMSF and WCPSMF are appropriately precautionary and provide for the fisheries to be conducted in a manner that does not lead to over-fishing. DEH considers that the information collection system and stock assessment and management arrangements generally are sufficient to ensure that the fisheries are 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'*

Stocks of pilchards in WA are still recovering from the 1995/98 mass mortality events. The mass mortality events were not a result of fishing practices in the SCPSMF or WCPSMF and management arrangements for these fisheries have demonstrated sufficient flexibility to accommodate such an event. A recovery strategy was developed which includes comprehensive monitoring of pilchard spawning biomass, age characteristics of the commercial catch and implementation of conservative TACs. Pilchard stocks appear to be recovering strongly as demonstrated through the ongoing analysis of the mean age of the commercial catch and estimates of spawning biomass. Pilchard stocks are not considered overfished.

There is greater uncertainty of the level of exploitation of stocks of scaly mackerel, however due to the limited number of operators targeting this species and through the implementation of recommendations made above for scaly mackerel, DEH do not consider stocks of scaly mackerel at risk of imminent overexploitation.

Conclusion

DEH considers that an appropriate recovery strategy has been implemented for previous mass mortality events of pilchards and that the pilchard and scaly mackerel stocks are not below a defined reference point. Should that occur in the future, DEH considered that the fisheries are conducted such that there is a high degree of probability the stock would recover to ecologically viable stock levels within nominated timeframes. DEH has made a number of recommendations which will ensure that stocks are maintained at ecologically viable levels, including the developments of management objectives and performance measures for all target and byproduct species (**Recommendation 3**) and the development of precautionary yield estimates for scaly mackerel (**Recommendation 5**).

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

There is no system in place for the collection of information on bycatch caught in the SCPSMF and WCPSMF. Fishers are not required to record discards in logbooks, and there has been no formal survey of bycatch in either fishery. Current information is restricted to anecdotal accounts and informal discussions with fishers.

Assessment

Anecdotal information suggests that the bycatch in these fisheries is small. Target and byproduct species in the SCPSMF and WCPSMF are pelagic species typically forming single species schools. DFWA notes that fishers are able to identify and target specific schools of fish with a high level of accuracy and that bycatch therefore tends to be minimal and limited to incidental catch of larger predatory fish species caught whilst feeding on the school. The discarding of fish is not currently recorded in the data collection process and therefore not included in stock assessment processes. The submission notes that although discarding is considered minimal, the discarding of fish by rolling them out of the net is considered a major offence under the current SCPSMF plan and will be considered so under the proposed WCPSMF plan, further discouraging the practice.

DEH considers that, given there is a low likelihood of significant bycatch occurring, in this instance the development and implementation of an ongoing monitoring program may not be appropriate to the scale of the fisheries. Nonetheless, DEH believes it would be prudent for DFWA to implement a program to obtain empirical evidence of low bycatch levels to provide a basis for future management. DEH expects that such a program will be replicated periodically in the future to provide adequate data for the review of management performance measures developed through **Recommendation 3** and ensure that bycatch levels remain minimal in the long term.

The program should also be sufficient to obtain baseline data on the level of interactions with protected/listed species, particularly of interactions with flesh-footed shearwaters in the SCPSMF and dolphins in both fisheries. Interactions with protected/listed species is discussed in more detail under Objective 2.

Recommendation 7. *DFWA to implement a program sufficient to obtain base-line data on abundance and composition of bycatch and level of interactions with protected/listed species.*

Management response

There are currently few measures in place to avoid the incidental catch of bycatch, nor monitor an indicator group of bycatch species. DEH considers that there is a low likelihood of significant bycatch occurring, however strongly recommends that a program to obtain base-line data on the incidence of bycatch be implemented in order to better determine the level of management responses required.

Conclusion

DEH considers that there is a high likelihood the fisheries is conducted in a manner that does not threaten bycatch species. Should this situation change, or evidence arise through the implementation of **Recommendation 7** indicating otherwise, DEH expects that DFWA would undertake appropriate actions to ensure that bycatch species are not threatened by these two fisheries.

A recommendation has been developed to ensure that the risk of unacceptable impact on bycatch species is detected and minimised in the longer term.

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

Information on levels of interactions with protected/listed species within the SCPSMF and WCPSMF is currently restricted to informal discussions with fishers. DEH notes that the current logbook system is being revised so that interactions with protected/listed species can be reported directly via catch and effort logbooks, however DFWA do not specify a clear timeline for the revised logbooks (see **Recommendation 8**).

Under the EPBC Act, reporting of interactions with listed protected/listed species is mandatory in Commonwealth waters and failure to do so is a prosecutable offence. DEH notes that one of the biggest barriers to successful commercial fishers' reporting of protected species interactions is the capacity of fishers to identify the species involved and an awareness of the importance of reporting. Both of these barriers can be reduced through education programs and opportunistic advice from observers and researchers as appropriate.

Recommendation 8. *DFWA to provide a mechanism, within 1 year, which allows fishers to record interactions with protected/listed species. DFWA to implement relevant protected species identification and handling procedures from the Manual for Setting Protocol, Wildlife Interactions and Species Identification to ensure that industry has the capacity to make these reports at an appropriate level of accuracy.*

Assessment

The risk assessment process for the ESD Report for the SCPSMF and WCPSMF rated interactions with protected/listed species to be negligible, therefore a full performance assessment was not required. Since the risk assessment workshop, it has been revealed that there are substantial interactions with seabirds, primarily flesh-footed shearwaters, in the SCPMSF. Interactions with this species may be exacerbated by fishing operations occurring during daylight hours. Flesh-footed shearwaters are a JAMBA listed species. There is reportedly a hot spot of interactions around the Albany zone during February and March, coinciding with breeding activity of the birds. Estimates of shearwater deaths are as high as six birds per day per boat during this period.

Two dolphin deaths have been reported for the SCPSMF in the last 12 months and there is significant potential for these to occur in the WCSPMF. Dolphins are vulnerable to encirclement and drowning in purse seine nets, as proven by recent events in the SA Pilchard Fishery. It is likely therefore, that future interactions with dolphins are possible in the SCPSMF and WCPSMF.

DEH notes that there is uncertainty in the level of interactions with protected/listed species due to a historic lack of reporting and absence of an independent observer program. DEH considers this uncertainty to be a considerable risk for the fisheries and have made recommendations to ensure more comprehensive data on interactions are gathered so that an informed assessment of the potential impacts on protected/listed species can be conducted (see **Recommendations 7** and **8**). DEH also considers DFWA should give priority to developing specific performance measures and indicators for interactions with protected/listed species, in particular flesh-footed shearwaters in the SCPSMF and

dolphins in both fisheries and to review the progress of the fisheries at minimising interactions annually.

Recommendation 9. *DFWA to develop specific performance measures and indicators for interactions with flesh-footed shearwaters and dolphins and to report annually on the performance of the SCPSMF and WCPSMF at minimising seabird and dolphin interactions.*

There are no listed ecological communities in the area of the fisheries.

Management response

The SCPSMF, in conjunction with SeaNet and the Western Australian Fishing Industry Council, have developed a Manual for Setting Protocol, Wildlife Interactions and Species Identification (the Manual) which outlines procedures for setting of nets and identification and handling of protected/listed species, including dolphins and seabirds. DEH notes that protocols for minimising interactions with dolphins are outlined in the Manual, including aborting net setting if dolphins are encircled or sinking a section of the net to allow the escape of encircled animals. DEH suggests that DFWA and the fishing industry monitor mitigation methods being trialled in the SA Pilchard fishery and incorporate any further measures if proven effective and appropriate. DEH commend SCPSMF in the development of the Manual and notes that it is equally applicable to the WCPSMF and should be applied within that fishery also.

Handling procedures are outlined in the Manual for the release of entangled seabirds, however the manual does not address preventative measures to avoid the entanglement of seabirds. A mitigation group has been formed to investigate methods to minimise seabird interactions with purse seining gear and the WA Conservation Council Sustainable Fisheries Liaison Office have proposed a student research project to obtain baseline data and perform preliminary research into the use of shark liver oil as a deterrent. DEH considers the development and implementation of measures to mitigate seabird interactions should be of highest priority for DFWA and the SCPSMF.

Recommendation 10. *Within 1 year, DFWA to trial mitigation mechanisms to minimise protected/listed species interactions, particularly with flesh-footed shearwaters in the SCPSMF. Mitigation measures considered should include spatial and temporal closures, effective deterrents and/or appropriate net setting and handling protocols, and be implemented within six months of being demonstrated effective.*

Conclusion

DEH notes that there are currently some interactions with protected/listed species in the SCPSMF and potentially interactions in the WCPSMF and that DFWA, in conjunction with other stakeholders in the fisheries, have taken steps to mitigate these interactions. DEH has provided recommendations to further facilitate the mitigation of such interactions and considers that the fisheries can be 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. DEH expects that appropriate actions will be undertaken to ensure the fisheries avoid mortality or injury to these species and avoids or minimises impacts on threatened ecological communities.

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

No information on ecosystem impacts of the SCPSMF and WCPSMF is routinely collected, however there are a number of papers available that provide valuable information on trophic interactions in southern and western Australian waters (e. g. FRDC project 1998/203 on identification and conservation of food fish for Abrolhos seabirds).

DEH is concerned at the lack of information collection and research covering the fisheries impact on the ecosystem and environment generally. However, DEH understands that this lack of information is the case across a range of Australian and International fisheries and until appropriate research techniques and programs are developed and implemented this will continue to be the case. DEH strongly supports research in this area.

Assessment

Small pelagic fish are recognised as occupying a pivotal position in the marine food web and therefore their removal may have broader ecosystem implications. A risk assessment of potential impacts of the SCPSMF and WCPSMF on the wider ecosystem was conducted as part of the ESD process for the fisheries. Several components were identified as low risk including the effect of removing pelagic bait fish on seabirds, other finfish and marine mammals. In addition, the practice of discarding fish, translocating marine organisms and net contact with seagrass beds were also identified as low risk. No components were identified as high risk in the ESD Report.

The removal of pelagic bait species from the food chain was considered low risk because catches of pilchards are restricted to a maximum of 10 % of the estimated biomass, therefore retaining at least 90 % of the pilchard biomass for marine predators. A study to determine the reliance on finfish for food for breeding colonies of seabirds on the Abrolhos Islands was commenced in 1998 (FRDC project 98/203). The study determined that scaly mackerel contributed a substantial component of the diet of a number of seabird species and therefore management arrangements of this species should take seabird conservation into account. DEH encourages DFWA to consider this aspect when determining precautionary yield estimates for scaly mackerel (see **Recommendation 5**). The practice of discarding fish in the SCPSMF and WCPSMF is considered minimal as fishers are able to target desirable fish with a high degree of accuracy.

The potential risk of translocating non-native organisms through ballast water or on the hulls of boats was considered minimal due to the strong natural connection of species along the WA coast as a result of the Leeuwin Current. Therefore, the SCPSMF and WCPSMF were not considered as significant contributors to the likelihood of organism transferral. Purse seine nets may occasionally come into contact with seagrass beds when fishers follow schools of fish into shallower waters. No specific studies have evaluated the impact of net contact on seagrass beds, however due to the light construction of purse seine nets, damage to seagrass beds is expected to be minimal.

Management response

The principle management response to minimising the impact of the SCPSMF and WCPSMF on the wider ecosystem is to restrict the TAC of small pelagic species to 10 % of estimated biomass, therefore retaining at least 90 % of the biomass for marine predators. For pilchard stocks, the TAC is calculated

via the decision matrix annually and is supported by a relatively solid mixture of fishery dependent and independent data. For scaly mackerel and byproduct species, estimates of stock biomass are not available. The submission indicates that for the WCPSMF, a total carrying capacity of small pelagic species is estimated to be 30,000 t, therefore total catches of small pelagic species is restricted to 3,000 t (i. e. 10 % of 30,000 t). Except for pilchards, there is considerable uncertainty of the relative abundance of individual species at any particular time. There is an independent nominal TAC of scaly mackerel of 2,700 t for the Northern DZ of the WCPSMF, implemented in 1995, which aims to address concerns over the effect of the fishery on breeding colonies of seabirds on the Abrolhos Islands. The TAC has not been breached since its inception.

The potential of impact of the SCPSMF on the broader environment through pollution is addressed through the development of a Code of Practice for the fishery. The Code of Practice details the key elements of MARPOL and provides methods of complying with the regulations. The Code of Practice is equally applicable for the WCPSMF and DEH expects DFWA to encourage the WCPSMF to adopt the code without delay.

DEH has made a number of recommendations which will facilitate minimising the potential affect of the SCPSMF and WCPSMF on the wider ecosystem. These include the development of specific objectives and performance measures for the sustainable harvest of all retained species and potential impacts on protected/listed species and wider environment (**Recommendation 3** and **9**), establishing precautionary harvest limits and monitoring the commercial catch of scaly mackerel (**Recommendation 5**) and minimising the impact on protected/listed species through enhanced monitoring and mitigation measures (**Recommendation 7**, **8** and **10**).

The National Oceans Office is currently leading a regional marine planning process in the area of the fisheries. The planning process aims to ensure the ecologically sustainable use of resources in the planning area and will help to integrate management across jurisdictions and sectors. It will also identify potential candidate areas for the National Representative System of Marine Protected Areas. The regional marine planning process is a potential vehicle for pursuing sustainable fisheries objectives, particularly where cross sectoral or cross jurisdictional approaches are required. DFWA should continue to engage in the process as far as practical. More information is available at www.oceans.gov.au.

Conclusion

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

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LIST OF ACRONYMS

AFZ	Australian Fishing Zone
DEH	Department of the Environment and Heritage
DFWA	Department of Fisheries, Western Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
DZ	Development Zone
ESD	Ecologically Sustainable Development
FBL	Fishing Boat License
FRDC	Fisheries Research and Development Corporation
FRMA	Fish Resources Management Act 1994
ITQ	Individual Transferable Quota
JAMBA	Japan and Australia Migratory Bird Agreement
MARPOL	International Convention for the Prevention of Pollution from Ships
OCS	Offshore Constitutional Settlement
PSMAC	Purse Seine Management Advisory Committee
SA	South Australia
SCPSMF	South Coast Purse Seine Managed Fishery
TAC	Total Allowable Catch
UNCLOS	United Nations Convention of the Law of the Sea
VMS	Vessel Monitoring System
WA	Western Australia
WCPSMF	West Coast Purse Seine Managed Fishery
WTO	Wildlife Trade Operation